June 1, 2023 *Revised August 13, 2023*

Paint Brush Hills Metropolitan District
9985 Towner Avenue
Falcon, CO 80831

RE: **Drainage Letter for Paint Brush Hills Metropolitan District's Pump House 6 within Paint Brush Hills Filing 12 Tract A and 14 Tract B**

To Whom It May Concern:

The Paint Brush Hills Metropolitan District (PBHMD) is located in Peyton, Colorado in unincorporated El Paso County. This drainage conformance letter pertains to the PBHMD project called the Pump House 6 Site Development Plan (Site) and is located southeast of the intersection of Keynes Drive and Kingsbury Drive and is west of Rockingham Drive and Keating Drive within the Paint Brush Hills Filing No. 14. The Site is located in the NW ¼, Section 25, Township 12 South, Range 65 West of the 6th PM, County of El Paso, State of Colorado.

The Site was previously studied for drainage improvements as a part of the Final Drainage Report for Paint Brush Hills – Phase 2 (Filing No. 13 EDAPC File Number SF0538) which was prepared in October 2005 and with the latest revision date of June 2008. This site includes a small area in the northern portion of the Paint Brush Hills Filing 12, Tract A and Tract B of the Paint Brush Hills Filing No. 14. In general, the Site drains north-east to south-west toward the Detention Pond "C" in Tract A. This area is within sub- basins "XX2", "YY" and "ZZ" of the Filing No. 13 Final Drainage Report.

The Filing No. 13 Phase 2 site is planned for a single-family home development with over 550 homes (in the 2,000+ square foot range), a 10-acre elementary school site, a 6-acre community commercial site and 44 acres of trails and open space. The Filing 13 site has provided for regional detention and water quality for the overall site development.

The PBHMD Pump House 6 Site Development Plan (26' x 42') within the single-family development with its respective gravel access driveway out to Keynes Drive. The area of imperviousness for the site is the well house roof and associated concrete pads at 1,177 SF and gravel driveway at 4,888 SF, for a total of 6,065 SF of imperviousness.

This area was subsequently studied as a part of the Preliminary/Final for Paint Brush Hills Filing No. 14 (EDPAC File Number SF2024) dated March 2021. The PBHMD Pump House 6 Site Development Plan is primarily within sub-basin N and minor portions with sub-basin C and Sub-basin M of the Filing No. 14 Drainage Report. Sub-basin N appears to correspond to sub-basin ZZ and sub-basin YY from the Filing 13 Drainage Report. The summary of flows for Filing No. 13, Filing No. 14 and the proposed PHHMD Pump House 6 are shown in the following table.

Sub-Basin	Area (acres)	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
XX2	5.72	0.35	0.45	7 cfs	16 cfs
YY	1.85	0.35	0.45	2 cfs	5 cfs
ZZ	7.01	0.30	0.40	6 cfs	13 cfs
Total (FDS Filing No 13)	14.85			15 cfs	34 cfs
C	11.80	0.28	0.48	9.2 cfs	28.6 cfs
M	2.53	0.27	0.48	2.6 cfs	7.8 cfs
N	8.94	0.20	0.44	6.2 cfs	23.0 cfs
Total (FDS Filing No 14)	23.27			18.0 cfs	59.6 cfs
C (proposed)	11.80	0.28	0.48	9.2 cfs	28.6 cfs
M (proposed)	2.53	0.27	0.48	2.6 cfs	7.8 cfs
N (proposed)	8.94	0.21	0.45	6.4 cfs	23.2 cfs
Total (PBHMD Pump 6)	23.27			18.2 cfs	59.8 cfs
Change in Flow				+0.2 cfs	+0.2 cfs

For the purposes these calculation C-value and rainfall intensities used in the Filing No. 14 Drainage Report were replicated for the PBHMD Pump House 6 plan to obtain comparable calculations. For sub-basin C and sub-basin M gravel driveway imperviousness in the amount 650 square-feet and 260 square-feet were added, respectively. The gravel driveway added were insignificant and did not have an impact upon either the imperviousness or flow rates for sub-basin C and sub-basin M. For sub-basin N the addition of 4,888 square-feet of gravel driveway and 1,177 square-feet roof /concrete increase the sub-basin imperviousness by 1.3-percent and increases the 5-year and 100-year flow rate both by 0.2 cfs.

The increase in imperviousness for sub-basin N by 1.3-percent translates to a 0.08-percent increase in imperviousness for the Detention Pond "C" and will have negligible impacts on the volume required and the water surface elevation (the difference change the pond volume requirement by approximately 400 cubic-feet or less than 0.1-percent).

Due to the minimal amount of imperviousness created by the proposed Pump House 6 and associated access drive, which were planned for with the development of the Paint Brush Hills Filing No. 14, it will not have any adverse drainage effects on any of the adjacent property and will not require any additional detention or water quality facilities.

Two drainage swales and associated riprap rundowns have been added to the site. The swale along the roadside ditch was designed to convey 2.2 cfs and the swale around the building was designed to convey 0.5 cfs. Both swales will be grass-lined until reach the side of the pond from there the swales will be riprap lined.

If you have any questions or concerns with drainage concepts associated with this proposed construction, please contact me at 303-293-8107.

Sincerely,

Gary E. Welp, P.E., CFM

Attachments

COLORADO REGISTERED GARY E. WELP 35850 PROFESSIONAL ENGINEER

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.

Gary E, Welp, P.E., CFM #35850

09-12-2023
Date

COLORADO REGISTERED GARY E. WELP 35850 PROFESSIONAL ENGINEER

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.

9/14/23
Date

[Name, Title] District Manager
[Business Name] Paint Brush Hills Metropolitan District
[Address] 9985 Towner Ave,
Falcon, CO 80831

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.

County Engineer / ECM Administrator

Date

Calculation of Peak Runoff using Rational Method

Designer: Gary E. Welp, PE, CFM
Company: RGA
Date: 8/13/2023
Project: Paintbrush Hills Well #12
Location: Peyton, CO

Version 2.00 released May 2017

ct UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this

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Computed $t_c = t_i + t_t$

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

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

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

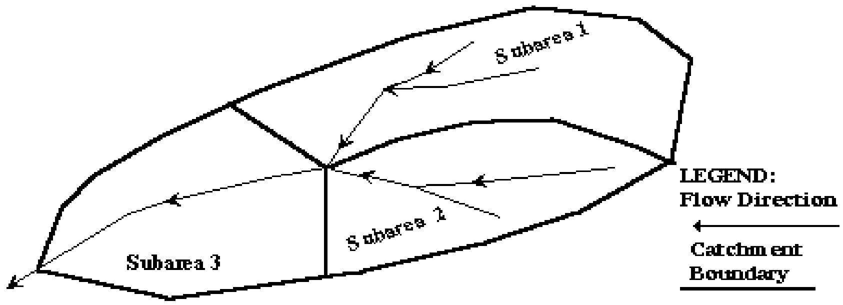
$Q(cfs) = CIA$

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C						e of Concentra	Rainfall Intensity, I (in/hr)						Peak Flow, Q (cfs)					
				2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	Selected t_c (min)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
C	11.80	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52													
					0.26				0.48	20.5		3.0				5.0		9.2				28.6
N	8.94	B	15.0	0.09	0.11	0.18	0.34	0.41	0.50													
					0.21				0.45	15.6		3.4				5.8		6.4				23.2
M	2.53	B	20	0.13	0.15	0.22	0.37	0.44	0.52													
					0.27				0.48	12.3		3.8				6.5		2.6				7.8
Sub #1	0.11	B	18	0.11	0.13	0.20	0.36	0.43	0.51													
					0.28				0.50	5.0		5.2				8.8		0.2				0.5
Sub #2	0.46	B	26	0.17	0.20	0.27	0.41	0.47	0.55													
					0.33				0.53	5.0		5.2				8.8		0.8				2.2

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: Gary E. Welp, PE, CFM
Company: RGA
Date: 8/13/2023
Project: Paintbrush Hills Well #12
Location: Peyton, CO



Subcatchment Name
N

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Cells of this color are for calculated results based on overrides

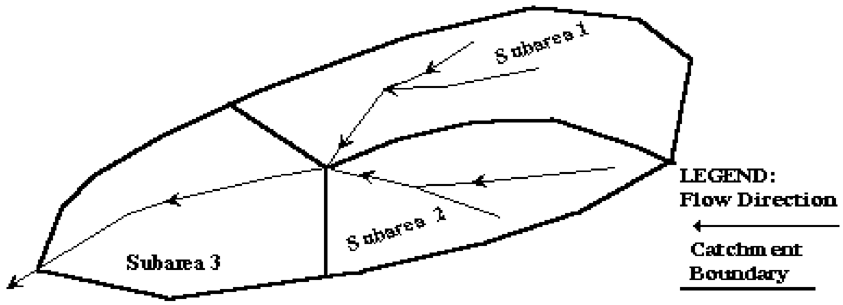
See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
landscape	3.07	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
					0.16				0.41	
gravel	0.09	B	80.0	0.64	0.67	0.70	0.75	0.77	0.80	0.83
					0.80				0.85	
building	0.03	B	90.0	0.74	0.76	0.78	0.81	0.83	0.84	0.87
					0.90				0.95	
residential	5.75	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52	0.61
					0.22				0.46	
15										
Total Area (ac)	**8.94**		**Area-Weighted C**	**0.09**	**0.11**	**0.18**	**0.34**	**0.41**	**0.49**	**0.59**
			Area-Weighted Override C	**0.09**	**0.21**	**0.18**	**0.34**	**0.41**	**0.45**	**0.59**

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: Gary E. Welp, PE, CFM
Company: RGA
Date: 8/13/2023
Project: Paintbrush Hills Well #12
Location: Peyton, CO



Subcatchment Name
M

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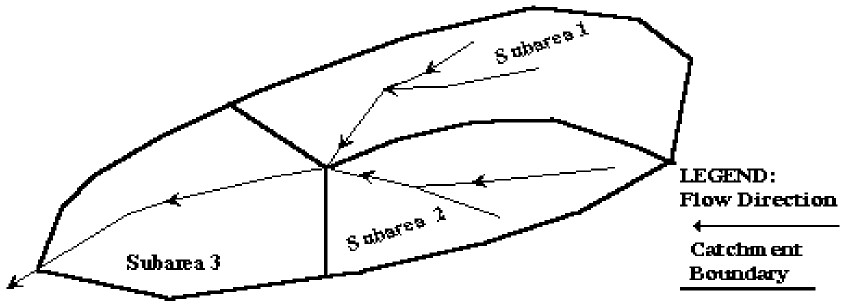
See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
landscape	0.00	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
					0.16				0.41	
gravel	0.01	B	80.0	0.64	0.67	0.70	0.75	0.77	0.80	0.83
					0.80				0.85	
building	0.00	B	90.0	0.74	0.76	0.78	0.81	0.83	0.84	0.87
					0.90				0.95	
residential	2.52	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52	0.61
					0.27				0.48	
20										
Total Area (ac)	**2.53**		**Area-Weighted C**	**0.13**	**0.15**	**0.22**	**0.38**	**0.44**	**0.52**	**0.61**
			Area-Weighted Override C	**0.13**	**0.27**	**0.22**	**0.38**	**0.44**	**0.48**	**0.61**

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: Gary E. Welp, PE, CFM
Company: RGA
Date: 8/13/2023
Project: Paintbrush Hills Well #12
Location: Peyton, CO



Subcatchment Name
C

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See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
landscape	0.00	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
					0.16				0.41	
gravel	0.01	B	80.0	0.64	0.67	0.70	0.75	0.77	0.80	0.83
					0.80				0.85	
building	0.00	B	90.0	0.74	0.76	0.78	0.81	0.83	0.84	0.87
					0.90				0.95	
residential	11.79	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52	0.61
					0.26				0.48	
20										
Total Area (ac)	**11.80**		**Area-Weighted C**	**0.13**	**0.15**	**0.22**	**0.38**	**0.44**	**0.52**	**0.61**
			Area-Weighted Override C	**0.13**	**0.26**	**0.22**	**0.38**	**0.44**	**0.48**	**0.61**

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

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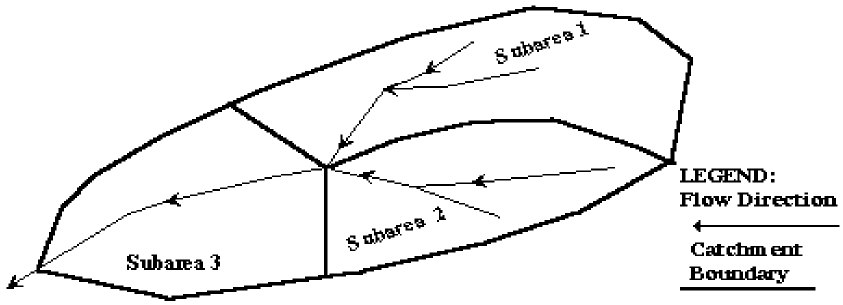

Subcatchment Name
Sub #1

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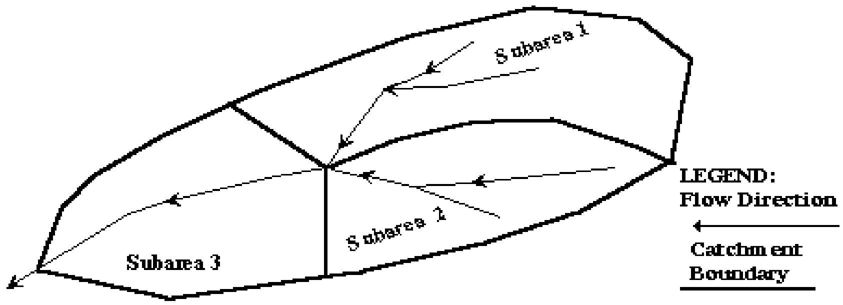
See sheet "Design Info" for imperviousness-based runoff coefficient values.

Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
landscape	0.07	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
					0.16				0.41	
gravel	0.00	B	80.0	0.64	0.67	0.70	0.75	0.77	0.80	0.83
					0.80				0.85	
building	0.01	B	90.0	0.74	0.76	0.78	0.81	0.83	0.84	0.87
					0.90				0.95	
residential	0.02	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52	0.61
					0.26				0.48	
18										
Total Area (ac)	**0.11**		**Area-Weighted C**	**0.13**	**0.14**	**0.20**	**0.36**	**0.43**	**0.51**	**0.60**
			Area-Weighted Override C	**0.13**	**0.28**	**0.20**	**0.36**	**0.43**	**0.50**	**0.60**

Area-Weighted Runoff Coefficient Calculations

Version 2.00 released May 2017

Designer: Gary E. Welp, PE, CFM
Company: RGA
Date: 8/13/2023
Project: Paintbrush Hills Well #12
Location: Peyton, CO



Subcatchment Name
Sub #2

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See sheet "Design Info" for imperviousness-based runoff coefficient values.

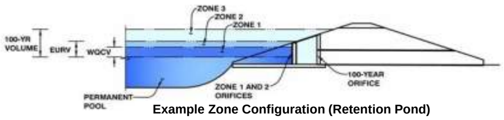
Sub-Area ID	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness	Runoff Coefficient, C 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
landscape	0.15	B	2.0	0.01	0.01	0.07	0.26	0.34	0.44	0.54
					0.16				0.41	
gravel	0.09	B	80.0	0.64	0.67	0.70	0.75	0.77	0.80	0.83
					0.80				0.85	
building	0.00	B	90.0	0.74	0.76	0.78	0.81	0.83	0.84	0.87
					0.90				0.95	
residential	0.22	B	20.0	0.13	0.15	0.22	0.37	0.44	0.52	0.61
					0.26				0.48	
26										
Total Area (ac)	**0.46**		**Area-Weighted C**	**0.19**	**0.21**	**0.26**	**0.41**	**0.47**	**0.55**	**0.63**
			Area-Weighted Override C	**0.19**	**0.33**	**0.26**	**0.41**	**0.47**	**0.53**	**0.63**

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **PBHMD Pump House #6**

Basin ID: **Detention Pond "C" with the addition of PBHMP Pump House #6**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**			
Watershed Area =	137.58	acres		
Watershed Length =	3,440	ft		
Watershed Length to Centroid =	2,149	ft		
Watershed Slope =	0.025	ft/ft		
Watershed Imperviousness =	32.85%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	100.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Target WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	User Input			

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.835	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.672	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	4.694	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	7.422	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	9.914	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	13.611	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	16.448	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	20.193	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	27.489	acre-feet		inches
Approximate 2-yr Detention Volume =	3.374	acre-feet		
Approximate 5-yr Detention Volume =	4.791	acre-feet		
Approximate 10-yr Detention Volume =	6.853	acre-feet		
Approximate 25-yr Detention Volume =	7.849	acre-feet		
Approximate 50-yr Detention Volume =	8.261	acre-feet		
Approximate 100-yr Detention Volume =	9.674	acre-feet		

Define Zones and Basin Geometry

Select Zone 1 Storage Volume (Required) =		acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =		acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	180	0.004		
	--	0.91	--	--	--	457	0.010	290	0.007
	--	1.91	--	--	--	14,185	0.326	7,611	0.175
	--	2.91	--	--	--	41,901	0.962	35,654	0.818
	--	3.91	--	--	--	61,466	1.411	87,337	2.005
	--	4.91	--	--	--	72,754	1.670	154,447	3.546
	--	5.91	--	--	--	81,398	1.869	231,523	5.315
	--	6.91	--	--	--	86,246	1.980	315,345	7.239
	--	7.91	--	--	--	92,877	2.132	404,906	9.295
	--	8.91	--	--	--	98,536	2.262	500,613	11.492
	--	9.91	--	--	--	105,513	2.422	602,637	13.835
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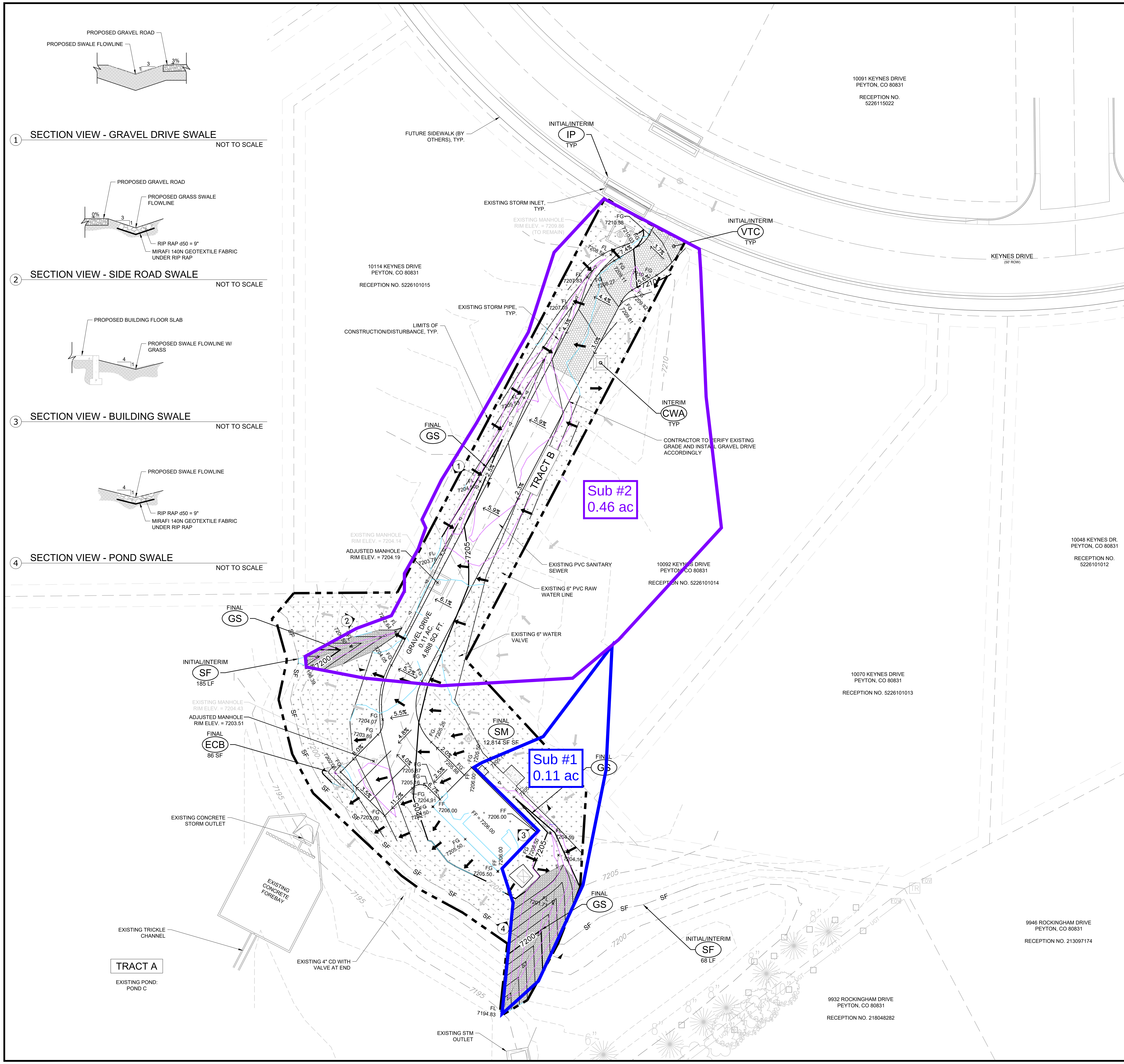


LEGEND

- EXISTING PROPERTY LINE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING STORM SEWER MANHOLE
- EXISTING WATER WELL
- EXISTING STORM PIPE
- EXISTING WATER VALVE
- EXISTING ELECTRIC MH
- EXISTING ELECTRIC MKR
- EXISTING ELECTRIC TRANSFORMER
- EXISTING ELECTRIC UNDERGROUND
- EXISTING FIBER OPTIC UNDERGROUND
- EXISTING CABLE TV UNDERGROUND
- EXISTING GAS LINE UNDERGROUND
- EXISTING CONT-MJR
- EXISTING CONT-MNR
- EXISTING SURFACE FLOW DIRECTION ARROW
- PROPOSED SURFACE FLOW DIRECTION ARROW
- 7206.00 × PROPOSED SPOT ELEVATION
- 5280 PROPOSED CONT-MJR
- PROPOSED CONT-MNR
- PROPOSED PUMP HOUSE FOOTPRINT
- PROPOSED GRAVEL DRIVE
- PROPOSED RIP RAP
- PROPOSED CUT LINE
- PROPOSED FILL LINE
- SF — PROPOSED SILT FENCE
- VTC — PROPOSED VEHICLE TRACKING CONTROL
- CWA — PROPOSED CONCRETE WASHOUT
- IP — PROPOSED INLET PROTECTION
- GS — PROPOSED SWALE
- ECB — PROPOSED EROSION CONTROL BLANKET
- SM — PROPOSED SEEDING AND MULCHING
- SSA — PROPOSED STABILIZED STAGING AREA

ABBREVIATIONS

- FL FLOW LINE
- FF FINISHED FLOOR
- FG FINISHED GRADE
- HP HIGH POINT

AREAS OF CUT/FILL

CUT = 371.4 CY
FILL = 31.91 CY
NET = (CUT) 339.5 CY

NOTES:

1. EXISTING SITE HAS NO NOTABLE VEGETATION OTHER THAN FIELD GRASS AND WEEDS.
2. SITE IS NOT LOCATED WITHIN THE FEMA 100-YEAR FLOODPLAIN.
3. CONTRACTOR TO INSTALL EROSION CONTROL BLANKET (ECB) ON SLOPES OF 3:1 OR GREATER.
4. LOCATION OF STABILIZED STAGING AREA (SSA) TO BE DETERMINED AT THE PRE-CONSTRUCTION MEETING.
5. AREAS OUTSIDE OF THE CONSTRUCTION SITE BOUNDARY SHALL BE PROTECTED WITH CONSTRUCTION FENCING OR OTHER METHODS AS APPROPRIATE.
6. THERE ARE NO DEDICATED ASPHALT/CONCRETE BATCH PLANTS ON SITE.

48 HOURS BEFORE YOU DIG, CALL UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) 811
GAS, ELECTRIC, TELEPHONE, CATV, AND PANHANDLE EASTERN PIPELINE LOCATIONS

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET SCALE ACCORDINGLY

REVISIONS

NO.	DESCRIPTION	DATE	BY
1	EL PASO COUNTY SDP SUBMITTAL	5/03/23	JGS
2	EPC SUBMITTAL #2	8/4/23	JGS

RG AND ASSOCIATES, LLC
4885 Ward Road, Suite 100 • Wheat Ridge, CO 80033
Del Norte • Wheat Ridge
303-293-8107 • www.rgengineers.com

PUMP HOUSE SIX UTILITY BUILDING
description

GRADING AND EROSION CONTROL PLAN

prepared for
PAINT BRUSH HILLS METROPOLITAN DISTRICT
9985 TOWNER AVENUE
PEYTON, CO 80831

DRAWN BY: JGS
DESIGNED BY: JS/RG
JOB NUMBER: 1070.0026
DATE: 8/7/23
SCALE: 1" = 20'
DRAWING DESCRIPTION: GEC PLAN
SHEET NO: 5 of 6
2

Saved: 8/4/2023 By: JSCHNEIDER Plotted: 8/7/2023 10:16 AM
Filename: S:\1070 - PAINT BRUSH HILLS METROPOLITAN DISTRICT\1070.0014 - WELL #12\SITE DEVELOPMENT PLAN\DWG\XX GRADING PLAN.DWG

Worksheet for Triangular Channel - Roadside grass

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.027
Channel Slope	2.5 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.20 cfs

Results	
Normal Depth	5.7 in
Flow Area	0.7 ft^2
Wetted Perimeter	3.0 ft
Hydraulic Radius	2.7 in
Top Width	2.86 ft
Critical Depth	6.1 in
Critical Slope	1.8 %
Velocity	3.23 ft/s
Velocity Head	0.16 ft
Specific Energy	0.64 ft
Froude Number	1.166
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.7 in
Critical Depth	6.1 in
Channel Slope	2.5 %
Critical Slope	1.8 %

Worksheet for Triangular Channel - Roadside riprap rundown

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.040
Channel Slope	10.0 %
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	2.20 cfs

Results

Normal Depth	5.1 in
Flow Area	0.5 ft²
Wetted Perimeter	2.7 ft
Hydraulic Radius	2.4 in
Top Width	2.56 ft
Critical Depth	6.1 in
Critical Slope	4.0 %
Velocity	4.04 ft/s
Velocity Head	0.25 ft
Specific Energy	0.68 ft
Froude Number	1.545
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.1 in
Critical Depth	6.1 in
Channel Slope	10.0 %
Critical Slope	4.0 %

Worksheet for Triangular Channel - Building grass

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.027
Channel Slope	2.9 %
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Discharge	0.50 cfs

Results	
Normal Depth	2.8 in
Flow Area	0.2 ft²
Wetted Perimeter	2.0 ft
Hydraulic Radius	1.4 in
Top Width	1.90 ft
Critical Depth	3.0 in
Critical Slope	2.2 %
Velocity	2.22 ft/s
Velocity Head	0.08 ft
Specific Energy	0.31 ft
Froude Number	1.136
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.8 in
Critical Depth	3.0 in
Channel Slope	2.9 %
Critical Slope	2.2 %

Worksheet for Triangular Channel - Building riprap rundown

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	25.0 %
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Discharge	0.50 cfs

Results	
Normal Depth	2.2 in
Flow Area	0.1 ft²
Wetted Perimeter	1.5 ft
Hydraulic Radius	1.1 in
Top Width	1.47 ft
Critical Depth	3.0 in
Critical Slope	4.9 %
Velocity	3.71 ft/s
Velocity Head	0.21 ft
Specific Energy	0.40 ft
Froude Number	2.161
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.2 in
Critical Depth	3.0 in
Channel Slope	25.0 %
Critical Slope	4.9 %

PRELIMINARY/FINAL DRAINAGE REPORT

FOR PAINT BRUSH HILLS FILING NO. 14

EL PASO COUNTY, COLORADO

MARCH 2021

Prepared for:

The Landhuis Company
212 N. Wahsatch Ave, Suite 301
Colorado Springs, CO 80903
(719) 635-3200

Prepared by:

CIVIL CONSULTANTS, INC.

102 E.Pikes Peak, 5th Floor
Colorado Springs, CO 80903
(719) 955-5485

Project #10-014
PCD Project # SP206 & SF2024

PRELIMINARY/FINAL DRAINAGE REPORT
FOR PAINT BRUSH HILLS FILING NO. 14

TABLE OF CONTENTS

APPENDIX

Sewer plans but the flows (slightly higher) have been adjusted by this report the Preliminary/Final Drainage Report for Paint Brush Hills Filing No. 14" prepared by MS Civil Consultants, dated December 2020.

Detailed Drainage Discussion

Basins Tributary to Detention Pond C

Basin OS5C, 29.0 acres, (Q_5=25.5 cfs, Q_{100}=57.0 cfs), consist of existing developed 3.5-acre properties and streets. Runoff produced by the offsite area, are routed via existing roadside swales to a larger natural swale which carries flows south towards the north boundary of the subject site.

Basin A, 3.82 acres, (Q_5=2.9 cfs, Q_{100}=10.7 cfs), consists of a proposed single family residential lots and proposed 25' wide trail easement/Tract A. Developed flows within **Basin A** and offsite **Basin OS5C** are routed as surface runoff via an existing swale, in a 75' drainage easement, to **DP3** (Q_5=27.7 cfs, Q_{100}=65.3 cfs). Surface runoff at **DP3** will be collected and conveyed via a 36" RCP FES and 36" RCP pipe (**PR2**) to **DP4**. The existing swale shall be natural, except for the lower portion where it will be graded to the 36" RCP FES. This portion of the swale shall be maintained by the Paint Brush Hills Metropolitan District (see SC 150 Turf Reinforcement Mat in appendix). In the event of clogging, flows at **DP3** will over top the embankment and shall be conveyed via curb and gutter to **DP4**.

Basin J, 3.9 acres, (Q_5=3.0 cfs, Q_{100}=10.4 cfs), consists of proposed single family residential lots and proposed local residential streets. Surface runoff is routed via curb and gutter to **DP4** which will be collected by a proposed 10' Type R sump inlet. The intercepted flow (Q_5=3.0 cfs, Q_{100}=10.4 cfs) will be routed west via an 18" RCP pipe (**PR3**, Q_5=3.0 cfs, Q_{100}=10.4 cfs) to **PR5** (Q_5=31.0 cfs, Q_{100}=75.9 cfs), a 48" RCP. In the event of clogging, flows at **DP4** will over top the high point and be routed via curb and gutter to **DP10**.

Basin K, 0.8 acres, (Q_5=1.1 cfs, Q_{100}=2.7 cfs), consists of proposed single family residential lots and proposed local residential streets. Surface runoff is routed via curb and gutter to **DP5** which will be collected by a proposed 5' Type R sump inlet. The intercepted flow (Q_5=1.1 cfs, Q_{100}=2.7 cfs) will be routed west via an 18" RCP pipe (**PR4**, Q_5=1.1 cfs, Q_{100}=2.7 cfs) to **PR5** (Q_5=31.0 cfs, Q_{100}=75.5 cfs), a 48" RCP. In the event of clogging, flows at **DP5** will over top the high point and be routed via curb and gutter to **DP10**.

Basin OS5B, 13.4 acres, (Q_5=4.6 cfs, Q_{100}=25.8 cfs), consist of existing developed 3.5-acre properties and streets. Runoff produced by the offsite area, will sheet flow into **Basin D**.

Basin D, 5.2 acres, (Q_5=3.8 cfs, Q_{100}=14.0 cfs), consists of a proposed single family residential lots. Cumulative developed flows within **Basin D** and offsite **Basin OS5B** are routed via curb and gutter and side lot swales to **DP6.**

Basin E, 0.5 acres, (Q_5=2.3 cfs, Q_{100}=4.1 cfs), consists of a proposed local residential street. Surface runoff from **Basin E** will combine with flows from **Basin OS5B** and **Basin D** and will be routed via curb and gutter to **DP6** which will be collected by a proposed 15' Type R sump inlet. The cumulative flow from **DP6** and **DP7** at **DP8** is Q_5=10.7 cfs, Q_{100}=44.4. The 100-year flow will be split between the two inlets. The intercepted flow at **DP6** (Q_5=9.3 cfs, Q_{100}=22.2) will be routed west via a 24" RCP pipe (**PR7,** Q_5=9.2 cfs, Q_{100}=22.2 cfs) to **PR9**. In the event of clogging, flows at **DP6** will over top the high point in Country Manor Drive and be routed to **DP12**.

Basin F, 1.6 acres, (Q_5=1.9 cfs, Q_{100}=5.4 cfs), consists of proposed single family residential lots and proposed local residential streets. Surface runoff is routed via curb and gutter to **DP7** which will be

Basin M, 2.53 acres, (Q_5=2.6 cfs, Q_{100}=7.8 cfs), consists of proposed single family residential lots and proposed local residential streets. Flowby from **DP9, DP11, DP12** and surface runoff from **Basin M** will be routed via curb and gutter to **DP13** (Q_5=2.1 cfs, Q_{100}=21.3 cfs). See **Basin C** for discussion of intercepted flow.

Basin OS5A, 3.7 acres, (Q_5=1.5 cfs, Q_{100}=8.4 cfs), consist of existing developed 3.5-acre properties and streets. Runoff produced by the offsite area, will sheet flow onto **Basin C** which will be routed via side lot swales and curb and gutter to **DP14**.

Basin C, 11.8 acres, (Q_5=9.2 cfs, Q_{100}=28.6 cfs), consists of proposed single family residential lots and proposed local residential streets. Surface runoff is routed via curb and gutter to **DP14** (Q_5=10.3 cfs, Q_{100}=34.8 cfs). The combined flows from **DP13** and **DP14** will be captured by proposed dual 20' Type R sump inlets at **DP15** (Q_5=12.3 cfs, Q_{100}=55.4 cfs). The intercepted flow will be routed south via a 30" RCP pipe (**PR22,** Q_5=6.1 cfs, Q_{100}=27.7 cfs per side) and then south to a proposed 36" RCP pipe (**PR23,** (Q_5=12.3 cfs, Q_{100}=55.4 cfs). The combined flows from **PR21** and **PR23** will be routed south to a proposed 60" RCP pipe (**PR24,** Q_5=98.8 cfs, Q_{100}=269.2 cfs) which will ultimately outfall into a proposed concrete lined forebay in Pond C.

Basin B, 8.31 acres, (Q_5=5.6 cfs, Q_{100}=20.8 cfs), consists of the backyards of proposed single family residential lots. Minimal improvements to the backyards will be implemented and shall have split rail fences only along the rear and side lots lines. Surface runoff will be collected by a 2' wide swale (see Table 10-4 in appendix), within a 20'/30' easement, to **DP16** a CDOT type C inlet. The intercepted flow will be routed east via a 30" RCP pipe (**PR25,** Q_5=5.6 cfs, Q_{100}=20.8 cfs). The cumulative flows from PR24 and PR25 will combine and be routed south to a proposed 66" RCP pipe (**PR26,** Q_5=103.6 cfs, Q_{100}=287.2 cfs) which will outfall into a proposed concrete lined forebay in Pond C.

Basin N, 8.94 acres, (Q_5=6.2 cfs, Q_{100}=23.0 cfs), consists of backyards of proposed single family residential lots, backyards of existing residential lots from Paint Brush Hills Filing No. 12 and existing Pond C. The combined surface runoff and PR26 will be collected at **DP17** (existing **Pond C,** Q_5=108.8 cfs, Q_{100}=306.5 cfs). The existing Pond C will require modifications in order to function as an Full Spectrum Extended Detention Basin (EDB). These modifications will be addressed in the Street and Storm Sewer Construction drawings for Paint Brush Hills Filing No. 14. The proposed Detention Pond C functions to provide full spectrum detention and water quality for runoff calculated onsite and offsite flows. The pond is designed to treat approx 137.6 acres, and provide 1.839 ac-ft of WQCV storage, 4.673 ac-ft of EURV and 11.583 ac-ft of 100-year storage. The forebay, trickle channel micropool, outlet structure and pipe have been designed per the UDFCD manual using the MHFD Detention v4.03 workbook. The detention pond will be private and shall be maintained by the Paint Brush Hills Metropolitan District. Access shall be granted to the owner and El Paso County for maintenance of the private detention pond. A private maintenance agreement document shall accompany the submittal. In the event of clogging of the outlet structure, flows at **DP17** will over top the emergency spillway and outfall onto an existing swale, as it previously was designed. Per the Paint Brush Hills Filing No. 12 Construction Plans, an existing 20' x 20' rip rap pad (D_{50} = 18") has been constructed and is in general conformance with the present release rate. The existing riprap pad will dissipate energy and prevent local scour at the outlet. The peak release rate from **Pond C** (**#PR27**, Q5=22.6 cfs and Q100=92.8cfs ~an existing 48" RCP) outfalls into an existing swale. The flows exiting the site are less than the flows as stated in the MDDP of Q5=22 cfs and Q100=161 cfs. The proposed discharge from the subject site will not adversely affect the downstream infrastructure or affect water quality.

Basin Tributary to Adjacent Property to the West

Basin B1, 0.92 acres, (Q_5=0.6 cfs, Q_{100}=2.4 cfs), consists of portions of two backyards of proposed single family residential lots which will have minimal to no impervious surfaces and an upstream natural swale.

APPENDIX

HYDROLOGIC CALCULATIONS

PAINTBRUSH HILLS FILING NO. 14
FINAL DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			IMPERVIOUS AREA/STREET			*LANDSCAPED/UNDEVELOPED*			*RESIDENTIAL*			*WEIGHTED*	
BASIN	**TOTAL AREA (Sq Ft)**	**TOTAL AREA** *(Acres)*	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**AREA** *(Acres)*	**C_5**	**C_{100}**	**C_5**	**C_{100}**
**RR	182952	4.20	0.00	0.90	0.96	0.00	0.16	0.41	4.20	0.30	0.50	0.30	0.50
**SS	131167	3.01	0.00	0.90	0.96	0.00	0.16	0.41	3.01	0.30	0.50	0.30	0.50
**OS1	193584	4.44	0.00	0.90	0.96	0.00	0.16	0.41	4.44	0.30	0.50	0.30	0.50
*OO	1268037	29.11	0.00	0.90	0.96	29.11	0.16	0.41	0.00	0.22	0.46	0.16	0.41
*TT	219978	5.05	0.00	0.90	0.96	0.00	0.16	0.41	5.05	0.35	0.45	0.35	0.45
*UU	55321	1.27	0.00	0.90	0.96	0.00	0.16	0.41	1.27	0.35	0.45	0.35	0.45
***OS-5	2008124	46.10	0.00	0.90	0.96	0.00	0.16	0.41	46.10	0.30	0.40	0.30	0.40
OS5A	159430	3.66	0.00	0.90	0.96	0.00	0.16	0.41	3.66	0.11	0.37	0.11	0.37
OS5B	585306	13.44	0.00	0.90	0.96	0.00	0.16	0.41	13.44	0.11	0.37	0.11	0.37
OS5C	1263404	29.00	0.00	0.90	0.96	0.00	0.16	0.41	29.00	0.30	0.40	0.30	0.40
A	166371	3.82	0.00	0.90	0.96	0.00	0.16	0.41	3.82	0.20	0.44	0.20	0.44
B	361915	8.31	0.00	0.90	0.96	0.00	0.16	0.41	8.31	0.20	0.44	0.20	0.44
B1	40214	0.92	0.00	0.90	0.96	0.00	0.16	0.41	0.92	0.16	0.41	0.16	0.41
C	514010	11.80	0.00	0.90	0.96	0.00	0.16	0.41	11.80	0.26	0.48	0.26	0.48
D	226401	5.20	0.00	0.90	0.96	0.00	0.16	0.41	5.20	0.20	0.44	0.20	0.44
E	21364	0.49	0.49	0.90	0.96	0.00	0.16	0.41	0.00	0.20	0.44	0.90	0.96
F	70330	1.61	0.00	0.90	0.96	0.00	0.16	0.41	1.61	0.30	0.50	0.30	0.50
G	531342	12.20	0.00	0.90	0.96	0.00	0.16	0.41	12.20	0.35	0.52	0.35	0.52
H	469586	10.78	0.00	0.90	0.96	0.00	0.16	0.41	10.78	0.35	0.52	0.35	0.52
I	554956	12.74	0.00	0.90	0.96	0.00	0.16	0.41	12.74	0.35	0.52	0.35	0.52
J	169859	3.90	0.00	0.90	0.96	0.00	0.16	0.41	3.90	0.22	0.45	0.22	0.45
K	32632	0.75	0.00	0.90	0.96	0.00	0.16	0.41	0.75	0.36	0.54	0.36	0.54
L	146850	3.37	0.00	0.90	0.96	0.00	0.16	0.41	3.37	0.36	0.54	0.36	0.54
M	110207	2.53	0.00	0.90	0.96	0.00	0.16	0.41	2.53	0.27	0.48	0.27	0.48
N	389341	8.94	0.00	0.90	0.96	3.19	0.16	0.41	5.75	0.22	0.46	0.20	0.44

Values taken from "Final Drainage Report for Paint Brush Hills Filing 13E" (*FDRPBH-13E) prepared by Classic Consulting Engineers and Surveyors, dated Sept 2018

***** Revised from "Final Drainage Report for Paint Brush Hills Filing 13E" (**PDRPBH13E) prepared by Classic Consulting Engineers and Surveyors, dated Sept 2018***

****** "Final Drainage Report for Paint Brush Hills-Phase 2 (Filing 13)" (FDRPBH-PH2-13) prepared by Classic Consulting Engineers and Surveyors, revised June 2008***

Calculated by: GT
Date: 3/12/2021
Checked by: VAS

PAINTBRUSH HILLS FILING NO. 14
FINAL DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				*OVERLAND*				*STREET / CHANNEL FLOW*				*Time of Travel*		*INTENSITY **		*TOTAL FLOWS*	
BASIN	AREA TOTAL	C_5	C_{100}	C_5	Length	Height	T_C	Length	Slope	Velocity	T_t	TOTAL	CHECK	I_5	I_{100}	Q_5	Q_{100}
	(Acres)	*From DCM Table 5-1*			*(ft)*	*(ft)*	*(min)*	*(ft)*	*(%)*	*(fps)*	*(min)*	*(min)*	*(min)*	*(in/hr)*	*(in/hr)*	*(c.f.s.)*	*(c.f.s.)*
Proposed Area Drainage Summary																	
***RR**	4.20	0.30	0.50	0.25												**8.0**	**17.0**
***SS**	3.01	0.30	0.50	0.25	170	3.4	16.5	800	3.9%	6.9	1.9	18.4	15.4	3.1	5.6	**2.8**	**8.4**
***OS1**	4.44	0.30	0.50	0.30	100	5	8.5	616	1.0%	2.0	5.1	13.6	14.0	3.7	6.2	**4.9**	**13.7**
***OO**	29.11	0.16	0.41	0.16												**22.0**	**51.0**
***TT**	5.05	0.35	0.45	0.25	180	3.6	17.0	150	1.5%	4.3	0.6	17.6	11.8	3.2	5.7	**5.7**	**13.0**
***UU**	1.27	0.35	0.45	0.25	180	3.6	17.0	475	2.5%	5.5	1.4	18.4	13.6	3.1	5.6	**1.4**	**3.2**
****OS-5**	46.10	0.30	0.40	0.30												**14.0**	**32.0**
OS5A	3.66	0.11	0.37	0.11	100	2	14.2	527	1.5%	1.8	4.8	19.0	13.5	3.7	6.2	**1.5**	**8.4**
OS5B	13.44	0.11	0.37	0.11	100	2	14.2	1684	1.5%	1.8	15.3	29.5	19.9	3.1	5.2	**4.6**	**25.8**
OS5C	29.00	0.30	0.40	0.30	100	2	11.5	2110	1.0%	2.0	17.6	29.1	22.3	2.9	4.9	**25.5**	**57.0**
A	3.82	0.20	0.44	0.20	100	4	10.3	373	3.2%	2.7	2.3	12.6	12.6	3.8	6.3	**2.9**	**10.7**
B	8.31	0.20	0.44	0.20	100	3	11.3	1063	3.2%	2.7	6.6	17.9	16.5	3.4	5.7	**5.6**	**20.8**
B1	0.92	0.16	0.41	0.16	100	3	11.8	265	2.6%	3.2	1.4	13.2	12.0	3.9	6.5	**0.6**	**2.4**
C	11.80	0.26	0.48	0.26	100	3	10.6	2030	2.6%	3.2	10.6	21.1	21.8	3.0	5.0	**9.2**	**28.6**
D	5.20	0.20	0.44	0.20	100	4	10.3	593	2.0%	2.1	4.7	14.9	13.9	3.6	6.1	**3.8**	**14.0**
E	0.49	0.90	0.96	0.90	10	0.2	0.9	471	2.0%	2.8	2.8	5.0	12.7	5.2	8.7	**2.3**	**4.1**
F	1.61	0.30	0.50	0.30	60	1.2	8.9	362	2.0%	2.8	2.1	11.0	12.3	4.0	6.7	**1.9**	**5.4**
G	12.20	0.35	0.52	0.35	100	2	10.8	1381	2.8%	3.3	6.9	17.7	18.2	3.3	5.5	**14.0**	**34.8**
H	10.78	0.35	0.52	0.35	100	2	10.8	1543	2.1%	2.9	8.9	19.6	19.1	3.2	5.3	**11.9**	**29.7**
I	12.70	0.35	0.52	0.35	100	2	10.8	1309	2.1%	2.9	7.5	18.3	17.8	3.3	5.5	**14.5**	**36.2**
J	3.90	0.22	0.45	0.22	100	2	12.6	799	1.9%	2.7	4.9	17.5	15.0	3.5	5.9	**3.0**	**10.4**
K	0.75	0.36	0.54	0.36	72	1.4	9.1	277	1.6%	2.5	1.8	10.9	11.9	4.0	6.7	**1.1**	**2.7**
L	3.37	0.36	0.54	0.36	75	1.5	9.2	1802	2.1%	2.9	10.4	19.6	20.4	3.1	5.2	**3.8**	**9.5**
M	2.53	0.27	0.48	0.27	100	2	11.9	318	2.1%	2.9	1.8	13.8	12.3	3.8	6.4	**2.6**	**7.8**
N	8.94	0.20	0.44	0.20	100	2	12.9	902	3.2%	3.6	4.2	17.1	15.6	3.5	5.8	**6.2**	**23.0**

Values taken from "Final Drainage Report for Paint Brush Hills Filing 13E" (*FDRPBH13E) prepared by Classic Consulting Engineers and Surveyors, dated Sept 2018

***** Revised from "Final Drainage Report for Paint Brush Hills Filing 13E" (**PDRPBH13E) prepared by Classic Consulting Engineers and Surveyors, dated Sept 2018***

****** "Final Drainage Report for Paint Brush Hills-Phase 2 (Filing 13)" (FDRPBH-PH2-13) prepared by Classic Consulting Engineers and Surveyors, revised June 2008***

Calculated by: GT
Date: 3/12/2021
ked by: VAS

HYDRAULIC CALCULATIONS / EDB WQCV CALCULATIONS

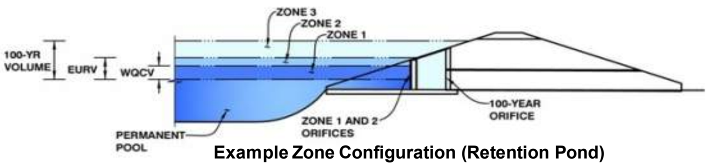
Weighted Percent Imperviousness of WQ Pond C				
Contributing Basins	***Area (Acres)***	***C_5***	***Impervious % (I)***	***(Acres)*(I)***
OS5A	3.66	0.11	5	18.30
OS5B	13.44	0.11	5	67.18
OS5C	29.00	0.30	40	1160.15
A	0.52	0.18	16	8.37
B	8.31	0.20	20	166.17
C	11.80	0.26	32	377.60
D	5.20	0.20	20	103.95
E	0.49	0.90	100	49.04
F	1.61	0.30	40	64.58
G	12.20	0.35	48	585.50
H	10.78	0.35	48	517.45
I	12.74	0.35	48	611.52
J	**7.19**	**0.22**	**25**	**179.81**
K	0.75	0.36	50	37.46
L	3.37	0.36	50	168.56
M	2.53	0.27	34	86.02
N	8.94	0.20	20	178.76
****TT***	5.05	0.35	25	126.25
Totals	***137.58***			***4506.69***
Imperviousness of WQ Pond C	***32.8***			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Paint Brush Hills Filing No.14

Basin ID: FSD Pond C



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	137.58	acres
Watershed Length =	3,440	ft
Watershed Length to Centroid =	2,149	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	32.80%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.834	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	4.664	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	4.688	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	7.414	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	9.906	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	13.603	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	16.440	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	20.186	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	27.480	acre-feet		inches
Approximate 2-yr Detention Volume =	3.368	acre-feet		
Approximate 5-yr Detention Volume =	4.783	acre-feet		
Approximate 10-yr Detention Volume =	6.844	acre-feet		
Approximate 25-yr Detention Volume =	7.840	acre-feet		
Approximate 50-yr Detention Volume =	8.251	acre-feet		
Approximate 100-yr Detention Volume =	9.664	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.834	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.831	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	5.000	acre-feet
Total Detention Basin Volume =	9.664	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Depth Increment = ft

	Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
7190.09	**Top of Micropool**	--	0.00	--	--	--	180	0.004		
7191		--	0.91	--	--	--	457	0.010	290	0.007
		--	1.91	--	--	--	14,185	0.326	7,611	0.175
		--	2.91	--	--	--	41,901	0.962	35,654	0.818
		--	3.91	--	--	--	61,466	1.411	87,337	2.005
		--	4.91	--	--	--	72,754	1.670	154,447	3.546
7196.00		--	5.91	--	--	--	81,398	1.869	231,523	5.315
7197.00		--	6.91	--	--	--	86,246	1.980	315,345	7.239
7198.00		--	7.91	--	--	--	92,877	2.132	404,906	9.295
7199.00		--	8.91	--	--	--	98,536	2.262	500,613	11.492
7200		--	9.91	--	--	--	105,513	2.422	602,637	13.835
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PAINT BRUSH HILLS FILING NO. 14

COUNTY OF EL PASO, STATE OF COLORADO

PROPOSED DRAINAGE MAP

MARCH 2021

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q_5	Q_{100}
*RR	4.20	8.0	17.0
**SS	3.01	2.8	8.4
**OS1	4.44	4.9	13.7
*OO	29.11	22.0	51.0
*TT	5.05	5.7	13.0
*UU	1.27	1.4	3.2
***OS-5	46.10	14.0	32.0
OS5A	3.66	1.5	8.4
OS5B	13.44	4.6	25.8
OS5C	29.00	25.5	57.0
A	3.82	2.9	10.7
B	8.31	5.6	20.8
B1	0.92	0.6	2.4
C	11.80	9.2	28.6
D	5.20	3.8	14.0
E	0.49	2.3	4.1
F	1.61	1.9	5.4
G	12.20	14.0	34.8
H	10.78	11.9	29.7
I	12.70	14.5	36.2
J	3.90	3.0	10.4
K	0.75	1.1	2.7
L	3.37	3.8	9.5
M	2.53	2.6	7.8
N	8.94	6.2	23.0

DESIGN POINT SUMMARY				
DESIGN POINT	Q_5	Q_{100}	CONTRIBUTING BASIN (S)	STRUCTURE
1	4.9	13.7	**OS1	PROP 10' TYPE R SUMP INLET
**33	8.0	17.0	**RR	*10' TYPE R SUMP INLET
**34	2.8	8.4	**SS	*5' TYPE R SUMP INLET
*34A	36	155	POND D	INFLOW TO POND D
3	27.7	65.3	A, OS5C	PROP 36" RCP FES
4	3.0	10.4	J	PROP 10' TYPE R SUMP INLET
5	1.1	2.7	K	PROP 5' TYPE R SUMP INLET
6	9.2	22.2	OS5B, D, E	SEE DP8 FOR CUMULATIVE FLOW
7	1.9	22.2	F	SEE DP8 FOR CUMULATIVE FLOW
8	10.7	44.4	DP6, DP7	PROP DUAL 15' TYPE R SUMP INLET
9	13.8	34.4	G	PROP DUAL 15' TYPE R AT-GRADE INLET
10	14.5	36.2	I	PROP DUAL 15' TYPE R AT-GRADE INLET
11	3.7	17.0	L, FLOWBY DP10	EX 15' TYPE R AT-GRADE INLET
*37	5.7	13.0	*TT	EX 15' TYPE R AT-GRADE INLET
12	11.9	29.7	H	PROP DUAL 15' TYPE R AT-GRADE INELT
13	2.1	21.3	M,FLOWBY DP9, FLOWYBY DP12, FLOWBY DP11	SEE DP15 FOR CUMULATIVE FLOW
14	10.3	34.8	C, OS5A	SEE DP15 FOR CUMULATIVE FLOW
15	12.3	55.4	DP13, DP14	PROP DUAL 20' TYPE R SUMP INLET
16	5.6	20.8	B	PROP CDOT TYPE C INLET
17	108.8	306.5	N, PR26	EX POND C

STORM SEWER SUMMARY			
PIPE RUN	Q_5	Q_{100}	PIPE SIZE
*36	4.4	12.4	*24" RCP
*37	6.9	19.4	*24" RCP
1	4.9	13.7	18" RCP
2	27.7	65.31	36" RCP
3	3.0	10.4	18" RCP
4	1.1	2.7	18" RCP
5	31.0	75.9	48" RCP
7	9.2	22.2	24" RCP
8	1.9	22.2	24" RCP
9	41.0	117.7	48" RCP
10	7.0	13.7	24" RCP
11	7.0	13.7	24" RCP
12	53.7	142.4	48" RCP
13	7.3	14.0	18" RCP
14	14.6	27.9	30" RCP
#38	14.6	27.9	*30" RCP
#15	3.7	13.5	*24" RCP
#16	17.4	39.7	*30" RCP
#39	5.7	13.0	*24" RCP
#17	22.8	51.3	*36" RCP
18	6.0	12.4	18" RCP
18.1	6.0	12.4	18" RCP
19	11.9	24.8	30" RCP
20	34.4	75.3	42" RCP
21	86.6	214.4	54" RCP
22	6.1	27.7	30" RCP
23	12.3	55.4	36" RCP
24	98.8	269.2	60" RCP
25	5.6	20.8	30" RCP
26	103.6	287.2	66" RCP
#27	22.6	92.8	EX 48" RCP

POND C EDB SUMMARY	
EPC/URBAN DRAINAGE EDB	
WQ WATER SURFACE ELEV	7193.88
WQ VOLUME	1.839 AC-FT
EURV WATER SURFACE ELEV	7195.65
EURV VOLUME	4.673 AC-FT
100-YR WATER SURFACE ELEV	7199.00
100-YR VOLUME	11.583 AC-FT
SPILLWAY CREST ELEV	7199.00
TOP OF EMBANKMENT ELEV	7201.00
100-YR INFLOW	248.0 CFS
100-YR RELEASE	92.8 CFS

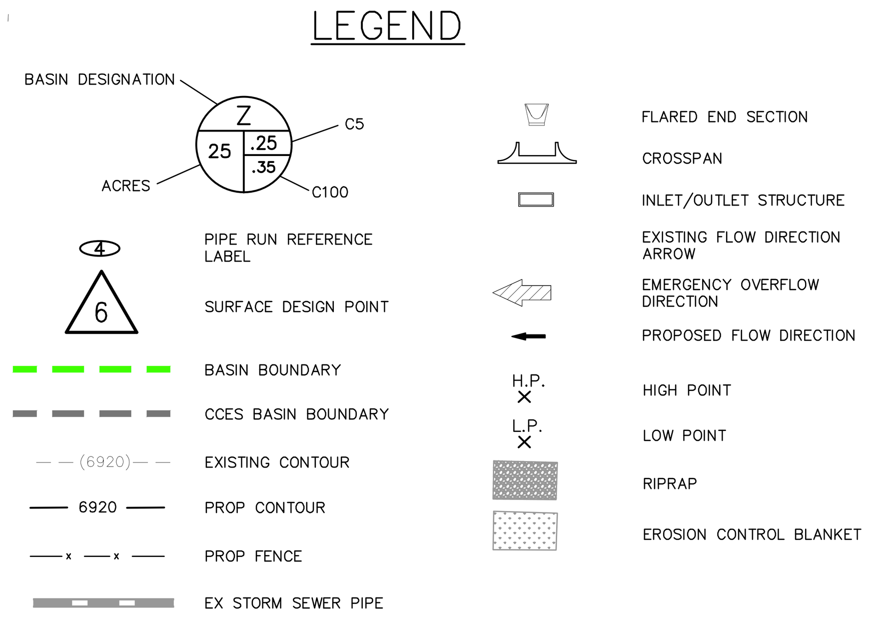
*VALUES TAKEN FROM "FINAL DRAINAGE REPORT FOR PAINT BRUSH HILLS FILING NO.13E" PREPARED BY CLASSIC ENGINEERS AND SURVEYORS, DATED SEPTEMBER. 2018 SEE PAINT BRUSH HILLS FILING NO.13E DRAINAGE MAP BASINS DD1, DD2, EE, FF, GG, HH, II, JJ AND KK FOR AREA DRAINAGE SUMMARY, BASIN ROUTING SUMMARY AND STORM SEWER ROUTING SUMMARY.

**REVISED FROM"FINAL DRAINAGE REPORT FOR PAINT BRUSH HILLS FILING NO.13E" PREPARED BY CLASSIC ENGINEERS AND SURVEYORS, DATED SEPTEMBER 2018

***"FINAL DRAINAGE REPORT FOR PAINT BRUSH HILLS PHASE 2 (FILING NO.13)" PREPARED BY CLASSIC ENGINEERS AND SURVEYORS, REVISED JUNE 2008

#REVISED FLOWS AND/OR PIPE SIZE FROM "FINAL DRAINAGE REPORT FOR PAINT BRUSH HILLS FILING NO.14" PREPARED BY MS CIVIL CONSULTANTS, DATED DECEMBER, 2020

LEGEND



1" = 100'

0 50 100 200

Scale in Feet

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M&S CIVIL CONSULTANTS, INC.
20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

PAINT BRUSH HILLS FILING NO. 14			
PROPOSED DRAINAGE MAP			
PROJECT NO. 10-014	SCALE:	DATE: 03/12/2021	
DESIGNED BY: GT DRAWN BY: CMN CHECKED BY: VAS	HORIZONTAL: 1"=100' VERTICAL: N/A	SHEET 1 OF 1	FDM

File: O:\10014A-PBH 14\PBH 14\dwg\Eng Exhibits\FDR Plan.dwg Plotstamp: 3/12/2021 9:59 AM

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

RECEIVED
JUL 17 2008
EPC DEVELOPMENT SERVICES

FINAL DRAINAGE REPORT FOR PAINT BRUSH HILLS – PHASE 2 (FILING NO. 13)

OCTOBER 2005
REVISED MARCH 2006
REVISED JULY 2006
REVISED JUNE 2008

FOR REVIEW PURPOSES ONLY
JUL 11 2008

PREPARED FOR:

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COLORADO SPRINGS, CO 80919
(719) 785-0790

2053.21

FINAL DRAINAGE REPORT
FOR PAINT BRUSH HILLS – PHASE 2 (FILING NO. 13)

TABLE OF CONTENTS:

APPENDICES

Design Point 32 (Q_5 = 4 cfs and Q_{100} = 7 cfs) consists of developed flows from Basin NN. An existing 6' sump inlet exists at this location. Based on the previous study, this location was notated as design point 18A with a developed flow of (Q_5 = 8 cfs and Q_{100} = 15 cfs). Thus, the existing facility at this location continues to adequately handle both the 5-year and 100-year developed flows.

Design Point 34A (Q_5 = 46 cfs and Q_{100} = 106 cfs) consists of developed flows from Basins DD1, DD2, EE, OO, RR and SS. Existing dual 36" RCP storm sewers exist at this location. Based on the previous study, this location was notated as Basin OS-9 with a developed flow of (Q_5 = 50 cfs and Q_{100} = 113 cfs). Thus, the existing facilities at this location continue to adequately handle both the 5-year and 100-year developed flows.

Design Point 34B (Q_5 = 139 cfs and Q_{100} = 302 cfs) consists of developed flows from much of the inner development. At this location, dual 42" RCP culverts are designed to handle both the 5-yr. and 100-yr. developed flows and route them safely under the proposed roadway and into the existing Detention Pond B1 based on the final overlot grading plan.

Design Point 34C (Q_5 = 154 cfs and Q_{100} = 337 cfs) consists of developed flows from the main natural channel. The existing Detention Pond B1 exists at this location. Based on the previous study, the total developed inflow to this facility was (Q_5 = 149 cfs and Q_{100} = 326 cfs). This increase equates to around 3% of what was previously accounted for at this design point. Thus, the existing detention facility at this location continues to adequately handle both the 5-yr. and 100-yr. developed flows.

Design Point 34D (Q_5 = 89 cfs and Q_{100} = 207 cfs) consists of developed flows from the off-site basins to the north and the north west corner of the development. The existing Detention Pond C exists at this location. Based on the previous study, the total developed inflow to this facility was (Q_5 = 90 cfs and Q_{100} = 206 cfs). Thus, the existing detention facility at this location continues to adequately handle both the 5-yr. and 100-yr. developed flows.

developed flows, respectfully. These collected flows are then combined with the collected flows mentioned earlier within the 42" RCP storm sewer. Approaching this sump location, the street design grade is 1.5%, which equates to a street capacity of 12.92 cfs per side. (See Appendix for Street Capacity Calculations) Incidentally, the total flows at Design Point 43 flow from both directions into the sump condition. Thus, the maximum flow from one direction would be from Basin WW2 (Q_5 = 13 cfs and Q_{100} = 30 cfs), which meets the County criteria for street capacity. The maximum ponding at this location will be 1.0' and then the flows will overtop the highpoint at the intersection and travel around the corner. These combined flows within the 42" RCP storm sewer will then combine with the collected flows from Design Points 42, 43 and 44. A 54" RCP storm sewer will convey these total flows in a westerly direction towards Design Point 45.

Basins XX1 and XX2 are tributary to the sump condition at Design Points 45 (Q_5 = 7 cfs and Q_{100} = 16 cfs) and 46 (Q_5 = 11 cfs and Q_{100} = 26 cfs). At these locations a 6' Type R sump inlet and a 10' Type R sump inlet will be installed to collect both the 5-year and 100-year developed flows. These collected flows are then combined with the flows from the previous design points and a 54" RCP will then convey the total developed flows in a southerly direction through a drainage tract directly into the existing detention pond. A rip-rap dissipater will be installed to minimize erosion. The emergency overlflow route at this location is via a natural swale within the tract and then directly into the existing pond. As mentioned earlier, the total developed flows entering this existing facility is consistent with the previously approved Final Drainage Report for Paint Brush Hills Filing Nos. 10, 11 and 12.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994. The Rational Method was used to estimate storm water runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

APPENDIX

JOB NAME: *PAINT BRUSH HILLS - PHASE 2 (FILING NO. 13)*
JOB NUMBER: *2053.21*
DATE: *06/10/08*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	**CA(5)**	**CA(100)**
RR	4.20	0.00	0.90	0.95	4.20	0.40	0.55	0.40	0.55	**1.68**	**2.31**
SS	6.14	0.00	0.90	0.95	6.14	0.35	0.45	0.35	0.45	**2.15**	**2.76**
TT1	1.05	0.00	0.90	0.95	1.05	0.35	0.45	0.35	0.45	**0.37**	**0.47**
TT2	6.10	0.00	0.90	0.95	6.10	0.30	0.40	0.30	0.40	**1.83**	**2.44**
UU1	3.05	0.00	0.90	0.95	3.05	0.35	0.45	0.35	0.45	**1.07**	**1.37**
UU2	10.60	0.00	0.90	0.95	10.60	0.35	0.45	0.35	0.45	**3.71**	**4.77**
UU3	2.75	0.00	0.90	0.95	2.75	0.35	0.45	0.35	0.45	**0.96**	**1.24**
VV1	4.85	0.00	0.90	0.95	4.85	0.35	0.45	0.35	0.45	**1.70**	**2.18**
VV2	1.30	0.00	0.90	0.95	1.30	0.37	0.50	0.37	0.50	**0.48**	**0.65**
VV3	0.40	0.20	0.90	0.95	0.20	0.35	0.45	0.63	0.70	**0.25**	**0.28**
WW1	1.20	0.00	0.90	0.95	1.20	0.35	0.45	0.35	0.45	**0.42**	**0.54**
WW2	12.80	0.00	0.90	0.95	12.80	0.35	0.45	0.35	0.45	**4.48**	**5.76**
WW3	5.20	0.00	0.90	0.95	5.20	0.35	0.45	0.35	0.45	**1.82**	**2.34**
XX1	11.45	0.00	0.90	0.95	11.45	0.35	0.45	0.35	0.45	**4.01**	**5.15**
XX2	5.72	0.00	0.90	0.95	5.72	0.35	0.45	0.35	0.45	**2.00**	**2.57**
YY	1.85	0.00	0.90	0.95	1.85	0.35	0.45	0.35	0.45	**0.65**	**0.83**
ZZ	7.01	0.00	0.90	0.95	7.01	0.30	0.40	0.30	0.40	**2.10**	**2.80**
AAA	8.95	0.00	0.90	0.95	8.95	0.30	0.40	0.30	0.40	**2.69**	**3.58**
OS-1	16.30	0.00	0.90	0.95	16.30	0.30	0.40	0.30	0.40	**4.89**	**6.52**
OS-2	29.00	0.00	0.90	0.95	29.00	0.30	0.40	0.30	0.40	**8.70**	**11.60**
OS-3	10.28	0.00	0.90	0.95	10.28	0.35	0.45	0.35	0.45	**3.60**	**4.63**
OS-4	14.84	0.00	0.90	0.95	14.84	0.35	0.45	0.35	0.45	**5.19**	**6.68**
OS-5	3.28	0.00	0.90	0.95	3.28	0.35	0.45	0.45	0.55	**1.48**	**1.80**
OS-6	0.82	0.65	0.90	0.95	0.17	0.35	0.45	0.79	0.85	**0.64**	**0.69**
H-1	92.30	0.00	0.90	0.95	92.30	0.25	0.35	0.25	0.35	**23.08**	**32.31**
H-2	1.50	0.00	0.90	0.95	1.50	0.25	0.35	0.25	0.35	**0.38**	**0.53**
H-3	18.80	0.00	0.90	0.95	18.80	0.25	0.35	0.25	0.35	**4.70**	**6.58**
H-4	121.30	3.00	0.90	0.95	118.30	0.25	0.35	0.27	0.36	**32.28**	**44.26**
H-5	55.60	0.00	0.90	0.95	55.60	0.25	0.35	0.25	0.35	**13.90**	**19.46**
H-6	4.40	0.00	0.90	0.95	4.40	0.25	0.35	0.25	0.35	**1.10**	**1.54**
H-7	14.70	0.00	0.90	0.95	14.70	0.25	0.35	0.25	0.35	**3.68**	**5.15**

JOB NAME: *PAINT BRUSH HILLS - PHASE 2 (FILING NO. 13)*
JOB NUMBER: *2053.21*
DATE: *06/10/08*
CALC'D BY: *MAW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

BASIN	WEIGHTED CA(5)	CA(100)	OVERLAND C(5)	Length (ft)	Height (ft)	Tc (min)	STREET / CHANNEL FLOW Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	Tc TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(5) (cfs)	Q(100) (cfs)
RR	1.68	2.31	0.25	150	3	15.5	250	2.0%	4.9	0.8	16.3	3.33	5.92	6	14
SS	2.15	2.76	0.25	150	3	15.5	900	3.5%	6.5	2.3	17.8	3.20	5.68	7	16
TT1	0.37	0.47	0.25	60	0.6	12.3	350	1.0%	3.5	1.7	14.0	3.57	6.35	1	3
TT2	1.83	2.44	0.25	250	8	17.1	350	1.0%	3.5	1.7	18.8	3.11	5.53	6	13
UU1	1.07	1.37	0.25	60	1.2	9.8	900	3.0%	6.1	2.5	12.3	3.78	6.72	4	9
UU2	3.71	4.77	0.25	200	4	17.9	1200	3.0%	6.1	3.3	21.2	2.93	5.20	11	25
UU3	0.96	1.24	0.25	60	1.2	9.8	700	1.5%	4.3	2.7	12.5	3.75	6.66	4	8
VV1	1.70	2.18	0.25	200	8	14.2	350	1.5%	4.3	1.4	15.6	3.40	6.05	6	13
VV2	0.48	0.65	0.25	200	5	16.6	100	2.0%	4.9	0.3	16.9	3.27	5.81	2	4
VV3	0.25	0.28	0.25	30	1.5	5.1	200	2.0%	4.9	0.7	5.8	4.91	8.73	1	2
WW1	0.42	0.54	0.25	100	2	12.6	400	2.0%	4.9	1.3	14.0	3.57	6.35	2	3
WW2	4.48	5.76	0.25	200	4	17.9	1300	2.5%	5.5	3.9	21.8	2.88	5.13	13	30
WW3	1.82	2.34	0.25	200	4	17.9	1300	2.5%	5.5	3.9	21.8	2.88	5.13	5	12
XX1	4.01	5.15	0.25	200	4	17.9	1500	2.5%	5.5	4.5	22.4	2.84	5.05	11	26
XX2	2.00	2.57	0.25	80	1.6	11.3	1200	2.5%	5.5	3.6	14.9	3.47	6.17	7	16
YY	0.65	0.83	0.25	300	15	16.2					16.2	3.34	5.94	2	5
ZZ	2.10	2.80	0.25	300	4	25.0					25.0	2.68	4.76	6	13
AAA	2.69	3.58	0.25	1000	32	34.2					34.2	2.24	3.99	6	14

JOB NAME: *PAINT BRUSH HILLS - PHASE 2 (FILING NO. 13)*
JOB NUMBER: *2053.21*
DATE: *06/10/08*
CALCULATED BY: *MAW*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Inlet Size
34C	DP-34B, V1, PR-6, PR-21	83.05	101.53	43.1	1.9	3.3	154	337	Exist. Dual 42"
34D	PR-55, YY, ZZ	40.70	53.16	34.7	2.2	4.0	91	210	Exist. Pond
35	OS-2, QQ1	9.43	12.57	23.3	2.8	5.0	26	62	36" RCP
36	QQ2	0.18	0.23	13.1	3.7	6.5	1	2	4' TYPE R
37	QQ3	1.67	2.20	17.2	3.3	5.8	5	13	4' TYPE R
38	TT1	0.37	0.47	14.0	3.6	6.4	1	3	4' TYPE R
39	OS-1, TT2	6.72	8.96	26.0	2.6	4.7	18	42	20' TYPE R
40	UU3	0.96	1.24	12.5	3.7	6.7	4	8	4' TYPE R
41	UU1, UU2	4.78	6.14	21.2	2.9	5.2	14	32	14' TYPE R
42	WW3	1.82	2.34	21.8	2.9	5.1	5	12	4' TYPE R
43	WW1, WW2	4.90	6.30	21.8	2.9	5.1	14	32	14' TYPE R
44	VV1	1.70	2.18	15.6	3.4	6.0	6	13	14' TYPE R
45	XX2	2.00	2.57	14.9	3.5	6.2	7	16	6' TYPE R
46	XX1	4.01	5.15	22.4	2.8	5.1	11	26	10' TYPE R

JOB NAME: *PAINT BRUSH HILLS - PHASE 2 (FILING NO. 13)*
JOB NUMBER: *2053.21*
DATE: *06/10/08*
CALCULATED BY: *MAW*

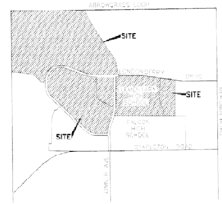
* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity I(5)	Intensity I(100)	Flow Q(5)	Flow Q(100)	Pipe Size*	
45	DP-41	4.78	6.14	21.2	2.93	5.20	14	32	30"	
46	PR-44, PR-45	5.74	7.38	22.0	2.87	5.10	16	38	30"	
47	DP-44 Pickup	1.11	1.35	15.6	3.40	6.05	4	8	18"	
48	PR-46, PR-47	6.85	8.73	22.4	2.84	5.06	19	44	36"	
49	DP-42	1.82	2.34	22.0	2.87	5.10	5	12	24"	
50	DP-43	4.90	6.30	22.0	2.87	5.10	14	32	30"	
51	PR-43, PR-49, PR-50	25.09	33.07	30.7	2.39	4.25	60	141	54"	
52	PR-48, PR-51	31.94	41.80	31.2	2.37	4.21	76	176	54"	
53	DP-45	2.00	2.57	14.9	3.47	6.17	7	16	24"	
54	DP-46	4.01	5.15	22.4	2.84	5.05	11	26	30"	
55	PR-52, PR-53, PR-54	37.95	49.53	32.7	2.30	4.10	87	203	54"	> 1%
56	1/2 DP34B	35.77	43.81	40.1	2.04	3.63	73	159	48"	> 1%
57	1/2 DP34B	35.77	43.81	40.1	2.04	3.63	73	159	48"	> 1%

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY	
DESIGN POINT	3
BASIN IDENTIFIER	BB
AREA IN ACRES	10.0
EXISTING DIRECTION OF FLOW	
PROPOSED DIRECTION OF FLOW	
PROPOSED STORM SEWER	
PROPOSED STORM SEWER INLETS	
STORM PIPE RUN SIZING	20
TIME OF CONCENTRATION	



VICINITY MAP

N.T.S.

NOTE: ALL PIPES BASED ON 100 YR. FLOWS AT 1.0% MIN. GRADE)

PIPE RUN	SIZE	PIPE RUN	SIZE	PIPE RUN	SIZE	PIPE RUN	SIZE
1	30" RCP	17	24" RCP	27	36" RCP	42	36" RCP
2	30" RCP	18	18" RCP	28	30" RCP	43	42" RCP
3 3A	30" RCP	19	24" RCP	29	30" RCP	44	18" RCP
4	30" RCP	20	30" RCP	30	36" RCP	45	30" RCP
5	24" RCP	21	30" RCP	31	24" RCP	46	30" RCP
6	30" RCP	22	18" RCP	32	18" RCP	47	18" RCP
7	EXIST. 24" RCP	23	18" RCP	33	30" RCP	48	36" RCP
8	36" RCP	24	18" RCP	34	36" RCP	49	24" RCP
9	30" RCP	24A	18" RCP	35	24" RCP	50	30" RCP
10	18" RCP	24B	24" RCP	36	30" RCP	51	54" RCP
11	30" RCP	24C	36" RCP	37	36" RCP	52	54" RCP
12	36" RCP	24D	36" RCP	38	18" RCP	53	24" RCP
13	18" RCP	24E	30" RCP	39	24" RCP	54	30" RCP
13A	42" RCP	24F	48" RCP	39A	42" RCP	55	54" RCP
14	30" RCP	25	18" RCP	40	42" RCP	56	48" RCP
15	24" RCP	26	30" RCP	41	18" RCP	57	48" RCP
16	42" RCP	26A	30" RCP	41A	42" RCP		

DESIGN POINT	FLOW	INLET SIZE
1	Q5 = 9 CFS Q100 = 20 CFS	8' TYPE R SUMP INLET
2	Q5 = 12 CFS Q100 = 26 CFS	12' TYPE R SUMP INLET
3	Q5 = 2 CFS Q100 = 5 CFS	4' TYPE R SUMP INLET
4	Q5 = 13 CFS Q100 = 27 CFS	12' TYPE R SUMP INLET
5	Q5 = 2 CFS Q100 = 5 CFS	18" CONC. CHASE SECTION
6	Q5 = 19 CFS Q100 = 38 CFS	EXIST. 14' TYPE R AT-GRADE INLET
7	Q5 = 15 CFS Q100 = 37 CFS	EXIST 18' TYPE R SUMP INLET
8	Q5 = 6 CFS Q100 = 12 CFS	4' TYPE R SUMP INLET
9	Q5 = 7 CFS Q100 = 14 CFS	8' TYPE R SUMP INLET
10	Q5 = 11 CFS Q100 = 21 CFS	EXIST 24" RCP STORM
11	Q5 = 23 CFS Q100 = 45 CFS	36" RCP STORM
12	Q5 = 2 CFS Q100 = 5 CFS	4' TYPE R SUMP INLET
13	Q5 = 13 CFS Q100 = 27 CFS	12' TYPE R SUMP INLET
14	Q5 = 12 CFS Q100 = 28 CFS	12' TYPE R SUMP INLET
14A	Q5 = 8 CFS Q100 = 17 CFS	12' TYPE R AT-GRADE INLET
15	Q5 = 8 CFS Q100 = 17 CFS	8' TYPE R SUMP INLET
16	Q5 = 6 CFS Q100 = 12 CFS	4' TYPE R SUMP INLET
17	Q5 = 2 CFS Q100 = 3 CFS	4' TYPE R SUMP INLET
18	Q5 = 12 CFS Q100 = 26 CFS	12' TYPE R SUMP INLET
19	Q5 = 9 CFS Q100 = 17 CFS	EXIST. 8' TYPE R SUMP INLET
20	Q5 = 19 CFS Q100 = 36 CFS	EXIST. 14' TYPE R AT-GRADE INLET
21	Q5 = 1 CFS Q100 = 3 CFS	4' TYPE R SUMP INLET
22	Q5 = 3 CFS Q100 = 7 CFS	4' TYPE R SUMP INLET
23	Q5 = 3 CFS Q100 = 6 CFS	4' TYPE R SUMP INLET
23A	Q5 = 10 CFS Q100 = 22 CFS	EXIST. 10' TYPE R INLETS
23B	Q5 = 13 CFS Q100 = 28 CFS	EXIST. 15' TYPE R INLET
23C	Q5 = 5 CFS Q100 = 10 CFS	EXIST. 15' TYPE R INLET
23D	Q5 = 3 CFS Q100 = 5 CFS	EXIST. 15' TYPE R INLET
23E	Q5 = 2 CFS Q100 = 4 CFS	10" GRATED INLET
23F	Q5 = 2 CFS Q100 = 3 CFS	18" GRATED INLET
23G	Q5 = 35 CFS Q100 = 68 CFS	EXIST. 48" CMP / DUAL 36" CULVERT
24	Q5 = 10 CFS Q100 = 23 CFS	14' TYPE R AT-GRADE INLET
25	Q5 = 9 CFS Q100 = 23 CFS	8' TYPE R SUMP INLET
26	Q5 = 6 CFS Q100 = 12 CFS	4' TYPE R SUMP INLET
27	Q5 = 11 CFS Q100 = 25 CFS	10' TYPE R SUMP INLET
28	Q5 = 10 CFS Q100 = 22 CFS	10' TYPE R SUMP INLET
29	Q5 = 8 CFS Q100 = 17 CFS	6' TYPE R SUMP INLET
30	Q5 = 2 CFS Q100 = 4 CFS	4' TYPE R SUMP INLET
31	Q5 = 15 CFS Q100 = 32 CFS	EXIST 12' TYPE R
32	Q5 = 4 CFS Q100 = 7 CFS	EXIST. 6' TYPE R
33	Q5 = 6 CFS Q100 = 14 CFS	4' TYPE R SUMP INLET
34	Q5 = 7 CFS Q100 = 16 CFS	6' TYPE R SUMP INLET
34A	Q5 = 46 CFS Q100 = 106 CFS	EXIST. DUAL 36" RCP STORM
34B	Q5 = 139 CFS Q100 = 302 CFS	PROP. DUAL 48" RCP STORM
34C	Q5 = 154 CFS Q100 = 337 CFS	EXIST. DUAL 42" RCP STORM
34D	Q5 = 89 CFS Q100 = 207 CFS	EXIST. POND
35	Q5 = 26 CFS Q100 = 62 CFS	PROP. 36" RCP STORM
36	Q5 = 1 CFS Q100 = 2 CFS	4' TYPE R SUMP INLET
37	Q5 = 5 CFS Q100 = 13 CFS	4' TYPE R SUMP INLET
38	Q5 = 1 CFS Q100 = 3 CFS	4' TYPE R SUMP INLET
39	Q5 = 18 CFS Q100 = 42 CFS	20' TYPE R SUMP INLET
40	Q5 = 4 CFS Q100 = 8 CFS	4' TYPE R SUMP INLET
41	Q5 = 14 CFS Q100 = 32 CFS	14' TYPE R SUMP INLET
42	Q5 = 5 CFS Q100 = 12 CFS	4' TYPE R SUMP INLET
43	Q5 = 14 CFS Q100 = 32 CFS	14' TYPE R SUMP INLET
44	Q5 = 6 CFS Q100 = 13 CFS	14' TYPE R AT-GRADE INLET
45	Q5 = 7 CFS Q100 = 16 CFS	6' TYPE R SUMP INLET
46	Q5 = 11 CFS Q100 = 26 CFS	10' TYPE R SUMP INLET

NOTES:

THIS MAP IS FOR DRAINAGE PURPOSES ONLY. SEE GRADING PLAN FOR APPROPRIATE GRADING INFORMATION.

N

200 100 0 200 400

SCALE: 1" = 200'

FLOOD PLAIN STATEMENT:

NO PORTION OF THIS SITE IS LOCATED WITHIN A FEMA FLOODPLAIN AS DETERMINED BY THE FLOOD INSURANCE RATE MAPS (F.I.R.M.) MAP NUMBERS 08041C 0535F AND 08041C 0575, WITH EFFECTIVE DATES OF MARCH 17, 1997 (SEE APPENDIX).

48 HOURS BEFORE YOU DIG,
CALL UTILITY LOCATORS
1-800-922-1987
CITY OF COLORADO SPRINGS DEPT. OF UTILITIES
GAS, ELECTRIC, WATER AND WASTEWATER

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE
1	REVISED PER COUNTY COMMENTS	7/12/06
2	REVISED PER COUNTY / NEIGHBORHOOD COMMENTS	6/10/08

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

MARC A. WHORTON, COLORADO P.E. #37155 DATE

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

PAINT BRUSH HILLS – PHASE 2
(FILING NO. 13)
FINAL DRAINAGE REPORT
PROPOSED CONDITIONS DRAINAGE MAP

DESIGNED BY	MAW	SCALE	6/10/08
DRAWN BY	MAW	(H) 1"= 200'	SHEET 2 OF 2
CHECKED BY		(V) 1"= N/A	JOB NO. 2053.21

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

El Paso County Area, Colorado

Sub-basin ZZ and XX2

April 26, 2021

Contents

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,990 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil 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
71	Pring coarse sandy loam, 3 to 8 percent slopes	8.9	100.0%
Totals for Area of Interest		**8.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No