DRAINAGE LETTER
FOR
ARBY'S – SOUTH ACADEMY

CITY OF FOUNTAIN, COLORADO

Prepared for:

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JN: 011098-01-001
June 2022

Signature Page
Arby's – South Academy

Engineer's Certification Statement

This report and plan for the drainage design of Arby's – South Academy was prepared by me (or under my direct supervision) in accordance with the City of Colorado Springs/El Paso County Drainage Criteria and with full spectrum detention per Urban Drainage and Flood Control District, now Mile High District Criteria, and is in conformity with the master plan of the drainage basin. I understand that the City of Fountain does not and will not assume liability for drainage facilities designed by others.

Developer's Statement

Arby's hereby certifies that the drainage facilities for Arby's shall be constructed according to the design presented in this report. I understand that the City of Fountain does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Fountain; and cannot, on behalf of Arby's – South Academy, guarantee that final drainage design review will absolve Arby's and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

_____
Name of Developer

_____
Authorized Signature Date

_____
Printed Name

_____
Title

_____
Address

City of Fountain:

_____ _____
For City Engineer Date
Conditions:

The purpose of this letter is to demonstrate that the proposed development, Arby's – South Academy (the 'site') conforms to the requirements of the "Preliminary and Final Drainage Report for Lots 1-4 South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022. Proposed work includes the construction of a 2,530 SF

restaurant w/drive thru, screened refuse enclosure, concrete pavement, curb & gutter, concrete sidewalk, storm drains, and utilities including sanitary sewer, waterline, electric service, and natural gas.

Existing Conditions
The Arby's – South Academy site is a 0.89 ac. vacant lot in Lot 2 of South Academy Highlands Filing No. 4. The property to the North is Lot 1 of South Academy Highlands Filing No. 4 which contains a vacant lot. The property to the South comprises Lots 3 and 4 of South Academy Highlands Filing No. 4 and is currently vacant and vegetated. The site is in Lot 2, a portion of Section 4, Township 15 South, Range 66 West of the Sixth P.M., City of Fountain, El Paso County, State of Colorado.

The subject site is located within the Fishers Canyon Drainage Basin, as described in the "Preliminary and Final Drainage Report for South Academy Highlands Filing No. 4" prepared by Classic Consulting Engineers & Surveyors revised January 2022. There is an existing private Extended Detention Basin that will connect to an existing 30" RCP stub that has been provided at the intersection of Wal-Mart Heights and Venetucci Blvd.

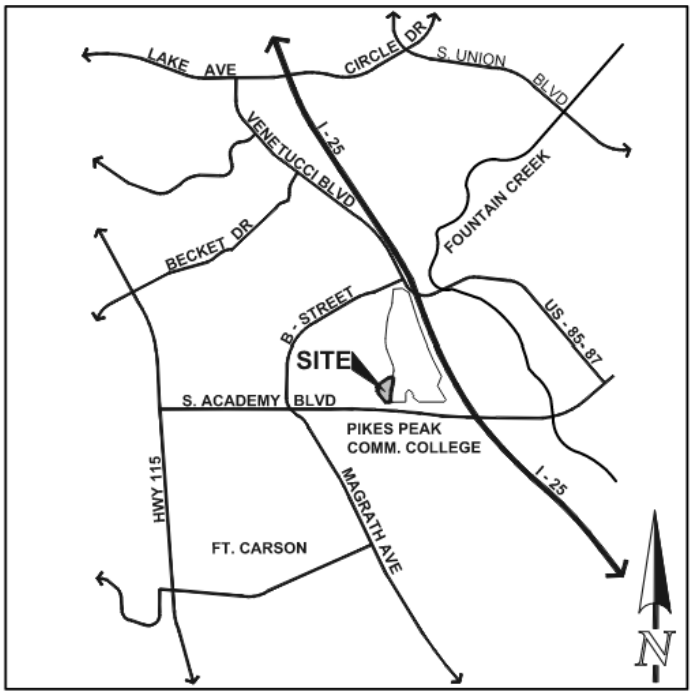

Figure 1-1
Vicinity Map

Drainage Conditions for Lots 1 – 4

Per "Preliminary and Final Drainage Report for Lots 1-4 South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022:

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 Report 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, Q5 = 4.0 cfs, Q100= 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 Report 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, Q5 = 6.9 cfs, Q100= 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 Report 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, Q5 = 3.6 cfs, Q100= 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, Q5 = 10.2 cfs, Q100= 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 (Private 30" RCP, Q_5 = 10.6 cfs, Q_{100} = 20.7 cfs) conveys the combines 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 Report 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 Pipe 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 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 with 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.

Proposed Drainage Basins
Basin A5.1 (0.10 Ac., C_5=0.36, C_{100}=0.79)
Basin A5.1 is located on the East of Lot 2 (Basin F) and is composed of asphalt pavement, curb and landscaping area. Runoff from this basin flows north to a proposed inlet (A.7-DI) located on the north end of A5.1 in the proposed drive aisle. Runoff entering the inlet conveys through a system of 18" HDPE storm sewer system prior to discharging into the master South Academy drainage system at Design Point 6.

Basin A5.2 (0.03 Ac., C_5=0.06, C_{100}=0.16)
Basin A5.2 is located on the southeast of Lot 2 (Basin F) and is composed of asphalt pavement, curb and landscaping area. Runoff from this basin flows north to a proposed inlet (A.6-DI) located on the north end of A5.2 in the proposed drive aisle. Runoff entering the inlet conveys through a system of 18" HDPE storm sewer system prior to discharging into the master South Academy drainage system at Design Point 6.

Basin A5.3 (0.04 Ac., C_5=0.06, C_{100}=0.16)
Basin A5.3 is located on the south of Lot 2 (Basin F, 0.65 Ac.) and is composed of asphalt pavement, curb and landscaping area. Runoff from this basin flows north to a proposed inlet (A.5-DI) located on the north end of A5.3 in the proposed drive aisle. Runoff entering the inlet conveys through a system of 18" HDPE storm sewer system prior to discharging into the master South Academy drainage system at Design Point 6.

Basin A5.4 (0.19 Ac., C_5=0.59, C_{100}=1.36)
Basin A5.4 is located centrally on Lot 2 (Basin F, 0.65 Ac.) and is composed of asphalt pavement, sidewalk, curb and landscaping area. Runoff from this basin flows to a proposed inlet (A.3-DI) located on the north end of A5.3 in the proposed drive aisle. Runoff entering the inlet conveys through a system of 18" HDPE storm sewer system prior to discharging into the master South Academy drainage system at Design Point 6.

Basin A5.5 (0.33 Ac., C_5=0.79, C_{100}=1.87)
Basin A5.5 is located on the west of Lot 2 (Basin F, 0.65 Ac.) and is composed of asphalt and concrete pavement, sidewalk, curb and landscaping area. Additionally, the proposed buildings roof leader connects into manhole A.4-MH within this basin. Runoff from this basin flows to a 10' Type-R inlet proposed as part of the master development located on the northwest property boundary of Lot 2. Runoff entering the inlet conveys through a system of 18" HDPE storm sewer system prior to discharging into the master South Academy drainage system at Design Point 6

Basin UD5 (0.20 Ac., C_5=0.26, C_{100}=0.75)
Basin UD5 is located is located on the East, North and Northwest sides of Lot 2 (Basin F, 0.65 Ac.), and is composed of proposed landscaping, curb, and asphalt pavement graded to match existing drainage patterns. Runoff from this basin flows, north into Lot 1 (Basin C, 0.94 Ac.) and west into the master developments drive aisle (Basin E, 0.20 Ac.).

Proposed Conditions
In the report prepared by Classic Consulting Engineers & Surveyors, the site is located within Basin F. Stormwater detention for Basin F is performed in the existing South Academy Highlands storm system which discharges into an existing downstream Private Detention and Storm Water Quality Facility "T", prior to releasing to the existing downstream Fishers Canyon Channel. Water quality and detention will be provided in this existing facility "T", which is a full spectrum detention, extended detention basin (EDB) storm water quality facility. The proposed Stormwater runoff will be conveyed to the EDB via a 30" RCP storm pipe that extends form South Academy Highlands Filing No. 1 along the east side of Lot 1.

Per the Classic Consulting Engineers & Surveyors Report, the EDB was designed to account for future commercial development in basin F and provide the required water quality capture volume in accordance with the City of Colorado Springs/El Paso County Drainage Criteria and with full spectrum detention per Urban Drainage and Flood Control District, now Mile High District Criteria.

The drainage map developed by Classic Consulting Engineers & Surveyors for the overall development can be found in Appendix C.

Appendices

APPENDIX A – FEMA Map

APPENDIX B – Calculations from "South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022

APPENDIX C – Drainage Area Maps from "South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022

APPENDIX D – Proposed Drainage Map

APPENDIX E – Proposed Routing Calculations

APPENDIX A – FEMA Map

National Flood Hazard Layer FIRMette

FEMA

104°47'25"W 38°46'18"N

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

1:6,000

104°46'48"W 38°45'50"N

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

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 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 7/19/2022 at 9:43 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.

APPENDIX B – Calculations from "South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022

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

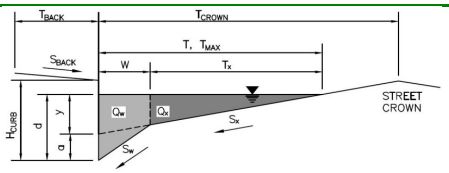
Version 4.05 Released March 2017

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: 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

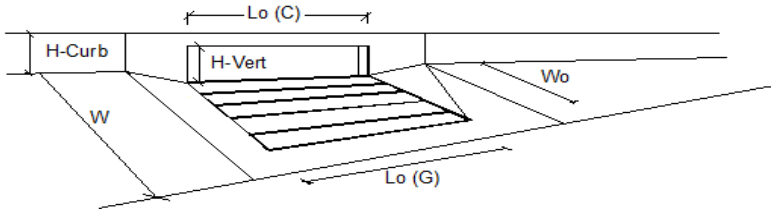
	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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

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 =**	**0.7**	**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**	**%**

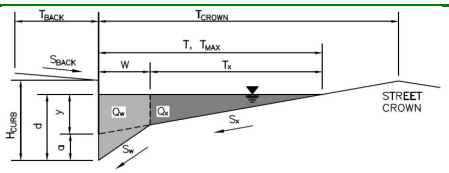
Version 4.05 Released March 2017

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

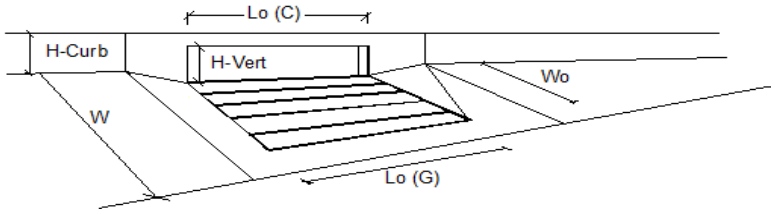
	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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**	**%**

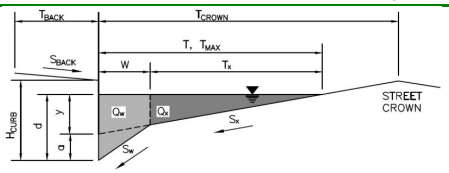
Version 4.05 Released March 2017

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

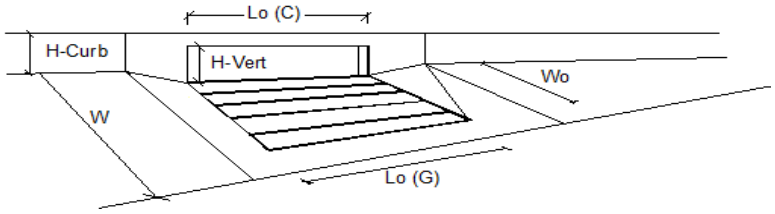
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**12.3**	**76.2**	**cfs**

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**	**%**

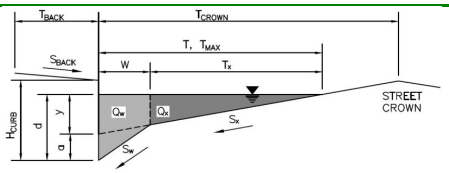
Version 4.05 Released March 2017

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

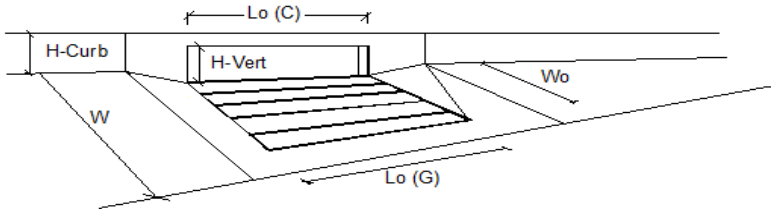
	Minor Storm	Major Storm	
Q_{allow} =	**12.3**	**76.2**	**cfs**

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**	**%**

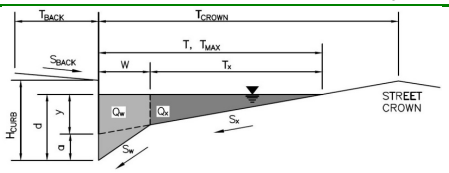
Version 4.05 Released March 2017

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

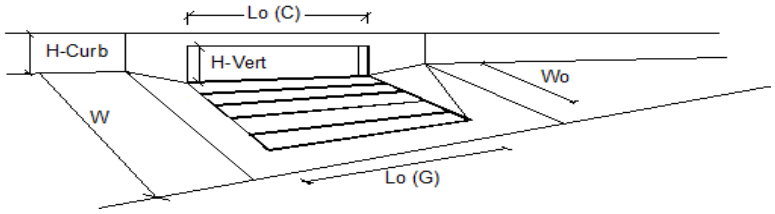
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**19.2**	**72.1**	**cfs**

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:															

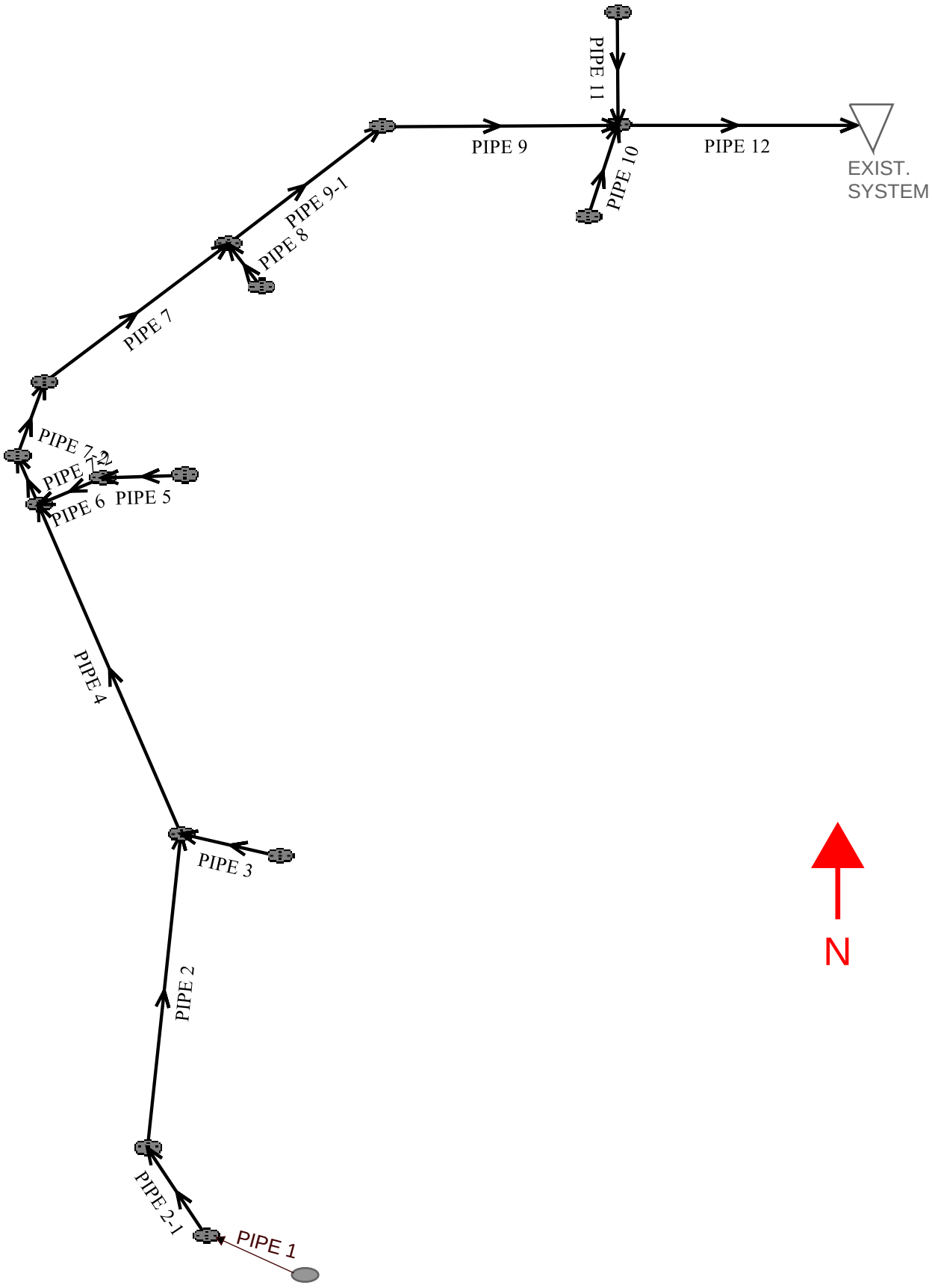
Total Site Imperviousness:	**88.1%**
Total Site Effective Imperviousness for WQCV Event:	**88.1%**
Total Site Effective Imperviousness for 5-Year Event:	**88.1%**
Total Site Effective Imperviousness for 100-Year Event:	**88.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

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
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EXIST.
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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

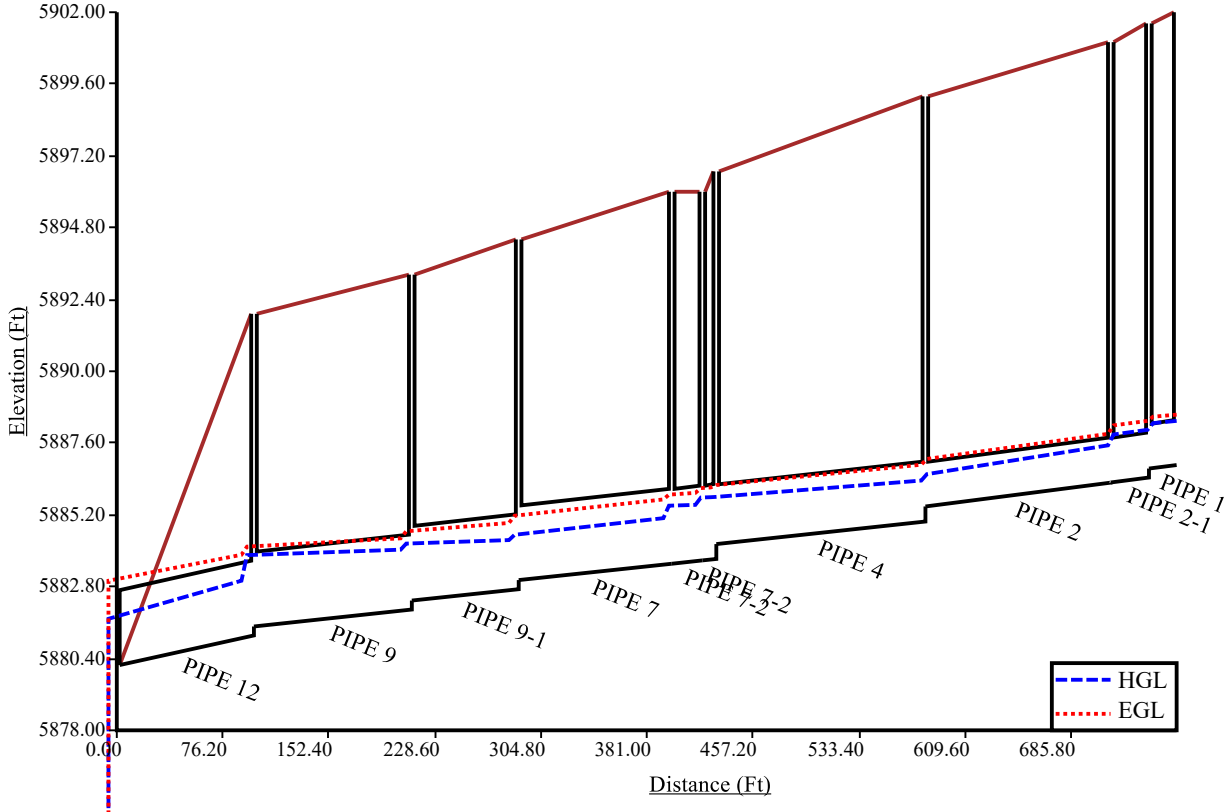
					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
PIPE 12	98.50	3.50	6.00	6.08	0.00	0.79	0.00	20.00	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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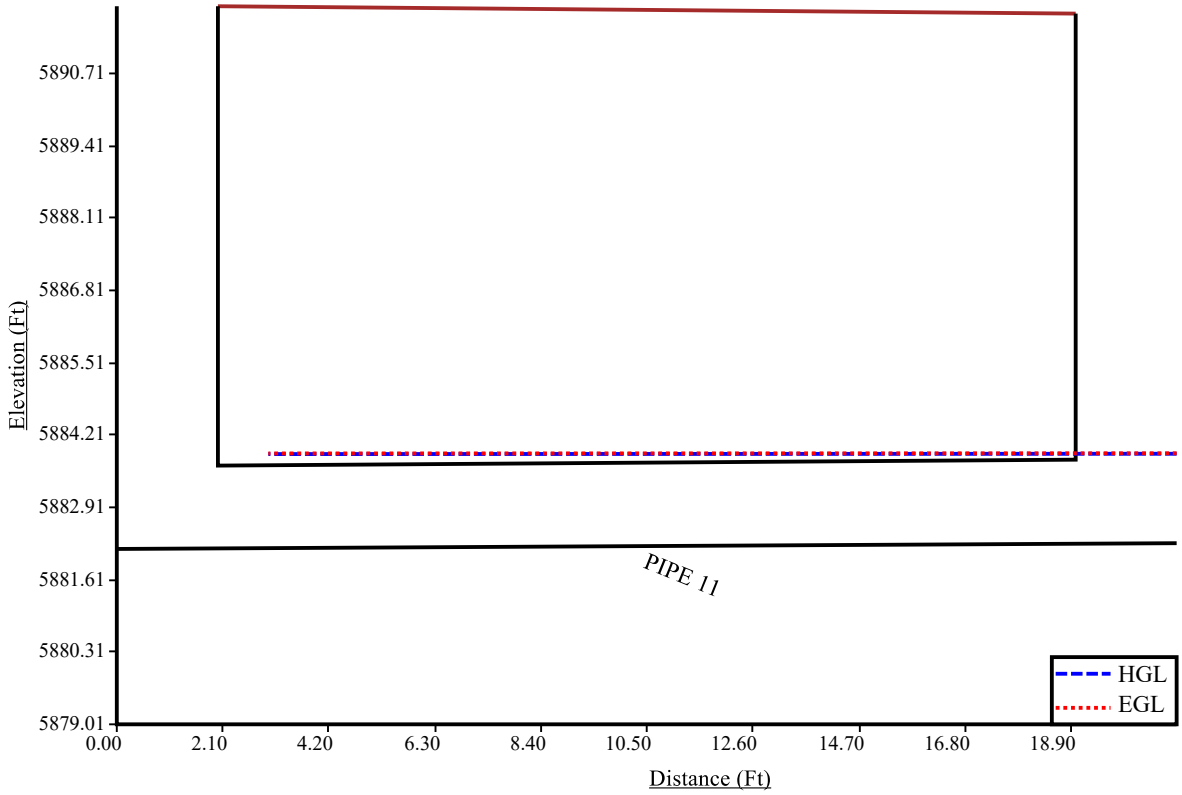
LAT B-1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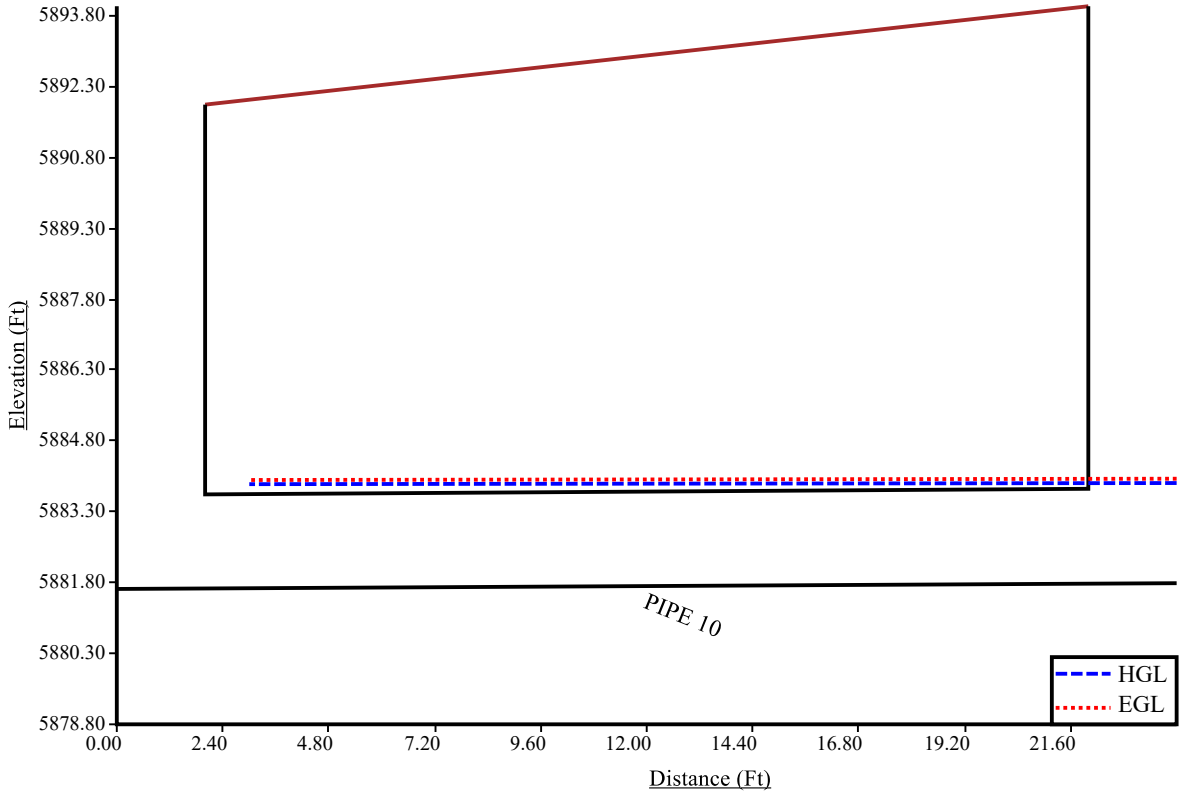
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Elevation (Ft)
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HGL
EGL
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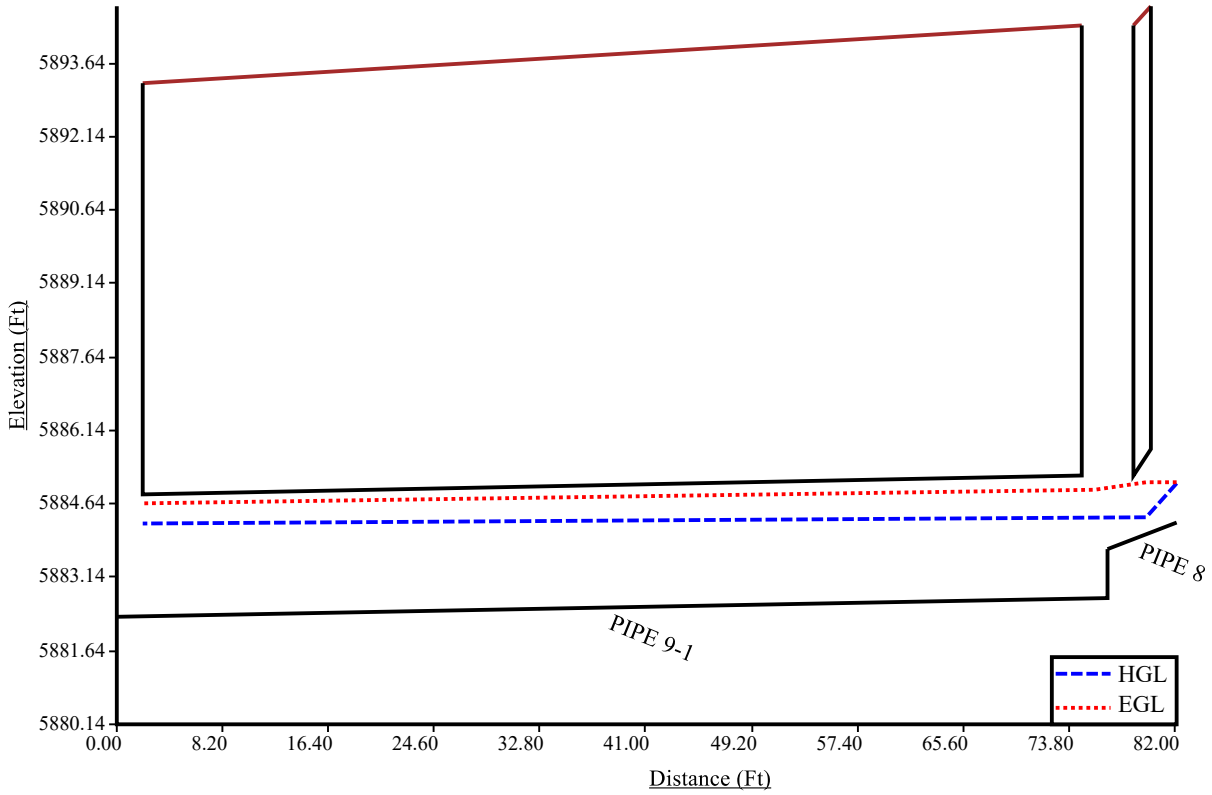
Distance (Ft)

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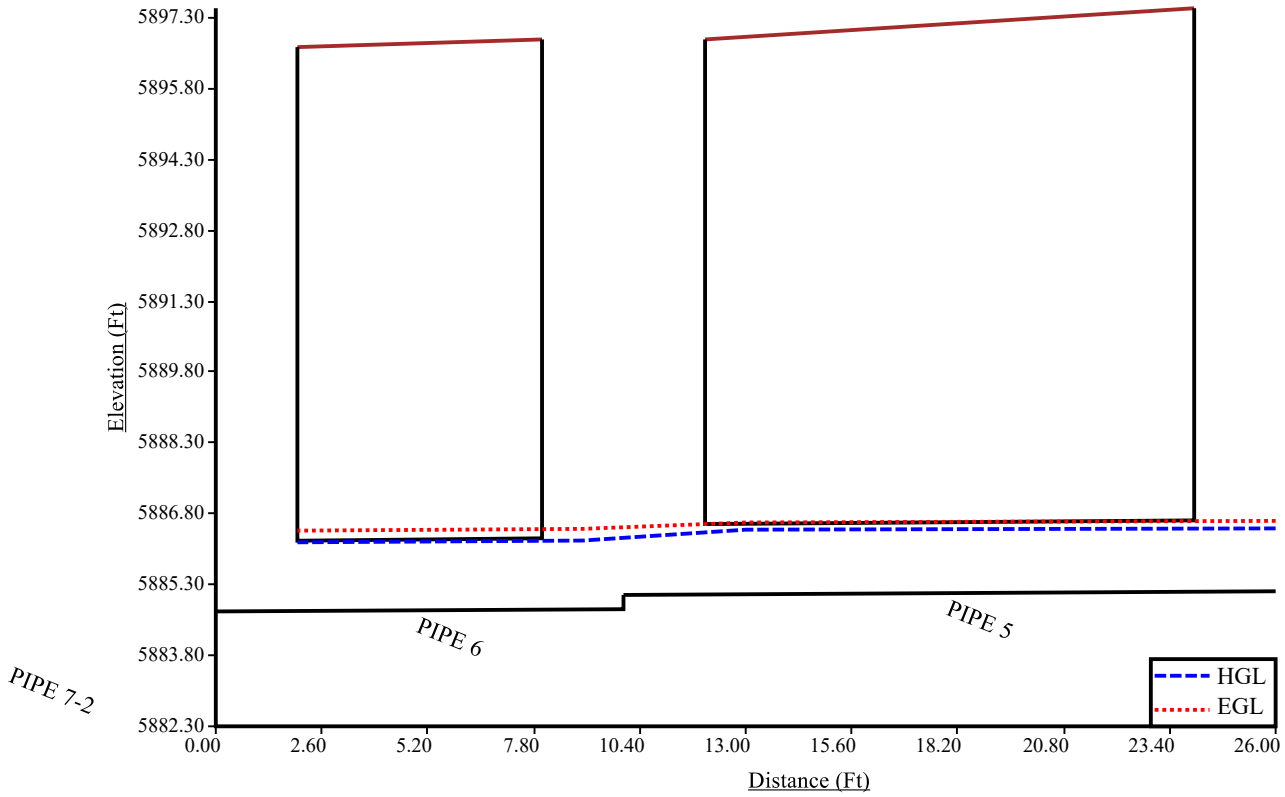
LAT D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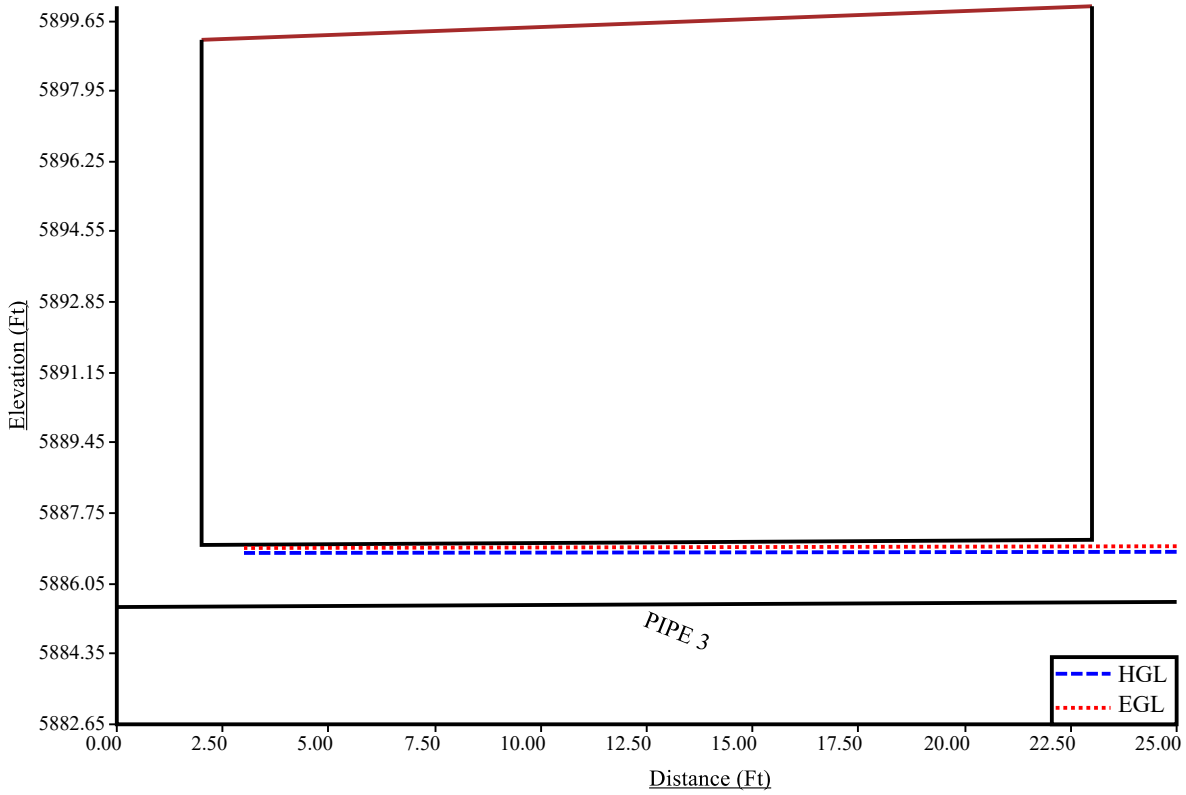
LAT E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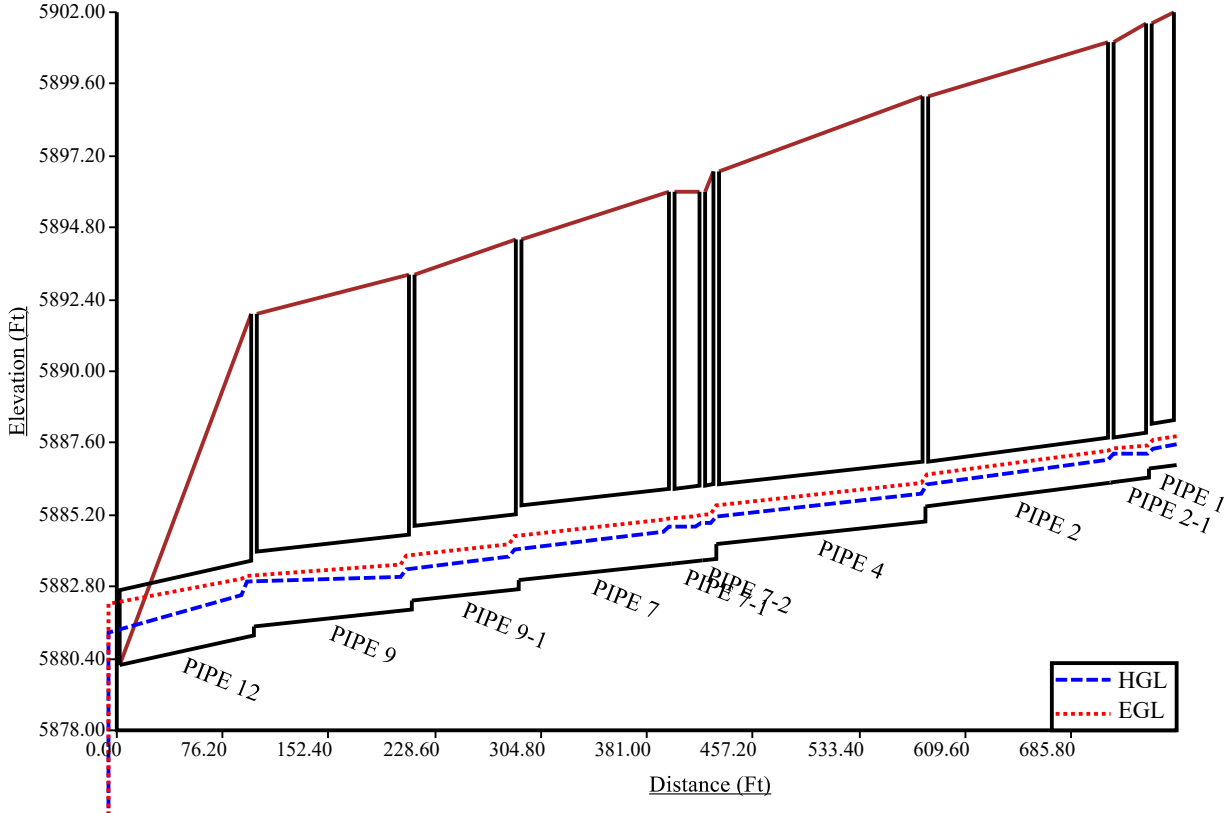
Elevation (Ft)
PIPE 3
HGL
EGL
0.00
2.50
5.00
7.50
10.00
12.50
15.00
17.50
20.00
22.50
25.00
Distance (Ft)

MAIN-5YR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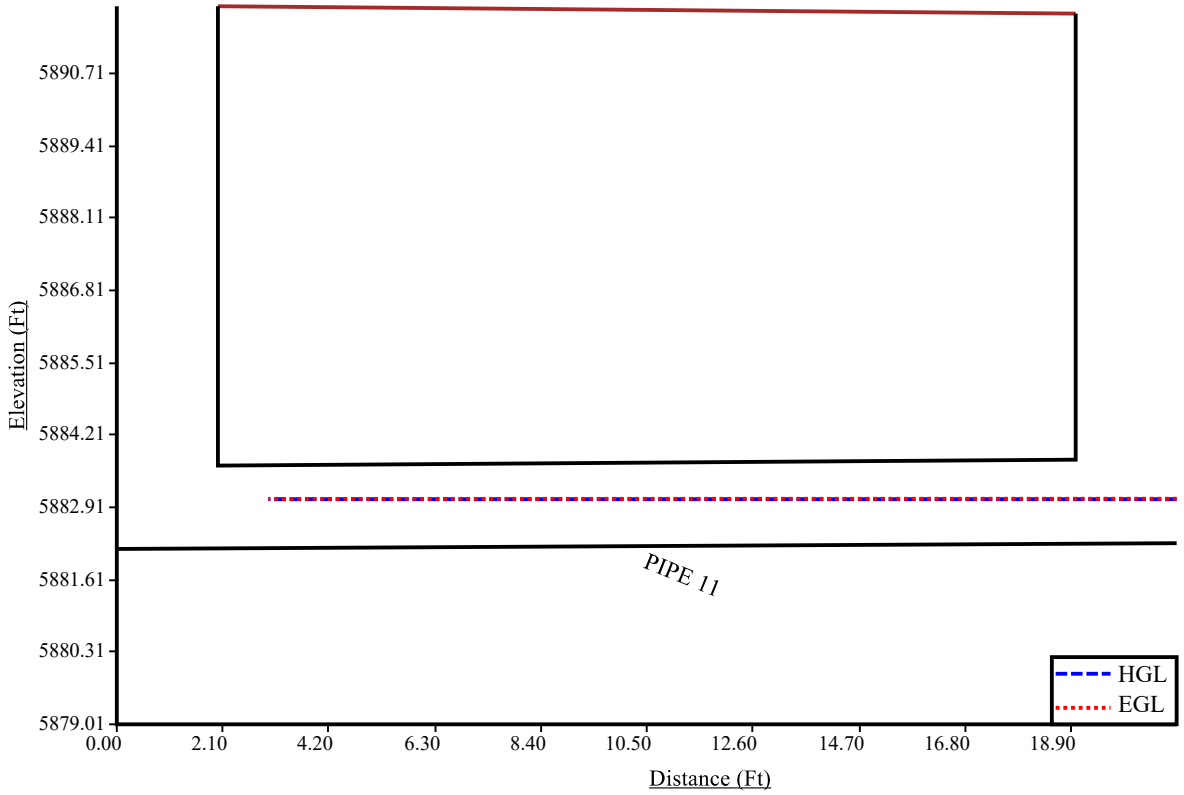
5899.60
5897.20
5894.80
5892.40
5890.00
5887.60
5885.20
5882.80
5880.40
5878.00
Elevation (Ft)
0.00
76.20
152.40
228.60
304.80
381.00
457.20
533.40
609.60
685.80
Distance (Ft)
PIPE 12
PIPE 9
PIPE 9-1
PIPE 7
PIPE 7-1
PIPE 7-2
PIPE 4
PIPE 2
PIPE 2-1
PIPE 1
HGL
EGL

B-1-5YR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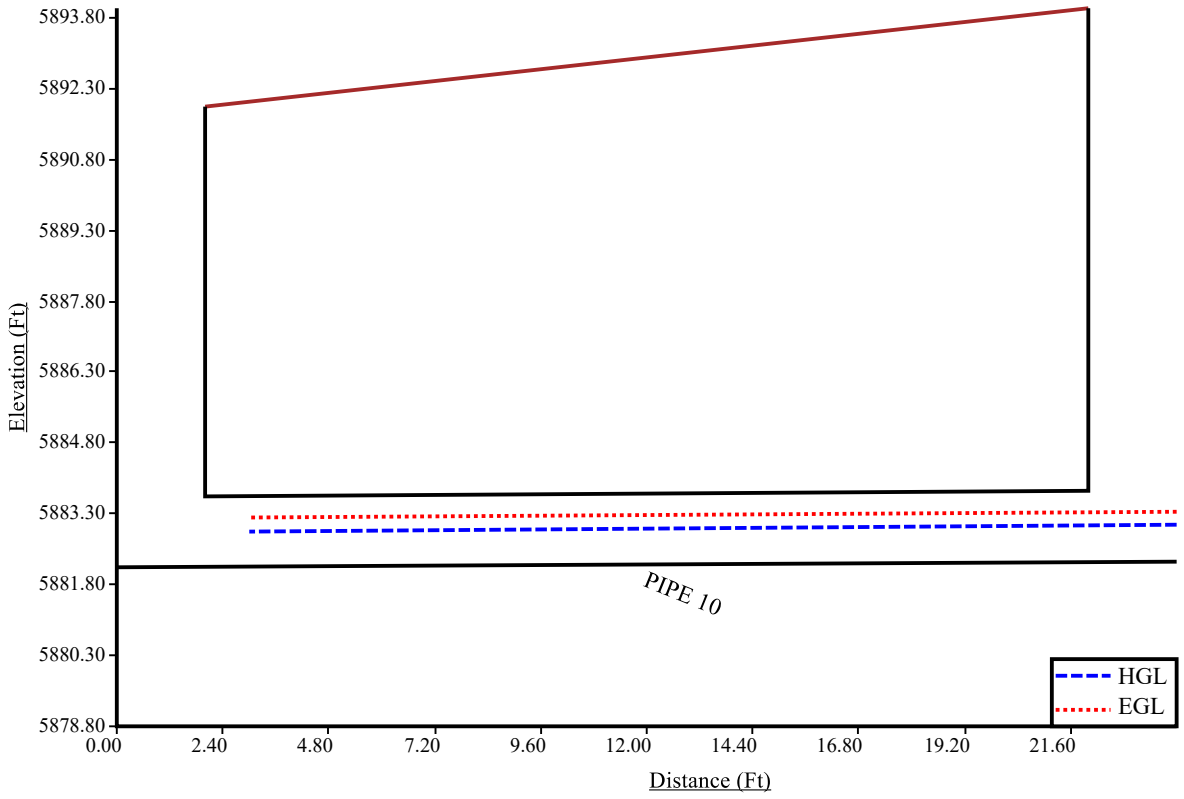
5889.41
5888.11
5886.81
5885.51
5884.21
5882.91
5881.61
5880.31
5879.01
Elevation (Ft)
PIPE 11
HGL
EGL
0.00
2.10
4.20
6.30
8.40
10.50
12.60
14.70
16.80
18.90
Distance (Ft)

B-2-5YR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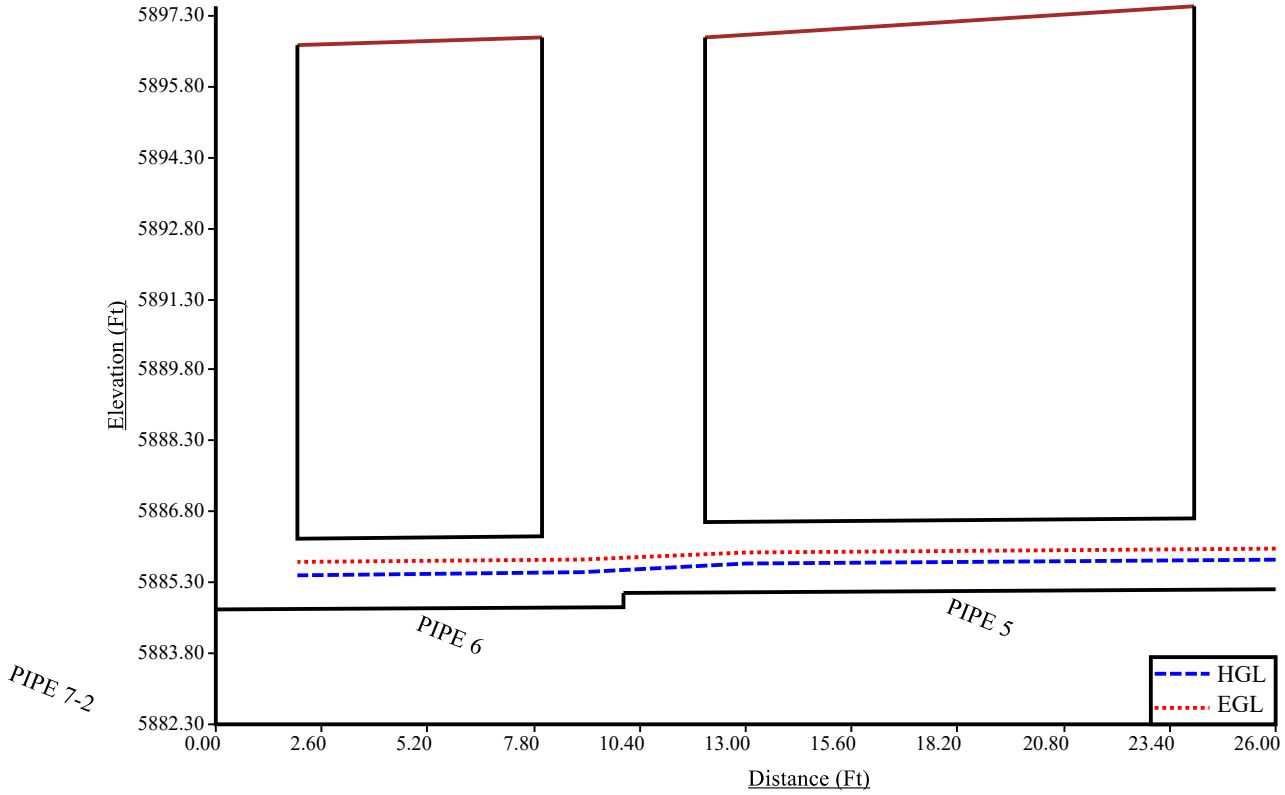
5892.30
5890.80
5889.30
5887.80
5886.30
5884.80
5883.30
5881.80
5880.30
5878.80
Elevation (Ft)
PIPE 10
HGL
EGL
0.00
2.40
4.80
7.20
9.60
12.00
14.40
16.80
19.20
21.60
Distance (Ft)

D-5YR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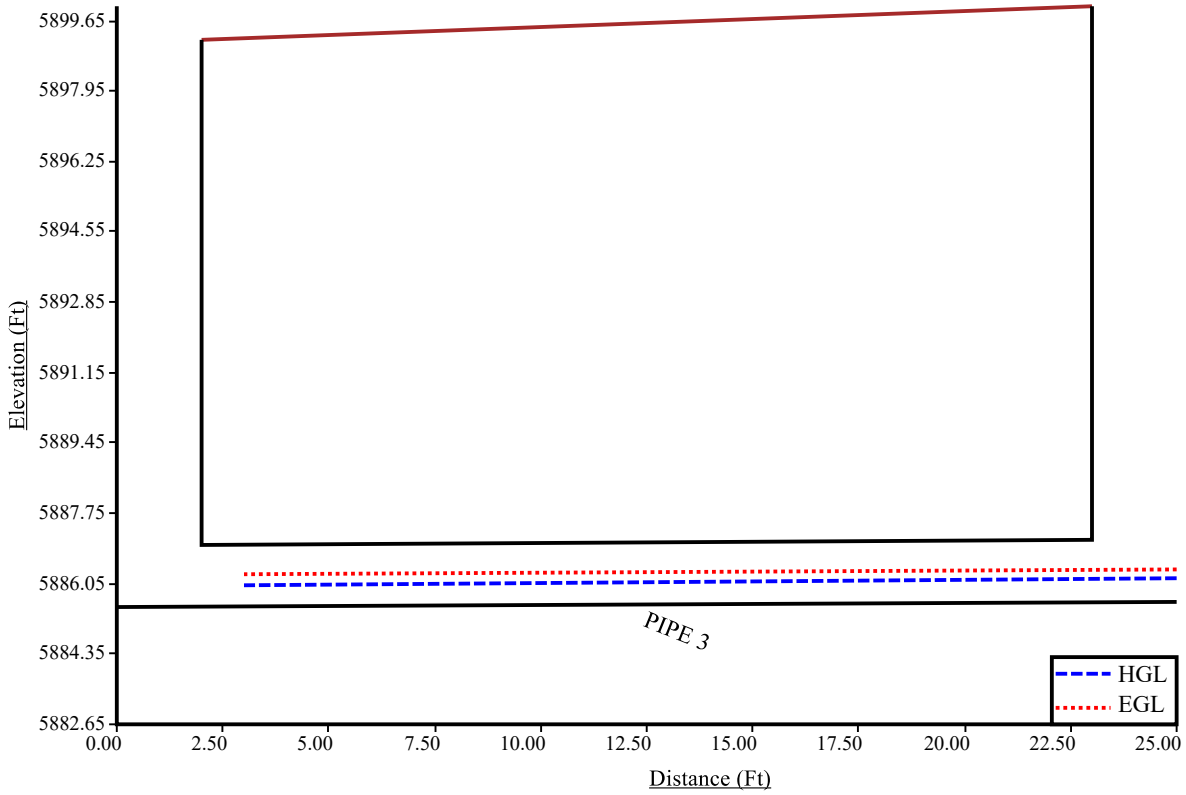
5894.30
5892.80
5891.30
5889.80
5888.30
5886.80
5885.30
5883.80
5882.30
Elevation (Ft)
0.00
2.60
5.20
7.80
10.40
13.00
15.60
18.20
20.80
23.40
26.00
Distance (Ft)
PIPE 7-2
PIPE 6
PIPE 5
HGL
EGL

E-5YR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5897.95
5896.25
5894.55
5892.85
5891.15
5889.45
5887.75
5886.05
5884.35
5882.65
Elevation (Ft)
0.00
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

APPENDIX C – Drainage Area Maps from "South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022

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

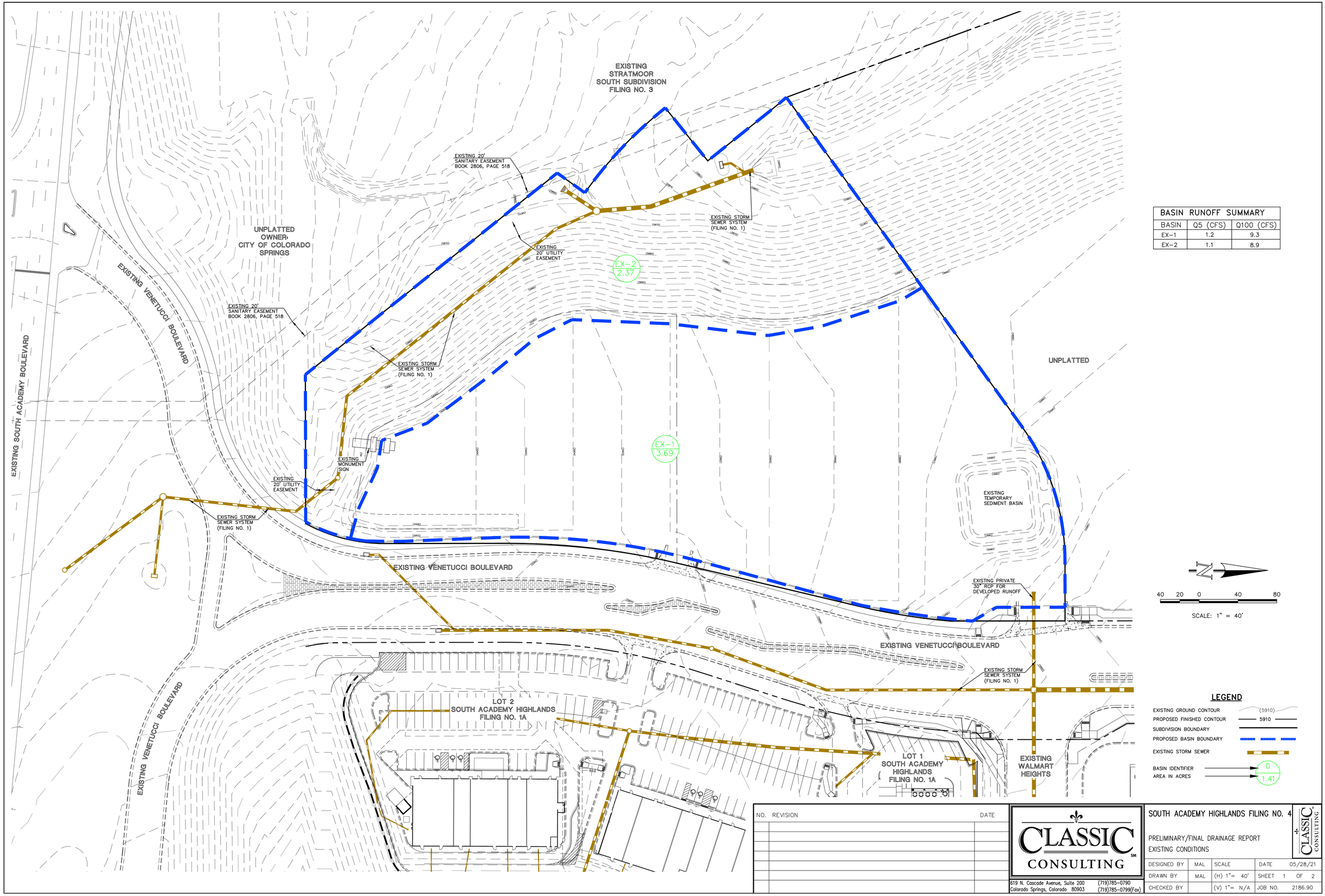
BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
A	6.7	16.8
B	4.3	11.6
C	5.7	15.2
D	7.8	20.8
E	40.7	76.6
F	30.7	57.7
G	11.0	27.5
H	31.2	58.8
I	4.1	10.8
J	5.4	14.4
K	2.9	7.8
L	7.9	21.1
M	5.9	15.6
N	8.6	22.9
P	5.3	14.1
Q	5.4	14.3
R-1	5.6	12.4
R-2	2.0	3.8
R-3	5.7	10.6

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)

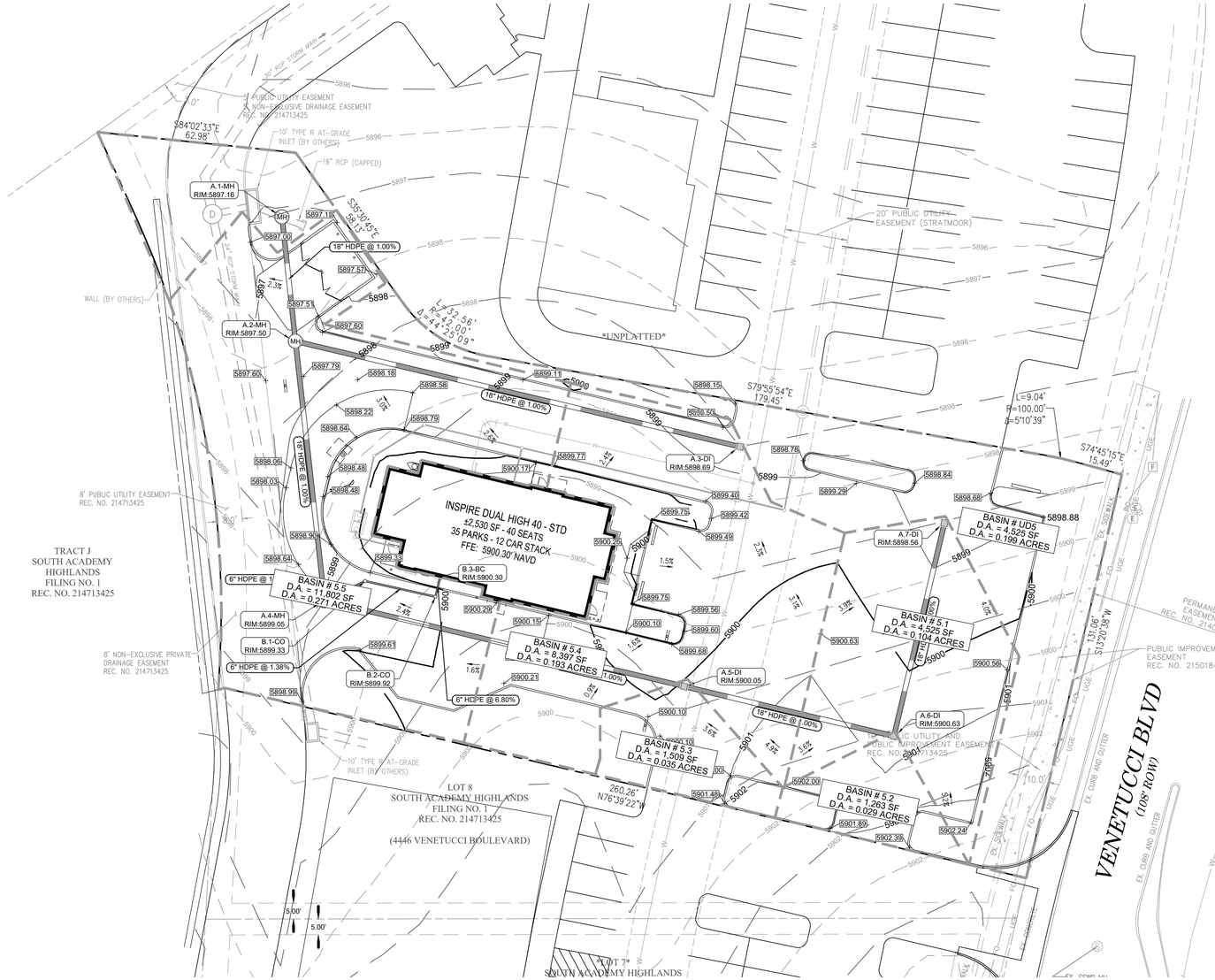
SOUTH ACADEMY HIGHLANDS FILING NO. 4

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

APPENDIX D – Proposed Drainage Map



GENERAL GRADING NOTES

1. ALL ELEVATIONS ARE BASED ON NAVD88.
2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF ALL EXISTING UTILITIES (ABOVE AND BELOW GROUND) AS SHOWN ON THESE PLANS ARE APPROXIMATE AND WERE LOCATED BASED ON EITHER VISUAL OBSERVATIONS AT THE SITE, EXISTING SURVEYS, AND/OR FROM UTILITY OWNERS. THE OWNER DOES NOT GUARANTEE THAT EXISTING UTILITY LOCATIONS ARE EXACT. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXACT LOCATIONS OF EXISTING UTILITIES(ABOVE AND BELOW GROUND) BEFORE BEGINNING ANY CONSTRUCTION. THE CONTRACTOR SHALL CALL APPROPRIATE UTILITY COMPANIES AND THE UTILITIES PROTECTION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY OWNER AND/OR ENGINEER OF ANY UTILITY CONFLICTS WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
3. ALL CUT OR FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
4. EXISTING DRAINAGE STRUCTURES TO BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILTS AND DEBRIS.
5. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.
6. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDING AND FOR ALL NATURAL AND PAVED AREAS. SLOPES IN GRASS AREAS SHALL BE GRADED AT A 1.0% MIN.

ALL SPOT ELEVATIONS REPRESENT GUTTER GRADE UNLESS OTHERWISE NOTED

GRADING & DRAINAGE LEGEND

- PROPOSED GRADE MAJOR CONTOUR LINE
- PROPOSED GRADE MINOR CONTOUR LINE
- EXISTING GRADE MAJOR CONTOUR LINE
- EXISTING GRADE MINOR CONTOUR LINE
- PROPOSED STORM PIPE
- RIDGE LINE
- FLOW LINE

STORMWATER STRUCTURE TABLE

STRUCTURE ID	STRUCTURE TYPE	RIM ELEV.	PIPE INVERTS	PIPE INFORMATION
A.1-MH	MANHOLE	RIM = 5897.16	IN (S) = 5889.83	40 LF, 18" HDPE @ 1.00%
A.2-MH	MANHOLE	RIM = 5897.50	IN (S) = 5890.33 OUT (N) = 5890.23 IN (E) = 5892.68	83 LF, 18" HDPE @ 1.00% 40 LF, 18" HDPE @ 1.00% 144 LF, 18" HDPE @ 1.00%
A.3-DI	DROP INLET	RIM = 5898.69	OUT (W) = 5894.13	144 LF, 18" HDPE @ 1.00%
A.4-MH	MANHOLE	RIM = 5899.05	IN (E) = 5891.25 OUT (N) = 5891.15 IN (NE) = 5895.51	117 LF, 18" HDPE @ 1.00% 83 LF, 18" HDPE @ 1.00% 14 LF, 6" HDPE @ 1.29%
A.5-DI	DROP INLET	RIM = 5900.05	IN (E) = 5892.52 OUT (W) = 5892.42	68 LF, 18" HDPE @ 1.00% 117 LF, 18" HDPE @ 1.00%
A.6-DI	DROP INLET	RIM = 5900.63	IN (N) = 5893.30 OUT (W) = 5893.20	69 LF, 18" HDPE @ 1.00% 68 LF, 18" HDPE @ 1.00%
A.7-DI	DROP INLET	RIM = 5898.56	OUT (S) = 5894.00	69 LF, 18" HDPE @ 1.00%
B.1-CO	CLEAN OUT	RIM = 5899.33	IN (E) = 5895.80 OUT (SW) = 5895.70	23 LF, 6" HDPE @ 1.38% 14 LF, 6" HDPE @ 1.29%
B.2-CO	CLEAN OUT	RIM = 5899.92	IN (N) = 5896.21 OUT (W) = 5896.11	6 LF, 6" HDPE @ 6.80% 23 LF, 6" HDPE @ 1.38%
B.3-BC	BUILDING CONNECTION	RIM = 5900.30	OUT (S) = 5896.64	6 LF, 6" HDPE @ 6.80%

Bowman
Certificate of Authorization License No. 30462
Bowman Consulting Group Ltd
13450 W. Sunrise Blvd., Suite 320
Sunrise, FL 33323
www.bowman.com
Phone: (954) 314-8480

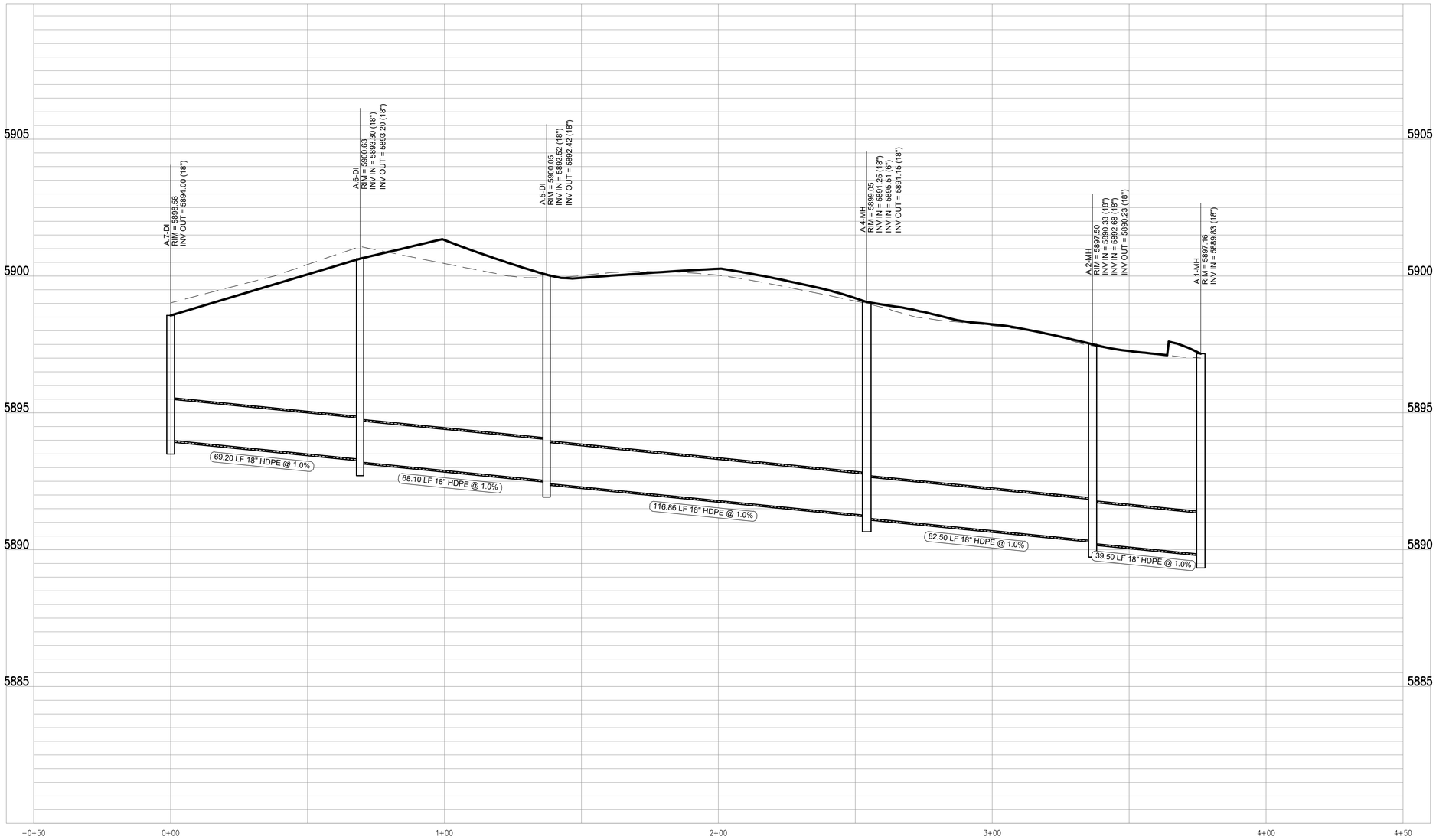
NO.	REVISION DESCRIPTION	DATE

GRADING AND DRAINAGE PLAN
ARBY'S
4446 VENETUCCI BOULEVARD
EL PASO COUNTY FOUNTAIN, COLORADO

EL DESIGN	DC DRAWN	BP CHKD
SCALE:	1" = 20'	
JOB No.:	011098-01-001	
DATE:	07/19/2022	

SHEET CG-101

STORMWATER STRUCTURE TABLE				
STRUCTURE ID	STRUCTURE TYPE	RIM ELEV.	PIPE INVERTS	PIPE INFORMATION
A.1-MH	MANHOLE	RIM = 5897.16	IN (S) = 5889.83	40 LF, 18" HDPE @ 1.00%
A.2-MH	MANHOLE	RIM = 5897.50	IN (S) = 5890.33 OUT (N) = 5890.23 IN (E) = 5892.68	83 LF, 18" HDPE @ 1.00% 40 LF, 18" HDPE @ 1.00% 144 LF, 18" HDPE @ 1.00%
A.3-DI	DROP INLET	RIM = 5898.69	OUT (W) = 5894.13	144 LF, 18" HDPE @ 1.00%
A.4-MH	MANHOLE	RIM = 5899.05	IN (E) = 5891.25 OUT (N) = 5891.15 IN (NE) = 5895.51	117 LF, 18" HDPE @ 1.00% 83 LF, 18" HDPE @ 1.00% 14 LF, 6" HDPE @ 1.29%
A.5-DI	DROP INLET	RIM = 5900.05	IN (E) = 5892.52 OUT (W) = 5892.42	68 LF, 18" HDPE @ 1.00% 117 LF, 18" HDPE @ 1.00%
A.6-DI	DROP INLET	RIM = 5900.63	IN (N) = 5893.30 OUT (W) = 5893.20	69 LF, 18" HDPE @ 1.00% 68 LF, 18" HDPE @ 1.00%
A.7-DI	DROP INLET	RIM = 5898.56	OUT (S) = 5894.00	69 LF, 18" HDPE @ 1.00%
B.1-CO	CLEAN OUT	RIM = 5899.33	IN (E) = 5895.80 OUT (SW) = 5895.70	23 LF, 6" HDPE @ 1.38% 14 LF, 6" HDPE @ 1.29%
B.2-CO	CLEAN OUT	RIM = 5899.92	IN (N) = 5896.21 OUT (W) = 5896.11	6 LF, 6" HDPE @ 6.80% 23 LF, 6" HDPE @ 1.38%
B.3-BC	BUILDING CONNECTION	RIM = 5900.30	OUT (S) = 5896.64	6 LF, 6" HDPE @ 6.80%



A.1-A.7 PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

Bowman
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Bowman Consulting Group Ltd
13450 W. Sunrise Blvd., Suite 320
www.bowman.com
Sunrise, FL 33323
Phone: (954) 314-8480

NO.	REVISION DESCRIPTION	DATE

DRAINAGE PROFILES
ARBY'S
4446 VENETUCCI BOULEVARD
EL PASO COUNTY FOUNTAIN, COLORADO

EL DESIGN	DC DRAWN	BP CHKD
SCALE:	1" = 20'	
JOB No.:	011098-01-001	
DATE:	07/19/2022	

SHEET CG-102

CAD file name: V:\011098 - Arby's 4446 Venetucci Blvd Fountain CO\011098-01-001 (ENG) - Arby's 4446 Venetucci Blvd Fountain CO\Engineering\Engineering Plans\Sheet Sets\C-10 - Grading and Drainage Plan.dwg 07/19/2022

APPENDIX E – Proposed Routing Calculations

Summary of Site Hydrology
Arby's - City of Fountain
Colorado Springs, CO

Cells of this color are for required user-input

Tips for using spreadsheet

1. if you need to override any values/equations in this spreadsheet - go to review tab, and choose "unprotect sheet" (this will make cells unlocked)
2. These equations are based on Urban Drainage Volume 1 from January 2016 (please check urban drainage for most recent version)
http://udfcd.org/volume-one

BASIN SUMMARY TABLE

Basin	Area (acres)	2-yr (cfs)	5-yr (cfs)	10-yr (cfs)	25-yr (cfs)	50-yr (cfs)	100-yr (cfs)	500-yr (cfs)
A5.5	0.33	#N/A	0.79	#N/A	#N/A	#N/A	1.87	#N/A
A5.4	0.19	#N/A	0.59	#N/A	#N/A	#N/A	1.36	#N/A
A5.3	0.04	#N/A	0.06	#N/A	#N/A	#N/A	0.16	#N/A
A5.2	0.03	#N/A	0.06	#N/A	#N/A	#N/A	0.16	#N/A
A5.1	0.10	#N/A	0.36	#N/A	#N/A	#N/A	0.79	#N/A
UD5	0.20	#N/A	0.26	#N/A	#N/A	#N/A	0.75	#N/A

DESIGN POINT SUMMARY TABLE				
Design Point	**Contributing Basins**	**Area (acres)**	**5-yr (cfs)**	**100-yr (cfs)**
5.5	A5.1 , A5.2 , A5.3 , A5.4 , A5.5	0.69	1.66	3.85
5.4	A5.4	0.19	0.59	1.36
5.3	A5.1 , A5.2 , A5.3	0.17	0.41	0.95
5.2	A5.1 , A5.2	0.13	0.38	0.85
5.1	A5.1	0.10	0.36	0.79

POST-DEVELOPMENT C VALUES

Designer: SZ
Company: Bowman Consulting
Date: 7/18/2022
Project: Arby's - City of Fountain
Location: Colorado Springs, CO

Global Parameters[1]	
Land Use	% Imp.
Open Space/Landscaping	2
Hardscape	100
Roof	90

Summary	
Total Area (ac)	0.89
Composite Impervious	77.5%

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[1] From Table 6-3 in UDFCD Volme 1
[2] From Table 6-4 in UDFCD Volme 1

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Open Space/Landscaping		Hardscape		Roof		% Check	Percent Imperviousness	Runoff Coefficient, C[2]						
			Area (ac)	%	Area (ac)	%	Area (ac)	%			2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
A5.5	0.33	A	0.05	15.2%	0.22	66.7%	0.06	18.2%	100.00%	83.3%	0.66	0.68	0.70	0.72	0.74	0.76	0.79
A5.4	0.19	A	0.03	13.0%	0.17	87.0%	0.00	0.0%	100.00%	87.3%	0.70	0.72	0.74	0.76	0.77	0.79	0.82
A5.3	0.04	A	0.01	34.3%	0.02	65.7%	0.00	0.0%	100.00%	66.4%	0.49	0.51	0.53	0.56	0.59	0.63	0.68
A5.2	0.03	A	0.01	24.1%	0.02	75.9%	0.00	0.0%	100.00%	76.3%	0.59	0.61	0.63	0.65	0.68	0.70	0.75
A5.1	0.10	A	0.00	3.8%	0.10	96.2%	0.00	0.0%	100.00%	96.2%	0.80	0.82	0.83	0.85	0.85	0.86	0.87
UD5	0.20	A	0.10	50.3%	0.10	49.7%	0.00	0.0%	100.00%	50.8%	0.35	0.36	0.38	0.41	0.46	0.51	0.58

TIME OF CONCENTRATION

Designer:	SZ
Company:	Bowman Consulting
Date:	7/18/2022
Project:	Arby's - City of Fountain
Location:	Colorado Springs, CO

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

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

Computed $t_c = t_i + t_t$

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

$t_{minimum}$= 5 (urban)
$t_{minimum}$= 10 (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

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Subbasin Data				Overland (Initial) Flow Time			Channelized (Travel) Flow Time					Time of Concentration			
Sub-Basin	Area	% Impervious	C5	Overland Flow Length L_i (ft)	Overland Flow Slope S_i (ft/ft)	Overland Flow Time t_i (min)	Channelized Flow Length L_t (ft)	Channelized Flow Slope S_t (ft/ft)	NRCS Conveyance Factor K	Channelized Flow Velocity V_t (ft/sec)	Channelized Flow Time t_t (min)	Computed t_c (min)	Regional t_c (min)	Selected t_c (min)	
A5.1	0.10	96.2%	0.82	66.00	0.035	2.72	66.00	0.010	20	2.00	0.55	3.27	10.13	5.00	
A5.2	0.03	76.3%	0.61	160.00	0.035	7.40	70.00	0.010	20	2.00	0.58	7.98	13.61	7.98	
A5.3	0.04	66.4%	0.51	165.00	0.035	9.04	65.00	0.010	20	2.00	0.54	9.58	15.30	9.58	
A5.4	0.19	87.3%	0.72	52.00	0.020	3.89	74.00	0.010	20	2.00	0.62	4.51	11.74	5.00	
A5.5	0.33	83.3%	0.68	148.00	0.025	6.78	237.00	0.010	20	2.00	1.98	8.76	13.74	8.76	
UD5	0.20	50.8%	0.36	88.00	0.030	8.69	0.00	0.010	20	2.00	0.00	8.69	17.37	8.69	

STORM DRAINAGE SYSTEM DESIGN - 5-YEAR DESIGN STORM

Designer:	SZ
Company:	Bowman Consulting
Date:	7/18/2022
Project:	Arby's - City of Fountain
Location:	Colorado Springs, CO

Bowman CONSULTING

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DESIGN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET		PIPE			TRAVEL TIME						
		Area Design	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ca)	Sum C*A (ac)	I in/hr	Q cfs	Slope %	Street Q cfs	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Q add'l		Remarks
		A5.1	0.10	0.82	5.0	0.09	4.21	0.36								0.36								
5.1	A5.1								5.0	0.10	0.09	4.21	0.36			0.36								
		A5.2	0.03	0.61	8.0	0.02	3.65	0.06								0.06								
5.2	A5.1 , A5.2								8.0	0.13	0.10	3.65	0.38			0.38								
		A5.3	0.04	0.51	9.6	0.02	3.41	0.06								0.06								
5.3	A5.1 , A5.2 , A5.3								9.6	0.17	0.12	3.41	0.41			0.41								
		A5.4	0.19	0.72	5.0	0.14	4.21	0.59								0.59								
5.4	A5.4								5.0	0.19	0.14	4.21	0.59			0.59								
		A5.5	0.33	0.68	8.8	0.23	3.53	0.79								0.79								
5.5	A5.1 , A5.2 , A5.3 , A5.4 , A5.5								9.6	0.69	0.49	3.41	1.66			1.66								
		UD5	0.20	0.36	8.7	0.07	3.54	0.26								0.26								

STORM DRAINAGE SYSTEM DESIGN - 100-YEAR DESIGN STORM

Designer:	SZ
Company:	Bowman Consulting
Date:	7/18/2022
Project:	Arby's - City of Fountain
Location:	Colorado Springs, CO

Bowman CONSULTING

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DESIGN POINT	STREET/ CONTRIBUTING BASINS	DIRECT RUNOFF							TOTAL RUNOFF					STREET		PIPE			TRAVEL TIME						
		Area Design	Area (ac)	Coeff C	Tc (min)	C*A (ac)	I	Q (cfs)	Tc (min)	Sum Area (ca)	Sum C*A (ac)	I in/hr	Q cfs	Slope %	Street Q cfs	Design Q cfs	Slope %	PIPE SIZE	L ft	VEL ft/sec	Tt min	Q add'l		Remarks
		A5.1	0.10	0.86	5.0	0.09	8.89	0.79								0.79								
5.1	A5.1								5.0	0.10	0.09	8.89	0.79			0.79								
		A5.2	0.03	0.70	8.0	0.02	7.71	0.16								0.16								
5.2	A5.1 , A5.2								8.0	0.13	0.11	7.71	0.85			0.85								
		A5.3	0.04	0.63	9.6	0.02	7.21	0.16								0.16								
5.3	A5.1 , A5.2 , A5.3								9.6	0.17	0.13	7.21	0.95			0.95								
		A5.4	0.19	0.79	5.0	0.15	8.89	1.36								1.36								
5.4	A5.4								5.0	0.19	0.15	8.89	1.36			1.36								
		A5.5	0.33	0.76	8.8	0.25	7.46	1.87								1.87								
5.5	A5.1 , A5.2 , A5.3 , A5.4 , A5.5								9.6	0.69	0.53	7.21	3.85			3.85								
		UD5	0.20	0.51	8.7	0.10	7.47	0.75								0.75								

Rainfall Data
Arby's - City of Fountain
Colorado Springs, CO

Recurrence Interval (yrs)	1-hr Rainfall Depth (in)
2	0.96
5	1.24
10	1.50
25	1.90
50	2.24
100	2.62
500	3.61