



**PRELIMINARY DRAINAGE REPORT
BLACK ROCK COFFEE OF COLORADO SPRINGS
(UPDATE TO DRAINAGE
REPORT FOR ADVANCED STORAGE
5560 BARNES ROAD)**

for

**BRC OF COLORADO SPRINGS
5560 BARNES RD,
COLORADO SPRINGS, CO**

Prepared for

**BLACK ROCK
DEVELOPMENT
COMPANY, LLC
PARKER, CO**

Submitted by: Atwell, LLC

Project Number: 24005174

I. DESIGN ENGINEER'S STATEMENT:

This report and plan for the drainage design of Black Rock Coffee of Colorado Springs was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plans have been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Carlos Casas, P.E.

Colorado Number PE.0055604

For and On Behalf of ATWELL, LLC

II. OWNER/DEVELOPER'S STATEMENT:

Black Rock Development Company, LLC hereby certifies that the drainage facilities for Black Rock Coffee of Colorado Springs shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs 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 Colorado Springs pursuant to section 7.4.701 of the City Code; and cannot, on behalf of Black rock Coffee of Colorado Springs, guarantee that final drainage design review will absolve Black Rock Development Company, LLC 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.

Rami Khalil

Black Rock Development Company, LLC

Parker, CO

III. CITY OF COLORADO SPRINGS:

Filed in accordance with Section 7.4.701 of the Code of the City of Colorado Springs, 2023, as amended.

For SWENT Manager Date

Date: November 25, 2024

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INTRODUCTION

This report includes a hydrologic analysis for the proposed improvements for a future Premium Coffee Shop with drive-thru and walk up window. The project will include a one-story drive-thru building and associated pavement, utilities, and appurtenances, now referred to as The Subject Property. The one-story drive-thru building resides at the corner of Chaparral Road and Barnes Road. Total disturbed area is 0.50 acres. This report provides calculations for stormwater runoff for the 2, 5, and 100-year storm events. The requirements included in the *City of Colorado Springs Drainage Criteria Manual Volumes 1 and 2* (Revised 2021) were used as the basis for this study.

This site was previously addressed by that *Drainage Report for Portion of Tract 5, Colorado Springs*, Civas Engineering, now called the Master Drainage Plan, and the Drainage report for Brake Plus Chaparral Ridge Filing no. 2, Olsson Project No. 023-06624, now called Eastern Adjoiner Study.

SOIL STUDY DESCRIPTION

The entire site is entirely Stapleton-Bernal sandy loams, this soil has a hydrologic rating of Class B. A full breakdown can be found in Figure 2 of this report. Soil ratings are consistent with those found in the master report and no change has occurred.

FEMA FLOOD ZONE

The project falls within the Flood Insurance Rate Map (FIRM) Community Panel Number 08041C0538G, effective date; December, 7 2018. The site is located within an area designated as Zone "X" (un-shaded). Zone "X" (un-shaded) is described by FEMA as areas outside of the 0.2% annual chance flood plain. Please find attached the FIRMette found as Figure 3.

HYDROLOGY

The site's proposed drainage pattern is consistent with the approved master drainage study. Our site falls within Basin D found in the Drainage Plan West of *that Drainage Report for Portion of Tract 5, Colorado Springs*, Civas Engineering. The Existing drainage pattern moves south to north. The Master Drainage Plan allows for and accommodates the subject properties flows via a CDOT Type C Area Inlet north of the proposed drive aisle. This Area inlet connects to an overall master rainage system and ultimately to an underground private drainage system that has been sized to accommodate the entire Parcels developed flows. The Subject Properties peak runoff rates are below those found in the Master report. This is due to an increased amount of pervious area than was allowed for in the master report. Pre and Post Runoff Rates can be found in Figures 4 and 5, along with their respective drainage areas.

Interim Conditions Peak Flows

INTERIM DRAINAGE SUMMARY										
BRC - COLORADO SPRINGS										
DRAINAGE AREA	AREA (AC)	Tc (MIN)	% Impervious	I (2 yr) (in/hr)	I (5 yr) (in/hr)	I (100 yr) (in/hr)	Q (2 yr) (cfs)	Q (5 yr) (cfs)	Q (100 yr) (cfs)	REMARKS
D	0.98	5.00	80.00	4.12	5.17	8.68	2.80	3.60	6.90	TO CONCENTRATION POINT 4
TOTALS	0.98								6.90	

Developed Conditions Peak Flow

POST-DEVELOPED DRAINAGE SUMMARY										
BRC - Colorado Springs										
DRAINAGE AREA	AREA (AC)	Tc (MIN)	C-VALUE (5 yr)	C-VALUE (100 yr)	I (5yr) (in/hr)	I (100 yr) (in/hr)	Q (5 yr) (cfs)	Q (100 yr) (cfs)	REMARKS	
D1	0.04	5.00	0.68	0.63	5.17	8.68	0.13	0.20	TO DESIGN POINT 6	
D2	0.46	5.00	0.70	0.65	5.17	8.68	1.67	2.60	TO DESIGN POINT 4	
D3	0.48	5.00	0.68	0.88	5.17	8.68	1.70	3.68	TO DESIGN POINT 4	
TOTALS	0.98						3.50	6.48		

There is a decrease in Peak flows as the basin which the proposed development lies within was originally calculated with a 80% impervious area across the entirety of 0.98. The proposed development has a considerable increase in landscaped area and such has a reduction by 4% for a total proposed impervious area of 76%. Please find in the Appendix the composite C values.

FOUR STEP PROCESS

The City of Colorado Springs Four Step Process has been utilized to minimize adverse impacts of urbanization and the subject property has been analyzed given the following considerations.

Step 1 – Reducing Runoff

The Master plan allows for and accommodates an 80% impervious area for the subject property's basin. The actual proposed impervious area is 76%. Along with this 4% reduction an increase in pervious areas where allowed has been considered. The Mile High Flood District UD-BMP Runoff Reduction Spreadsheet has been utilized and can be found in the Appendix of this report. The Master Report has made the assumption that all future developed parcels will accommodate a 10% downstream reduction. This Reduction has been met.

Step 2 – Treat and Slowly Release WQCV

The Subject Property will utilize the existing underground detention outlined in the Master Drainage report which makes accommodation not only for the developed runoff flows but the water quality improvements.

The Master Report outlines that the detention facility provides 0.046 ac-ft of Water Quality Capture Volume, 0.021ac-ft of EURV and a 100 year storage volume of 0.218 ac-ft

Step 3 – Stabilize Streams

The Subject Property has no drainageways or channels. The subject property has no natural drainageways or streams.

There are no proposed additional Storm system facilities other than those outlined in the master drainage report. All Site flows are surface draining.

Step 4 – Implement Source Controls

The Subject Property will take full advantage of source control measures including disposal of household waste, good Housekeeping, stabilized staging areas, vehicle maintenance, and monitored fueling and storage areas.

CONCLUSION

The proposed development's grading and hydrology adhere to previous studies and calculations. The post development Impervious values are lower than those allowed for in the master report. This therefore, means that the existing detention and water quality accommodations will be adequate to serve the subject properties needs.

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Figure 2 – Hydrologic Soil Grouping Map

Figure 3 – FIRMette

Figure 4 – Interim Conditions Basin Map

Figure 5 – Developed Conditions Basin Map

Figure 6 – Water Quality Area Exhibit

APPENDIX

APPENDIX A – Approved Plans

APPENDIX B – Water Quality Calculations

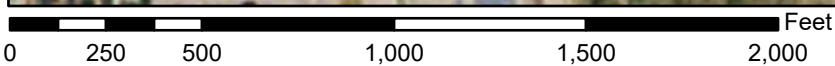
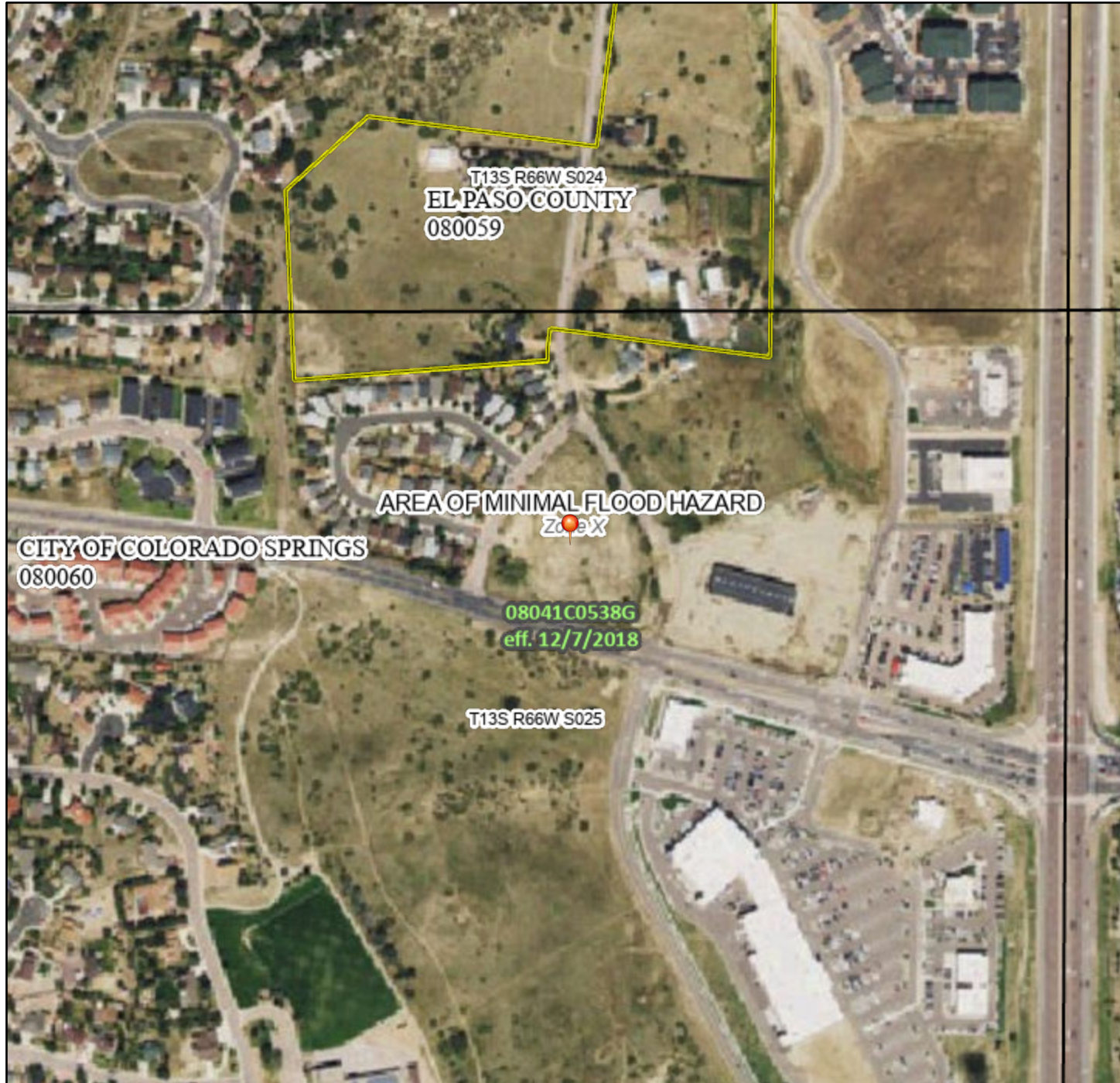
APPENDIX C – Previous Studies

FIGURES

National Flood Hazard Layer FIRMMette



104°43'47"W 38°53'57"N




























1:6,000

104°43'9"W 38°53'29"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

- | | | |
|------------------------------------|---|--|
| SPECIAL FLOOD HAZARD AREAS |  | Without Base Flood Elevation (BFE)
<i>Zone A, V, A99</i> |
| |  | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i> |
| |  | 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 <i>Zone X</i> |
| |  | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i> |
| |  | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i> |
| |  | Area with Flood Risk due to Levee <i>Zone D</i> |
| OTHER AREAS |  | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i> |
| |  | Effective LOMRs |
| GENERAL STRUCTURES |  | Area of Undetermined Flood Hazard <i>Zone D</i> |
| |  | Channel, Culvert, or Storm Sewer |
| |  | Levee, Dike, or Floodwall |
| OTHER FEATURES |  | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation |
| |  | 17.5 |
| |  | Coastal Transect |
| |  | Base Flood Elevation Line (BFE) |
| |  | Limit of Study |
| MAP PANELS |  | Jurisdiction Boundary |
| |  | Coastal Transect Baseline |
| |  | Profile Baseline |
| |  | Hydrographic Feature |
| |  | Digital Data Available |
| |  | No Digital Data Available |
| |  | Unmapped |
| |  | 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

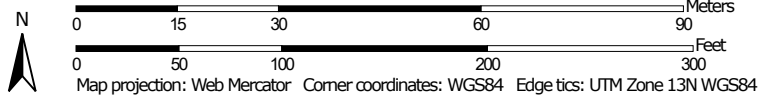
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/25/2024 at 4:13 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded 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.

Hydrologic Soil Group—El Paso County Area, Colorado




Map Scale: 1:1,120 if printed on A portrait (8.5" x 11") sheet.



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





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

Soil Rating Lines

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

Soil Rating Points




-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 22, Sep 3, 2024

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
85	Stapleton-Bernal sandy loams, 3 to 20 percent slopes	B	4.0	100.0%
Totals for Area of Interest			4.0	100.0%

Description

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

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

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

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

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

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

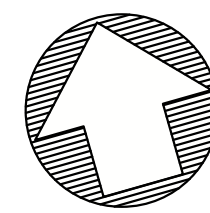
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

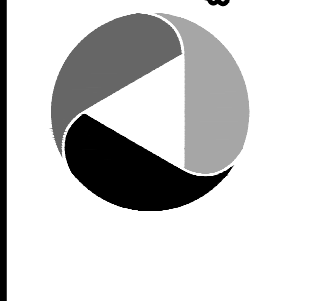


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NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE HELD RESPONSIBLE FOR ANY INJURIES OR DAMAGES TO PERSONS OR PROPERTY ENGAGED IN THE WORK OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

24 HOUR EMERGENCY CONTACT

ATWELL
866.850.4200 www.atwell-group.com
9001 AIRPORT FREEWAY, SUITE 660
NORTH RICHLAND HILLS, TX 76180
972.955.9860



BRC COLORADO SPRINGS
S25-T135-R66W
5560 BARNES ROAD
COLORADO SPRINGS
EL PASO COUNTY, CO

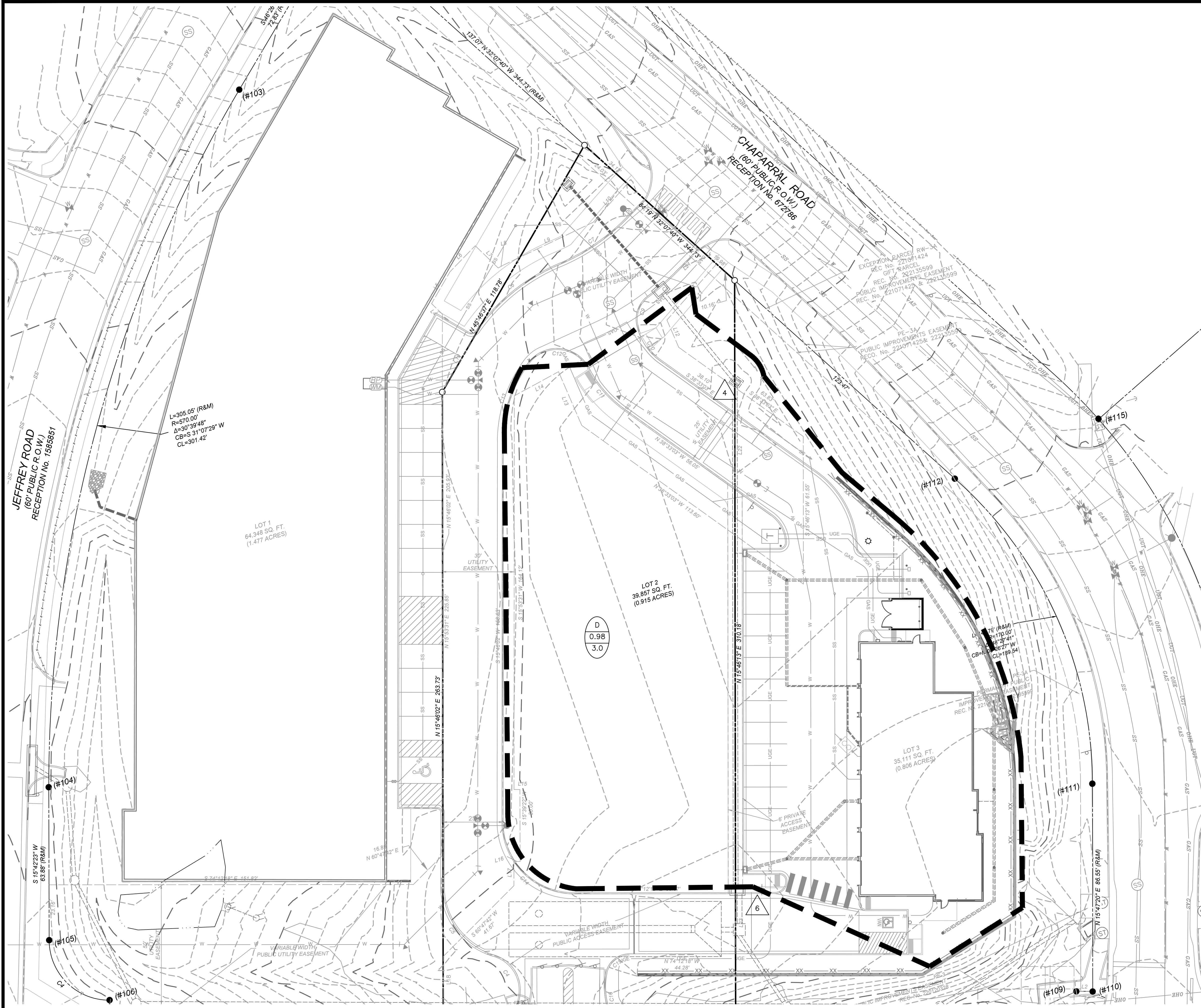
BLACK ROCK DEVELOPMENT COMPANY, LLC
CONSTRUCTION DRAWINGS
INTERIM DAM

DATE 2024-11-25

REVISIONS

DRAWN BY: A.M. & R.S.
CHECKED BY: N. SALAZAR
PROJECT MANAGER: N. SALAZAR
JOB #: 24005174
FILE CODE: ##
SHEET NO.

SCALE: 1"=20'
NOT-ISSUED-FOR-CONSTRUCTION CAD FILE: C310INTERIM-DAM



DRAINAGE LEGEND:

- SUBAREA
- AREA — ACRES
- FLOW — Q 100 (CFS)
- DRAINAGE AREA LINE

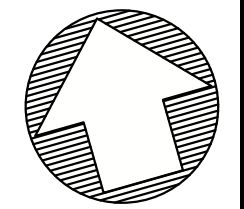
DRAINAGE NOTES:

1. THE DEVELOPER, THROUGH HIS ENGINEER OR AUTHORIZED REPRESENTATIVE, SHALL ACQUIRE ALL REQUIRED NATIONWIDE PERMITS, SUCH AS CWA 401, 402 AND/OR 404 PERMITS, AS APPROPRIATE, FROM THE USEPA, AND/OR USACE.
2. TOPOGRAPHICAL INFORMATION IS PRESENTED FOR DRAINAGE ANALYSIS PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION.
3. TOPOGRAPHICAL INFORMATION PRESENTED HEREIN IS DERIVED FROM SURVEY AS PROVIDED BY _____

INTERIM DRAINAGE SUMMARY
BRC - COLORADO SPRINGS

DRAINAGE AREA	AREA (AC)	Tc (MIN)	% Impervious	1 (2 yr) (in/hr)	1 (5 yr) (in/hr)	1 (100 yr) (in/hr)	Q (2 yr) (cfs)	Q (5 yr) (cfs)	Q (100 yr) (cfs)	REMARKS
D	0.98	5.00	80.00	4.12	5.17	8.68	2.80	3.60	6.90	TO CONCENTRATION POINT 4
TOTALS	0.98								6.90	

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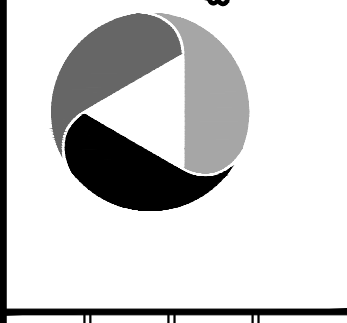


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9001 AIRPORT FREEWAY, SUITE 660
NORTH RICHLAND HILLS, TX 76180
972.992.8860



DRAINAGE LEGEND:

- SUBAREA
- AREA - ACRES
- FLOW - Q 100 (CFS)
- DRAINAGE AREA LINE

DRAINAGE NOTES:

1. THE DEVELOPER, THROUGH HIS ENGINEER OR AUTHORIZED REPRESENTATIVE, SHALL ACQUIRE ALL REQUIRED NATIONWIDE PERMITS, SUCH AS CWA 401, 402 AND/OR 404 PERMITS, AS APPROPRIATE, FROM THE USEPA, AND/OR USACE.
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3. TOPOGRAPHICAL INFORMATION PRESENTED HEREIN IS DERIVED FROM SURVEY AS PROVIDED BY _____

PROVIDED MAXIMUM IMPERVIOUS COVER = 80.0%
PROPOSED IMPERVIOUS COVER = 74.0%
ALLOWED IMPERVIOUS COVER FOR SITE AREA HAS NOT BEEN EXCEEDED.
PRIVATE DETENTION FOR MASTER STORM FACILITY HAS BEEN MADE TO ACCOMMODATE BASIN AREA D

POST-DEVELOPED DRAINAGE SUMMARY
BRC - Colorado Springs

DRAINAGE AREA	AREA (AC)	Tc (MIN)	C-VALUE (5 yr)	C-VALUE (100 yr)	I (5yr) (in/hr)	I (100 yr) (in/hr)	Q (5 yr) (cfs)	Q (100 yr) (cfs)	REMARKS
D1	0.04	5.00	0.68	0.63	5.17	8.68	0.13	0.20	TO DESIGN POINT 6
D2	0.46	5.00	0.70	0.65	5.17	8.68	1.67	2.60	TO DESIGN POINT 4
D3	0.48	5.00	0.66	0.77	5.17	8.68	1.64	3.22	TO DESIGN POINT 4
TOTALS	0.98						3.31	5.82	

S25-T13S-R66W
5560 BARNES ROAD
COLORADO SPRINGS
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BRC COLORADO SPRINGS
BLACK ROCK DEVELOPMENT COMPANY, LLC
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POST-DEV DAM

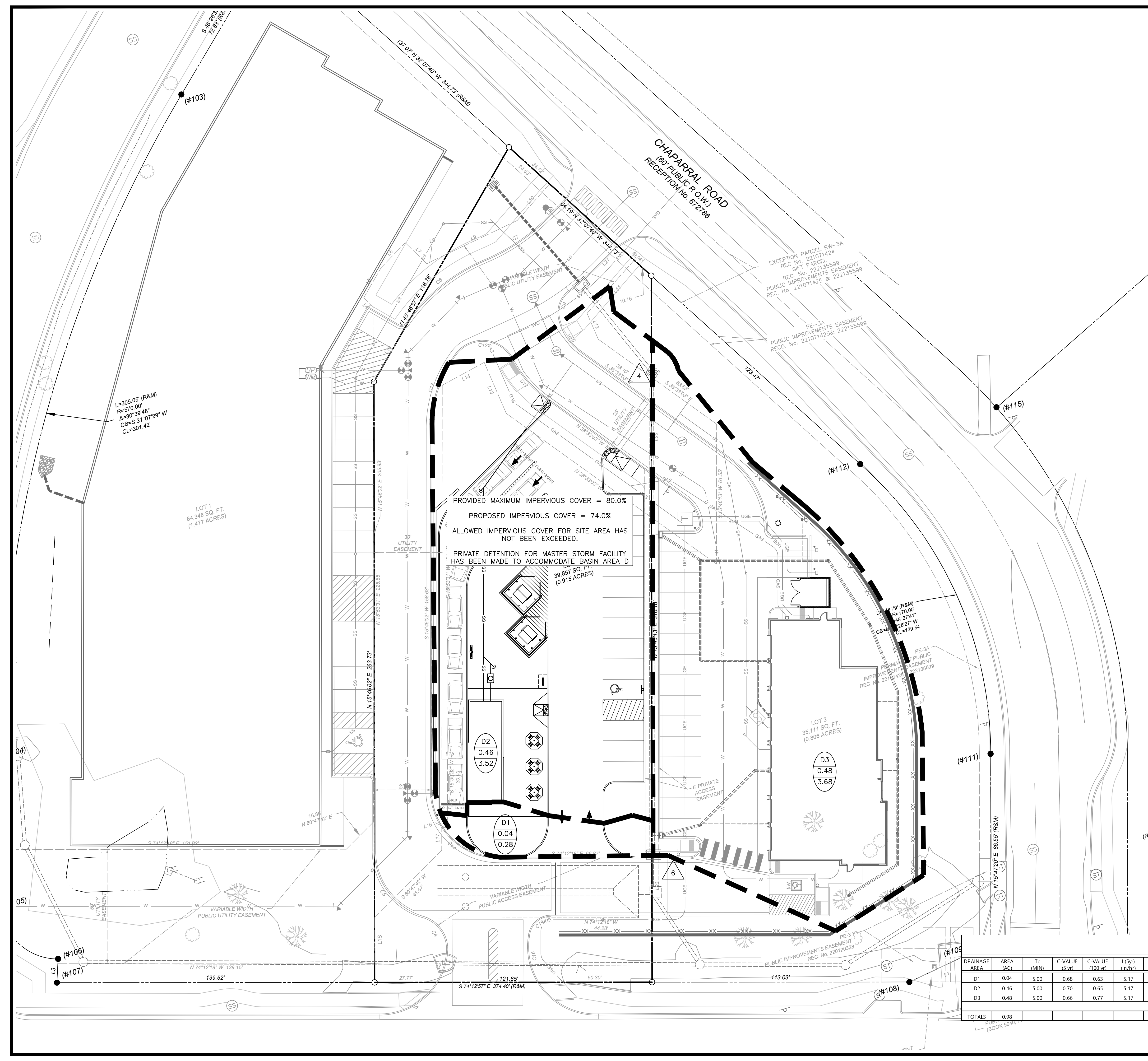
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REVISIONS

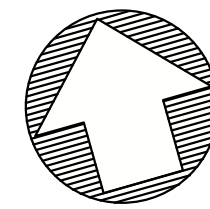


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FILE CODE: ##
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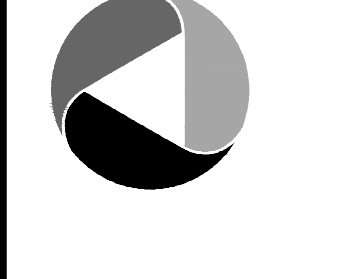
811
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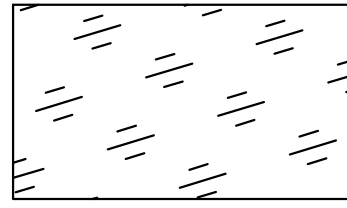
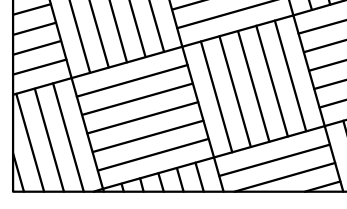
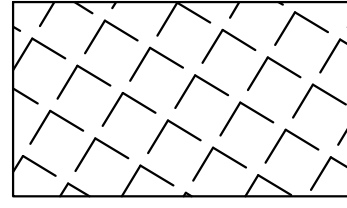
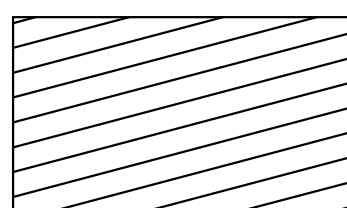
NOTICE
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE HELD RESPONSIBLE FOR ANY INJURY OR DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE WORK OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

REVISIONS

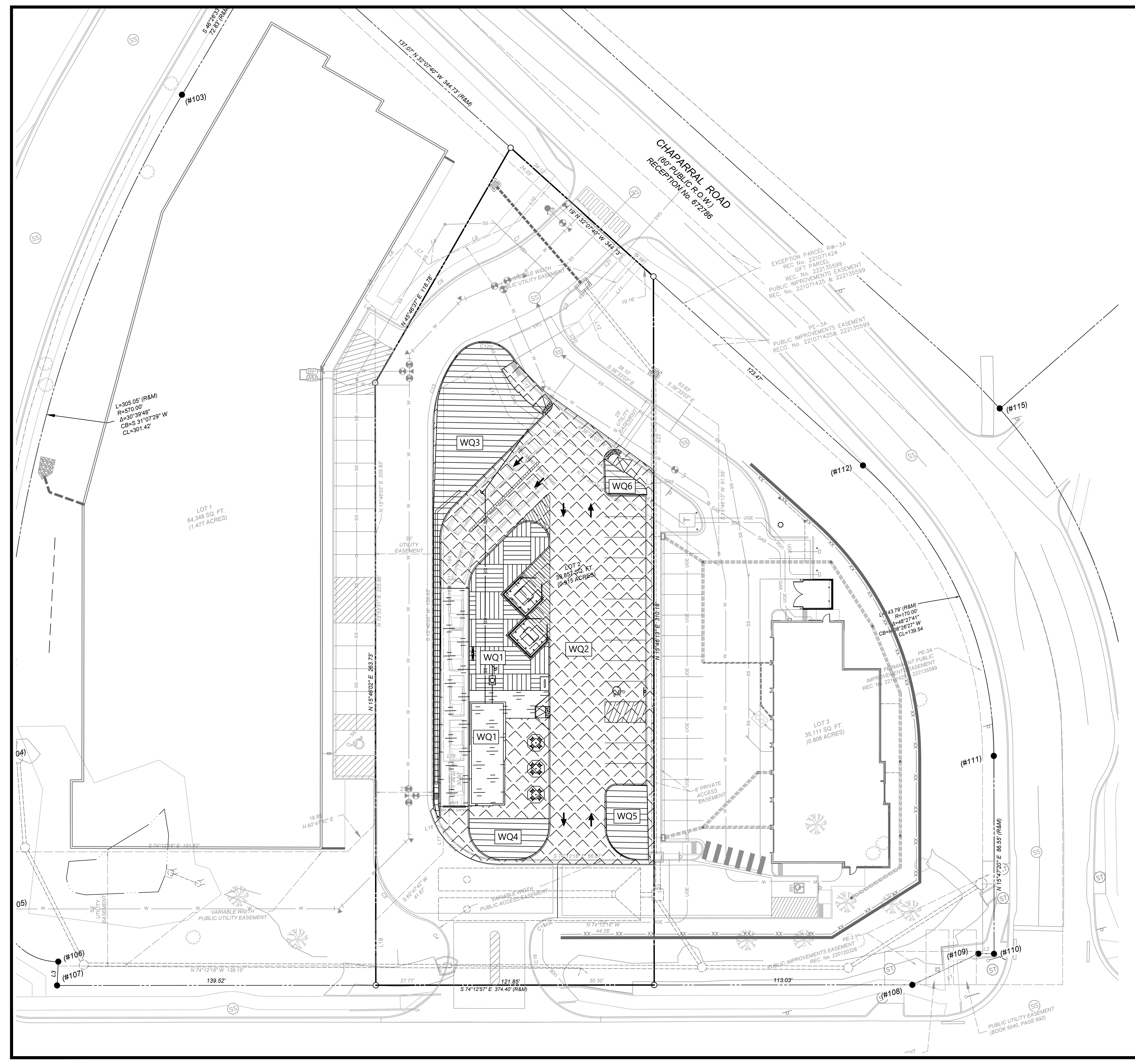
24 HOUR EMERGENCY CONTACT

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 9001 AIRPORT FREEWAY, SUITE 660
 NORTH RICHLAND HILLS, TX 76180
 972.995.8860



-  UIA - UNCONNECTED IMPERVIOUS AREA
-  RPA - RECEIVING IMPERVIOUS AREA
-  DCIA - DIRECTLY CONNECTED IMPERVIOUS AREA
-  SPA - SEPARATE PERVIOUS AREA

Total Area (ft ²)	118,020
Total Impervious Area (ft ²)	86,160
WQCV (ft ²)	598
WQCV Reduction (ft ²)	93
WQCV Reduction (%)	16%
Untreated WQCV (ft ²)	505



S25-T13S-R66W
 5560 BARNES ROAD
 COLORADO SPRINGS
 EL PASO COUNTY, CO

BRC COLORADO SPRINGS
 BLACK ROCK DEVELOPMENT COMPANY, LLC
 WATER QUALITY EXHIBIT

DATE 2024-11-25

REVISIONS

0 10' 20'
 SCALE: 1"=20'

DRAWN BY: A.M. & R.S.
 CHECKED BY: N. SALAZAR
 PROJECT MANAGER: N. SALAZAR
 JOB #: 24005174
 FILE CODE: ##
 SHEET NO.

FILE NAME: K:\24005174 - BRC - Barnes & Salazar - Colorado Springs - Water Quality Reduction Exhibit.dwg LAST SAVED BY: nmsal 12/27/2024 10:17 AM PLOTTED BY: Ray Dyer 12/27/2024 PAPER: ARCH D (24.00 x 36.00 INCHES) DEVICE: DWG TO PDF (ACAD) PLOT STYLE: ATWELL.ctb

NOT-ISSUED-FOR-CONSTRUCTION CAD FILE WATER QUALITY REDUCTION EXHIBIT

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: RS
Company: ATWELL
Date: December 3, 2024
Project: BRC - Colorado Springs
Location: Colorado Springs, CO

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
 Depth of Average Runoff Producing Storm, d_0 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	DCIA	SPA	SPA	SPA	SPA						
Area ID	WQ1	WQ2	WQ3	WQ4	WQ5	WQ6						
Downstream Design Point ID	4	4	4	4	4	4						
Downstream BMP Type	None	None	None	None	None	None						
DCIA (ft ²)	--	12,117	--	--	--	--						
UIA (ft ²)	2,243	--	--	--	--	--						
RPA (ft ²)	1,654	--	--	--	--	--						
SPA (ft ²)	--	--	2,405	533	170	548						
HSG A (%)	0%	--	0%	0%	0%	0%						
HSG B (%)	100%	--	100%	100%	100%	100%						
HSG C/D (%)	0%	--	0%	0%	0%	0%						
Average Slope of RPA (ft/ft)	0.020	--	--	--	--	--						
UIA:RPA Interface Width (ft)	30.00	--	--	--	--	--						

CALCULATED RUNOFF RESULTS

Area ID	WQ1	WQ2	WQ3	WQ4	WQ5	WQ6						
UIA:RPA Area (ft ²)	3,897	--	--	--	--	--						
L / W Ratio	4.33	--	--	--	--	--						
UIA / Area	0.5756	--	--	--	--	--						
Runoff (in)	0.00	0.50	0.00	0.00	0.00	0.00						
Runoff (ft ³)	0	505	0	0	0	0						
Runoff Reduction (ft ³)	93	0	120	27	9	27						

CALCULATED WQCV RESULTS

Area ID	WQ1	WQ2	WQ3	WQ4	WQ5	WQ6						
WQCV (ft ³)	93	505	0	0	0	0						
WQCV Reduction (ft ³)	93	0	0	0	0	0						
WQCV Reduction (%)	100%	0%	0%	0%	0%	0%						
Untreated WQCV (ft ³)	0	505	0	0	0	0						

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	4	4	4	4	4	4						
DCIA (ft ²)	12,117	12,117	12,117	12,117	12,117	12,117						
UIA (ft ²)	2,243	2,243	2,243	2,243	2,243	2,243						
RPA (ft ²)	1,654	1,654	1,654	1,654	1,654	1,654						
SPA (ft ²)	3,656	3,656	3,656	3,656	3,656	3,656						
Total Area (ft ²)	19,670	19,670	19,670	19,670	19,670	19,670						
Total Impervious Area (ft ²)	14,360	14,360	14,360	14,360	14,360	14,360						
WQCV (ft ³)	598	598	598	598	598	598						
WQCV Reduction (ft ³)	93	93	93	93	93	93						
WQCV Reduction (%)	16%	16%	16%	16%	16%	16%						
Untreated WQCV (ft ³)	505	505	505	505	505	505						

CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft ²)	118,020
Total Impervious Area (ft ²)	86,160
WQCV (ft ³)	598
WQCV Reduction (ft ³)	93
WQCV Reduction (%)	16%
Untreated WQCV (ft ³)	505

APPENDIX A – APPROVED PLANS

CONSTRUCTION DRAWINGS FOR BRC COLORADO SPRINGS

5560 BARNES ROAD
COLORADO SPRINGS, EL PASO COUNTY, CO
TAX PARCELS: 6325106040

LEGAL DESCRIPTION

A REMAINDER OF TRACT 5 SADDLEBACK ESTATES, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO EXCEPTING THEREFROM ALL THAT PORTION OF SAID TRACT 5 WHICH IS INCLUDED WITHIN THE PLAT OF CHAPARRAL RIDGE FILING NO. 1, RECORDED IN PLAT BOOK C-4 AT PAGE 32; AND FURTHER EXCEPTING THEREFROM THAT PORTION AS CONVEYED IN GENERAL WARRANTY DEED RECORDED APRIL 9, 2021 UNDER RECEPTION NO. 221071424.

MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ALONG NORTHERLY RIGHT-OF-WAY OF BARNES ROAD AND THE WESTERLY RIGHT-OF-WAY OF CHAPARRAL ROAD; THENCE N80°34'12"E, 32.02 FEET TO A POINT,

THENCE S74°00'33"E, 6.80 FEET TO A POINT,

THENCE N15°47'20"E, 86.55 FEET TO A POINT OF CURVATURE,

THENCE ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 170.00 FEET, A CENTRAL ANGLE OF 48°27'30", THE CHORD OF WHICH BEARS N8°26'26"W FOR A DISTANCE OF 139.54; THENCE ALONG THE ARC OF SAID CURVE A DISTANCE OF 143.79 FEET TO A POINT,

THENCE N32°07'40"W, 344.73 FEET TO A POINT ALONG THE EASTERLY RIGHT-OF-WAY OF JEFFREY ROAD THE FOLLOWING 6 COURSES;

THENCE ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 25.00 FEET, A CENTRAL ANGLE OF 17°43'32", THE CHORD OF WHICH BEARS S55°25'17"W FOR A DISTANCE OF 7.70 FEET; THENCE ALONG THE ARC OF SAID CURVE A DISTANCE OF 7.73 FEET TO A POINT,

THENCE S46°26'33"W, 72.83 FEET TO A POINT OF CURVATURE,

THENCE ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 570.00 FEET, A CENTRAL ANGLE OF 30°39'47", THE CHORD OF WHICH BEARS S31°07'29"W FOR A DISTANCE OF 301.42 FEET; THENCE ALONG THE ARC OF SAID CURVE A DISTANCE OF 305.05 FEET TO A POINT,

THENCE S15°42'23"W, 63.88 FEET TO A POINT OF CURVATURE,

THENCE ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 25.00 FEET, A CENTRAL ANGLE OF 90°11'54", THE CHORD OF WHICH BEARS S29°26'21"E FOR A DISTANCE OF 35.42 FEET; THENCE ALONG THE ARC OF SAID CURVE A DISTANCE OF 39.36 FEET TO A POINT,

THENCE S18°35'42"W, 10.42 FEET TO A POINT ALONG THE NORTHERLY RIGHT-OF-WAY OF BARNES ROAD,

THENCE ALONG SAID NORTHERLY RIGHT-OF-WAY OF BARNES ROAD S74°12'57"E, 374.40 FEET TO THE POINT OF BEGINNING.

BENCHMARK

ELEVATIONS ARE BASED UPON COLORADO SPRINGS UTILITIES FACILITIES INFORMATION MANAGEMENT SYSTEM MONUMENT AB3.

ELEVATION: 6429.20 (US FEET)

BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

BASIS OF BEARING

BEARINGS ARE BASED UPON THE WESTERLY LINE OF CHAPARRAL ROAD, MONUMENTED AT BOTH ENDS WITH A #5 REBAR AND 1.5" ALUMINUM CAP STAMPED "WJC PLS 38954", AND IS ASSUMED TO BEAR N 32°07'40" W, A DISTANCE OF 344.73 FEET.

BRC COLORADO SPRINGS

TOTAL SITE AREA: 0.91 AC
ZONING: MX-L (MIXED USE LARGE SCALE)

DEVELOPMENT TEAM

OWNER
DBN DURBAN MANAGEMENT, LLC
106 FOSTER AVENUE
CHARLOTTE, NC 28203
PHONE: (704) 319-8330
CONTACT: C. COLLIN RICKS

CIVIL ENGINEER
ATWELL, LLC
9001 AIRPORT FREEWAY, SUITE 660
NORTH RICHLAND HILLS, TX 76180
PHONE: (972) 638-8860
CONTACT: NICHOLAS SALAZAR
EMAIL: NSALAZAR@ATWELL.COM

DEVELOPER
BLACK ROCK DEVELOPMENT COMPANY, LLC
9170 E BAHIA DR
SCOTTSDALE, AZ 85260
CONTACT: TONY PALLOTTA
PHONE: (514) 531-2149
EMAIL: TONY@BR.COFFEE

SURVEYOR
BARRON LAND, LLC
2790 N ACADEMY RD, SUITE 311
COLORADO SPRINGS, CO 80917
PHONE: (719) 360-6827
FAX: (719) 466-6527



VICINITY MAP
N.T.S.



FEMA MAP
N.T.S.

NOTE: BASED ON GRAPHIC DETERMINATION, THIS PROPERTY DOES NOT LIE IN A F.E.M.A. F.I.R.M. SPECIAL FLOOD HAZARD AREA PER COMMUNITY PANEL NO. 08041C05386 DATED 12-07-2016.



AERIAL MAP
N.T.S.

SUBMITTAL DATE

SUBMITTAL - 2024-11-25

ATWELL NOTES

- THESE PLANS ARE SUBJECT TO THE INTERPRETATION OF INTENT BY THE ENGINEER. ALL QUESTIONS REGARDING THESE PLANS SHALL BE PRESENTED TO THE ENGINEER. ANYONE WHO TAKES UPON HIMSELF THE INTERPRETATION OF THE DRAWINGS OR MAKES REVISIONS TO SAME WITHOUT CONFERRING WITH THE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR THE CONSEQUENCES THEREOF.
- THE ENGINEER MAKES NO GUARANTEE REGARDING THE LOCATION OR ELEVATION OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS. THE CONTRACTOR SHALL CALL BLUE STAKE FOR LOCATION OF ALL UTILITIES.
- THE CONTRACTOR SHALL MAKE HIS OWN ESTIMATE OF EARTHWORK QUANTITIES REQUIRED TO COMPLETE ALL WORK AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL IMPORT FILL OR EXPORT SOIL AS REQUIRED TO PROVIDE AN EARTHWORK BALANCE AT NO EXTRA COST TO THE PROJECT.
- THE CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS SPECIFIED IN THE GEOTECHNICAL INVESTIGATION.
- THE DEVELOPER/CONTRACTOR ASSUMES ALL RESPONSIBILITY AND COSTS INCURRED IF HE ELECTS TO LANDSCAPE RETENTION BASINS BEFORE THE REQUIRED RETENTION VOLUME HAS BEEN CERTIFIED BY THE ENGINEER.
- CONTRACTOR IS RESPONSIBLE FOR PROTECTING STORM DRAIN PIPES DURING THE CONSTRUCTION STAGE. THE COVER ON THE DRAINAGE PIPE IS DESIGNED FOR FINAL GRADE; THEREFORE, EXTRA CARE MUST BE EXERCISED DURING THE CONSTRUCTION PHASE TO MAINTAIN COVER OVER PIPES TO PREVENT DAMAGE.
- CONTRACTOR IS TO LOCATE ALL EXISTING PROPERTY MONUMENTS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL MAKE NO CLAIM AGAINST THE OWNER OR THE SURVEYOR REGARDING ALLEGED INACCURACY OF CONSTRUCTION STAKES SET BY THE ENGINEER UNLESS ALL SURVEY STAKES SET BY THE SURVEYOR ARE MAINTAINED INTACT AND CAN BE VERIFIED AS TO THEIR ORIGIN. IF IN THE OPINION OF THE SURVEYOR, THE STAKES ARE NOT MAINTAINED INTACT AND CANNOT BE VERIFIED AS TO THEIR ORIGIN, ANY REMEDIAL WORK REQUIRED TO CORRECT ANY ITEM OR IMPROPER CONSTRUCTION WORK IN THIS DEVELOPMENT SHALL BE PERFORMED AT THE SOLE EXPENSE OF THE RESPONSIBLE CONTRACTOR OR SUBCONTRACTOR.
- STORM WATER POLLUTION PREVENTION PLAN DEPICTS TYPICAL EROSION CONTROL MEASURES TO BE EMPLOYED ON THIS SITE. IT IS UNDERSTOOD THAT THE STORM WATER POLLUTION PREVENTION PLAN IS A DYNAMIC DOCUMENT AND IT IS TO BE UPDATED AS NEEDED TO REFLECT CURRENT CONDITIONS AND ADDRESS UNFORESEEN CONDITIONS.

Sheet List Table

Sheet Number	Sheet Title
C000	COVER
C100	NOTES
C110	DEMOLITION PLAN
C200	SITE PLAN
C300	GRADING PLAN
C310	INTERIM DAM
C320	POST-DEV DAM
C400	UTILITY PLAN
C500	EROSION CONTROL PLAN
C700	DETAILS
C800	EROSION DETAILS

UTILITY INFORMATION

COMPANY	CONTACT	TELEPHONE
COLORADO SPRINGS PLANNING & NEIGHBORHOOD SERVICES 30 S. NEVADA AVE, SUITE 701 COLORADO SPRINGS, COLORADO 80903	LOGAN HUBBLE	(719) 385-5905
COLORADO SPRINGS CITY ENGINEERING DEVELOPMENT 30 S. NEVADA AVE COLORADO SPRINGS, COLORADO 80903	PATRICK MORRIS	(719) 385-5075
COLORADO SPRINGS WATER QUALITY 30 S. NEVADA AVE COLORADO SPRINGS, COLORADO 80903	ANNA BERGMARK	(719) 385-5546
COLORADO SPRINGS TRAFFIC & TRANSPORTATION ENGINEERING 30 S. NEVADA AVE COLORADO SPRINGS, COLORADO 80903	ZAKER ALAZZEH	(719) 385-9468
CSU UTILITIES		(719) 448-4800
COLORADO SPRINGS FIRE DEPARTMENT 375 PRINTERS PARKWAY COLORADO SPRINGS, COLORADO 80910	STEVEN SMITH	(719) 385-7362



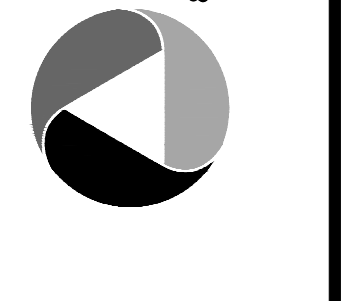
Know what's below.
Call before you dig.
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NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE DEEMED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK OR PERSONS ENGAGED IN THE WORK, OR ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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S25-T135-R66W

5560 BARNES ROAD

COLORADO SPRINGS

EL PASO COUNTY, CO

BRC COLORADO SPRINGS

BLACK ROCK DEVELOPMENT COMPANY, LLC

CONSTRUCTION DRAWINGS

COVER

DATE

2024-11-25

REVISIONS

DRAWN BY: A.M. & R.S.

CHECKED BY: N. SALAZAR

PROJECT MANAGER: N. SALAZAR

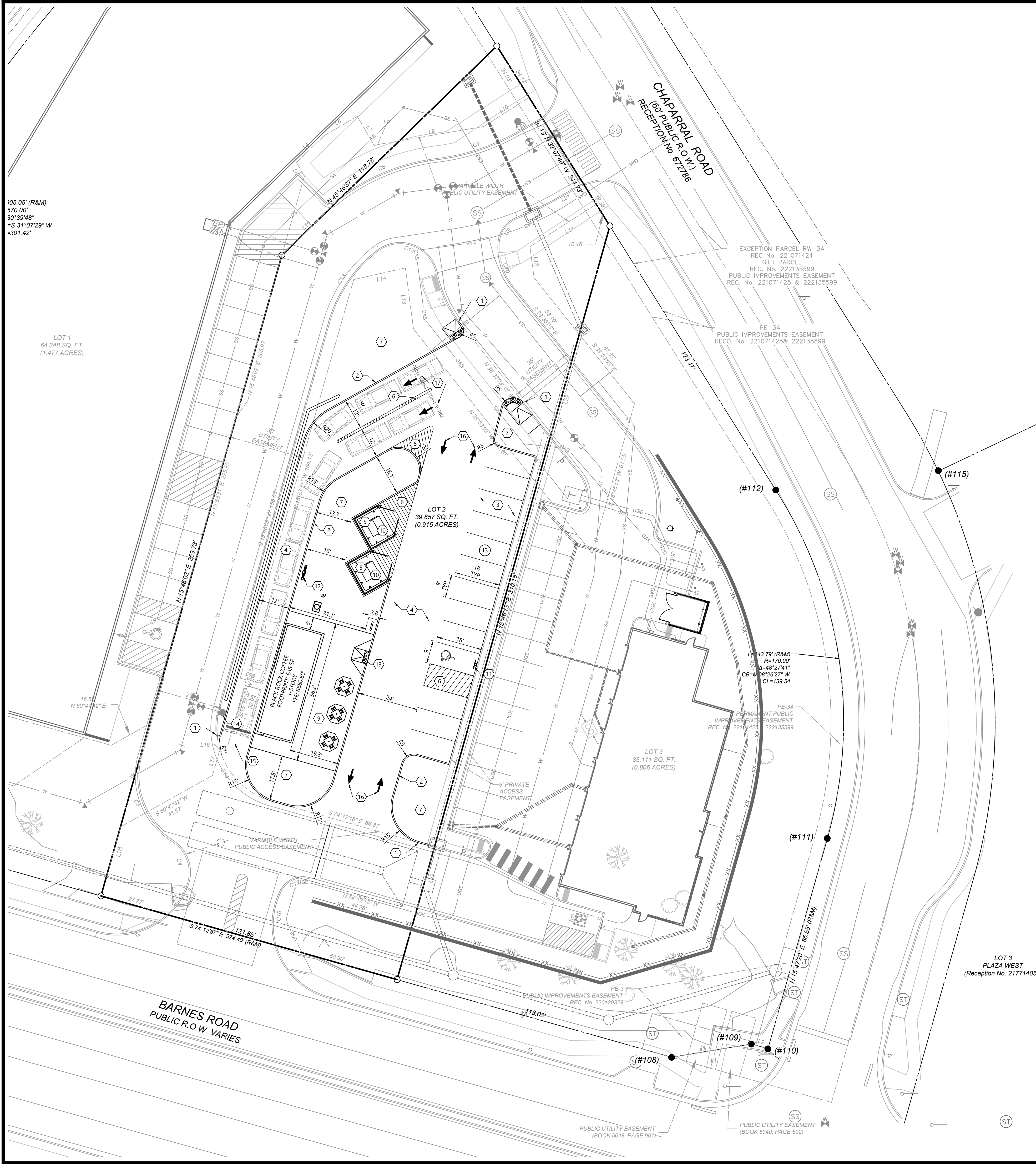
JOB #: 24005174

FILE CODE: ##

SHEET NO.

C000

NOT-ISSUED-FOR-CONSTRUCTION CAD FILE: C000-COVER



SITE AREA	
TOTAL PROPERTY AREA:	0.91 AC ± AC (39,857 ± S.F.)
DISTURBED AREA:	----± AC (#### ± S.F.)
IMPERVIOUS AREA:	----± AC (#### ± S.F.)
PERVIOUS AREA:	----± AC (#### ± S.F.)
ZONING CLASSIFICATION	
JURISDICTION:	CITY OF COLORADO SPRINGS
ZONING:	MX-L, MIXED USE LARGE SCALE
ADJACENT ZONING:	MX-M (NORTH, EAST, SOUTH), PDZ (WEST)
BUILDING SETBACKS	
FRONT:	NONE
SIDE:	NONE
REAR:	NONE
BUILDING SUMMARY	
PROPOSED BUILDING AREA:	645 SF
BUILDING HEIGHT LIMIT:	65'
PARKING SUMMARY	
PARKING REQUIREMENTS	1 SPACE/300 GFA OF BUILDING 1 SPACE/350 SF OF OUTDOOR SEATING TOTAL PARKING REQUIRED 4 SPACES
PARKING PROVIDED	12 SPACES, 1 ADA SPACE

SITE LEGEND	
	EXISTING PROPERTY LINE
	EXISTING RIGHT-OF-WAY
	TRAFFIC FLOW ARROW (PAVEMENT MARKING)
	HANDICAP STALL
	PARKING SPACE COUNT
	STOP BAR (PAVEMENT MARKING)

NOTE NUMBER	CORRESPONDING DETAIL NUMBER (SEE DETAIL SHEETS)
1	TIE IN CURB/DRIVE TO MATCH EXISTING CURB/STREET
2	NEW CONCRETE CURB - SEE DETAILS
3	PROPOSED LIGHT DUTY ASPHALT PAVEMENT
4	PROPOSED HEAVY DUTY ASPHALT PAVEMENT
5	PROPOSED HEAVY DUTY CONCRETE PAVEMENT
6	4" WIDE PAINTED STRIPING @ 2' O.C. AND 45°
7	LANDSCAPE AREA
8	4" WIDE PAINTED WHITE TRAFFIC STRIPE (SEE LENGTH THIS SHEET)
9	CONCRETE SIDEWALK (SEE WIDTH THIS SHEET)
10	DUMPSTER ENCLOSURE
11	H/C PARKING SIGNAGE
12	PROPOSED MENU BOARD & ORDER/SPEAKER BOX
13	PROPOSED ADA CURB RAMP
14	EXISTING FIRE HYDRANT
15	DO NOT ENTER / STOP STRIPING
16	TRAFFIC FLOW ARROW STRIPING
17	DRIVE-THRU STRIPING
18	PROPOSED CONCRETE WHEEL STOP
19	PROPOSED LIGHT POLE
20	4" WIDE PAINTED YELLOW TRAFFIC STRIPE (SEE LENGTH THIS SHEET)

- SITE GENERAL NOTES:**
- DIMENSIONS SHOWN ARE TO THE FACE OF CURB, UNLESS OTHERWISE INDICATED.
 - USE 3' RADII, UNLESS SHOWN OTHERWISE.
 - THE INFORMATION PERTAINING TO EXISTING CONDITIONS WAS TAKEN FROM A SURVEY PROVIDED BY: DIAMONDBACK LAND SURVEYING THE LOCATION OF ALL EXISTING UTILITIES WERE OBTAINED FROM AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND DEPTH OF UTILITY PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
 - ALL ACCESSIBLE PARKING SPACES AND TRAVEL ROUTES SHALL BE CONSTRUCTED IN ACCORDANCE WITH A.D.A. AND/OR STATE REQUIREMENTS.
 - ANY DISCREPANCIES IN THIS PLAN AND ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE OWNER AND ENGINEER PRIOR TO THE START OF CONSTRUCTION.
 - PRIOR TO STARTING CONSTRUCTION, THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED. NO CONSTRUCTION SHALL BEGIN UNTIL ALL PERMITS HAVE BEEN RECEIVED.
 - CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKERS AND PUBLIC SHALL BE PROTECTED FROM INJURY, AND ADJOINING PROPERTY PROTECTED FROM DAMAGE. CONTRACTOR SHALL REPAIR ANY DAMAGE DONE TO PRIVATE OR PUBLIC PROPERTY.
 - ACCESS TO UTILITIES, FIRE HYDRANTS, ETC. SHALL REMAIN UNDISTURBED AT ALL TIMES, UNLESS COORDINATED OTHERWISE.
 - THE GENERAL CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE UPON COMPLETION OF THE PROJECT.
 - ALL SUBGRADE PREPARATION, PAVING, AND UTILITY TRENCHING MUST BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE SOILS INVESTIGATION. IF THERE IS A CONFLICT BETWEEN THE SOILS REPORT AND THE PLANS, THE MORE PROHIBITIVE OF THE TWO SHALL TAKE PRECEDENCE.
 - CONTRACTOR TO ENSURE COMPLIANCE WITH ANY AND ALL LAND DISTURBANCE NOTIFICATIONS REQUIREMENTS, AND THAT ALL REQUIRED EROSION CONTROL MEASURES ARE INSTALLED AND MAINTAINED IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
 - FOR WORK IN, OR ADJACENT TO, STREET RIGHT OF WAYS, CONTRACTOR SHALL ENSURE APPROPRIATE PERMITS ARE OBTAINED PRIOR TO CONSTRUCTION. CONTRACTOR TO ERECT AND MAINTAIN TRAFFIC CONTROL SIGNS AND DEVICES IN CONFORMANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
 - ALL PARKING LOT LIGHTING MUST BE INSTALLED AND OPERATE SO AS NOT TO PRODUCE GLARE OR CAST DIRECT ILLUMINATION ACROSS THE BOUNDING PROPERTY LINE. LOW PRESSURE SODIUM LIGHTING IS PROHIBITED. ALL LIGHTING FIXTURES MUST BE RESTRICTED TO DOWN-LIGHT OR CUT-OFF TYPES.

Know what's below. Call before you dig. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN BY AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY BE OCCURRED BY THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

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NORTH RICHLAND HILLS, TX 76180
972.956.9560

BRC COLORADO SPRINGS
BLACK ROCK DEVELOPMENT COMPANY, LLC
CONSTRUCTION DRAWINGS
SITE PLAN

S25-T135-R66W
5560 BARNES ROAD
COLORADO SPRINGS
EL PASO COUNTY, CO

DATE: 2024-11-25

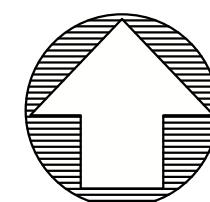
REVISIONS:

SCALE: 1" = 20'

DRAWN BY: A.M. & R.S.
CHECKED BY: N. SALAZAR
PROJECT MANAGER: N. SALAZAR
JOB #: 24005174
FILE CODE: ##
SHEET NO: C200

NOT ISSUED FOR CONSTRUCTION CAD FILE: C08 SITE PLAN

FILE NAME: K:\24005174 - BR - Barnes & Jeffrey - Colorado Springs - CO\Users\mrodriguez\CS20 SITE PLAN.dwg LAST SAVED BY: mrodriguez 12/17/2024 8:22 PM PLOTTED BY: mrodriguez 12/17/2024 PAPER: ARCH PLOT BLEED @ 2x10 @ 1/8" MGS INCHES) REVISED - AUTOCAD PLOT (GENERAL DOCUMENTATION) PLOT STYLE: ANDLCT.rvt



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NOTICE:
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE HELD RESPONSIBLE FOR ANY ACCIDENTS OR INJURIES TO PERSONS OR PROPERTY ARISING FROM THE WORK OR FROM ANY OTHER PERSONS.

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ATWELL



BRC COLORADO SPRINGS

BLACK ROCK DEVELOPMENT COMPANY, LLC

CONSTRUCTION DRAWINGS

GRADING PLAN

S25-T135-R66W

5560 BARNES ROAD

COLORADO SPRINGS

EL PASO COUNTY, CO

DATE 2024-11-25

REVISIONS

DRAWN BY: A.M. & R.S.

CHECKED BY: N. SALAZAR

PROJECT MANAGER: N. SALAZAR

JOB #: 24005174

FILE CODE: ##

SHEET NO. **C300**

NOT-ISSUED-FOR-CONSTRUCTION CAD FILE: C300 GRADING PLAN

GRADING NOTES:

- GRADES SHOWN ARE PROPOSED FINISHED GRADES.
- ALL PROPOSED GRADES AND SPOT ELEVATIONS INDICATE TOP OF PAVEMENT OR FACE/FLOWLINE OF CURB UNLESS OTHERWISE NOTED.
- THE INFORMATION PERTAINING TO EXISTING CONDITIONS WAS TAKEN FROM A SURVEY PROVIDED BY DIAMONDBACK LAND SURVEYING.
- THE LOCATION OF ALL EXISTING UTILITIES WERE OBTAINED FROM AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND DEPTH OF UTILITY PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
- ANY DISCREPANCIES IN THIS PLAN AND ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE OWNER AND ENGINEER PRIOR TO THE START OF CONSTRUCTION.
- PRIOR TO STARTING CONSTRUCTION, THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THAT ALL REQUIRED PERMITS AND APPROVALS HAVE BEEN OBTAINED. NO CONSTRUCTION SHALL BEGIN UNTIL ALL PERMITS HAVE BEEN RECEIVED.
- CONTRACTOR SHALL MAINTAIN THE SITE IN A MANNER SO THAT WORKERS AND PUBLIC SHALL BE PROTECTED FROM INJURY, AND ADJOINING PROPERTY PROTECTED FROM DAMAGE. CONTRACTOR SHALL REPAIR ANY DAMAGE DONE TO PRIVATE OR PUBLIC PROPERTY.
- ACCESS TO UTILITIES, FIRE HYDRANTS, ETC. SHALL REMAIN UNDISTURBED AT ALL TIMES, UNLESS COORDINATED OTHERWISE.
- THE GENERAL CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE UPON COMPLETION OF THE PROJECT.
- ALL SUBGRADE PREPARATION, PAVING, AND UTILITY TRENCHING MUST BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE SOILS INVESTIGATION. IF THERE IS A CONFLICT BETWEEN THE SOILS REPORT AND THE PLANS, THE MORE PROHIBITIVE OF THE TWO SHALL TAKE PRECEDENCE.
- CONTRACTOR TO ENSURE COMPLIANCE WITH ANY AND ALL LAND DISTURBANCE NOTIFICATIONS REQUIREMENTS, AND THAT ALL REQUIRED EROSION CONTROL MEASURES ARE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE STATE, LOCAL, OR FEDERAL REQUIREMENTS.
- REMOVE EXISTING TOPSOIL IN ACCORDANCE WITH THE GEOTECHNICAL REPORT, PRIOR TO PLACEMENT OF ANY FILL MATERIAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING TRENCH SAFETY REQUIREMENTS IN ACCORDANCE WITH CITY STANDARDS, NEVADA STATE LAW, AND O.S.H.A. STANDARDS FOR ALL EXCAVATION IN EXCESS OF FIVE FEET IN DEPTH.
- DRAINAGE SHOULD BE MAINTAINED AWAY FROM THE FOUNDATIONS, BOTH DURING AND AFTER CONSTRUCTION.

GRADING LEGEND

- EXISTING PROPERTY LINE
- EXISTING RIGHT-OF-WAY
- EXISTING SETBACK LINE
- PROPOSED RIGHT-OF-WAY
- PROPOSED SETBACK LINE
- 100 YEAR FLOOD PLAIN
- - - 123 EXISTING MINOR CONTOURS
- - - 123 EXISTING MAJOR CONTOURS
- - - 123 PROPOSED MINOR CONTOUR
- - - 123 PROPOSED MAJOR CONTOUR
- PROPOSED BREAK LINE
- EXISTING STORM LINE
- PROPOSED STORM LINE
- PROPOSED RETAINING WALL
- x 12.4 PROPOSED SPOT ELEV
- 2% SLOPE ARROW
- ⊙ GRATE INLET
- ⊙ STORM MANHOLE
- ⊙ DOUBLE WING CATCH BASIN
- ⊙ SINGLE WING CATCH BASIN
- ⊙ AREA INLET
- ⊙ OUTLET CONTROL STRUCTURE
- ⊙ HEADWALL
- ⊙ SANITARY SEWER MANHOLE



FILE NAME: K:\24005174 - BRC - Barnes & Jeffrey - Colorado Springs - CD\100\100\PRODUCTION\C300 Colorado Springs - AutoCAD FOR GENERAL DOCUMENTATION\PCS 1001 STD\1001.dwg
 DATE: 12/27/2024 10:18 AM
 PLOTTER: HP DesignJet T1300
 PLOTTER DRIVER: HP DesignJet T1300
 PLOTTER SETTINGS: HP DesignJet T1300
 PLOTTER STATUS: OK
 PLOTTER ERROR: NONE
 PLOTTER MESSAGE: SUCCESS
 PLOTTER COMMAND: PLOT

APPENDIX B – PREVIOUS STUDIES



**ADVANCED STORAGE
5560 Barnes Road**

Portion of Tract 5, Saddleback Estates

COLORADO SPRINGS, COLORADO

**PRELIMINARY
DRAINAGE REPORT**

Prepared for:
Advanced Storage Barnes LLC
5001 S Windemere Street, Suite 100
Littleton, Colorado 80120

phone: (303) 941-4831

Prepared by:
CIVAS Engineering, LLC
10056 Brisbane Lane
Littleton, Colorado 80130

phone: (720) 240-5882

Revised August 19, 2024
December 22, 2023
Project No. 23-318

Drainage Report (FDR) will be in accordance with the City of Colorado Springs Drainage Criteria Manual Volume 1 and the Mile High Flood District Urban Storm Drainage Manual. The storm sewer system will be analyzed in the FDR using Civil 3D Storm and Sanitary Analysis. The storm sewer inlet capacity for the inlets will be determined in the FDR using the MHFD-Inlet_v5.02 spreadsheet. The water quality facilities and runoff reduction were determined in this PDR, and will be determined in the FDR, using the UD-BMP_v3.07 spreadsheet. The MHFD MHFD-Detention_v4.06 spreadsheet was used in this PDR, and will be used in the FDR, to design the detention and water quality capture volume elements.

Planned Infiltration Areas (PIAs) have been incorporated into the Advanced Storage Barnes Road project to minimize the directly connected pervious areas. Therefore, the runoff coefficients for the Water Quality Capture Volume have been reduced, as described in Volume 3 of the MHFD Urban Storm Drainage Criteria Manual.

All proposed swales with a total depth greater than 18-inches will need to be sized to convey the 100-year flow with a required 1-ft of freeboard.

DRAINAGE FACILITY DESIGN

General Concept

The proposed development will eliminate the existing private rip rap lined swales along the south side of the property that convey off-site flows, and instead will construct a proposed public CDOT 20' Type R curb inlet, a proposed public 18" RCP storm sewer (located in the right-of-way) and a proposed private 18" RCP storm sewer system in the same general location which will connect to an existing private 36" HDPE storm sewer stub, located in the back of the existing public 15' curb inlet located at the southwest corner of the Barnes Road and Chaparral Road. The proposed development will also utilize proposed private landscape swales, proposed private 5' CO Springs D-10-R curb inlets, proposed private CDOT Type C area inlets, and proposed private 12" PVC, 18" RCP and 24" RCP storm sewers to collect and convey developed runoff from Basins A -

F (2.82 ac.) to a proposed on-site private underground detention and water quality facility in Basin F. As previously discussed in this report, a waiver request for the proposed private underground detention and water quality facility was reviewed by the Colorado Springs Stormwater Enterprise (STM-REV24-0359) and was approved (#07718Z) on 4/23/2024. A copy of the approved waiver request is included in the appendix. A proposed private 18" RCP storm sewer will convey flows from the proposed private underground detention and water quality facility to the proposed private 18" RCP storm sewer along the south side of the property that conveys the off-site flows to the existing private 36" HDPE storm sewer stub, as previously discussed. The proposed private underground detention and water quality facility will utilize an emergency overflow weir, internal to the outlet structure, therefore the proposed private 18" RCP storm sewer from the outlet structure to the existing 36" HDPE storm sewer stub will be sized to convey the undetained 100-year peak inflow rate. Runoff from the existing on-site perimeter landscaped slope on the southwest side of the site will sheet flow to an existing private landscape swale that will convey flows to an existing opening in the back of the existing public 15' curb inlet at the southwest corner of the site. Runoff from the existing on-site perimeter landscaped slope on the east side of the site will sheet flow into the existing public type 2 vertical catch curb and gutter in the Chaparral Road that will convey flows to the existing public 15' curb inlet located adjacent to the southwest corner of the site. Runoff from a small portion of the disturbed are on the south side of the site and the off-site (right-of-way) disturbed areas will either sheet flow directly into Jeffrey Road, Chaparral Road or Barnes Road and will be conveyed to the existing public 15' curb inlet located adjacent to the southwest corner of the site by the existing public catch curb and gutter in Jeffrey Road, Chaparral Road and/or Barnes Road.

Form A in the appendix summarizes the calculation of the composite imperviousness and runoff coefficient values for each basin. Table 6-6 in the appendix was used to determine the imperviousness and runoff coefficients for the individual basin characteristics in Forms A. Standard Form SF-1 in the appendix summarizes the calculation of the time of concentration for each basin. Standard Form SF-2 in the appendix summarizes the calculation of the peak runoff for each basin and each design point for the 2-year, 5 year

CDOT Type C area sump inlet in Basin D. The proposed private CDOT Type C area sump inlet, located on the north side of the future private paved access drive, will be used to collect developed runoff from Basin D at design point 4. Should the proposed private CDOT Type C area sump inlet become 100% clogged, the emergency flow path is to the northwest into the paved access drive in Basin C. A proposed private 24" RCP storm sewer will convey developed flows from the proposed private CDOT Type C area sump inlet to a proposed private 5' CO Springs D-10-R sump curb inlet in Basin F. A proposed private 1.0' deep landscape swale will convey developed runoff from Basin E to a proposed private curb cut and proposed private concrete pan in Basin F at design point 5. The proposed private 5' CO Springs D-10-R sump curb on the north side of the private paved access drive will be used to collect developed runoff from Basin E and F at design point 6. Should the proposed private 5' CO Springs D-10-R sump curb inlet become 100% clogged, the emergency flow path is to southwest and down the private paved access drive into the existing public type 2 catch curb and gutter on the north side of Barnes Road. A proposed private 24" RCP storm sewer will convey developed runoff from the proposed private 5' CO Springs D-10-R sump curb inlet to the proposed private underground detention facility inlet/outlet structure. The proposed private underground detention facility will provide a calculated water quality capture volume (WQCV) of 0.046 ac-ft, an EURV storage volume (incl. WQCV) of 0.121 ac-ft and a 100-year storage volume (incl. WQCV and EURV) of 0.218 ac-ft for developed Basins A, B, C, E and F and for undeveloped Basin D. The proposed private underground detention facility will have the capacity to provide an ultimate storage volume of 0.300 ac-ft which will provide an estimated 100-year storage volume (incl. WQCV and EURV) of 0.295 ac-ft at the time Basin D fully is developed. The WQCV has been reduced by 10% as discussed in the Four Step Process section of this report. Some flows from a portion of the existing perimeter landscaped slope (Basin G) will sheet flow to the shallow swale on the south side which will convey flows to the existing opening in the back of the existing public 15' curb inlet at the southwest corner of Barnes Road and Chaparral Road at design point 9. Some flows from a portion of the existing perimeter landscaped slope (Basin H) will sheet flow into Chaparral Road at design point 10. Runoff from a portion of the perimeter landscaping and the access point (Basin I) will sheet flow into Barnes Road at design

points 11. However these flows are relatively minor, and are also equal to or less than the flows under the existing conditions. Existing public catch curb and gutter in both Barnes Road and Chaparral will convey these flow to the existing public curb inlet located adjacent to the southeast corner of the site. Runoff from the off-site disturbed areas in the right-of-way in Basins OS3, OS4 and OS5 will continue to sheet flow to existing public type 2 catch curb and gutter in Jeffrey Road, Barnes Road and Chaparral Road which will convey flows to the existing public 15' curb inlet located adjacent to the southeast corner of the site. The existing downstream public storm sewer system will convey the developed flows to Sand Creek.

As previously discussed, the private underground detention facility for the Advanced Storage Barnes Road development has been designed based on future Lots 2 and 3 being undeveloped. However, the underground detention facility has been sized to provide an ultimate storage volume of 0.300 ac-ft and was based on a maximum imperviousness of 80% for the future developments in future Lots 2 and 3 and the required 10% WQCV reduction in each of the future Lots 2 and 3. The Final Drainage Report for each of those developments will be required to include 1) an independent analysis of the volume reduction to ensure that the minimum 10% WQCV volume reduction for that particular development is being achieved, 2) an independent analysis of the underground detention facility to ensure that its volumes meet all applicable criteria at the time of future development, and 3) a redesign of the outlet structure WQCV/EURV orifice plate and 100-year restrictor plate to ensure that the drain times meet all applicable criteria at the time of future development

The developed flows for the existing and proposed basins and the existing and proposed design points are summarized below and on pages 10 and 11.

4 STEP PROCESS

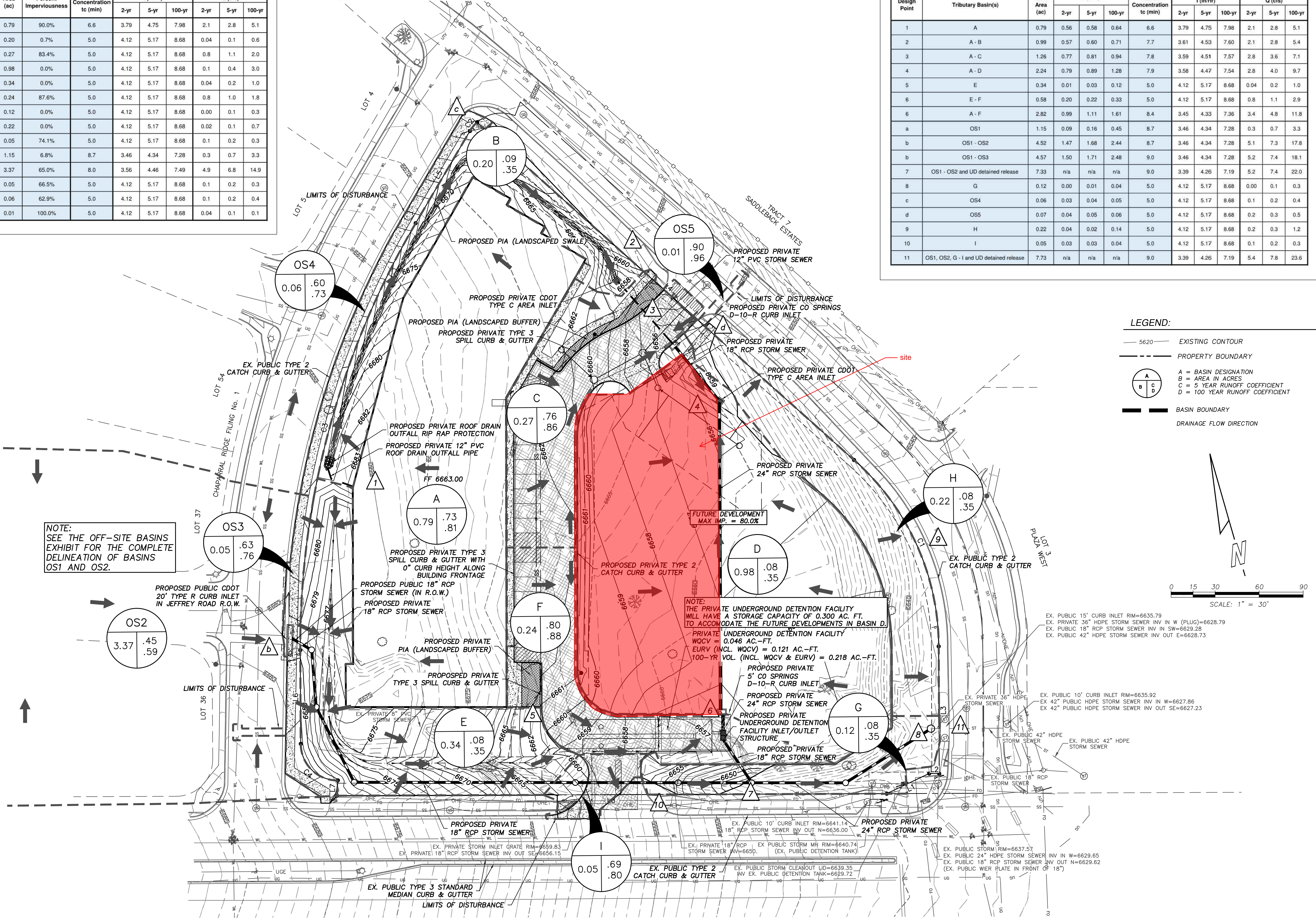
The proposed development area is 2.5 acres, so the 4 step process and detention criteria are applicable. As previously discussed in this report, detention and water quality are being provided by a proposed on-site private underground detention and water quality facility. A waiver request for the proposed private underground detention and water quality facility was reviewed by the Colorado Springs Stormwater Enterprise (STM-REV24-0359) and was approved (#07718Z) on 4/23/2024. A copy of the approved waiver request is included in the appendix.

STEP ONE

Volume Reduction – the site utilizes 3 planned infiltration area (PIAs) to employ volume reduction methods. One is a 360' long cobble landscape swale that conveys developed runoff from the roof of the 35,195 s.f. storage building at an average slope of 6.7% and with 4:1 side slopes. The wetted perimeter of the flow in the swale during the 2-year storm is 3.15 feet. The other two are landscape buffers totaling 990 s.f. that provide infiltration for runoff from a total of 1,110 s.f. of concrete sidewalk and provide an interface width of 190'. The roof and sidewalk areas are considered unconnected impervious areas (UIAs) and the landscape swale and landscape buffers PIAs are considered receiving pervious areas (RPAs). The interface width of 3.15' for the landscape swale was based on the developed flows from the roof during the 2-year storm event. The volume reduction calculations for this development are based on future Lots 2 and 3 being undeveloped at this time and as previously discussed, the Final Drainage Report for each of those developments will be required to include 1) an independent analysis of the volume reduction to ensure that the minimum 10% WQCV volume reduction for that particular development is being achieved. The MHFD UD-BMP spreadsheet was used to calculate the 10% reduction in the water quality capture volume (WQCV), for the 3.33 acres of disturbed area for the development and by employing the volume reduction method, the WQCV has been reduced from 0.051 ac-ft to 0.046 ac-ft.

Basin Summary Table									
Basin Name	Area (ac)	Percent Imperviousness	Time of Concentration tc (min)	Rainfall Intensity I (in/hr)			Peak Flow Q (cfs)		
				2-yr	5-yr	100-yr	2-yr	5-yr	100-yr
A	0.79	90.0%	6.6	3.79	4.75	7.98	2.1	2.8	5.1
B	0.20	0.7%	5.0	4.12	5.17	8.68	0.04	0.1	0.6
C	0.27	83.4%	5.0	4.12	5.17	8.68	0.8	1.1	2.0
D	0.98	0.0%	5.0	4.12	5.17	8.68	0.1	0.4	3.0
E	0.34	0.0%	5.0	4.12	5.17	8.68	0.04	0.2	1.0
F	0.24	87.6%	5.0	4.12	5.17	8.68	0.8	1.0	1.8
G	0.12	0.0%	5.0	4.12	5.17	8.68	0.00	0.1	0.3
H	0.22	0.0%	5.0	4.12	5.17	8.68	0.02	0.1	0.7
I	0.05	74.1%	5.0	4.12	5.17	8.68	0.1	0.2	0.3
OS1	1.15	6.8%	8.7	3.46	4.34	7.28	0.3	0.7	3.3
OS2	3.37	65.0%	8.0	3.56	4.46	7.49	4.9	6.8	14.9
OS3	0.05	66.5%	5.0	4.12	5.17	8.68	0.1	0.2	0.3
OS4	0.06	62.9%	5.0	4.12	5.17	8.68	0.1	0.2	0.4
OS5	0.01	100.0%	5.0	4.12	5.17	8.68	0.04	0.1	0.1

Design Point Summary Table												
Design Point	Tributary Basin(s)	Total Area (ac)	Σ(C'A)			Time of Concentration tc (min)	Rainfall Intensity I (in/hr)			Peak Flow Q (cfs)		
			2-yr	5-yr	100-yr		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr
1	A	0.79	0.56	0.58	0.64	6.6	3.79	4.75	7.98	2.1	2.8	5.1
2	A - B	0.99	0.57	0.60	0.71	7.7	3.61	4.53	7.60	2.1	2.8	5.4
3	A - C	1.26	0.77	0.81	0.94	7.8	3.59	4.51	7.57	2.8	3.6	7.1
4	A - D	2.24	0.79	0.89	1.28	7.9	3.58	4.47	7.54	2.8	4.0	9.7
5	E	0.34	0.01	0.03	0.12	5.0	4.12	5.17	8.68	0.04	0.2	1.0
6	E - F	0.58	0.20	0.22	0.33	5.0	4.12	5.17	8.68	0.8	1.1	2.9
6	A - F	2.82	0.99	1.11	1.61	8.4	3.45	4.33	7.36	3.4	4.8	11.8
a	OS1	1.15	0.09	0.16	0.45	8.7	3.46	4.34	7.28	0.3	0.7	3.3
b	OS1 - OS2	4.52	1.47	1.68	2.44	8.7	3.46	4.34	7.28	5.1	7.3	17.8
b	OS1 - OS3	4.57	1.50	1.71	2.48	9.0	3.46	4.34	7.28	5.2	7.4	18.1
7	OS1 - OS2 and UD detained release	7.33	n/a	n/a	n/a	9.0	3.39	4.26	7.19	5.2	7.4	22.0
8	G	0.12	0.00	0.01	0.04	5.0	4.12	5.17	8.68	0.00	0.1	0.3
c	OS4	0.06	0.03	0.04	0.05	5.0	4.12	5.17	8.68	0.1	0.2	0.4
d	OS5	0.07	0.04	0.05	0.06	5.0	4.12	5.17	8.68	0.2	0.3	0.5
9	H	0.22	0.04	0.02	0.14	5.0	4.12	5.17	8.68	0.2	0.3	1.2
10	I	0.05	0.03	0.03	0.04	5.0	4.12	5.17	8.68	0.1	0.2	0.3
11	OS1, OS2, G - I and UD detained release	7.73	n/a	n/a	n/a	9.0	3.39	4.26	7.19	5.4	7.8	23.6

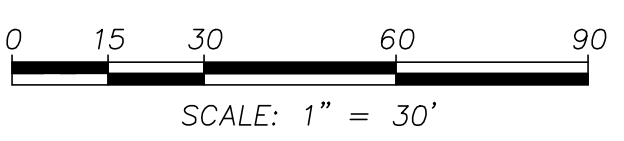


NOTE:
SEE THE OFF-SITE BASINS
EXHIBIT FOR THE COMPLETE
DELINEATION OF BASINS
OS1 AND OS2.

NOTE:
THE PRIVATE UNDERGROUND DETENTION FACILITY
WILL HAVE A STORAGE CAPACITY OF 0.300 AC. FT.
TO ACCOMMODATE THE FUTURE DEVELOPMENTS IN BASIN D.
PRIVATE UNDERGROUND DETENTION FACILITY
WQCV = 0.046 AC.-FT.
EURV (INCL. WQCV) = 0.121 AC.-FT.
VOL. (INCL. WQCV & EURV) = 0.218 AC.-FT.

LEGEND:

- 5620 EXISTING CONTOUR
- PROPERTY BOUNDARY
- A = BASIN DESIGNATION
- B = AREA IN ACRES
- C = 5 YEAR RUNOFF COEFFICIENT
- D = 100 YEAR RUNOFF COEFFICIENT
- BASIN BOUNDARY
- DRAINAGE FLOW DIRECTION



CALL UTILITY NOTIFICATION
CENTER OF COLORADO
811
CALL 811 TO REPORT ANY
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.

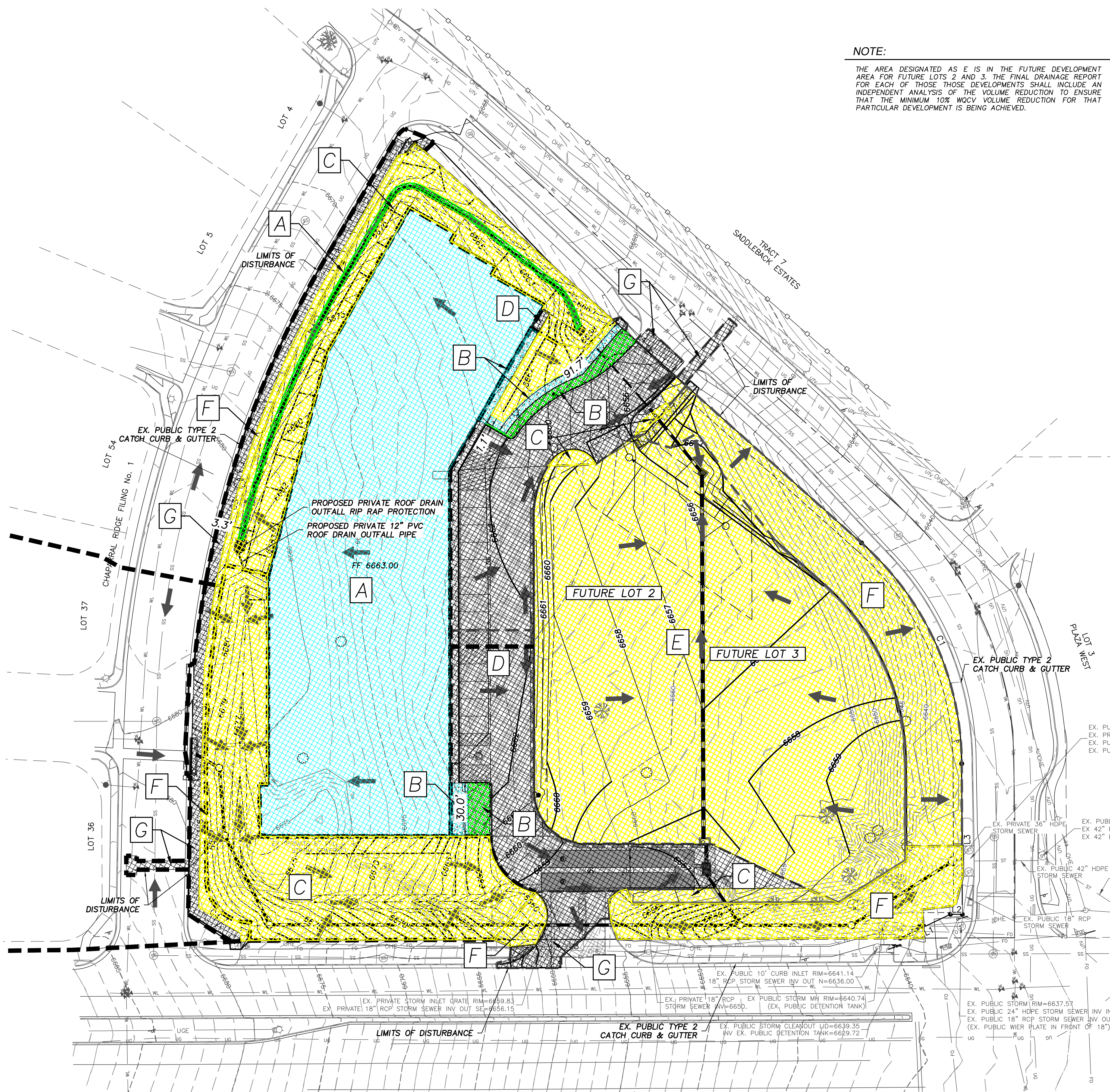
REVISION	DATE	BY	SS
CITY REVIEW COMMENTS	5/30/24	SS	
CITY REVIEW COMMENTS	7/24/24	SS	

DATE: 4/9/2024
DESIGNED BY: SMS
DRAWN BY: SS
CHECKED BY:

ADVANCED STORAGE
BARNES ROAD
PRELIMINARY DRAINAGE
PLAN EXHIBIT

CIVAS
engineering
civil engineering solutions
10056 Brubaker Lane
Littleton, Colorado • 80130
720-240-5882
civas-eng.com

STEVEN M. STRICKLING
COLORADO P.E. NO. 31237
FOR AND ON BEHALF OF
CIVAS ENGINEERING, LLC



NOTE:
 THE AREA DESIGNATED AS E IS IN THE FUTURE DEVELOPMENT AREA FOR FUTURE LOTS 2 AND 3. THE FINAL DRAINAGE REPORT FOR EACH OF THOSE DEVELOPMENTS SHALL INCLUDE AN INDEPENDENT ANALYSIS OF THE VOLUME REDUCTION TO ENSURE THAT THE MINIMUM 10% WQCV VOLUME REDUCTION FOR THAT PARTICULAR DEVELOPMENT IS BEING ACHIEVED.

Design Procedure Form: Runoff Reduction
 Sheet 1 of 1

Designer: SMS
 Company: CIVAS Engineering, LLC
 Date: July 25, 2024
 Project: Advanced Storage Barnes Road
 Location: 560 Barnes Road

SITE INFORMATION (User Input in Blue Cells)

Area ID	WQCV (Runoff Coeff)						
	A	B	C	D	E	F	G
Depth of Average Runoff Producing Storm, t_d	0.60 inches						
Depth of Average Runoff Producing Storm, t_d	0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)						

Downstream Design Point ID

Area ID	A	B	C	D	E	F	G
DCIA (ft ²)	0	0	0	17,910	0	0	5,260
UA (ft ²)	34,495	1,110	0	0	0	0	0
RPA (ft ²)	1,190	980	0	0	0	0	0
SPA (ft ²)	0	0	24,845	0	42,490	16,970	0
Total Area (ft ²)	35,685	2,090	24,845	17,910	42,490	16,970	5,260

Calculated Runoff Results

Area ID	A	B	C	D	E	F	G
WQCV (ft ³)	1,437	46	0	746	0	0	219
WQCV Reduction (%)	13%	100%	0%	0%	0%	0%	0%

Calculated WQCV Results

Area ID	A	B	C	D	E	F	G
WQCV (ft ³)	1,437	46	0	746	0	0	219
WQCV Reduction (%)	13%	100%	0%	0%	0%	0%	0%

Calculated Design Point Results

Design Point ID	A	B	C	D	E	F	G
DCIA (ft ²)	0	0	0	17,910	0	0	5,260
UA (ft ²)	34,495	1,110	0	0	0	0	0
RPA (ft ²)	1,190	980	0	0	0	0	0
SPA (ft ²)	0	0	24,845	0	42,490	16,970	0
Total Area (ft ²)	35,685	2,090	24,845	17,910	42,490	16,970	5,260

Calculated Site Results

Category	Value
Total Area (ft ²)	145,250
Total Impervious Area (ft ²)	36,775
WQCV (ft ³)	2,448
WQCV Reduction (%)	23%
Unretained WQCV (ft ³)	2,218

- LEGEND:**
- 5620 — EXISTING CONTOUR
 - - - - - PROPERTY BOUNDARY
 - (A/B/C/D) BASIN DESIGNATION
 - (A/B/C) AREA IN ACRES
 - (A/B/C) 5 YEAR RUNOFF COEFFICIENT
 - (A/B/C) 100 YEAR RUNOFF COEFFICIENT
 - (A/B/C) DESIGN POINT
 - (A/B/C) 5 YEAR RUNOFF
 - (A/B/C) 100 YEAR RUNOFF
 - — — BASIN BOUNDARY
 - DRAINAGE FLOW DIRECTION
 - ▨ UIA - UNCONNECTED IMPERVIOUS AREA
 - ▨ RPA - RECEIVING PERVIOUS AREA
 - ▨ DCIA - DIRECTLY CONNECTED IMPERVIOUS AREA
 - ▨ SPA - SEPARATE PERVIOUS AREA

EX. PUBLIC 15" CURB INLET RIM=6635.79
 EX. PRIVATE 36" HDPE STORM SEWER INV IN W (PLUG)=6628.79
 EX. PUBLIC 18" RCP STORM SEWER INV IN SW=6629.28
 EX. PUBLIC 42" HDPE STORM SEWER INV OUT E=6628.73

EX. PRIVATE 36" HDPE STORM SEWER
 EX. PUBLIC 10" CURB INLET RIM=6635.92
 EX. 42" PUBLIC HDPE STORM SEWER INV IN W=6627.86
 EX. 42" PUBLIC HDPE STORM SEWER INV OUT SE=6627.23

EX. PUBLIC 42" HDPE STORM SEWER
 EX. PUBLIC 42" HDPE STORM SEWER

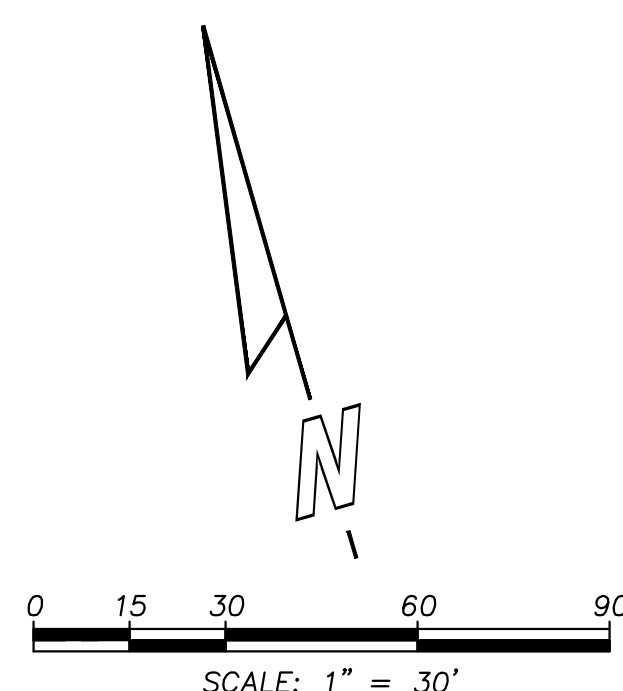
EX. PRIVATE 18" RCP STORM SEWER
 EX. PUBLIC 18" RCP STORM SEWER

EX. PRIVATE STORM INLET GRATE RIM=6639.83
 EX. PRIVATE 18" RCP STORM SEWER INV OUT SE=6636.15

EX. PRIVATE 18" RCP STORM SEWER INV=6650.
 EX. PUBLIC STORM MH RIM=6640.74
 EX. PUBLIC DETENTION TANK (EX. PUBLIC DETENTION TANK)

EX. PUBLIC STORM CLEANOUT UID=6639.35
 INV EX. PUBLIC DETENTION TANK=6629.72

EX. PUBLIC STORM RIM=6637.57
 EX. PUBLIC 24" HDPE STORM SEWER INV IN W=6629.65
 EX. PUBLIC 18" RCP STORM SEWER INV OUT N=6629.62
 (EX. PUBLIC WIER PLATE IN FRONT OF 18")



CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
 CALL 8-8-8 BEFORE YOU DIG. GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

REVISION

DATE	BY	REVISION
5/30/24	SS	
7/24/24	SS	

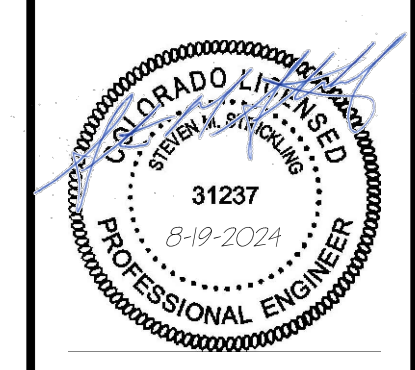
CITY REVIEW COMMENTS

CITY REVIEW COMMENTS

DATE: 12/22/2023
 DESIGNED BY: SMS
 DRAWN BY: SS
 CHECKED BY:

ADVANCED STORAGE BARNES ROAD
 UIA - RPA, SPA AND DCIA EXHIBIT

CIVAS engineering
 civil engineering solutions
 10056 Brisbane Lane
 Littleton, Colorado • 80130
 720-240-5882
 civas-eng.com



STEVEN M. STRICKLING
 COLORADO P.E. NO. 31237
 FOR AND ON BEHALF OF
 CIVAS ENGINEERING, LLC

Form A - Calculation of Composite Imperviousness and Runoff Coefficient Values

Designer: SMS
Company: CIVAS Engineering, LLC
Date: 7/24/2024
Project Name: Advanced Storage Barnes Road
Project Number: 23-318

Hydrological Soil Group: B Land Use:	Paved Drives	Concrete/ Walks	Roofs	Gravel / RipRap	Lawns/ Native	Residential 1/4 ac.			Sub-Basin Composite Imperviousness and Runoff Coefficient Values			
	Imperviousness:	100%	100%	90%	80%	0%	65%					
	C ₂ :	0.89	0.89	0.71	0.57	0.02	0.41					
	C ₅ :	0.90	0.90	0.73	0.59	0.08	0.45					
	C ₁₀₀ :	0.96	0.96	0.81	0.70	0.35	0.59					
Subcatchment Basin(s)	Area (s.f.)	Area (s.f.)	Area (s.f.)	Area (s.f.)	Area (s.f.)	Area (s.f.)	Total Area (s.f.) (ac.)		Imp. %	C ₂	C ₅	C ₁₀₀
A	0	0	34,495	0	0	0	34,495	0.79	90.0%	0.71	0.73	0.81
B	0	60	0	0	8,860	0	8,920	0.20	0.7%	0.03	0.09	0.35
C	9,060	810	0	0	1,960	0	11,830	0.27	83.4%	0.75	0.76	0.86
D (FUTURE DEVELOPMENT) (MAX 80% IMP.)	0	0	0	0	42,490	0	42,490	0.98	0.0%	0.02	0.08	0.35
E	0	0	0	0	14,910	0	14,910	0.34	0.0%	0.02	0.08	0.35
F	8,790	300	0	0	1,285	0	10,375	0.24	87.6%	0.78	0.80	0.88
TOTAL - UD DETENTION	17,850	1,170	34,495	0	69,505	0	123,020	2.82	40.7%	0.35	0.39	0.57
G	0	0	0	0	5,380	0	5,380	0.12	0.0%	0.02	0.08	0.35
H	0	0	0	0	9,415	0	9,415	0.22	0.0%	0.02	0.08	0.35
I	1,485	0	0	0	520	0	2,005	0.05	74.1%	0.66	0.69	0.80
OS1		3,385			46,570		49,955	1.15	6.8%	0.08	0.14	0.39
OS2						146,835	146,835	3.37	65.0%	0.41	0.45	0.59
OS3	215	1,335			780		2,330	0.05	66.5%	0.60	0.63	0.76
OS4		1,685			995		2,680	0.06	62.9%	0.57	0.60	0.73
OS5	575						575	0.01	100.0%	0.89	0.90	0.96
	17,850	1,170	34,495	0	27,015	0						

Standard Form SF-2, Storm Drainage System Design (Rational Method Procedure)

Designer: SMS
Company: CIVAS Engineering, LLC
Date: 7/24/2024
Project Name: Advanced Storage Barnes Rd
Project Number: 23-318

Design Storm: 100-year

Note:
 $I_{100} = -2.52 \times \ln(t_c) + 12.735$

STREET	Design Point	Direct Runoff							Total Runoff				Street		Pipe			Travel Time			REMARKS
		Basin Desig.	Area (A) ac.	Runoff Coeff. (C)	t _c min.	C*A	I	Q	t _c min.	Σ(C*A)	I	Q	Slope %	Street Flow cfs	Design Flow cfs	Slope %	Pipe Size in	Length ft	Velocity ft/sec	t _t min	
							in/hr	cfs			in/hr	cfs									
	1	A	0.79	0.81	6.6	0.64	7.98	5.1			5.1	7.8	5.1					270	4.2	1.1	
	2	B	0.20	0.35	5.0	0.07	8.68	0.6	7.7	0.71	7.60			5.4	4.0	12		55	10.1	0.1	
	3	C	0.27	0.86	5.0	0.23	8.68	2.0	7.8	0.94	7.57			7.1	1.0	12		25	4.5	0.1	
	4	D	0.98	0.35	5.0	0.34	8.68	3.0	7.9	1.28	7.54			9.7	0.5	24		190	5.4	0.6	
	5	E	0.34	0.35	5.0	0.12	8.68	1.0			1.0										
	6 6	F	0.24	0.88	5.0	0.21	8.68	1.8	5.0 8.4	0.33 1.61	8.68 7.36	2.9 11.8									
	a	OS1	1.15	0.39	8.7	0.45	7.28	3.3			3.3										
	b	OS2	3.37	0.59	8.0	1.99	7.49	14.9	8.7	2.44	7.28	17.8									
	b 7	OS3	0.05	0.76	5.0	0.04	8.68	0.3	8.7 9.0	2.48 2.48	7.28 7.19	18.1 17.8			18.1	8.8	18	375	18.4	0.3	+ 4.2 detained release = 22.0
	8	G	0.12	0.35	5.0	0.04	8.68	0.3			0.3										
	c	OS4	0.06	0.73	5.0	0.05	8.68	0.4			0.4										
	d	OS5	0.01	0.96	5.0	0.01	8.68	0.1	5.0	0.06	8.68	0.5									
	9	H	0.22	0.35	5.0	0.08	8.68	0.7	5.0	0.14	8.68	1.2									
	10 11	I	0.05	0.80	5.0	0.04	8.68	0.3	9.0	2.70	7.19	0.3 19.4									+ 4.2 detained release = 23.6

Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: SMS
Company: CIVAS Engineerin, LLC
Date: July 25, 2024
Project: Advanced Storage Barnes Road
Location: 5560 Barnes Road

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth = 0.60 inches
 Depth of Average Runoff Producing Storm, d_0 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	SPA	DCIA	SPA	SPA	DCIA						
Area ID	A	B	C	D	E	F	G						
Downstream Design Point ID	1	2	3	4	5	6	7						
Downstream BMP Type	EDB	EDB	EDB	EDB	EDB	None	None						
DCIA (ft ²)	--	--	--	17,910	--	--	5,260						
UIA (ft ²)	34,495	1,110	--	--	--	--	--						
RPA (ft ²)	1,190	980	--	--	--	--	--						
SPA (ft ²)	--	--	24,845	--	42,490	16,970	--						
HSG A (%)	0%	0%	0%	--	0%	0%	--						
HSG B (%)	100%	100%	100%	--	100%	100%	--						
HSG C/D (%)	0%	0%	0%	--	0%	0%	--						
Average Slope of RPA (ft/ft)	0.067	0.040	--	--	--	--	--						
UIA:RPA Interface Width (ft)	3.30	122.00	--	--	--	--	--						

CALCULATED RUNOFF RESULTS

Area ID	A	B	C	D	E	F	G						
UIA:RPA Area (ft ²)	35,685	2,090	--	--	--	--	--						
L / W Ratio	16.00	0.14	--	--	--	--	--						
UIA / Area	0.9667	0.5311	--	--	--	--	--						
Runoff (in)	0.42	0.00	0.00	0.50	0.00	0.00	0.50						
Runoff (ft ³)	1250	0	0	746	0	0	219						
Runoff Reduction (ft ³)	187	46	1242	0	2125	849	0						

CALCULATED WQCV RESULTS

Area ID	A	B	C	D	E	F	G						
WQCV (ft ³)	1437	46	0	746	0	0	219						
WQCV Reduction (ft ³)	187	46	0	0	0	0	0						
WQCV Reduction (%)	13%	100%	0%	0%	0%	0%	0%						
Untreated WQCV (ft ³)	1250	0	0	746	0	0	219						

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

Downstream Design Point ID	1	2	3	4	5	6	7						
DCIA (ft ²)	0	0	0	17,910	0	0	5,260						
UIA (ft ²)	34,495	1,110	0	0	0	0	0						
RPA (ft ²)	1,190	980	0	0	0	0	0						
SPA (ft ²)	0	0	24,845	0	42,490	16,970	0						
Total Area (ft ²)	35,685	2,090	24,845	17,910	42,490	16,970	5,260						
Total Impervious Area (ft ²)	34,495	1,110	0	17,910	0	0	5,260						
WQCV (ft ³)	1,437	46	0	746	0	0	219						
WQCV Reduction (ft ³)	187	46	0	0	0	0	0						
WQCV Reduction (%)	13%	100%	0%	0%	0%	0%	0%						
Untreated WQCV (ft ³)	1,250	0	0	746	0	0	219						

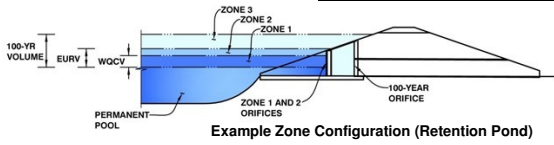
CALCULATED SITE RESULTS (sums results from all columns in worksheet)

Total Area (ft ²)	145,250
Total Impervious Area (ft ²)	58,775
WQCV (ft ³)	2,449
WQCV Reduction (ft ³)	233
WQCV Reduction (%)	10%
Untreated WQCV (ft ³)	2,216

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Advanced Storage Barnes Road
Basin ID: Underground Detention Facility



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.07	0.046	Orifice Plate
Zone 2 (EURV)	4.07	0.075	Orifice Plate
Zone 3 (100-year)	6.93	0.115	Rectangular Orifice
Total (all zones)		0.236	

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

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

Calculated Parameters for Underdrain
 Underdrain Orifice Area = ft²
 Underdrain Orifice Centroid = feet

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

Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
 Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
 Orifice Plate: Orifice Vertical Spacing = inches
 Orifice Plate: Orifice Area per Row = sq. inches

Calculated Parameters for Plate
 WQ Orifice Area per Row = ft²
 Elliptical Half-Width = feet
 Elliptical Slot Centroid = feet
 Elliptical Slot Area = ft²

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.50	3.60					
Orifice Area (sq. inches)	0.37	0.25	0.25					

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

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice = Zone 3 Rectangular Not Selected ft (relative to basin bottom at Stage = 0 ft)
 Depth at top of Zone using Vertical Orifice = Zone 3 Rectangular Not Selected ft (relative to basin bottom at Stage = 0 ft)
 Vertical Orifice Height = inches
 Vertical Orifice Width = inches

Calculated Parameters for Vertical Orifice
 Zone 3 Rectangular Not Selected
 Vertical Orifice Area = ft²
 Vertical Orifice Centroid = feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, Ho = Not Selected Not Selected ft (relative to basin bottom at Stage = 0 ft)
 Overflow Weir Front Edge Length = feet
 Overflow Weir Grate Slope = H:V
 Horiz. Length of Weir Sides = feet
 Overflow Grate Type =
 Debris Clogging % = %

Calculated Parameters for Overflow Weir
 Height of Grate Upper Edge, H₁ = feet
 Overflow Weir Slope Length = feet
 Grate Open Area / 100-yr Orifice Area =
 Overflow Grate Open Area w/o Debris = ft²
 Overflow Grate Open Area w/ Debris = ft²

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

Depth to Invert of Outlet Pipe = Not Selected Not Selected ft (distance below basin bottom at Stage = 0 ft)
 Circular Orifice Diameter = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
 Outlet Orifice Area = ft²
 Outlet Orifice Centroid = feet
 Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

Calculated Parameters for Spillway
 Spillway Design Flow Depth = feet
 Stage at Top of Freeboard = feet
 Basin Area at Top of Freeboard = acres
 Basin Volume at Top of Freeboard = acre-ft

Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period									
One-Hour Rainfall Depth (in)	N/A	N/A	0.95	1.23	1.49	1.89	2.23	2.60	3.58
CUHP Runoff Volume (acre-ft)	0.046	0.121	0.077	0.115	0.161	0.262	0.336	0.429	0.655
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.077	0.115	0.161	0.262	0.336	0.429	0.655
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.0	0.4	1.0	2.6	3.6	4.8	7.7
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.02	0.14	0.35	0.92	1.28	1.70	2.72
Peak Inflow Q (cfs)	N/A	N/A	1.3	2.1	3.0	4.9	6.3	8.0	12.0
Peak Outflow Q (cfs)	0.0	0.0	0.0	0.0	0.2	1.9	3.1	4.2	6.6
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.1	0.2	0.7	0.9	0.9	0.9
Structure Controlling Flow	Plate	Plate	Plate	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	39	64	52	63	70	66	64	61	54
Time to Drain 99% of Inflow Volume (hours)	41	68	54	67	75	73	72	71	68
Maximum Ponding Depth (ft)	2.07	4.08	2.82	3.78	4.73	5.41	5.79	6.48	8.54
Area at Maximum Ponding Depth (acres)	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03
Maximum Volume Stored (acre-ft)	0.046	0.121	0.072	0.109	0.148	0.175	0.191	0.218	0.290