

Drainage Letter for

Arby's | Falcon, Colorado

FILE NUMBER ADDED

Add PCD File No. PPR2041

Project:

Arby's | Falcon, CO
11775 Meridian Market VW
Falcon, CO 80831

Client:

RB American Group LLC
6200 Oak Tree Blvd.
Independence, OH 44131
p. 314-960-7864

Engineer:

Hamilton Designs, LLC
11 Municipal Drive, Suite 300
Fishers, Indiana 46038
p. 317-570-8800

Professional Certification:

December 16, 2020

Design Engineer’s Statement:

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

Michael Thompson, P.E. #0057768

Date

Owner/Developer’s Statement:

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

Andy Noah, Manager
RB American Group, LLC
6200 Oak Tree Blvd.

Date

El Paso County:

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

Jennifer Irvine, P.E.
County Engineer / ECM Administrator

Date

Conditions:

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Please provide the FEMA FIRM panel # and the date.

FIRM PANEL PROVIDED IN TEXT.

1.0 DRAINAGE NARRATIVE:

1.1 Introduction

The site is located near the southwest corner of Woodmen Road and Meridian Road in El Paso County, CO within the Falcon Highlands Market Place commercial subdivision. The subject property has been platted as Lot 2 within the FHMP Filing No. 1B and has been assigned an address of 11775 Meridian Market View; Falcon, Colorado. The proposed improvements will include a ±2,579 square-foot Arby's fast-food restaurant building along with its associated parking, drainage, and utility infrastructure. It should be noted that there is no floodplain onsite and that the project site is in the CWHS1400 Falcon Drainage Basin. Onsite soil types for the project site involve "Blakeland-Fluvaquentic Haplaquolls – 9".

Stormwater quality and detention has been master planned for the subject site's proposed improvements and the overall calculations for the entire commercial subdivision has been provided in the appendix of this report. Applicable pages from the "Falcon Highlands Market Place Filing No. 1B Preliminary and Final Drainage Letter" prepared by URS (October 18, 2005) can be found in Appendix D.

1.2 Zoning Status

The site is currently zoned CR, Commercial Regional Zoning District.

2.0 EXISTING CONDITIONS:

The existing site is currently a vacant 1.14-acre 'pad-ready' commercial outlot that mainly consists of grass vegetation with an east/west access drive at the north end of the property. The ground cover over the existing site generally directs stormwater runoff from north to south into a master planned storm sewer system located in the Meridian Market VW right-of-way. Stormwater is collected by the existing storm sewer system and then directed to an existing wet stormwater quality detention pond (Pond 'MN' in the master planned report) that is located just south of the subject site and across Meridian Road.

3.0 PROPOSED CONDITIONS

The proposed project includes a land disturbance of ±0.80 acres which involves the development of the new ±2,579 square-foot Arby's fast-food restaurant building along with its associated parking, drainage, and utility infrastructure. Stormwater will travel via overland flow from north to south, just as it does in the existing condition, and then will be collected by a new on-site storm sewer system. The new on-site storm sewer system will be routed to an existing 24" RCP stub at the southeast corner of the site. Stormwater will then travel to the existing wet detention pond (Pond MN), which also treats the proposed runoff with its stormwater quality features, and ultimately discharge into Black Squirrel Creek. The proposed improvements are in compliance with all previously studied drainage letters and plans, which is explained below.

Stormwater detention and stormwater quality calculations are not required for the proposed development being that the project site's improvements fall into an already master planned drainage analysis for the existing commercial development. The project site, Lot 2 of the Falcon Highlands Market Place Filing No. 1B, falls within master planned drainage basin D-24, which was designed with a weighted runoff coefficient of C=0.90 in a 5-year storm event and C=0.95 in a 100-year storm event. The post-developed improvements generate a runoff coefficient of C=0.58 in the proposed condition. **The proposed runoff coefficient is significantly lower than that in the master planned report; therefore, the existing wet pond is adequately sized for the post-**

TEXT ADDED TO DENOTE PRIVATE FACILITY

Please identify whether that the proposed storm facilities are private.

developed improvements. Please note that all proposed and existing comparison calculations can be found in the Appendix of this letter.

The proposed onsite storm sewer system will include 118 linear feet of 12-inch diameter RCP and 20 linear feet of 15-inch diameter RCP that will connect to an existing 24-inch diameter RCP storm run. We are proposing to set a beehive inlet manhole over the existing 24-inch storm pipe stub while setting two curb inlets (an Inlet Type C and a Curb Inlet Manhole) in the new pavement to collect surface runoff. The existing wet detention pond in which the proposed surface runoff will flow into is adequately functioning; however, any noticeable signs of pond disfunction, inlet/orifice clogging, etc. will be brought to the owner's attention and addressed before construction is complete.

4.0 WATER QUALITY

The proposed improvements will result in an impervious area lot coverage of approximately 59%. The calculated water quality control volume (WQCV) from the proposed improvements equals 0.23. The overall development was designed with a master planned WQCV of 0.49. The proposed value is significantly less than that in the master planned report for the overall Falcon Highlands Market Place commercial development and therefore suggests that water quality is being adequately provided by the overall development. Narrative and calculation can be found in the overall development Stormwater Report.

5.0 CHANNEL PROTECTION

None Required

6.0 FLOOD PROTECTION

None Required

7.0 DRAINAGE FEES

There are no drainage fees due at this time because they were paid with the original plat of the existing Falcon Highlands Market Place commercial development. Drainage fees will not be assessed with this Site Development Application.

8.0 SUMMARY:

Please explain if/how the practice of "minimizing directly connected impervious areas" (MDCIA) has been employed per ECM 1.7.2

TEXT REVISED

In summary, this report establishes that the proposed improvements will present no adverse impacts to the subject site and/or the surrounding properties. The Four-Step Process outlined in ECM 1.7.2. has been followed per each step's explanation below:

Step 1: The master drainage letter for the existing Falcon Highlands Marketplace Development stated that the project site was planned for more impervious area than what is being proposed. Therefore, it can be stated that the proposed improvements and reduction in impervious area from the master plan for the 1.14-acre subject site will be beneficial to the existing commercial development

Step 2: The existing Arby's site will be stabilized via temporary/permanent seeding along with landscape mulch and rock. The implementation of a landscape plan will help stabilize the site improvements. The existing wet pond has been master planned for water quality to control pollutants from the commercial development with natural channels.

TEXT ADDED

Please state that there are no defined drainageways on this site to be stabilized. The other information here is good, and please keep it, but it is used for site stabilization.

Please describe the detention pond and state the total WQCV for this site vs. what was stated in the master drainage report.

TEXT ADDED

Step 3: The WQCV calculation can be viewed in Appendix C and is explained in Section 4 of this report. The proposed WQCV for the subject site is less than that of master planned value.

Step 4: Any onsite spills will be controlled immediately. The necessary maintenance and procedures are described in the projects SWMP.

How will they be controlled? Spill kit, berming of storage areas. etc.?

9.0 APPENDIX:

TEXT REVISED TO MENTION SPILL KITS

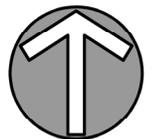
A. Site Maps

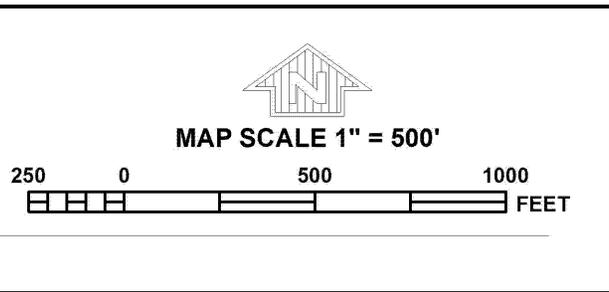
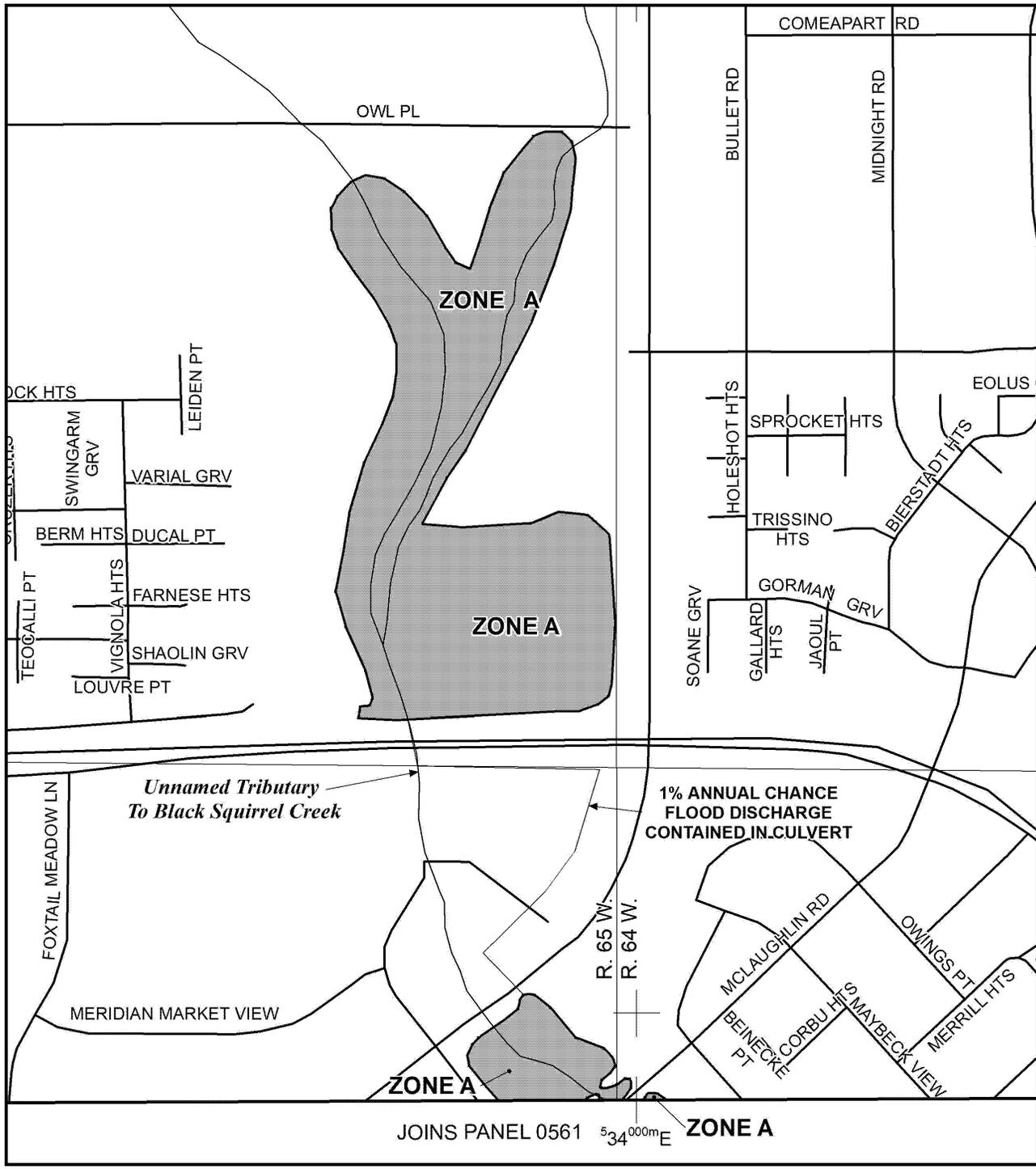


VICINITY MAP

1" = 3,000'

FALCON, COLORADO





PANEL 0553G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 553 OF 1300
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	G

Notice: This map was reissued on 05/15/2020 to make a correction. This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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



MAP NUMBER
08041C0553G

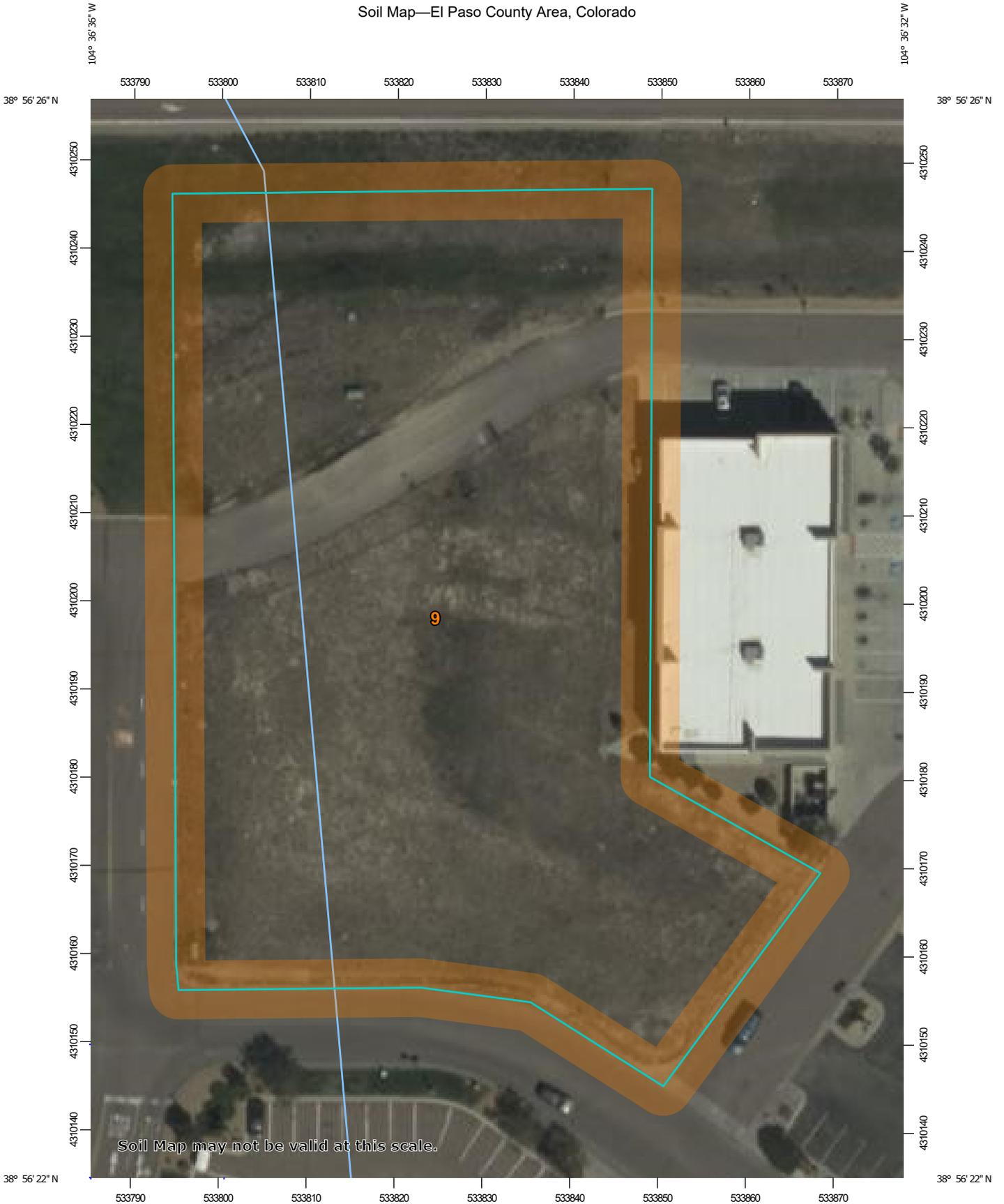
MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

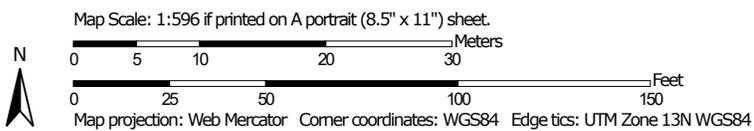
JOINS PANEL 0561 $534^{000}m$ E **ZONE A**

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Soil Map—El Paso County Area, Colorado



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
9	Blakeland-Fluvaquentic Haplaquolls	1.3	100.0%
Totals for Area of Interest		1.3	100.0%

B. Existing Conditions

Hamilton Designs Project No.: 2019-0246 By: KPB
 Project Name: Arby's - Falcon | El Paso County, CO Date 10/09/20
 Description: **Composite C Computation**

Rational Method runoff coefficients
 All watertight roof surfaces 0.90
 Pavement 0.90
 Gravel 0.80
 Slightly pervious soil (with turf) 0.25

EX	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	0	5,920	0	43,790	49,710	1.141	0.33

PR	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	2,579	26,628	0	20,503	49,710	1.141	0.63

Percent Impervious

Basin EX	12%
Basin PR	59%

Hamilton Designs Project No.: 2019-0246
 Project Name: Arby's - Falcon | El Paso County, CO
 Description: **Time of Concentration**

By: KPB
 Date: 10/16/20

L = length, feet
 S = slope, percent
 n = Manning's roughness coefficient
 T_t = travel time, hours
 T_c = time of concentration, minutes
 V = velocity, feet per second

Roughness coefficients (Manning's n) for sheet flow *
 Smooth surfaces, concrete, asphalt, gravel, or bare soil 0.011
 Fallow (no residue) 0.050
 Grass, short prairie 0.150
 Grass, dense grass 0.240
 Woods, light underbrush 0.400

* Table 3-1, TR-55, Second Ed., June 1986

2-year, 24-hour rainfall = 2.64 inches
 minimum T_c = 5.0 minutes

Basin Name	Overland Flow, (1)				Overland Flow, (2)				Shallow Concentrated Flow					Channel Flow			T _c
	L	S	n	T _t	L	S	n	T _t	L	S	paved/ unpaved	V	T _t	L	V	T _t	
EX	66	2.0	0.150	7.74	34	2.0	0.011	0.56	242	1.0	Unpaved	1.6	2.50				10.8
PR	54	2.0	0.150	6.59	46	2.0	0.011	0.72	155	1.1	Paved	2.1	1.21				8.5

Hamilton Designs Project No.: 2019-0246 By: KPB
 Project Name: Arby's - Falcon | El Paso County, CO Date 10/16/20
 Description: **Rational Runoff Method**

Rational Runoff Method, $Q = CiA$
 C = composite C
 i = rainfall intensity, inches per hour
 A = area, acres
 Q = runoff peak flow rate, cubic feet per second

EX	Rainfall Event	Composite C	Time of Concentration	Rainfall Intensity	Area	Peak Runoff Rate
	2-Year	0.28	10.8	3.50	1.141	1.12
	10-Year	0.28	10.8	5.30	1.141	1.69
	100-Year	0.28	10.8	7.53	1.141	2.41

PR	Rainfall Event	Composite C	Time of Concentration	Rainfall Intensity	Area	Peak Runoff Rate
	2-Year	0.58	8.5	3.89	1.141	2.58
	10-Year	0.58	8.5	5.85	1.141	3.87
	100-Year	0.58	8.5	8.25	1.141	5.46

C. Proposed Conditions

Hamilton Designs Project No.: 2019-0246 By: KPB
 Project Name: Arby's - Falcon | El Paso County, CO Date 10/09/20
 Description: **Composite C Computation**

Rational Method runoff coefficients
 All watertight roof surfaces 0.90
 Pavement 0.90
 Gravel 0.80
 Slightly pervious soil (with turf) 0.25

EX	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	0	5,920	0	43,790	49,710	1.141	0.33

PR	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	2,579	26,628	0	20,503	49,710	1.141	0.63

Percent Impervious

Basin EX	12%
Basin PR	59%

Hamilton Designs Project No.: 2019-0246 By: KPB
 Project Name: Arby's - Falcon | El Paso County, CO Date 10/16/20
 Description: **Rational Runoff Method**

Rational Runoff Method, $Q = CiA$
 C = composite C
 i = rainfall intensity, inches per hour
 A = area, acres
 Q = runoff peak flow rate, cubic feet per second

EX	Rainfall Event	Composite C	Time of Concentration	Rainfall Intensity	Area	Peak Runoff Rate
	2-Year	0.28	10.8	3.50	1.141	1.12
	10-Year	0.28	10.8	5.30	1.141	1.69
	100-Year	0.28	10.8	7.53	1.141	2.41

PR	Rainfall Event	Composite C	Time of Concentration	Rainfall Intensity	Area	Peak Runoff Rate
	2-Year	0.58	8.5	3.89	1.141	2.58
	10-Year	0.58	8.5	5.85	1.141	3.87
	100-Year	0.58	8.5	8.25	1.141	5.46

Hamilton Designs Project No.: 2020-0246 By: KPB
 Project Name: Arby's I Falcon, CO Date 12/15/20
 Description: **Composite C Computation - Storm Structure Basins**

Rational Method runoff coefficients

All watertight roof surfaces 0.90
 Pavement 0.90
 Gravel 0.80
 Slightly pervious soil (with turf) 0.25

102	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	2,579	10,494	0	4,076	17,149	0.394	0.75

101	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	0	14,311	0	5,635	19,946	0.458	0.72

100	All watertight surfaces	Pavement	Gravel	Pervious soil / turf	Total	Total	Composite C
	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(ft ²)	(acres)	(ft ²)
	0	0	0	1,992	1,992	0.046	0.25

Please provide the 100 year storm sewer sizing worksheet.

CALCS PROVIDED

Hamilton Designs Project No.: 2020-0246
 Project Name: Arby's - Falcon, CO
 Description: **Proposed Conditions - Storm Sewer Sizing Worksheet**

By: KPB
 Date 12/15/20

Design Storm Frequency = 10-year
 Manning's n = 0.013

STRUCTURE		LENGTH (ft)	DRAINAGE AREA "A"		RUNOFF COEFFICIENT "C"	"A" x "C"		FLOW TIME		RAINFALL INTENSITY (in/hr)	TOTAL RUNOFF (cfs)	PIPE DIAMETER (ft)	SLOPE OF SEWER (%)	FULL CAPACITY (cfs)	VELOCITY		RIM ELEVATION		INVERT ELEVATION		COVER	
			Increment (acres)	Total (acres)		Increment	Total	To Upper End (min)	In Section (min)						Flowing Full (ft/s)	Design Flow (ft/s)	U/S Structure (ft)	D/S Structure (ft)	U/S Structure (ft)	D/S Structure (ft)	U/S Structure (ft)	D/S Structure (ft)
102	101	118	0.39	0.39	0.75	0.30	0.30	5.00	0.46	6.98	2.06	1.00	0.89	3.37	4.29	-	6871.40	6869.55	6867.40	6866.35	2.83	2.03
101	100	20	0.46	0.85	0.72	0.33	0.63	5.46	0.09	6.81	4.26	1.25	0.50	4.58	3.73	-	6869.55	6869.50	6866.10	6866.00	2.01	2.06
100	EX	47	0.05	0.90	0.25	0.01	0.64	5.55	0.15	6.77	4.31	2.00	0.50	16.04	5.11	-	6869.50	6869.53	6865.48	6865.24	1.77	2.04

Note: The Storm Run from Str. 100 to Str. EX is an Existing 24" RCP Stub.

Hamilton Designs Project No.: 2019-0246
 Project Name: Arby's - Falcon | El Paso County, CO
 Description: **Time of Concentration**

By: KPB
 Date: 10/16/20

L = length, feet
 S = slope, percent
 n = Manning's roughness coefficient
 T_t = travel time, hours
 T_c = time of concentration, minutes
 V = velocity, feet per second

Roughness coefficients (Manning's n) for sheet flow *
 Smooth surfaces, concrete, asphalt, gravel, or bare soil 0.011
 Fallow (no residue) 0.050
 Grass, short prairie 0.150
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* Table 3-1, TR-55, Second Ed., June 1986

2-year, 24-hour rainfall = 2.64 inches
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Basin Name	Overland Flow, (1)				Overland Flow, (2)				Shallow Concentrated Flow					Channel Flow			T _c
	L	S	n	T _t	L	S	n	T _t	L	S	paved/ unpaved	V	T _t	L	V	T _t	
EX	66	2.0	0.150	7.74	34	2.0	0.011	0.56	242	1.0	Unpaved	1.6	2.50				10.8
PR	54	2.0	0.150	6.59	46	2.0	0.011	0.72	155	1.1	Paved	2.1	1.21				8.5

Hamilton Designs Project No.: 2019-0246
 Project Name: Arby's I Falcon, CO
 Description: **Water Quality Control Volume (WQCV)**

By: KPB
 Date 10/16/20

WQCV = Water quality control volume (watershed-in)
 a = BMP Type Coefficient
 I = Percent impervious cover (%)

$$WQCV = a \times [0.91(I)^3 - 1.19(I)^2 + 0.78(I)]$$

(Per *Urban Storm Drainage Criteria Manual* Vol. 3)

Drain Time Coefficients (a)	
Drain Time (hours)	Coefficient, a
12 hours (filtration BMP / Retention Pond)	0.8
24 hours (constructed wetland pond)	0.9
40 hours (extended detention)	1.0
No attenuation (ex. Swale)	1.0

SUBAREA ID	ONSITE CONTRIBUTING AREA	IMPERVIOUS AREA	IMPERVIOUS AREA
PR	(acres)	(acres)	(%)
	1.14	0.67	59%
	I	a	WQCV
	(%)		(watershed-inches)
	0.59	1.00	0.23

D. Excerpts from Falcon Highlands Market Place Filing No. 1B Report



Market Place Filing No. 1B
DRAINAGE LETTER
El Paso County, Colorado
June 2009

Prepared for:

Regency Centers
1873 S. Bellaire St., Suite 600
Denver, Colorado 80222

Prepared by:

Springs Engineering
31 N Tejon Street
Suite 315
Colorado Springs, CO 80903
Phone: 719-227-7388

Project No. 090-09-010

CERTIFICATIONS

Market Place Filing No. 1B – Drainage Letter

Engineer's Statement:

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

Charlene Sammons

For and on behalf of Springs Engineering
Charlene Sammons, PE # 36727



Developer's Statement:

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

Escall

Regency Centers

By: Eric A. Chekal 10/16/09

Title: Sr. Project Manager

Address: 1873 Bellaire St., Suite 600 Denver, CO 80222

El Paso County Statement

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

Max Z. Rutschfeld PE
County Engineer/ECM Administrator

10/22/09
Date

Conditions:

Market Place Filing No. 1B - Drainage Letter -

This Drainage Letter/Report is prepared in accordance with the City of Colorado Springs/El Paso County Drainage Criteria Manual. This site was originally part of the Falcon Highlands Market Place Filing No. 1 Preliminary and Final Drainage Reports, prepared by URS. The analysis and drainage plans from this report have been included in the appendix for reference.

GENERAL LOCATION AND DESCRIPTION

This development (Site) was originally platted as Lot 3 of Market Place Filing No. 1, and replatted as Lots 1 and 2 of Market Place Filing No. 1A. The site is situated approximately 240 feet west of the southwest intersection of Woodmen and Meridian Roads. The project Site is approximately 1.94 acres and is located in a portion of Section 12, Township 13 South and Range 65 West of the 6th Principal Meridian. This report is accompanying a plat amendment, which relocates the internal lot line for lots 1 and 2 from the Market Place Filing No. 1A replat. The overall area between the 2 lots being addressed remains the same.

The Site is currently vacant. The vegetation is typical eastern Colorado prairie grass. The terrain is evenly sloped to the south with slopes ranging from 1% to 4%. The entire site will enter into the existing detention pond, Pond MN located just south of the project on the east side of Meridian Road. An existing storm system intercept flows from this area and conveys flow under Meridian Road to the existing Detention Pond. This is consistent with the design in the Market Place Filing No. 1 drainage report. On-site specific drainage will be addressed with the site development plan.

The intermittent runoff from this development drains directly into the Black Squirrel Creek and eventually into the Arkansas River. The Flood Insurance Rate Map (FIRM No. 08041C0575 revised 11/26/03) indicates that there is no floodplain in the vicinity of the proposed site. The floodplain was modified in this area, so that an existing underground storm system along the north side of the site was constructed to convey all the flow from the north side of Woodmen, through and around the site to Detention Pond MN. There remains an existing floodplain north of Woodmen Road.

PREVIOUS DRAINAGE STUDIES

The City of Colorado Springs/El Paso County - Drainage Criteria Manual, Volumes I and II, latest revision.

Falcon Basin - Drainage Basin Planning Study, (DBPS) prepared by URS, latest revision.

Falcon Highlands Master Drainage Development Plan (MDDP) prepared by URS, latest revision

Falcon Highlands Market Place Filing No. 1 Preliminary and Final Drainage Report, prepared by URS October 18, 2005.

EXISTING DRAINAGE CHARACTERISTICS

As stated above, the terrain of the Site is evenly sloped to the south with slopes ranging from 2% to 4%. The existing conditions of this site were analyzed with the Market Place Filing No. 1 drainage report. These calculations and drainage plan have been included in the index for reference.

Market Place Filing No.1B
Drainage Letter

PROPOSED DRAINAGE CHARACTERISTICS

The site was analyzed as part of the Market Place Filing No.1 Final Drainage Report. The area was located within the larger basin D-24. This basin directs flows toward Design Point 20, a stub pipe located at the back of the existing inlet at Design Point 3. This system releases into Pond MN. There are no changes to the proposed site, which would change any basin boundaries, flow paths or design point locations. A copy of the proposed drainage analysis has been included in the appendix. No new calculations have been performed at this time.

STORM SYSTEM:

It is anticipated, that there maybe the need for some on-site structures. These will be designed during the site development stage of the project.

WATER QUALITY:

No water quality will be necessary for this site, as all flows are directed towards Pond MN which has a water quality facility.

DETENTION POND MN:

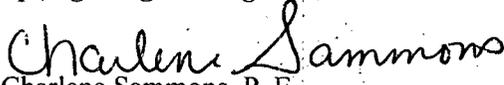
There are current deficiencies in Detention Pond MN. The construction of this site does not increase the deficiencies which are present in the pond. These issues are being dealt with by the Falcon Highlands Metropolitan District directly in order to have drainage credits assigned and to allow their collateral to be released.

CONCLUSION

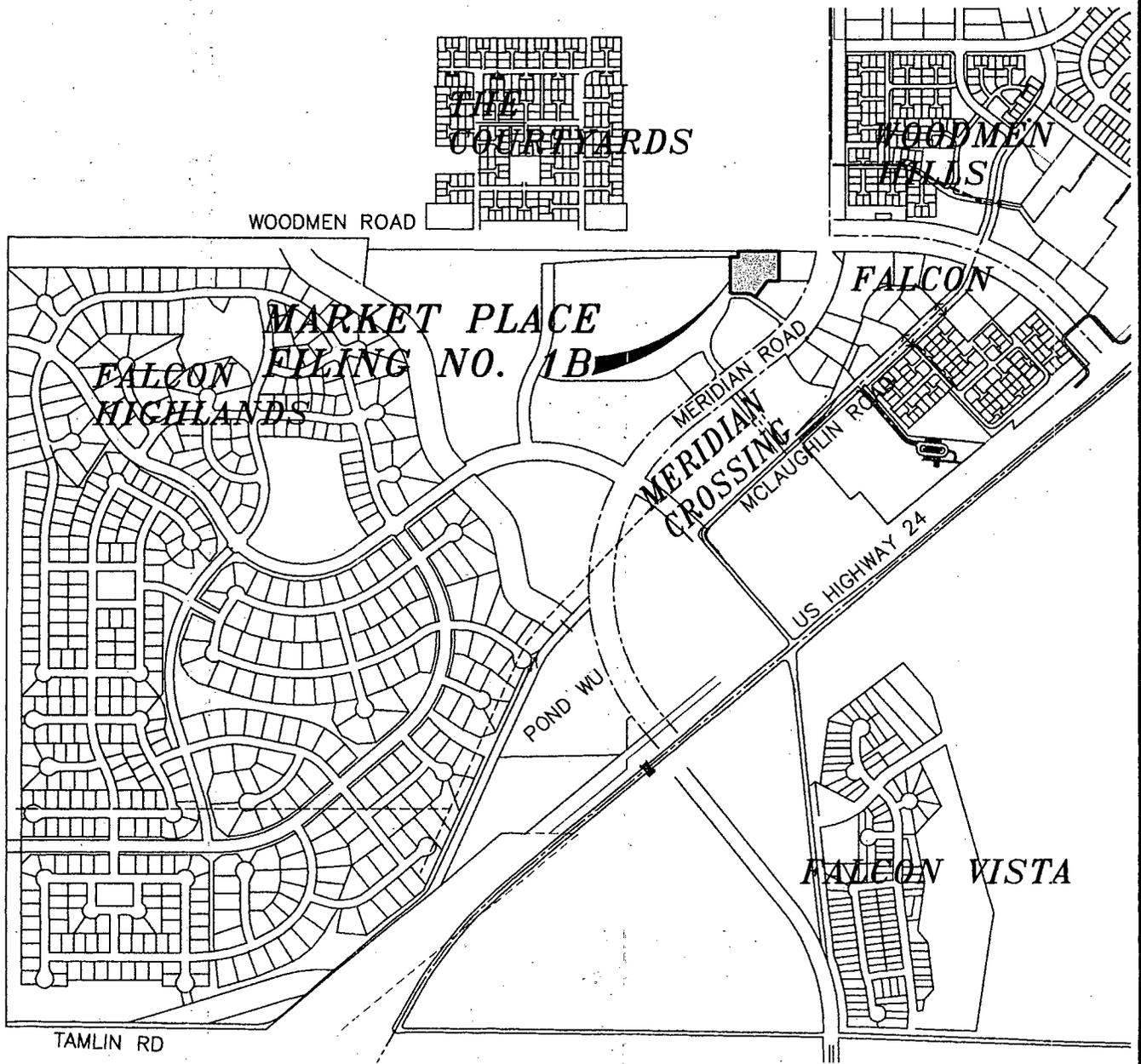
There have been no changes to the proposed site, which allows the drainage calculations performed in the Market Place Filing No. 1 Final Drainage Report to remain current and up to date. This Drainage Report for the Site is in accordance with Section 4.5 of the El Paso County Drainage Criteria manual.

If you have any questions or comments, please contact me at 719-227-7388.

Sincerely,
Springs Engineering


Charlene Sammons, P. E..
Project Engineer

Appendix A: Exhibits



VICINITY MAP
N.T.S.

**FALCON HIGHLANDS
MARKET PLACE FILING NO. 1B**

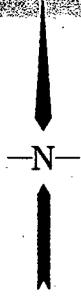
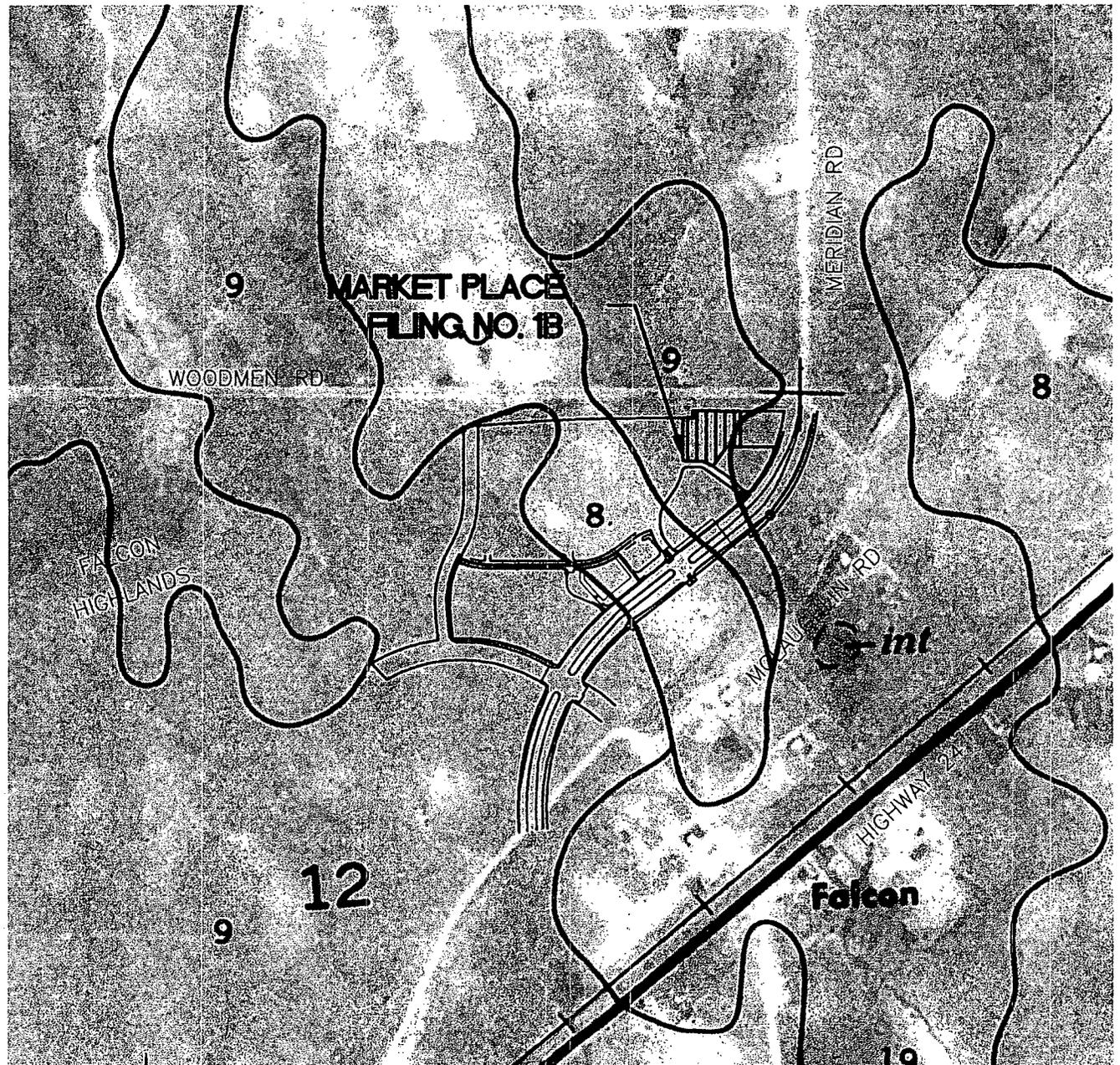
VICINITY MAP

SE Springs
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
FAX: (719) 227-7392

FIGURE 1

PROJECT NO. 090-09-010



SOIL MAP
N.T.S.

**FALCON HIGHLANDS
MARKET PLACE FILING NO. 1B**

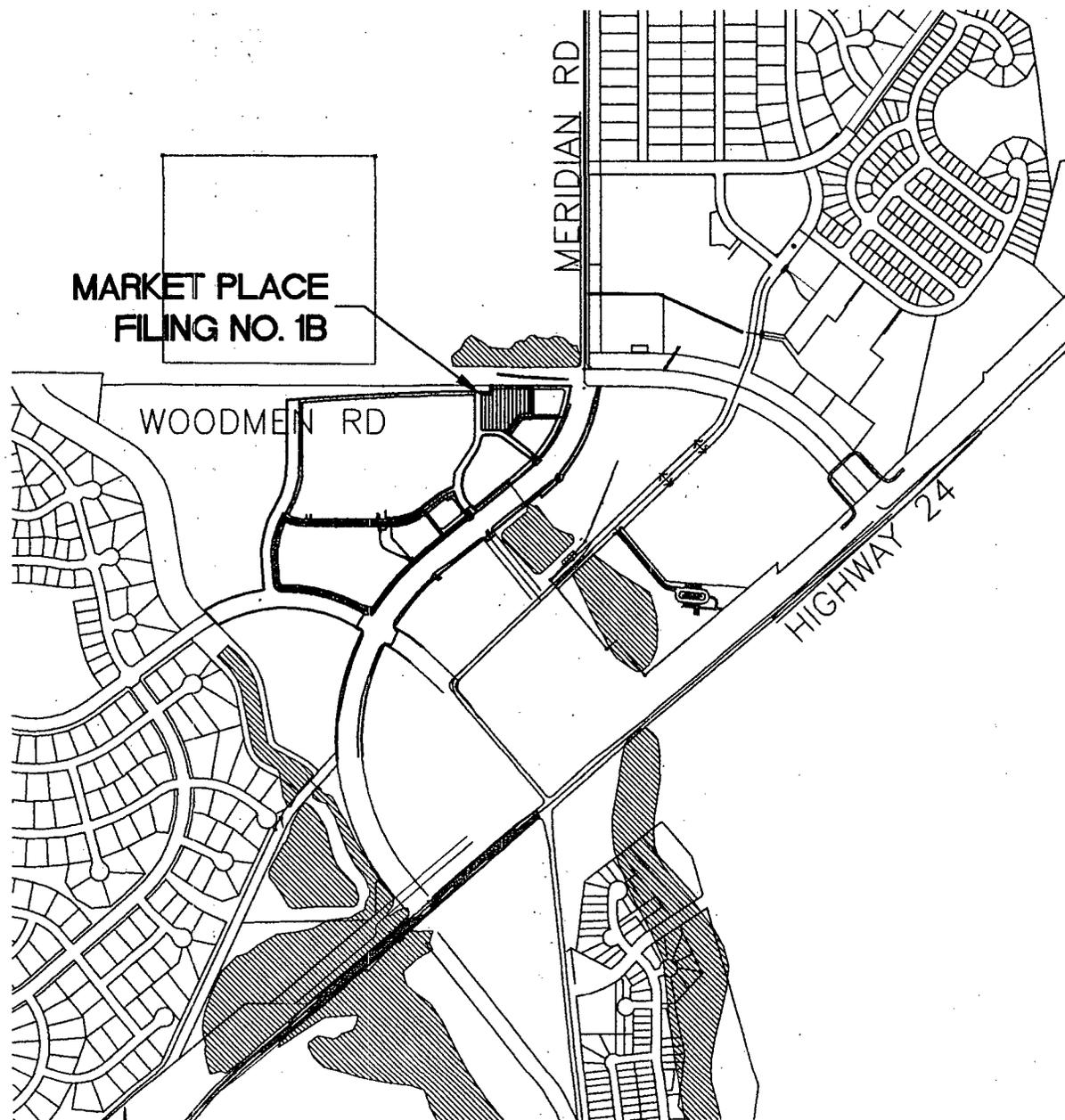
SCS Soils Map

SE Springs
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
FAX: (719) 227-7392

FIGURE 2

PROJECT NO. 090-09-010



FLOODPLAIN MAP

N.T.S.

**FALCON HIGHLANDS
MARKET PLACE FILING NO. 1B**

FIRM MAP 08041CO575 REV 11/26/03

SE Springs
Engineering

31 NORTH TEJON, SUITE 315
COLORADO SPRINGS, CO 80903
TEL: (719) 227-7388
FAX: (719) 227-7392

FIGURE 3

PROJECT NO. 090-09-010

Appendix B: Excerpts from Market Place Filing No. 1 Report
(Calculations & Drainage Plans)

**MARKET PLACE FILING NO. 1-PDR & FDR - EXISTING CONDITIONS
(RATIONAL METHOD Q=CIA)**

BASIN	TOTAL FLOWS				AREA TOTAL (Ac)	WEIGHTED		OVERLAND				CHANNEL				Tc TOTAL (min)	INTENSITY		COMMENTS
	Q ₅	Q ₁₀₀	CA(equiv.)			C ₅	C ₁₀₀	C ₅	Length	Slope	Tco	Length	Slope	Velocity	Tcc		I ₅	I ₁₀₀	
	(c.f.s.)	(c.f.s.)	5 YR	100 YR				(ft)	(ft)	(min)	(ft)	(%)	(fps)	(min)	(in/hr)		(in/hr)		
E-1	21.5	53.7	7.12	9.96	28.47	0.25	0.35	0.25	140	7.5%	9.7	1,650	1.8%	2.7	10.2	19.8	3.0	5.4	
E-2	19.0	47.4	7.65	10.71	30.61	0.25	0.35	0.25	285	5.3%	15.5	2,180	1.9%	2.8	13.1	28.7	2.5	4.4	
E-3	12.8	31.9	5.85	8.19	23.41	0.25	0.35	0.25	400	2.9%	22.4	2,100	1.7%	2.6	13.5	35.8	2.2	3.9	
E-4	24.3	60.4	8.53	11.94	34.12	0.25	0.35	0.25	100	9.0%	7.7	2,320	1.7%	2.6	14.7	22.4	2.8	5.1	
E-5	2.4	5.9	0.66	0.92	2.64	0.25	0.35	0.25	40	1.0%	10.1	545	1.5%	2.4	3.7	13.8	3.6	6.4	
E-6	5.3	13.3	1.39	1.94	5.54	0.25	0.35	0.25	15	2.0%	4.9	975	1.4%	2.4	6.8	11.7	3.9	6.9	
Offsite	21.2	48.5	6.35	8.16	18.14	0.35	0.45	0.25	20	2.0%	5.7	1,650	1.7%	2.6	10.5	16.2	3.3	5.9	
Formula:	C*I*A	C*I*A	Q/I	Q/I	142.93	0.25	0.35			*1				*2	*3	Tco+Tcc	*4	*6	
														20			1.5	2.67	

$Tco = 1.87 * (1.1 - C5) * (L^{0.5}) * ((S * 100)^{-0.33})$ (DCM page 5-11)

$Vc = 20 * S^{0.5}$ (USDCM RO-4)

$Tcc = 1 / V * L / 60$

$I5 = (26.65 * 1.50) / (10 + Tc)^{0.76}$ (City Letter of 1/7/2003)

$I100 = (26.65 * 2.67) / (10 + Tc)^{0.76}$ (City Letter of 1/7/2003)

MARKET PLACE FILING NO. 1-PDR & FDR - EXISTING CONDITIONS SURFACE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
1	E-1	7.12	9.96	19.8	2.9	5.1	21	51	
		TRAVEL TIME							
		7.12	9.96	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	19.8
2	E-2	7.65	10.71	28.7	2.4	4.2	18	45	
		TRAVEL TIME							
		7.65	10.71	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	30.4
3	E-3 Beckett Property MN1 MN2	5.85	8.19	35.8	2.1	3.6	74	517	
		3.06	3.23						
		12.05	62.78						
		14.56	67.83	TRAVEL TIME					
		35.52	142.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	35.8
4	E-4	8.53	11.94	22.4	2.7	4.8	23	57	
		TRAVEL TIME							
		8.53	11.94	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	22.4
5	E-5	0.66	0.92	13.8	3.5	6.1	2	6	
		TRAVEL TIME							
		0.66	0.92	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	13.8
6	E-6	1.39	1.94	11.7	3.8	6.6	5	13	
		TRAVEL TIME							
		1.39	1.94	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	11.7

MARKET PLACE FILING NO. 1- PDR & FDR - DEVELOPED CONDITIONS

SURFACE ROUTING

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
1	D-1	1.38	1.45	5.0	5.2	9.1	7.1	13.2	
		TRAVEL TIME							
		1.38	1.45	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.9	0.0	5.0		
2	D-2	1.31	1.39	5.0	5.2	9.1	6.8	12.6	
		TRAVEL TIME							
		1.31	1.39	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					2.8	0.0	5.0		
3	D-4	1.16	1.23	5.0	5.2	9.1	6.0	11.1	
		TRAVEL TIME							
		1.16	1.23	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			83	3.3	0.4	5.4			
5	D-5	1.22	1.29	5.0	5.2	9.1	6.4	11.7	
		TRAVEL TIME							
		1.22	1.29	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					4.5	0.0	5.0		
6	D-7	1.96	2.07	6.4	4.8	8.4	9.4	17.4	
		TRAVEL TIME							
		1.96	2.07	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					4.5	0.0	6.4		
7	DP-6 (INLET) D-16	0.62	0.80	6.4	4.8	8.4	40.8	76.5	
		7.88	8.32	TRAVEL TIME					
		8.51	9.12	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			77	4.7	0.3	6.7			
10	D-6	2.02	2.13	6.8	4.7	8.2	9.5	17.5	
		TRAVEL TIME							
		2.02	2.13	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			83	5.8	0.2	7.0			
11	D-19 D-25	5.40	5.70	8.8	4.3	7.4	38.7	71.3	
		3.69	3.90	TRAVEL TIME					
		9.09	9.60	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					0.0	0.0	8.8		
13	D-12	1.94	2.04	6.3	4.8	8.4	9.4	17.2	
		TRAVEL TIME							
		1.94	2.04	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			98	6.1	0.3	6.5			

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS		
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
14	D-11	1.96	2.07	6.8	4.7	8.2	9.2	17.0	
		TRAVEL TIME							
		1.96	2.07	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
					5.2	0.0	6.8		
15	D-15	2.09	2.20	5.4	5.1	8.9	10.6	19.6	
		TRAVEL TIME							
		2.09	2.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			347	2.0	2.9	8.3			
16	D-14	2.36	2.49	5.8	5.0	8.6	11.7	21.5	
		TRAVEL TIME							
		2.36	2.49	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			62	9.0	0.1	5.9			
17	DP-7 DP-13 D-17 OFFSITE	8.51	9.12	8.7	4.3	7.5	157.9	300.6	
		1.94	2.04						
		21.50	22.70						
		4.89	6.28						
		36.83	40.14						Type/flow
			36	1.5	0.4	9.1			
18	DP-17 DP-15 (INLET) DP-16 (INLET)	36.83	40.14	5.9	4.9	8.6	181.2	345.5	
		0.00	0.07	TRAVEL TIME					
		0.00	0.00	TRAVEL TIME					
		36.83	40.21	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			139	8.4	0.3	6.2			
19	D-18	0.72	0.76	5.5	5.0	8.8	3.6	6.7	
		TRAVEL TIME							
		0.72	0.76	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			62	9.0	0.1	5.7			
20	D-24	15.88	16.76	6.9	4.7	8.2	74.2	136.9	
		TRAVEL TIME							
		15.88	16.76	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			139	8.4	0.3	7.2			
21	D-26 DP-10 (INLET) D-22 DP-19 (INLET)	1.28	1.35	16.2	3.2	5.7	10.2	12.3	
		0.64	0.82						
		1.15	1.22						
		0.06	0.04						
		3.13	2.17						Type/flow
			139	8.4	0.3	16.5			
22	D-27 DP 21 (INLET)	0.77	0.82	8.7	4.3	7.5	3.3	6.1	
		0.00	0.00	TRAVEL TIME					
		0.77	0.82	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
			139	8.4	0.3	8.9			

DESIGN POINT	CONTRIBUTING BASINS	CA (equivalent)		Tc (min.)	INTENSITY		TOTAL FLOWS	
		CA(5)	CA(100)		I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
23	DP-11 DP-22 (INLET)	9.09	9.60	10.5	4.0	6.9	39.2	72.2
		0.77	0.82					
		TRAVEL TIME						
		9.86	10.41	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					139	8.4	0.3	
25	DP-18 POND WU DP-14 D-30	36.83	40.21	13.0	3.6	6.3	221.9	1479.1
		19.44	188.25					
		1.96	2.07					
		3.29	4.23					
TRAVEL TIME								
		61.53	234.76	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					83	5.8	0.2	13.3
26	DP-3 (INLET) DP-5 (INLET) DP-2 (INLET) DP-20 BECKETT PROP DP-MN1 DP-MN2	0.00	0.02	7.2	4.6	8.1	160.9	788.5
		0.00	0.09					
		0.29	0.41					
		15.88	16.76					
		3.06	3.23					
		7.07	37.20					
		8.61	40.20					
TRAVEL TIME								
		34.91	97.91	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
						5.8	0.0	7.2
27	D-31	0.11	0.14	7.1	4.6	8.1	0.5	1.2
		TRAVEL TIME						
		0.11	0.14	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					139	8.4	0.3	7.3
28	D-28	0.42	0.45	10.2	4.0	7.0	1.7	3.1
		TRAVEL TIME						
		0.42	0.45	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)
					139	8.4	0.3	10.5

**MARKET PLACE FILING NO. 1- PDR & FDR - DEVELOPED CONDITIONS
INLET CALCULATIONS**

DP	Inlet size L(i)	INLET TYPE	CROSS SLOPE	STREET SLOPE	Q(5)	Q(100)	Q ₅						Q ₁₀₀					
							Q _i	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD	Q _i	CA(eqv.)	FB	CA(eqv.)	DEPTH (max)	SPREAD
2	15	FLOW-BY	2.0%	0.5%	7	13	5.3	1.02	2	0.29	0.42	16.9	8.8	0.97	4	0.41	0.51	21.2
3	10	SUMP	2.0%	SAG	6	11	6.0	1.16	0	0.00	0.50		10.9	1.20	0	0.02	0.50	
5	10	SUMP	2.0%	SAG	6	12	6.4	1.22	0	0.00	0.50		10.9	1.20	1	0.09	0.50	
6	15	FLOW-BY	2.0%	1.0%	9	17	6.4	1.34	3	0.62	0.42	16.7	10.7	1.27	7	0.80	0.51	21.0
10	15	FLOW-BY	2.0%	1.0%	9	17	6.5	1.37	3	0.64	0.42	16.8	10.7	1.31	7	0.82	0.51	21.1
13	20	SUMP	2.0%	SAG	9	17	9.4	1.94	0	0.00	0.50		17.2	2.04	0	0.00	0.50	
14	20	SUMP	2.0%	SAG	9	17	9.2	1.96	0	0.00	0.50		17.0	2.07	0	0.00	0.50	
15	20	SUMP	2.0%	SAG	11	20	10.6	2.09	0	0.00	0.50		18.9	2.14	1	0.07	0.50	
16	25	SUMP	2.0%	SAG	12	22	11.7	2.36	0	0.00	0.50		21.5	2.49	0	0.00	0.50	
19	5	FLOW-BY	2.0%	2.8%	1	1	0.4	0.09	0	0.06	0.19	5.3	0.4	0.05	0	0.04	0.19	5.4
21	25	SUMP	2.0%	SAG	10	12	10.2	3.13	0	0.00	0.50		12.3	2.17	0	0.00	0.50	
22	5	SUMP	2.0%	SAG	3	6	3.3	0.77	0	0.00	0.50		6.1	0.82	0	0.00	0.50	
27	5	FLOW-BY	2.0%	0.6%	1	1	0.4	0.08	0	0.03	0.21	6.2	0.8	0.10	0	0.05	0.25	8.4
28	10	FLOW-BY	2.0%	0.6%	2	3	1.4	0.35	0	0.08	0.28	9.7	2.3	0.33	1	0.12	0.33	12.2

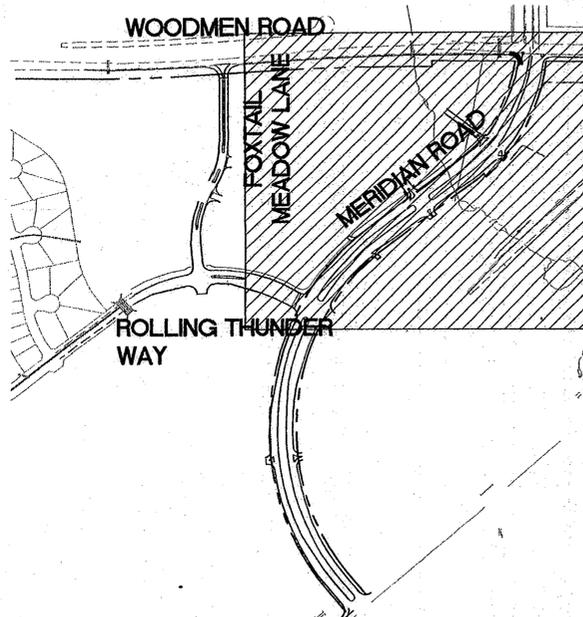
**STREET CAPACITY
VERTICAL CURB
FOR 1/2 STREET SECTION**

	Formula	Slope	Slope	n	Type	flow	Q _{max}	Q	Comments
Residential	Q=171.7 S ^{1/2}	0.5%	0.02	0.016	V	0.5	34	12.0	
		1.0%					34	17.0	
		1.5%					34	20.8	
		2.0%					34	24.1	
		2.5%					34	26.9	
		3.0%					34	29.5	
		3.5%					34	31.8	
		4.0%					34	34.0	
Collector/Arterial	Q=171.7 S ^{1/2}	0.5%	0.02	0.016	V	0.5	34	12.0	
		1.0%					34	17.0	
		1.5%					34	20.8	
		2.0%					34	24.1	
		2.5%					34	26.9	
		3.0%					34	29.5	
		3.5%					34	31.8	
		4.0%					34	34.0	

**STREET CAPACITY
RAMP CURB
FOR 1/2 STREET SECTION**

	Formula	Slope	Slope	n	Type	flow	Q _{max}	Q	Comments
Residential	Q=112.6 S ^{1/2}	0.5%	0.02	0.016	R	0.5	20	8.0	County ramp curb is 6"
		1.0%					20	11.3	
		1.5%					20	13.8	
		2.0%					20	15.9	
		2.5%					20	17.8	
		3.0%					20	19.5	
		3.15%					20	20.0	

DEVELOPED DRAINAGE PLAN - FALCON HIGHLANDS MARKET PLACE FILING NO. 1



KEY MAP
N.T.S.

LEGEND

- BASIN DATA
- DESIGN POINT
- ROAD HIGH POINT
- ROAD LOW POINT
- ROAD GRADE
- BASIN BOUNDARY
- FLOW PATH
- EX. 10' CONTOUR
- EX. 2' CONTOUR
- PR 10' CONTOUR
- PR 2' CONTOUR
- WEST TRIBUTARY FLOODPLAIN
(LOMR SUBMITTAL-AWAITING APPROVAL)
- MIDDLE TRIBUTARY FLOODPLAIN
(CLOMR SUBMITTAL-APPROVED MAY 2005)
- EXISTING WETLANDS

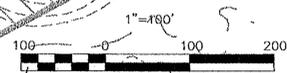
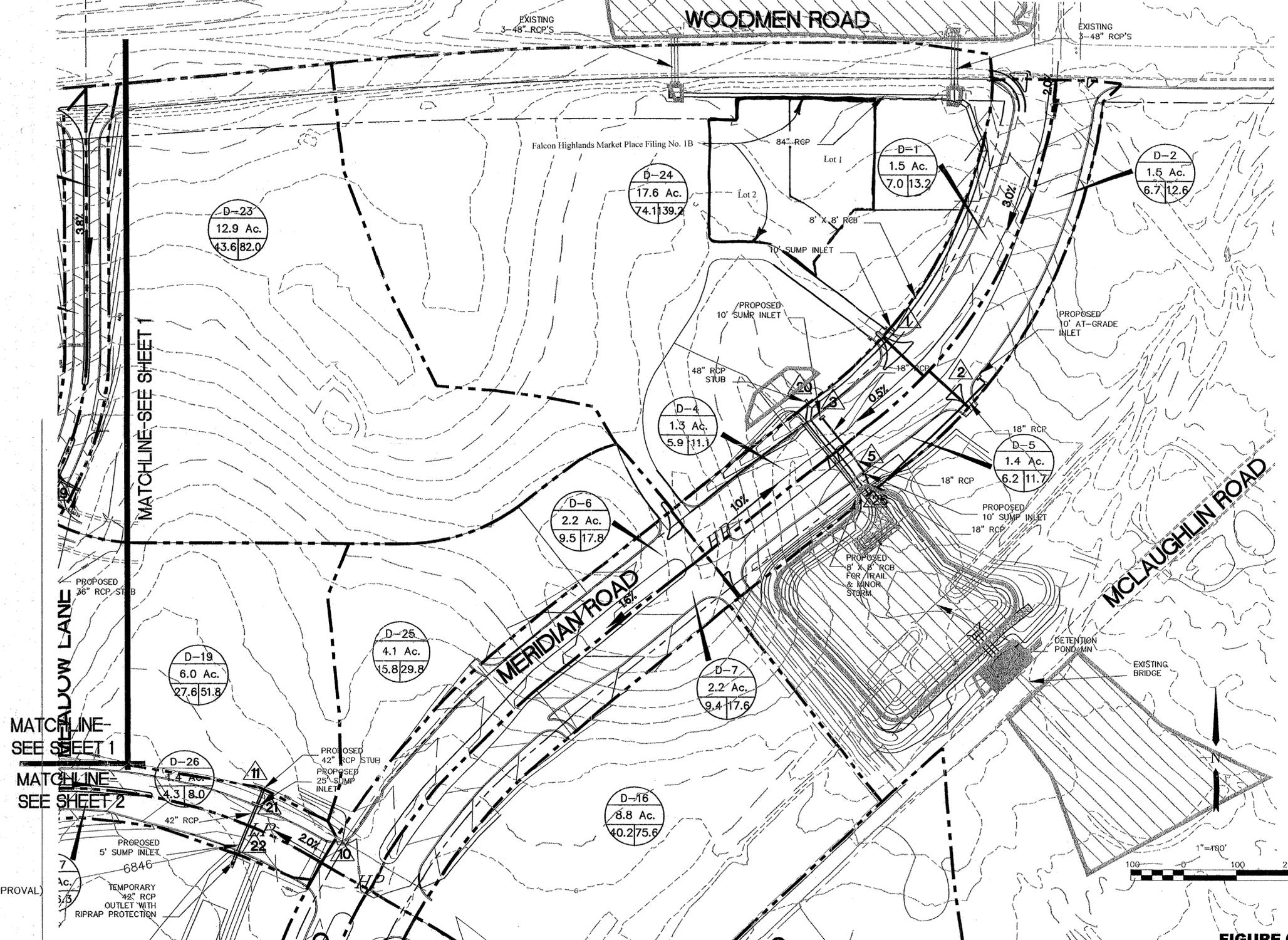


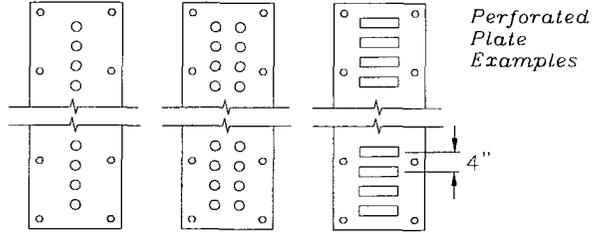
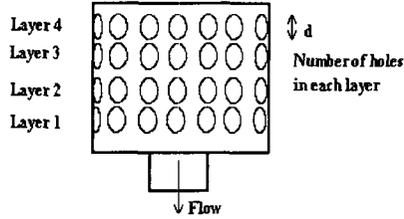
FIGURE 6

REVISIONS:			ENGINEER:		URS 9960 FEDERAL DRIVE #300 COLORADO SPRINGS, COLORADO 80921 PHONE: (719) 531-0001 FAX: (719) 531-0007 PROJECT: F.H. MARKET PLACE - PDR/FDR SHEET TITLE: DEVELOPED DRAINAGE PLAN FROM: _____ TO: _____ JOB NO. 21711426 SHEET 4 OF 4
NO.	DESCRIPTION	DATE	DESIGNED BY: CMS	DATE: 8/9/05	
			DRAWN BY: CMS	DATE: 8/9/05	
			CHECKED BY: XXX	DATE: XX/XX/XX	
			48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS 1-800-922-1987 (SEE COVER FOR LIST OF UTILITY CONTACTS)		

Appendix G: Water Quality Pond Calculations

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Armstrong Development
 Basin ID: Lowes Site Incl. Meridian Crossing



WQCV Design Volume (Input):

Catchment Imperviousness, $I_p = 99.0$ percent
 Catchment Area, $A = 27.6600$ acres
 Depth at WQCV outlet above lowest perforation, $H = 12.00$ inches
 Number of layers, $N_L = 3$
 Vertical distance between layers, $h = 4.00$ inches
 Orifice discharge coefficient, $C_o = 0.65$

Diameter of holes, $D =$ _____ in.
 Number of holes per layer, $N =$ _____
OR
 Height of slot, $H = 2.00$ in.
 Width of slot, $W = 4.24$ in.

Outlet Design Information (Output):

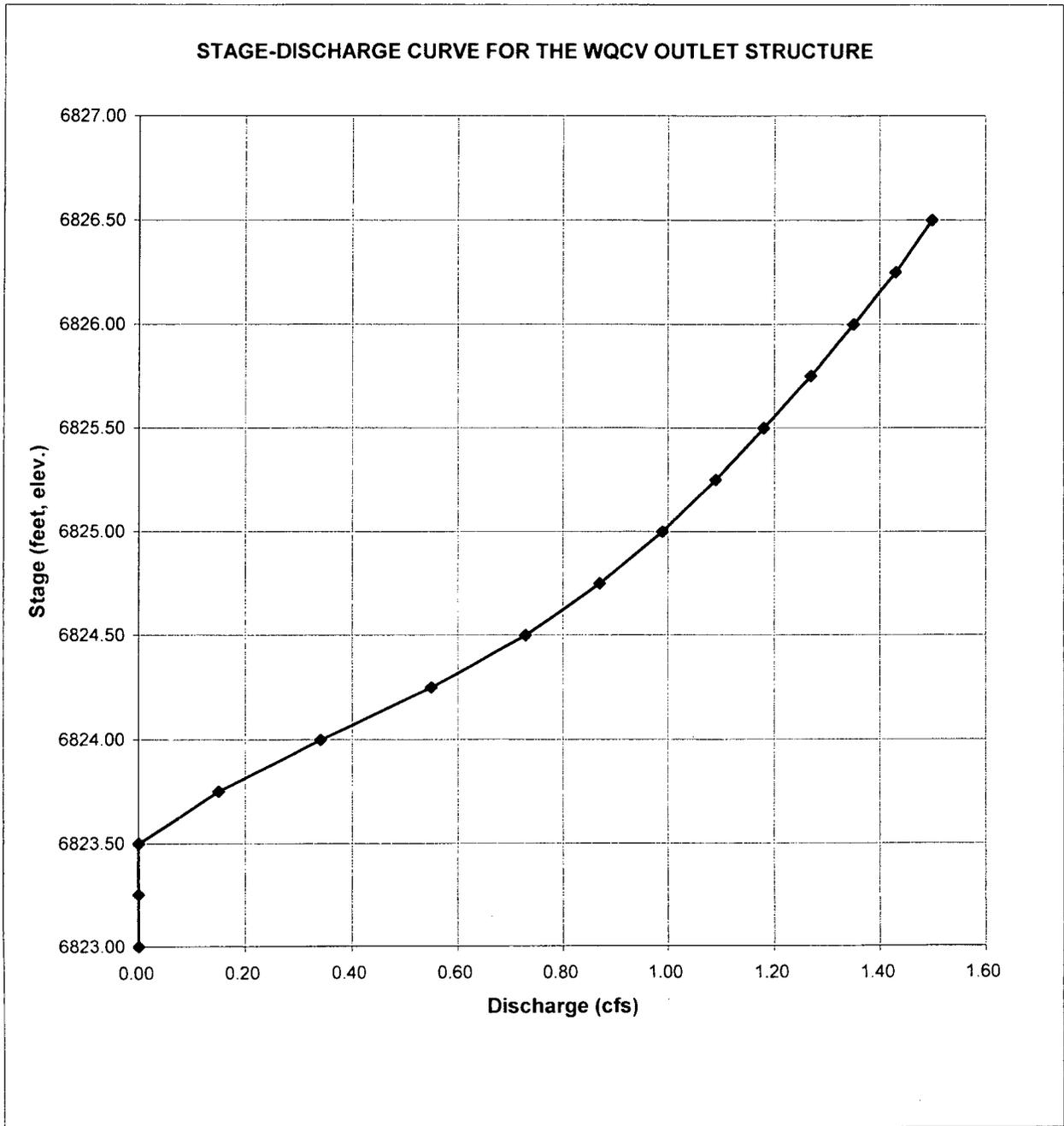
Water Quality Capture Volume ($1.0 * (0.91 * I_3 - 1.19 * I_2 + 0.78 * I_1)$), WQCV ≈ 0.49 watershed inches
 Design Volume ($WQCV / 12 * Area * 1.2$) Vol ≈ 1.3522 acre-feet
 Recommended maximum outlet area per layer (based on 4" vertical spacing of layers), $A_o = 8.47$ square inches
 Total opening area at each layer, $A_o = 8.47$ square inches
 Total opening area at each layer, $A_o = 0.0588$ square feet

Calculation of Collection Capacity :

Stage ft (input)	Central Elevations of Layers of Holes in feet												Flow cfs	
	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	Layer 8	Layer 9	Layer 10	Layer 11	Layer 12		
	6823.50	6823.83	6824.17											
	Collection Capacity for Each Layer of Holes in cfs													
6823.00	0.000	0.000	0.000											0.00
6823.25	0.000	0.000	0.000											0.00
6823.50	0.000	0.000	0.000											0.00
6823.75	0.153	0.000	0.000											0.15
6824.00	0.217	0.127	0.000											0.34
6824.25	0.266	0.199	0.087											0.55
6824.50	0.307	0.251	0.176											0.73
6824.75	0.343	0.294	0.234											0.87
6825.00	0.376	0.332	0.280											0.99
6825.25	0.406	0.366	0.319											1.09
6825.50	0.434	0.397	0.354											1.18
6825.75	0.460	0.425	0.386											1.27
6826.00	0.485	0.452	0.415											1.35
6826.25	0.509	0.477	0.443											1.43
6826.50	0.532	0.501	0.468											1.50
	#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	#N/A											#N/A
	#N/A	#N/A	#N/A											#N/A
	#N/A	#N/A	#N/A											#N/A

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

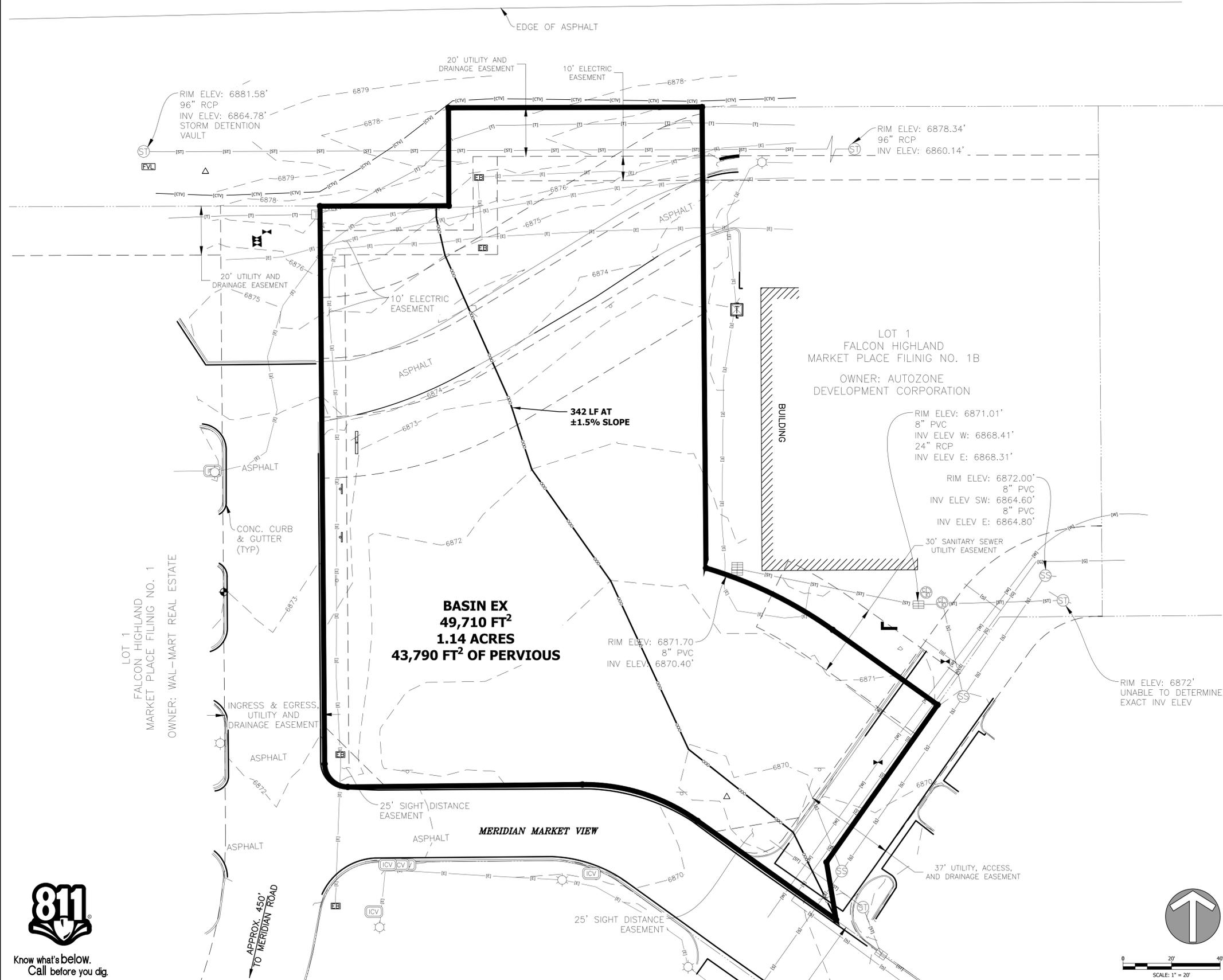
Project: Armstrong Development
Basin ID: Lowes Site Incl. Meridian Crossing



EAST WOODMEN ROAD
(PUBLIC R.O.W. VARIES)
(REC. NO. 215032985 & 204062427)

ASPHALT

APPROX. 500'
TO MERIDIAN ROAD
INTERSECTION



LEGEND OF EXISTING FEATURES

---	PROPERTY LINE	◆	BENCHMARK
---	RIGHT-OF-WAY LINE	○	RBC MONUMENT
---	SETBACK LINE	△	SECTION CORNER
---	EASEMENT	ET	TRANSFORMER
---	SECTION LINE	ET	HVAC
---	CENTERLINE	E	ELECTRIC METER
---	799	⊕	ELECTRIC MANHOLE
---	800	⊕	POWER POLE GUY WIRE
---	INDEX CONTOUR	☆	LIGHT POLE
---	TELEPHONE UNDER GR.	⊕	TELEPHONE PEDESTAL
---	TELEPHONE OVERHEAD	⊕	TELEPHONE MANHOLE
---	FIBER OPTIC SERVICE	⊕	GAS MARKER
---	GAS SERVICE	⊕	ELECTRIC MARKER
---	POWER UNDERGROUND	⊕	TRAFFIC MANHOLE
---	POWER OVERHEAD	⊕	GAS METER
---	WATER SERVICE	⊕	GAS VALVE
---	SANITARY SEWER	⊕	STORM MANHOLE
---	STORM SEWER	⊕	SANITARY MANHOLE
---	POND NORMAL POOL	⊕	STORM INLETS
---	EX. FLOWLINE	⊕	CLEAN-OUT
---	CHAIN LINK FENCE	⊕	DOWNSPOUT
---	FARM FENCE	⊕	FIRE HYDRANTS
---	WOOD FENCE	⊕	WATER METER
---	IRON FENCE RAILING	⊕	WATER VALVES
---	BUILDING STRUCTURE	⊕	POST INDICATOR VALVE
---	EX. BUILDING OVERHEAD	⊕	FIRE DEPARTMENT CONN.
---	RIM	+	SIGNS
---	INV.	+	MAILBOX
---	FFE	+	ADA PARKING
---		+	PARKING COUNT
---		+	TREES
---		+	SHRUB
---		+	SPOT GRADE

GRADING PLAN LEGEND

---	ST	STORM SEWER	RIM	RIM ELEVATION
---	SSD	SUBSURFACE DRAIN	INV.	INVERT ELEVATION
---	---	SWALE FLOWLINE	FFE	FINISHED FLOOR ELEVATION
---	NP	POND (NORMAL POOL)	---	FLOW ARROW
---	799	INTERMEDIATE CONTOUR	⊕	STORM MANHOLE
---	800	INDEX CONTOUR	⊕	STORM INLETS
---	---	MATCH EXISTING	⊕	STORM ENDSECTION
---	---	PAVEMENT SPOT GRADE	⊕	CLEAN-OUT
---	---	GROUND SPOT GRADE	⊕	DOWNSPOUT
---	---	TOP OF CURB	---	
---	---	BOTTOM OF CURB	---	
---	---	TOP OF WALL	---	
---	---	BOTTOM OF WALL	---	

REVISION BLOCK

NOT FOR CONSTRUCTION

DATE: 10/16/2020
DRAWN BY: KPB
CHECKED BY: AMT

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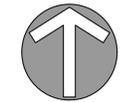
CONSTRUCTION PLANS FOR:
ARBY'S | FALCON, CO
11775 Meridian Market View
Falcon, Colorado 80831

BELL AMERICAN GROUP, LLC
8930 Bath Street, Suite L
Indianapolis, Indiana 46256

PROJECT NO. 2019-0246
DATE 10/16/2020
SCALE 1" = 20'
SHEET NAME **EXISTING BASINS MAP**
SHEET NO. **B-1**



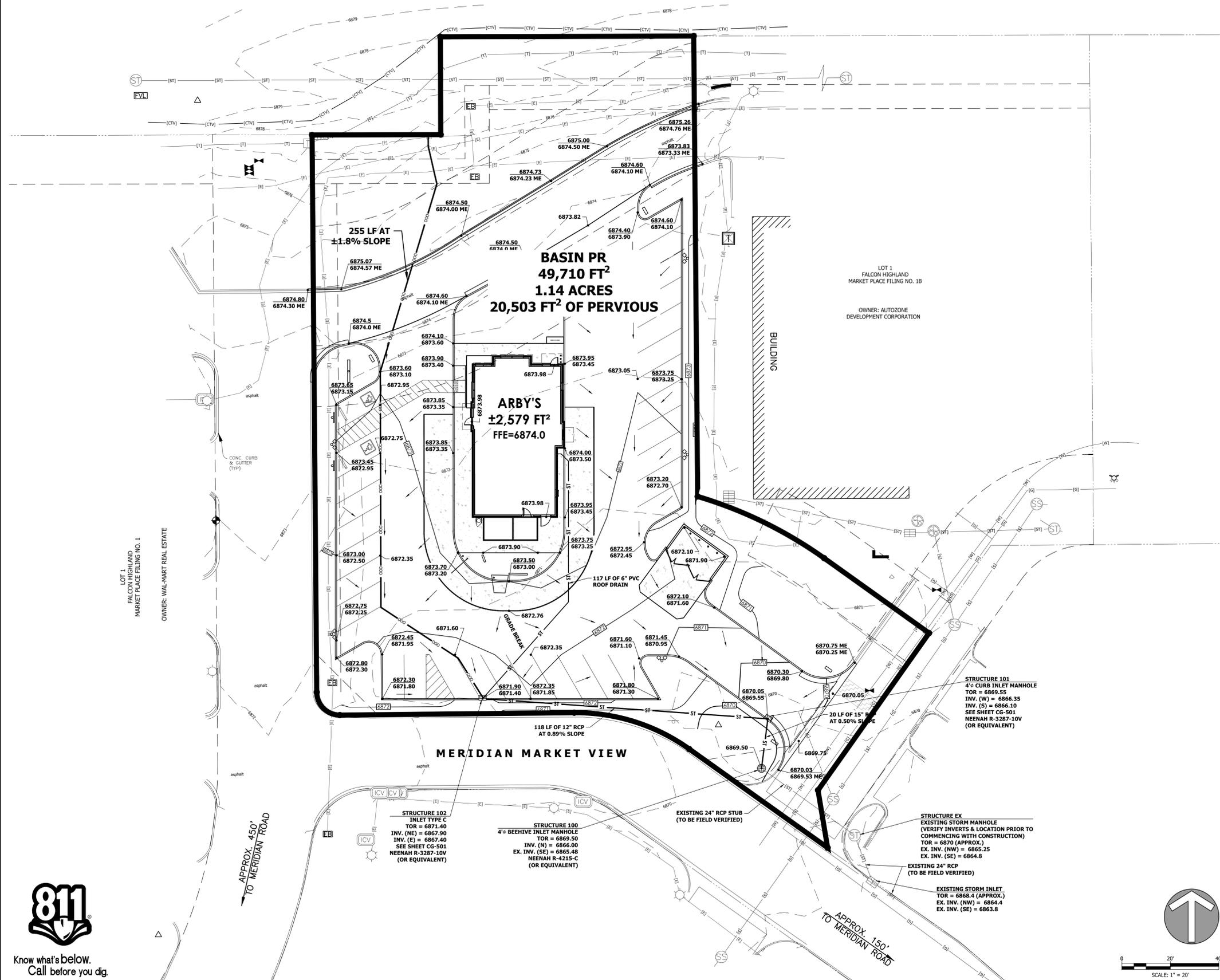
Know what's below.
Call before you dig.



SCALE: 1" = 20'

p:\2019\0246 - bell american group - falcon, colorado\existing conditions\1 - existing basins.mxd.dwg

APPROX. 500'
TO MERIDIAN ROAD
INTERSECTION



LEGEND OF EXISTING FEATURES

---	PROPERTY LINE	◆	BENCHMARK
---	RIGHT-OF-WAY LINE	○	RBC
---	SETBACK LINE	△	SECTION CORNER
---	EASEMENT	⊠	TRANSFORMER
---	SECTION LINE	⊞	HVAC
---	CENTERLINE	⊞	ELECTRIC METER
---	799	⊞	ELECTRIC MANHOLE
---	INTERMEDIATE CONTOUR	⊞	POWER POLE GUY WIRE
---	800	⊞	LIGHT POLE
---	INDEX CONTOUR	⊞	TELEPHONE PEDESTAL
---	TELEPHONE UNDER GR.	⊞	TELEPHONE MANHOLE
---	TELEPHONE OVERHEAD	⊞	GAS MARKER
---	FIBER OPTIC SERVICE	⊞	ELECTRIC MARKER
---	GAS SERVICE	⊞	TRAFFIC MANHOLE
---	POWER UNDERGROUND	⊞	GAS METER
---	POWER OVERHEAD	⊞	GAS VALVE
---	WATER SERVICE	⊞	STORM MANHOLE
---	SANITARY SEWER	⊞	SANITARY MANHOLE
---	STORM SEWER	⊞	STORM INLETS
---	POND NORMAL POOL	⊞	CLEAN-OUT
---	EX. FLOWLINE	⊞	DOWNSPOUT
---	CHAIN LINK FENCE	⊞	FIRE HYDRANTS
---	FARM FENCE	⊞	WATER METER
---	WOOD FENCE	⊞	WATER VALVES
---	IRON FENCE RAILING	⊞	POST INDICATOR VALVE
---	BUILDING STRUCTURE	⊞	FIRE DEPARTMENT CONN.
---	EX. BUILDING OVERHEAD	⊞	SIGNS
---	RIM	⊞	MAILBOX
---	INVERT	⊞	ADA PARKING
---	FFE	⊞	PARKING COUNT
---		⊞	TREES
---		⊞	SHRUB
---		⊞	SPOT GRADE

GRADING PLAN LEGEND

---	ST	STORM SEWER	RIM	RIM ELEVATION
---	SSD	SUBSURFACE DRAIN	INV.	INVERT ELEVATION
---	---	SWALE FLOWLINE	FFE	FINISHED FLOOR ELEVATION
---	NP	POND (NORMAL POOL)	---	FLOW ARROW
---	---	INTERMEDIATE CONTOUR	⊞	STORM MANHOLE
---	---	INDEX CONTOUR	⊞	STORM INLETS
---	800.00 ME -	MATCH EXISTING	⊞	STORM ENDSECTION
---	800.00 -	PAVEMENT SPOT GRADE	⊞	CLEAN-OUT
---	800.4 -	GROUND SPOT GRADE	⊞	DOWNSPOUT
---	800.00	TOP OF CURB	⊞	
---	800.50	BOTTOM OF CURB	⊞	
---	800.00 TW	TOP OF WALL	⊞	
---	800.50 BW	BOTTOM OF WALL	⊞	

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Michael Thompson

DATE: 12/15/2020
DRAWN BY: KPB
CHECKED BY: AMT

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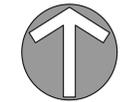
CONSTRUCTION PLANS FOR:
ARBY'S | FALCON, CO
11775 Meridian Market View
Falcon, Colorado 80831

RB AMERICAN GROUP, LLC
4200 Oak Tree Blvd
Independence, Ohio 44131

PROJECT NO.: 2019-0246
DATE: 12/15/2020
SCALE: 1" = 20'
SHEET NAME: **PROPOSED BASINS MAP**
SHEET NO.: **C-1**



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SCALE: 1" = 20'

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ASPHALT

APPROX. 500'
TO MERIDIAN ROAD
INTERSECTION

EDGE OF ASPHALT

LEGEND OF EXISTING FEATURES

- PROPERTY LINE
- RIGHT-OF-WAY LINE
- SETBACK LINE
- EASEMENT
- SECTION LINE
- CENTERLINE
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- TELEPHONE UNDER GR.
- TELEPHONE OVERHEAD
- FIBER OPTIC SERVICE
- GAS SERVICE
- POWER UNDERGROUND
- POWER OVERHEAD
- WATER SERVICE
- SANITARY SEWER
- STORM SEWER
- POND NORMAL POOL
- EX. FLOWLINE
- CHAIN LINK FENCE
- FARM FENCE
- WOOD FENCE
- IRON FENCE | RAILING
- BUILDING | STRUCTURE
- EX. BUILDING OVERHEAD
- RIM
- INV.
- FFE
- BENCHMARK
- MONUMENT
- SECTION CORNER
- TRANSFORMER
- HVAC
- ELECTRIC METER
- ELECTRIC MANHOLE
- POWER POLE | GUY WIRE
- LIGHT POLE
- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- GAS MARKER
- ELECTRIC MARKER
- TRAFFIC POLE
- TRAFFIC MANHOLE
- GAS METER
- GAS VALVE
- STORM MANHOLE
- SANITARY MANHOLE
- STORM INLETS
- CLEAN-OUT
- DOWNSPOUT
- FIRE HYDRANTS
- WATER METER
- WATER VALVES
- POST INDICATOR VALVE
- FIRE DEPARTMENT CONN.
- SIGNS
- MAILBOX
- ADA PARKING
- PARKING COUNT
- TREES
- SHRUB
- SPOT GRADE

GRADING PLAN LEGEND

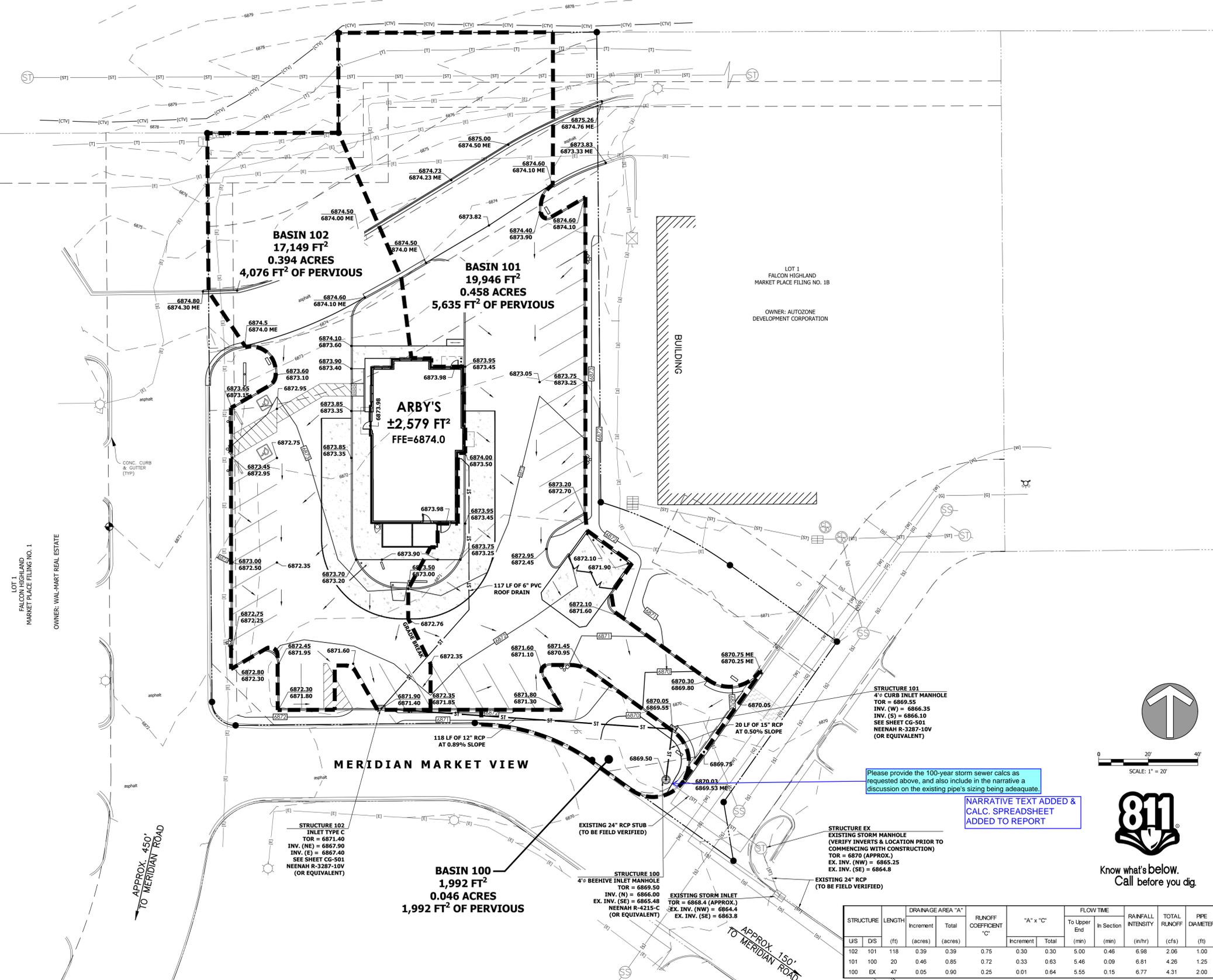
- ST - STORM SEWER
- SSD - SUBSURFACE DRAIN
- SWALE | FLOWLINE
- NP - POND (NORMAL POOL)
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- 800.00 ME - MATCH EXISTING
- 800.00 - PAVEMENT SPOT GRADE
- 800.4 - GROUND SPOT GRADE
- 800.00 - TOP OF CURB
- 800.50 - BOTTOM OF CURB
- 800.00 TW - TOP OF WALL
- 800.50 BW - BOTTOM OF WALL
- RIM - RIM ELEVATION
- INV. - INVERT ELEVATION
- FFE - FINISHED FLOOR ELEVATION
- FLOW ARROW
- STORM MANHOLE
- STORM INLETS
- STORM ENDSECTION
- C.O. - CLEAN-OUT
- D.S. - DOWNSPOUT

Rational Method runoff coefficients

All w airtight roof surfaces	0.90
Pavement	0.90
Gravel	0.80
Slightly pervious soil (w th turf)	0.25

BASIN	All w airtight surfaces			Pervious soil / turf			Composite C		
	Surf. (ft²)	Pavement (ft²)	Gravel (ft²)	Surf. (ft²)	Total (ft²)	Total (acres)	Composite C	Total (ft²)	Total (acres)
102	2,579	10,494	0	4,076	17,149	0.394	0.75		
101	0	14,311	0	5,635	19,946	0.458	0.72		
100	0	0	0	1,992	1,992	0.046	0.25		

STRUCTURE	LENGTH	DRAINAGE AREA "A"		RUNOFF COEFFICIENT "C"	"A" x "C"		FLOW TIME		RAINFALL INTENSITY	TOTAL RUNOFF	PIPE DIAMETER	SLOPE OF SEWER	FULL CAPACITY	VELOCITY		RIM ELEVATION		INVERT ELEVATION		COVER	
		Increment	Total		Increment	Total	To Upper End	In Section						Flowing Full	Design Flow	U/S Structure	D/S Structure	U/S Structure	D/S Structure	U/S Structure	D/S Structure
102	101	118	0.39	0.39	0.75	0.30	0.30	5.00	0.46	6.98	2.06	1.00	0.89	3.37	4.29	6871.40	6869.55	6867.40	6866.35	2.83	2.03
101	100	20	0.46	0.85	0.72	0.33	0.63	5.46	0.09	6.81	4.26	1.25	0.50	4.58	3.73	6869.55	6869.50	6866.10	6866.00	2.01	2.06
100	EX	47	0.05	0.90	0.25	0.01	0.64	5.55	0.15	6.77	4.31	2.00	0.50	16.04	5.11	6869.50	6869.53	6865.48	6865.24	1.77	2.04



Please provide the 100-year storm sewer calcs as requested above, and also include in the narrative a discussion on the existing pipe's sizing being adequate.

NARRATIVE TEXT ADDED & CALC. SPREADSHEET ADDED TO REPORT

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PROJECT NO.
2019-0246

DATE
12/15/2020

SCALE
1" = 20'

SHEET NAME
STORM SEWER BASINS MAP

SHEET NO.

D-1

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