DRAINAGE REPORT
FOR
ARBY'S
SOUTH ACADEMY HIGHLANDS FILING NO. 4, LOT 2
CITY OF FOUNTAIN, COLORADO
PARCEL NO.: 650-431-1005

Prepared for:

Flynn Restaurant Group, LLC
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Independence, OH 44131

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Prepared by:

Bowman

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QA/QC Officer: William O. Schock, P.E.

JN: 011098-01-001
June 2022
Revised November 2022

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY WILLIAM O. SCHOCK, P.E. 0055466
ON Nov 18, 2022

Signature Page
Arby's – South Academy

Engineer's Certification 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 established criteria 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.

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. Flynn Restaurant Group understands 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. Flynn Restaurant Group further understands 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 report is to demonstrate that the proposed development, Arby's – South Academy (the 'site') is consistent with 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 with 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 1.549 ac. vacant lot in Lot 2 of "South Academy Highlands Filing No. 4", a subdivision being developed by UTW Academy Development, LLC. The property is bounded to the North by Lot 1 of South Academy Highlands Filing No. 4 which is vacant. 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. This area drains to an existing regional extended detention basin offsite which is intended to provide the required water quality treatment and runoff reduction measures for the site.

As shown on the NRCS Soil Map (Appendix A), the entire site is located within Schamber-Razor Complex soil, which is in Hydrologic Soil Group A. The site currently slopes gently to moderately to the north, with a mean slope of approximately 2.5%.

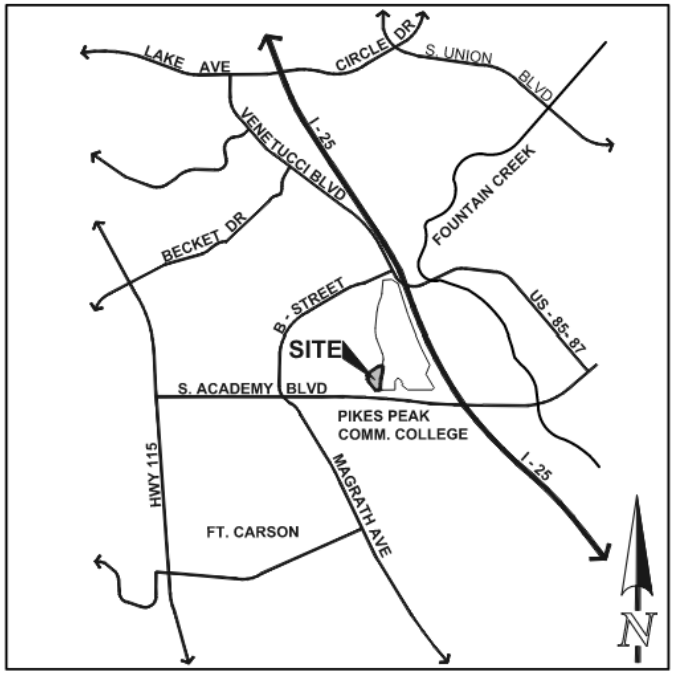


Figure 1-1
Vicinity Map

Parameters Set in South Academy Highlands Filing No. 4 Drainage Report
As previously noted, the project site is part of the subdivision South Academy Highlands Filing No. 4. Offsite drainage improvements and a regional detention basin were constructed in the vicinity of the project site to capture and treat the runoff from the project site and surrounding lots. The design of the offsite drainage improvements is documented in a report entitled "Preliminary and Final Drainage Report for Lots 1-4 South Academy Highlands Filing No. 4" by Classic Consulting Engineers & Surveyors, revised January 2022, henceforth referred to as the "Classic Consulting Report". The relevant portions of the report are included in Appendices B and C of this report.

The site is located within Basins E and F as depicted in the "Developed Conditions" map in the Classic Consulting Report. Most of the site runoff will be conveyed through an 18" diameter stub shown on the Developed Conditions map as Pipe #5. The remainder of the site, which consists mostly of grass areas along the perimeter of the site, will sheet flow to the offsite drainage system. As shown on the Developed Conditions Map, the flow associated with Pipe #5 is 2.7 CFS for the 5-year storm and 5.3 CFS for the 100-year storm. Per the developed conditions map, the existing inlet at the northeast corner of the property is intended to capture 0.8 CFS during a 5-year storm and 1.6 CFS during a 100-year storm. As the downstream systems were designed to handle these flows, the subject project has been designed so that the total flow from the site, the peak flows to the 18" stub, and the flow to the existing inlet at the northeast corner of the site do not exceed those listed in the Classic Consulting Report.

Proposed Conditions

The proposed improvements to the project site include a proposed private storm sewer system consisting of 5 inlets, 286 LF of 15" HDPE pipe, 45 LF of 18" HDPE pipe, and a manhole used to connect the proposed system to an 18" stub intended for the site constructed by others. The site is divided into 7 drainage basins as described below.

Basin A5.1 (0.15 Ac., C_5=0.85, C_{100}=0.92)
Basin A5.1 is located in the East of Lot 2 and is composed of pavement, sidewalk and landscaping area. Runoff from this basin flows north to a proposed inlet (A.4-DI) located on the north end of A5.1 in the proposed drive aisle. Runoff exits the inlet through a 15" HDPE storm sewer (A.4 TO A.3) and eventually discharges into the master subdivision drainage system.

Basin A5.2 (0.23 Ac., C_5=0.82, C_{100}=0.89)
Basin A5.2 is located in the center of Lot 2 and is composed of pavement, sidewalk and landscaping area. Runoff from this basin flows north to a proposed inlet (A.3-HCI) located in the proposed drive aisle. Runoff exits the inlet through a 15" HDPE storm sewer (A.3 TO A.2) and eventually discharges into the master subdivision drainage system.

Basin A5.3 (0.14 Ac., C_5=0.76, C_{100}=0.85)
Basin A5.3 is located on the southeast of Lot 2 and is composed of pavement, landscaping area, and the proposed building. Runoff from this basin flows north to a proposed inlet (A.6-DI). Runoff exits the inlet through a 15" HDPE storm sewer (A.4 TO A.3) and eventually discharges into the master subdivision drainage system.

Basin A5.4 (0.05 Ac., C_5=0.69, C_{100}=0.79)
Basin A5.4 is located in the northeast of Lot 2 and is composed of pavement, sidewalk, curb and landscaping area. Runoff from this basin flows to a proposed inlet (A.2-HCI) located in the proposed drive aisle. Runoff exits the inlet through an 18" HDPE storm sewer (A.2 TO A.1) and eventually discharges into the master subdivision drainage system.

Basin A5.5 (0.03 Ac., C_5=0.45, C_{100}=0.62)
Basin A5.5 is located west of the proposed building on Lot 2 and is composed of asphalt and and landscaping area. Runoff from this basin flows to a proposed inlet (A.5-HCI). Runoff exits the inlet through a 15" HDPE storm sewer (A.5 TO A.2) and eventually discharges into the master subdivision drainage system.

Basin UD5 (0.12 Ac., C_5=0.46, C_{100}=0.63)
Basin UD5 is located is located on the East and North sides of Lot 2 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 and west into the master developments drive aisle.

Basin E (0.16 Ac., C_5=0.70, C_{100}=0.81)
Basin E is located is located on the west side of Lot 2 and is composed of the proposed dumpster pad and the private drive aisle of the development. Runoff from this area drains to a 10' Type R private at-grade inlet to be constructed by others as part of the South Academy Highlands Filing No. 4 development. This area is designated as Area E in the South Academy Highlands Filing No. 4 Drainage Report.

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

Methodology

In accordance with the Colorado Springs DCM, the rational method was used to calculate the peak flow from the site. The runoff coefficients used for impervious area and lawn area are consistent with those in the Classic Consulting Report. In addition, due to the small size of the site and high percentage of impervious cover proposed, the minimum allowable time of concentration of 5 minutes was used to determine the rainfall intensity values. This is also consistent with the Classic Consulting Report.

The storm sewer system was designed for the 100-year storm. Hydraflow Storm Sewers Extension was used to calculate the HGL in the system. A Manning's Roughness Coefficient of 0.013 was used for all pipes.

Results
The calculated values for each Basin are included in Appendix E. The table below compares the proposed flows to the allowable flows as set in the Preliminary and Final Drainage Report for Lots 1-4 South Academy Highlands Filing No. 4.

	Allowable Flow – 5 YR (CFS)	Proposed Flow- 5 YR (CFS)	Allowable Flow – 100 YR (CFS)	Proposed Flow- 100 YR (CFS)
Total to MH A.1	2.70	2.42	5.30	4.75
Total to Existing Inlet from Site	3.50	2.97	6.90	5.84
Total From Site	3.50	3.26	6.90	6.50

The differences between the proposed flows, as calculated above, and the allowable flows calculated in the South Academy Highlands Filing No. 4 Drainage Report are due to the difference between the impervious coverage anticipated in the Classic Consulting Report and the actual impervious coverage proposed. Whereas the total impervious area anticipated in the Classic Consulting Report in Basins E and F was 0.77 acres, the proposed impervious coverage on the site (comprised of Basins E and F) is 0.69 acres. In addition, due to grading constrains, the drainage patterns on the site were altered slightly from those in the Classic Consulting Report. Specifically, small portions "Basin F" in the Classic Consulting Report were included in Basin UD5, which sheet flows off of the site in a northerly and westerly direction, and the dumpster pad, which was part of "Basin F" in the Classic Consulting Report is part of Basin E in the proposed conditions.
Lastly, the Classic Consulting Report excludes small portions of the site from Basins E and F, whereas the entire property aside from the "No-Build Area" was analyzed in this report.

Four-Step Process
Per Section 7.1 of the City of Colorado Springs Drainage Criteria Manual, Volume 1, the UDFCD has long recommended a "Four Step Process" for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long-term source controls. Each of the four steps are repeated below, followed by a description in *italic* typeface of how each of the steps is addressed in the proposed project.

Step 1: Reduce runoff by disconnecting impervious area, eliminating "unnecessary" impervious area and encouraging infiltration into soils that are suitable.

The parking stall size and parking aisle widths are the minimum needed to meet industry standards and to facilitate smooth circulation through the site. The gradual slopes proposed in the lawn areas will maximize infiltration of runoff into the soil.

2. Step 2: Treat and slowly release the WQCV.

As noted above, the runoff from the site will be directed to a regional extended detention basin which is intended to meet all regulatory standards.

3. Step 3: Stabilize stream channels.

No stream channels exist of the site.

4. Step 4: Implement source controls.

Most of the runoff from the site will be captured by grated inlets which will prevent debris and trash from entering the storm sewer system.

Estimate Of Cost Of Proposed Facilities

Description	Quantity	Units	Cost	Total
18" HDPE Pipe	45	LF	$ 65.00	$ 2,925.00
15" HDPE Pipe	332	LF	$ 60.00	$ 19,920.00
6" HDPE Pipe	46	LF	$ 30.00	$ 1,380.00
Storm Cleanout	1	EA	$ 250.00	$ 250.00
Grated Inlet (Type 13) 5' ≤ Depth < 10'	2	EA	$ 5,932.00	$ 11,864.00
Storm Sewer Manhole, Box Base	1	EA	$12,034.00	$ 12,034.00
Curb Inlet (Type R) L=5', 5' ≤ Depth < 10'	3	EA	$ 7,440.00	$ 22,320.00
Total:				$ 70,693.00

Conclusion

As demonstrated above and in the Appendices of this report, the proposed flows from the developed site, to the 18" pipe stub, and to the inlet adjacent to the site will be less than those anticipated in the South Academy Highlands Filing No. 4 Drainage Report. Therefore, the proposed development will have no negative impact on the ability of the downstream storm sewer system and extended detention basin to function as designed.

References

1. City of Colorado Springs Drainage Criteria Manual, Volume 1, May 2014
2. South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022
3. NRCS Web Soil Survey, Soil Map of El Paso County Area, Colorado, obtained September 2, 2022
4. FEMA Firm Map No. 08041C0743G, effective December 7, 2018

Appendices

APPENDIX A – Reference Maps

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 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**

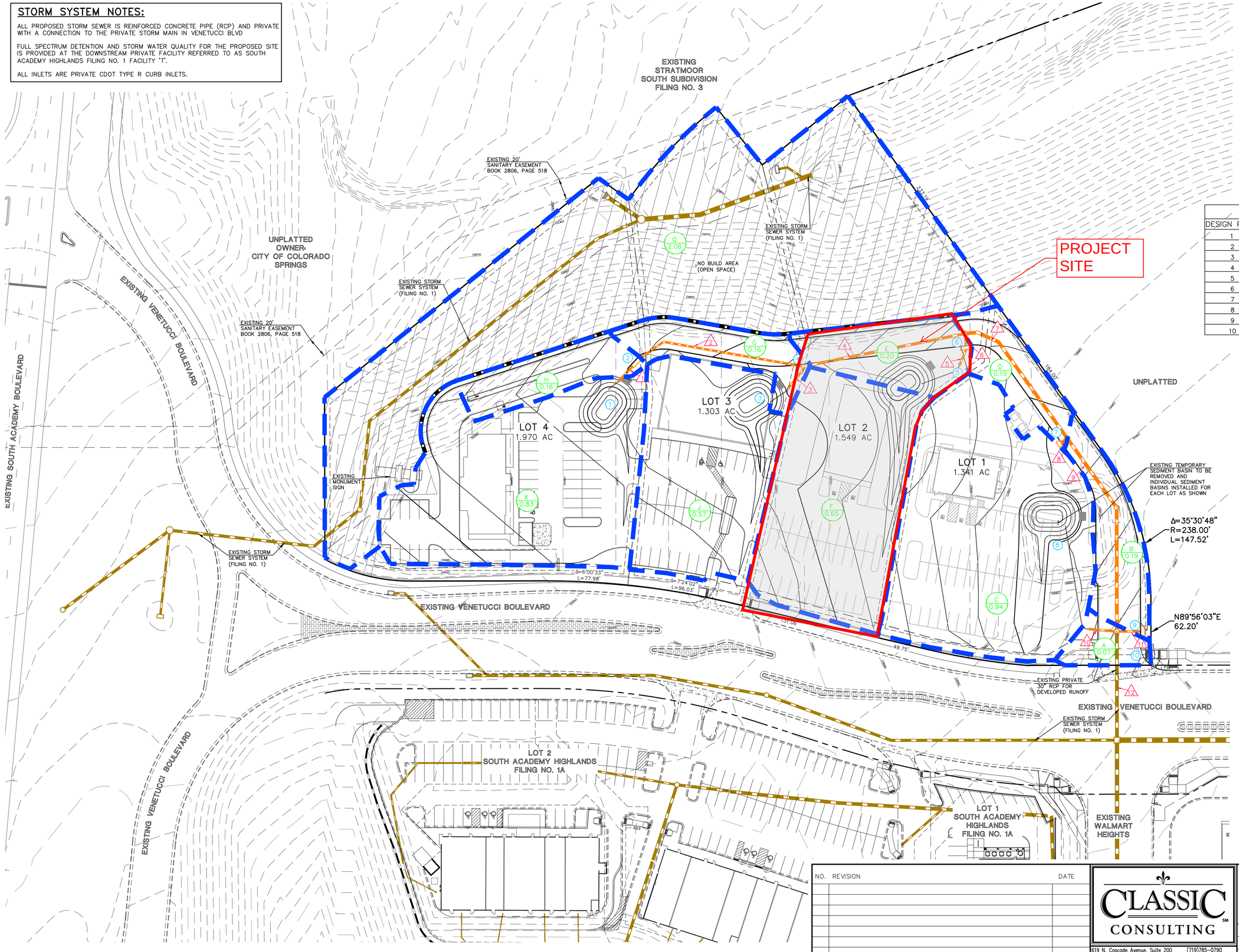
APPENDIX C – Drainage Area Maps from "South Academy Highlands Filing No. 4", prepared by Classic Consulting Engineers & Surveyors, revised January 2022

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"

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

CLASSIC CONSULTING

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

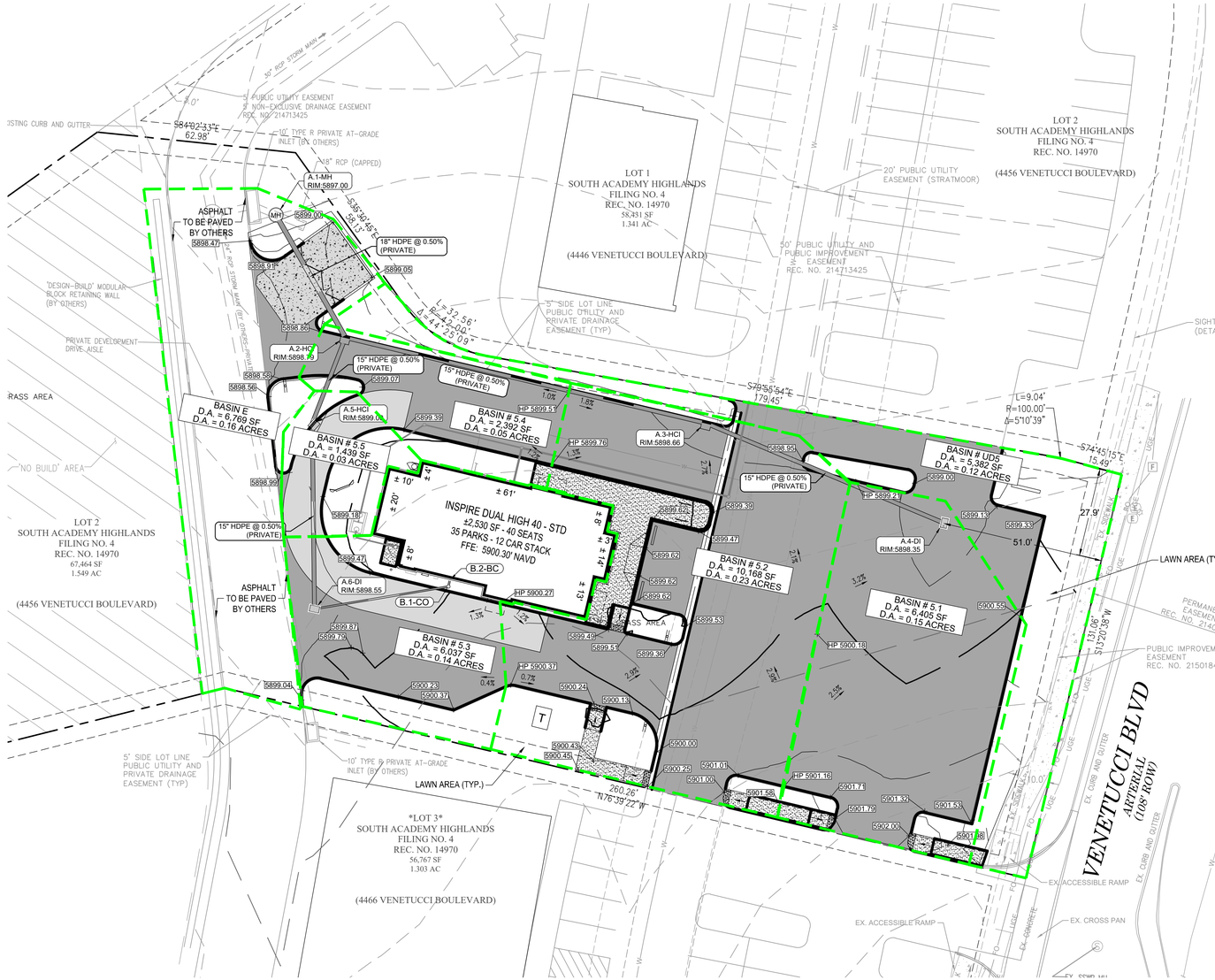
N:\2186\DRAWINGS\DEVELOPMENT\2186DR-PDR-MAP.dwg, 4/6/2022 2:08:44 PM, 1:1

APPENDIX D – Proposed Drainage Map

GRAPHIC SCALE

0 10 20 40

(IN FEET)
SCALE: 1" = 20'



NOTES

1. ALL ELEVATIONS ARE BASED ON NAVD88.
2. ALL PROPOSED INLETS ARE SUMP UNLESS OTHERWISE NOTED.

ALL SPOT ELEVATIONS REPRESENT FACE OF CURB 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
- LIGHT/MEDIUM DUTY CONCRETE PAVEMENT
- LIGHT/MEDIUM DUTY ASPHALT PAVEMENT
- 4" CONCRETE SIDEWALK
- HEAVY DUTY CONCRETE PAVEMENT

STORMWATER STRUCTURE TABLE

STRUCTURE ID	STRUCTURE TYPE	RIM ELEV.	PIPE INVERTS	PIPE INFORMATION
A.1-MH	48" SDMH TYPE II	RIM = 5897.00	IN (SE) = 5892.37	45 LF, 18" HDPE @ 0.50%
A.2-HCI	HOODED CURB INLET TYPE R	RIM = 5898.79	IN (E) = 5892.69 IN (S) = 5892.59 OUT (NW) = 5892.59	117 LF, 15" HDPE @ 0.50% 29 LF, 15" HDPE @ 0.50% 45 LF, 18" HDPE @ 0.50%
A.3-HCI	HOODED CURB INLET TYPE R	RIM = 5898.66	IN (SE) = 5893.38 OUT (W) = 5893.28	82 LF, 15" HDPE @ 0.50% 117 LF, 15" HDPE @ 0.50%
A.4-DI	DROP INLET TYPE 13	RIM = 5898.35	OUT (NW) = 5893.79	82 LF, 15" HDPE @ 0.50%
A.5-HCI	HOODED CURB INLET TYPE R	RIM = 5899.00	OUT (N) = 5892.74 IN (S) = 5892.84	29 LF, 15" HDPE @ 0.50% 59 LF, 15" HDPE @ 0.50%
A.6-DI	DROP INLET TYPE 13	RIM = 5898.55	OUT (N) = 5893.13 IN (E) = 5893.23	59 LF, 15" HDPE @ 0.50% 43 LF, 6" HDPE @ 1.04%
B.1-CO	6" CLEAN OUT	RIM = 5900.42	IN (N) = 5893.78 OUT (W) = 5893.68	2 LF, 6" HDPE @ 1.04% 43 LF, 6" HDPE @ 1.04%
B.2-BC	BUILDING CONNECTION	RIM = 5900.30	OUT (S) = 5893.80	2 LF, 6" HDPE @ 1.04%

RUNOFF CALCULATIONS - 5 YEAR

Sub-Basin	Total Area (Ac)	Weighted Runoff Coefficient	Intensity (in/hr)	Peak Flow (CFS)
A5.1	0.15	0.85	5.10	1.14
A5.2	0.23	0.82	5.10	1.73
A5.3	0.14	0.76	5.10	0.96
A5.4	0.05	0.69	5.10	0.34
A5.5	0.03	0.45	5.10	0.13
UD5	0.12	0.46	5.10	0.52
BASIN E	0.16	0.70	5.10	0.99
Total to MH A.1	0.61	0.78	5.10	2.42
Total to Existing Inlet	0.76	0.76	5.10	2.97
Total From Site	0.89	0.72	5.10	3.26

RUNOFF CALCULATIONS - 100 YEAR

Sub-Basin	Total Area (Ac)	Weighted Runoff Coefficient	Intensity (in/hr)	Peak Flow (CFS)
A5.1	0.15	0.92	9.07	1.22
A5.2	0.23	0.89	9.07	1.88
A5.3	0.14	0.85	9.07	1.07
A5.4	0.05	0.79	9.07	0.40
A5.5	0.03	0.62	9.07	0.19
UD5	0.12	0.63	9.07	0.70
BASIN E	0.16	0.81	9.07	1.13
Total to MH A.1	0.61	0.86	9.07	4.75
Total to Existing Inlet	0.76	0.84	9.07	5.84
Total From Site	0.89	0.81	9.07	6.50

Bowman
Certificate of Authorization License No. 30462
Bowman Consulting Group Ltd
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www.bowman.com
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NO.	REVISION DESCRIPTION	DATE

STORMWATER PLAN
ARBY'S
4456 VENETUCCI BOULEVARD
EL PASO COUNTY FOUNTAIN, COLORADO

COLORADO REGISTERED WILLIAM O. SCHOCK 0055466 EXP 10/31/23 PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY WILLIAM O. SCHOCK, P.E. 0055466 ON Nov 08, 2022

EL DESIGN	DC DRAWN	BS CHKD
SCALE:	1" = 20'	
JOB No.:	011098-01-001	
DATE:	11/8/2022	
SHEET	SWP	

APPENDIX E – Proposed Calculations

SUB-BASIN CALCULATIONS - 5 YR

Project: Arby's - South Academy
Project #: 011098-01-001
Prepared by: JS **DATE:** 11/8/2022

Sub-Basin	Impervious Area (SF)	Impervious Area Coefficient	Pervious Area (SF)	Pervious Area Coefficient	Total Area (SF)	Total Area (Ac)	Weighted Runoff Coefficient	Intensity (in/hr)	Peak Flow (CFS)
A5.1	6042	0.9	363	0.08	6405	0.15	0.85	5.10	1.14
A5.2	9116	0.9	1052	0.08	10168	0.23	0.82	5.10	1.73
A5.3	5026	0.9	1011	0.08	6037	0.14	0.76	5.10	0.96
A5.4	1774	0.9	618	0.08	2392	0.05	0.69	5.10	0.34
A5.5	648	0.9	791	0.08	1439	0.03	0.45	5.10	0.13
UD5	2497	0.9	2885	0.08	5382	0.12	0.46	5.10	0.52
BASIN E	5135	0.9	1634	0.08	6769	0.16	0.70	5.10	0.99
Total to MH A.1	22606	0.9	3835	0.08	26441	0.61	0.78	5.10	2.42
Total to Existing Inlet	27741	0.9	5469	0.08	33210	0.76	0.76	5.10	2.97
Total From Site	30238	0.9	7991	0.08	38592	0.89	0.72	5.10	3.26

SUB-BASIN CALCULATIONS - 100 YR

Project: Arby's - South Academy
Project #: 011098-01-001
Prepared by: JS **DATE:** 11/8/2022

Sub-Basin	Impervious Area (SF)	Impervious Area Coefficient	Pervious Area (SF)	Pervious Area Coefficient	Total Area (SF)	Total Area (Ac)	Weighted Runoff Coefficient	Intensity (in/hr)	Peak Flow (CFS)
A5.1	6042	0.95	363	0.35	6405	0.15	0.92	9.07	1.22
A5.2	9116	0.95	1052	0.35	10168	0.23	0.89	9.07	1.88
A5.3	5026	0.95	1011	0.35	6037	0.14	0.85	9.07	1.07
A5.4	1774	0.95	618	0.35	2392	0.05	0.79	9.07	0.40
A5.5	648	0.95	791	0.35	1439	0.03	0.62	9.07	0.19
UD5	2497	0.95	2885	0.35	5382	0.12	0.63	9.07	0.70
BASIN E	5135	0.95	1634	0.35	6769	0.16	0.81	9.07	1.13
Total to MH A.1	22606	0.95	3835	0.35	26441	0.61	0.86	9.07	4.75
Total to Existing Inlet	27741	0.95	5469	0.31	33210	0.76	0.84	9.07	5.84
Total From Site	30238	0.95	7991	0.31	38592	0.89	0.81	9.07	6.50

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	44.546	0.05	0.60	0.79	0.04	0.52	5.0	5.0	9.1	4.71	7.38	3.21	18	0.49	5892.37	5892.59	5893.62	5893.68	5897.00	5898.79	A.2 TO A.1
2	1	29.037	0.03	0.17	0.62	0.02	0.14	5.0	5.0	9.1	1.25	4.65	1.06	15	0.52	5892.59	5892.74	5893.83	5893.84	5898.79	5899.00	A.5 TO A.2
3	2	58.665	0.14	0.14	0.85	0.12	0.12	5.0	5.0	9.1	1.08	4.54	1.24	15	0.49	5892.84	5893.13	5893.84	5893.86	5899.00	5898.55	A.6 TO A.5
4	1	117.241	0.23	0.38	0.89	0.20	0.34	5.0	5.0	9.1	3.11	4.58	3.19	15	0.50	5892.69	5893.28	5893.83	5894.08	5898.79	5898.66	A.3 TO A.2
5	4	81.527	0.15	0.15	0.92	0.14	0.14	5.0	5.0	9.1	1.25	4.58	2.38	15	0.50	5893.38	5893.79	5894.13	5894.24	5898.66	5898.35	A.4 TO A.3

Project File: Arbys Storm Sewer.stm | Number of lines: 5 | Run Date: 11/8/2022

NOTES:Intensity = 315.90 / (Inlet time + 30.80) ^ 0.99; Return period =Yrs. 100 ; Pipe travel time suppressed. ; c = cir e = ellip b = box