JR ENGINEERING
A Westrian Company

June 15, 2018

County of El Paso
Engineering Division
2880 International Circle, Suite 110
Colorado Springs, Colorado 80910

Re: Academy Village Filing No. 3 - Drainage Addendum Letter

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.

COLORADO LICENSED
GLENN DEAN ELLIS
38861
PROFESSIONAL ENGINEER

Glenn D. Ellis
Glenn Ellis, Colorado P.E. # 38861
For and On Behalf of JR Engineering, LLC

21 Jun. 18
Date

Owner/Developer's Statement:

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

Ron Covington
Ron Covington Homes
13725 Struthers Road, Suite 200
Colorado Springs, CO 80920

6-21-2018
Date

El Paso County:

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

Approved
by Jeff Rice
El Paso County Planning and Community Development
on behalf of Elizabeth Nijkamp, Engineering Review Manager
07/30/2018 12:38:27 PM

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

Date

Conditions:

VR-17-012

To Whom It May Concern:

This letter is an addendum to the "Final Drainage Report for Academy Village", dated April 1999, prepared by HMS Group, LLC. This addendum will address the reconfiguration of the drainage pattern within Basin 1a of the approved report. The purpose of this addendum is to quantify the changes to the drainage condition due to site variations from the approved report.

The site was originally intended to drain to a CDOT Type D Catch Basin located at the north end of the site. The Type D catch basin can be seen within the approved "Drainage Map – Developed Academy Village", located in Appendix B. The existing site currently drains to two locations. The first site outfall is a 24'' RCP with a flared end section located at where the Type D Catch Basin was originally planned to the northeast. The second site outfall is at a 24'' RCP with a flared end section located northeast of the existing bank parking lot. Both 24'' RCPs connect to an existing 54'' RCP storm drain that flows northwest, ultimately outfalling to a detention pond west of Struthers Road, approximately 1,200 feet northwest of the site.

General Location

The legal description for the property is as follows: Academy Village Filing No. 3, Lot 4, "Academy Village Filing No. 2", being a portion of the southeast quarter of Section 1, Township 12 South, Range 67 West of the 6th P.M., County of El Paso, State of Colorado. The site is bounded by Academy Village Filing 3, Lot 1 to the southeast, Struthers Road to the west and south, and Paradise Villas Phases 1E, 1F and 1C to the northeast. Surrounding platted developments are the Gleneagle Executive Office Condominiums to the west, Paradise Villas to the east, Lot 1 of the Academy Village Filing 3 to the south, and an unplatted piece of property further south across Struthers Road. The legal description for the property is as follows: Academy Village Filing No. 3, Lot 4, "Academy Village Filing No. 2", being a portion of the southeast quarter of Section 1, Township 12 South, Range 67 West of the 6th P.M., County of El Paso, State of Colorado.

Description of Property

Academy Village Filing 3, Lot 2 is composed of approximately 0.709 acres of vacant land. The site has a large ditch running parallel to Struthers Road along the western edge of the property that generally slopes from southeast to northwest with slopes ranging from 0-3%. Academy Village Filing 3 is generally made up of Type B Soil, classified as Pring Coarse Sandy Loam as can be seen in the NRCS Map located within Appendix B. The vacant land is vegetated with native grasses. The site is located within the Black Forest FOMO 4200 drainage basin. The associated drainage fee for the project is $8,536.22 ($16,270 x 0.709 acres x 0.74 (%

impervious)). The associated bridge fee for the project is $232.42 ($443 x 0.709 acres x 0.74 (% impervious)).

Hydrology

All hydrologic data was obtained from the "El Paso County Drainage Criteria Manual," Volume 2 and the "Urban Drainage and Flood Control District Urban Drainage Criteria Manual" Volumes 1, 2, and 3 (DCM). Onsite drainage improvements were designed based on the 5-year (minor) storm event and the 100-year (major) storm event. Runoff was calculated using the Rational Method, and rainfall intensities for the 5-year and the 100-year storm return frequencies were obtained from Table 6-2 of the Colorado Springs Criteria. One hour point rainfall data for the storm events is identified in the Table below. Runoff coefficients were determined based on proposed land use and from data in Table 6-6 from the DCM. Time of concentrations were developed using equations from the DCM. All runoff calculations and applicable charts and graphs are included in Appendix B.

Table 1- 1-hr Point Rainfall Data

Storm	Rainfall (in.)
5-year	1.50
100-year	2.52

The proposed improvements have been designed with the intent to maintain the hydrology of the approved report. The approved report conveyed the generated runoff untreated to the existing 54'' RCP. The proposed drainage condition for Academy Village will convey the generated runoff to an on-site water quality pond before ultimately outfalling to the same 54'' RCP as in the approved report. The drainage map for Academy Village is located in Appendix B. Runoff from Basin A will be routed via curb and gutter, a natural swale, and a 12" PVC pipe to a water quality capture pond at the northern end of the site. The water quality pond is sized to treat 0.014 ac-ft, and release the treated runoff to the existing 54'' RCP via a 12" RCP outfall. The runoff from Basin B will be collected in a natural grass swale that runs along the southeast edge of the site. Flows from Basin B will go to an existing 24'' RCP that ties into the 54'' RCP to the north of the site. All basin calculations can be found in Appendix A. The runoff from Basin OS1 is primarily sheet flow off of Struthers into the natural swale within Basin B.

Basin OS2 is composed of a portion of the adjacent Bank site drive, drainage swale, and Struthers Road. Basin OS2 was evaluated in order to determine the offsite flows that made their way into the drainage ditch on Lot 2 via a culvert at design point 3 (DP3). The runoff from OS2 ultimately makes its way to DP2 and into the 54'' RCP.

Table 2 – Basin Summary

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A	0.46	86%	0.65	0.79	6.9	1.4	2.8
B	0.22	50%	0.12	0.38	10.1	0.1	0.6
OS1	0.51	88%	0.71	0.82	6.6	1.7	3.3
OS2	0.71	84%	0.65	0.77	7.1	2.1	4.3

Therefore, the total inflows as determined in the approved Final Drainage Report are still valid and no revisions to the existing storm sewer are necessary.

Hydraulic Criteria

The Rational Method and UDDCM's SF-2 and SF-3 forms were used to determine the runoff from the minor and major storms on the site, and the UDFCD UD-Detention v3.07 spreadsheet was utilized for sizing and release rate of the water quality pond.

Water Quality

In accordance with the El Paso County Drainage Criteria Manual, Volume 2 this site has implemented the four step process to minimize adverse impacts of urbanization. The four step process includes reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long-term source controls. In order to reduce runoff volume the new impervious area for the site was minimized. The WQCV is treated through an on-site water quality pond located at the northeast portion of the site. The pond was designed using the Urban Drainage spreadsheet, "UD_Detention_v3.07" located in Appendix A. The water quality pond was sized to treat 0.014 ac-ft of site runoff. The pond is relatively small so rather than implementing a trickle channel, the pond bottom will be sloped at 1.0 percent minimum to the water quality structure. The emergency spillway for the pond is located along its western border with an elevation of 6763.49. One foot of freeboard has been provided above the emergency spillway water surface elevation as well. The emergency spillway will outfall towards the existing natural grass swale inside the western property line. The restrictor plate, as well as pond storage design details, can be located in Appendix B. There are no proposed major drainageways for the site that would need to be stabilized. Some site specific source control BMPs that will be implemented include, but are not limited to, silt fencing placed around downstream areas of disturbance, construction vehicle tracking pads at the entrances, designated concrete truck washout basin, designated vehicle fueling areas, covered storage areas, spill containment and control, etc. The IRF calculations were performed, and can be found attached within Appendix A.

Maintenance access will be provided via an eight-foot wide maintenance access path. The path follows the western border of the pond and services to the outlet structure. The path maintenance access crosses the emergency spillway, therefore; side slopes of the spillway do not exceed 10% to allow for maintenance truck access.

Conclusion

The proposed changes to the hydrologic configuration and drainage calculations including storm sewer and water quality pond pose no significant changes to the concepts presented within the "Final Drainage Report for Academy Village", dated April 1999, prepared by HMS Group, LLC. This addendum is in conformance with the originally intended design and meets the latest criteria requirements.

Sincerely,

Glenn Ellis, P.E.
Project Manager

Appendix A

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: Academy Village Filing Number 3
Location: El Paso County , CO

Project Name: Struthers Road
Project No.: 25123.00
Calculated By: AJH
Checked By:
Date: 12/22/17

Basin ID	Total Area (ac)	Paved Roads & Walks			Roofs			Lawns			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A	0.46	100%	0.25	55.0%	90%	0.09	17.0%	48%	0.14	14.0%	86.0%
B	0.22	100%	0.01	5.0%	90%	0.00	0.0%	48%	0.21	45.0%	50.0%
OS1	0.51	100%	0.39	77.0%	90%	0.00	0.0%	48%	0.12	11.0%	88.0%
OS2	0.71	100%	0.50	70.0%	90%	0.00	0.0%	48%	0.21	14.0%	84.0%
TOTAL	1.91										81.5%

COMPOSITE % RUNOFF COEFFICIENT CALCULATIONS

Subdivision: Academy Village Filing Number 3
Location: El Paso County , CO

Project Name: Struthers Road
Project No.: 25123.00
Calculated By: AJH
Checked By:
Date: 12/22/17

Basin ID	Total Area (ac)	Paved Roads & Walks			Roofs			Lawns			Basins Total Runoff Coeff.
		C	Area (ac)	Weighted C	C	Area (ac)	Weighted C	C	Area (ac)	Weighted C	
5 year, HSG A											
A	0.46	0.90	0.25	0.49	0.73	0.09	0.14	0.08	0.14	0.02	0.65
B	0.22	0.90	0.01	0.04	0.73	0.00	0.00	0.08	0.21	0.08	0.12
OS1	0.51	0.90	0.39	0.69	0.73	0.00	0.00	0.08	0.12	0.02	0.71
OS2	0.71	0.90	0.50	0.63	0.73	0.00	0.00	0.08	0.21	0.02	0.65
TOTAL	1.91										0.60
100 year, HSG A											
A	0.46	0.96	0.25	0.53	0.81	0.09	0.15	0.35	0.14	0.11	0.79
B	0.22	0.96	0.01	0.05	0.81	0.00	0.00	0.35	0.21	0.33	0.38
OS1	0.51	0.96	0.39	0.74	0.81	0.00	0.00	0.35	0.12	0.08	0.82
OS2	0.71	0.96	0.50	0.67	0.81	0.00	0.00	0.35	0.21	0.10	0.77
TOTAL	1.91										0.74

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Academy Village Filing Number 3
Location: El Paso County , CO

Project Name: Struthers Road
Project No.: 25123.00
Calculated By: AJH
Checked By:
Date: 12/22/17

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_o (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
A	0.46	B	86%	0.65	0.79	45	1.8%	4.5	226	0.6%	20.0	1.5	2.4	6.9	271.0	6.9	6.9
B	0.22	B	50%	0.12	0.38	49	8.0%	6.2	326	0.5%	20.0	1.4	3.8	10.1	375.0	14.2	10.1
OS1	0.51	B	88%	0.71	0.82	49	5.6%	2.8	326	0.5%	20.0	1.4	3.8	6.6	375.0	7.5	6.6
OS2	0.71	B	84%	0.65	0.77	63	5.6%	3.6	253	0.5%	20.0	1.4	3.0	6.6	316.0	7.7	6.6

NOTES:

$t_c = t_i + t_t$ *(Equation 6-2)*

$t_i = (0.395*(1.1 - C_5)*(L)^{0.5})/((S_o)^{0.33})$ *(Equation 6-3)*

t_i = overland (initial) flow time (minutes)

S = Average Slope along the overland flow path, ft/ft

$t_t = L/(60K*(S_o)^{0.5})$ *(Equation 6-4)*

t_t = channelized flow time (minutes)

S = waterway slope, ft/ft

V_t = travel time velocity (ft/sec) = $K*S_o^{0.5}$

Table 6-2. NRCS Conveyance Factors, K

Type of Land Surface	K
Heavy Meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

First Design Point Time of Concentration:

$t_c = (18-15*i)+L/(60*(24*i+12)*(S_o)^{0.5})$ *(Equation 6-5)*

i = imperviousness (expressed as a decimal)

t_c is lesser of Equation 6-2 and Equation 6-5.

For Urbanized basins a minimum t_c of 5.0 minutes is required.

For non-urbanized basins a minimum t_c of 10.0 minutes is required.

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Academy Village Filing Number 3
Location: El Paso County , CO
Design Storm: 5-Year

Project Name: Struthers Road
Project No.: 25123.00
Calculated By: AJH
Checked By:
Date: 12/22/17

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				Street/Swale		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Design Flow (cf	Slope (%)	Pipe Size (inche	Length (ft)	Velocity (fps)	t_t (min)	
	1	A	0.46	0.65	6.9	0.30	4.7	1.4													Flow to pond through pipe to 54" pipe
	2	B	0.22	0.12	10.1	0.03	4.1	0.1	10.1	0.85	4.1	3.5									Flow through Swale
		OS1	0.51	0.71	6.6	0.36	4.7	1.7													Struthers Road sheet flow into ditch
	3	OS2	0.71	0.65	6.6	0.46	4.7	2.2													Bank ditch/culvert

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Academy Village Filing Number 3
Location: El Paso County , CO
Design Storm: 100-Year

Project Name: Struthers Road
Project No.: 25123.00
Calculated By: AJH
Checked By:
Date: 12/22/17

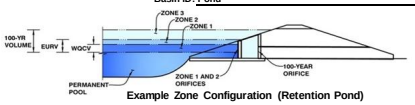
STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				Street/Swale		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Design Flow (cf	Slope (%)	Pipe Size (inche	Length (ft)	Velocity (fps)	t_t (min)	
	1	A	0.46	0.79	6.9	0.36	7.87	2.8							2.8	1.0	18	56	5.0	0.2	Flow to pond through pipe to 54" pipe
	2	B	0.22	0.38	10.1	0.09	6.91	0.6	10.1	1.06	6.91	7.3									Flow through Swale
		OS1	0.51	0.82	6.6	0.42	7.97	3.3													
	3	OS2	0.71	0.77	6.6	0.55	7.97	4.4													

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Academy Village Filing Number 3

Basin ID: Pond



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	0.46	acres
Watershed Length =	360	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	86.00%	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
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.014	acre-feet
Excess Urban Runoff Volume (EURV) =	0.044	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.038	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.049	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.060	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.072	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.081	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.093	acre-feet
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet
Approximate 2-yr Detention Volume =	0.035	acre-feet
Approximate 5-yr Detention Volume =	0.046	acre-feet
Approximate 10-yr Detention Volume =	0.057	acre-feet
Approximate 25-yr Detention Volume =	0.061	acre-feet
Approximate 50-yr Detention Volume =	0.063	acre-feet
Approximate 100-yr Detention Volume =	0.066	acre-feet

Optional User Override 1-hr Precipitation

1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.014	acre-feet
Zone 2 Volume (User Defined - Zone 1) =	0.000	acre-feet
Zone 3 Volume (User Defined - Zones 1 & 2) =	0.000	acre-feet
Total Detention Basin Volume =	0.014	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

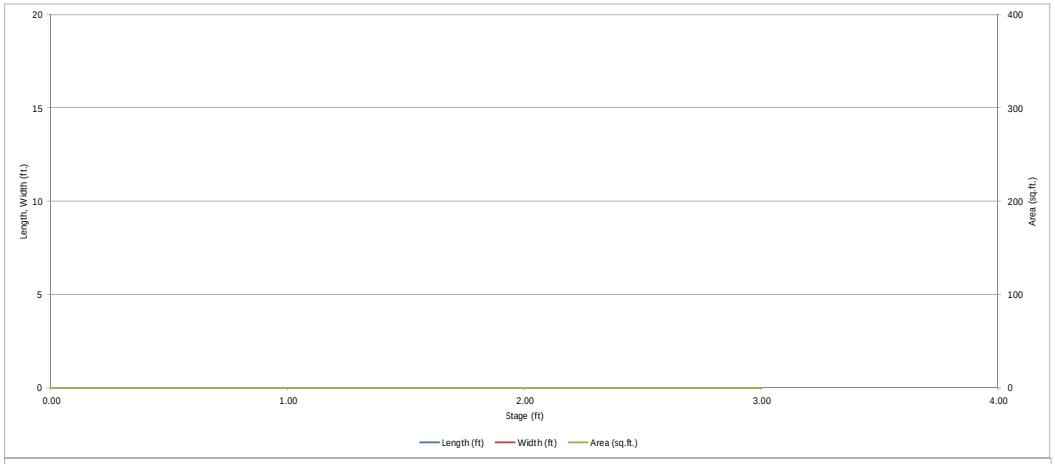
Total detention volume is less than 100-year volume.

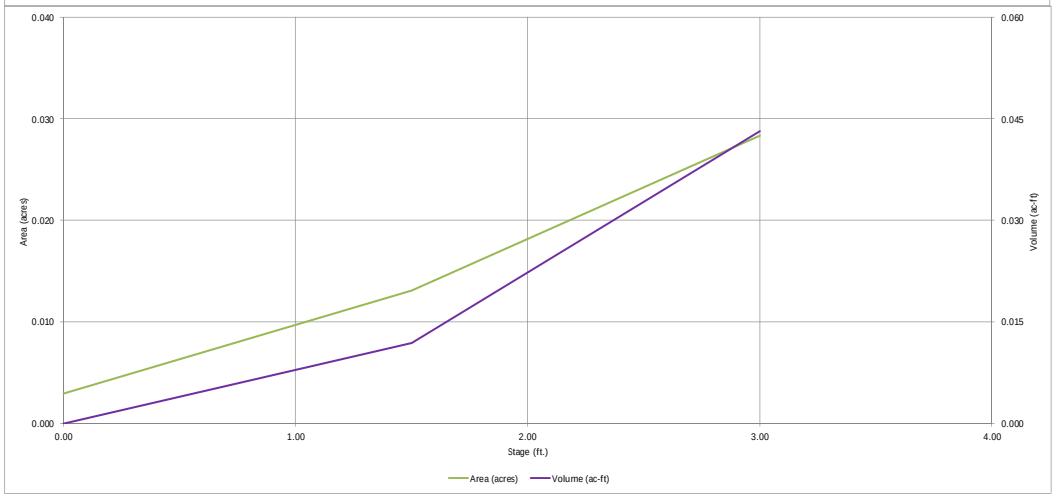
Depth Increment = 0.1 ft

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	--	--	--	130	0.003		
	--	1.50	--	--	--	570	0.013	519	0.012
	--	3.00	--	--	--	1,235	0.028	1,879	0.043

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



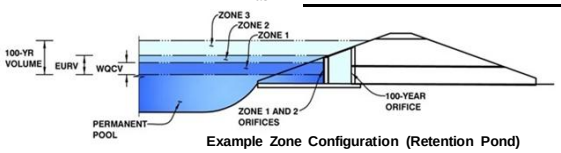


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project:

Basin ID:



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.66	0.014	Orifice Plate
Zone 2 (User)	1.66	0.000	
Zone 3 (User)	1.66	0.000	
		0.014	Total

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

			Calculated Parameters for Underdrain		
Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	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)

			Calculated Parameters for Plate		
Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	8.333E-04	ft^2
Depth at top of Zone using Orifice Plate =	1.13	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.12	sq. inches (diameter = 3/8 inch)	Elliptical Slot Area =	N/A	ft^2

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	1.00	0.80					
Orifice Area (sq. inches)	0.12	0.12						

	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)

	Not Selected	Not Selected		Calculated Parameters for Vertical Orifice	Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =			ft^2
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =			feet
Vertical Orifice Diameter =			inches				

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Not Selected	Not Selected		Calculated Parameters for Overflow Weir	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	1.40		ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	1.40		feet
Overflow Weir Front Edge Length =	5.00		feet	Over Flow Weir Slope Length =	5.00		feet
Overflow Weir Slope =	0.00		H:V (enter zero for flat grate)	Grate Open Area / 100-yr Orifice Area =	22.28		should be ≥ 4
Horiz. Length of Weir Sides =	5.00		feet	Overflow Grate Open Area w/o Debris =	17.50		ft^2
Overflow Grate Open Area % =	70%		%, grate open area/total area	Overflow Grate Open Area w/ Debris =	8.75		ft^2
Debris Clogging % =	50%		%				

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

	Not Selected	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	0.00		ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	0.79		ft^2
Circular Orifice Diameter =	12.00		inches	Outlet Orifice Centroid =	0.50		feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

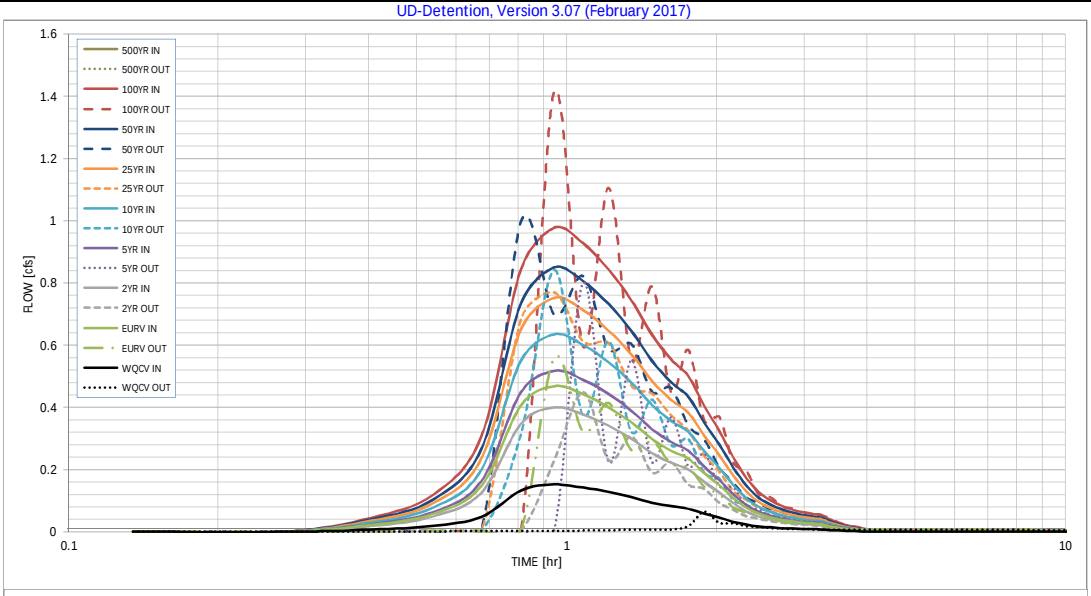
			Calculated Parameters for Spillway		
Spillway Invert Stage=	1.74	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.12	feet
Spillway Crest Length =	6.00	feet	Stage at Top of Freeboard =	2.86	feet
Spillway End Slopes =	10.00	H:V	Basin Area at Top of Freeboard =	0.03	acres
Freeboard above Max Water Surface =	1.00	feet			

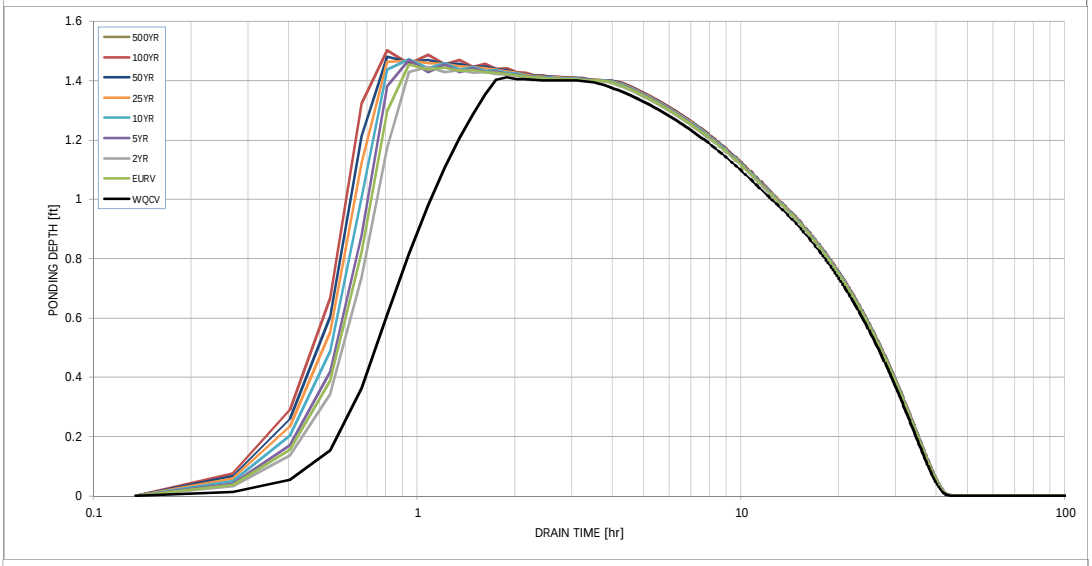
Routed Hydrograph Results

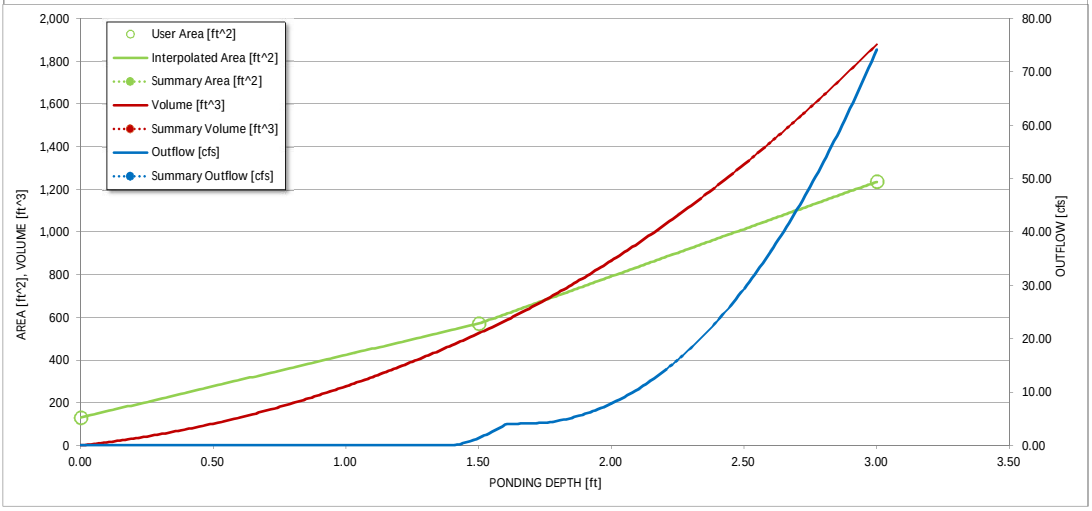
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	0.00
Calculated Runoff Volume (acre-ft) =	0.014	0.044	0.038	0.049	0.060	0.072	0.081	0.093	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.014	0.044	0.037	0.049	0.060	0.071	0.081	0.093	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.01	0.11	0.39	0.54	0.75	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.0
Peak Inflow Q (cfs) =	0.2	0.5	0.4	0.5	0.6	0.8	0.8	1.0	#N/A
Peak Outflow Q (cfs) =	0.1	0.6	0.4	0.8	0.8	0.8	1.0	1.4	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	146.5	17.1	4.3	4.0	4.1	#N/A
Structure Controlling Flow =	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	#N/A
Max Velocity through Grate 1 (fps) =	0.00	0.02	0.02	0.0	0.0	0.0	0.0	0.1	#N/A
Max Velocity through Grate 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) =	37	32	33	31	29	28	27	25	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	37	38	37	36	36	35	34	#N/A
Maximum Ponding Depth (ft) =	1.41	1.45	1.45	1.47	1.47	1.47	1.48	1.50	#N/A
Area at Maximum Ponding Depth (acres) =	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	#N/A
Maximum Volume Stored (acre-ft) =	0.011	0.011	0.011	0.012	0.012	0.012	0.012	0.012	#N/A

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs UD-Detention, Version 3.07 (February 2017)

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	#N/A
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
8.10 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	0:08:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
Hydrograph	0:16:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
Constant	0:24:18	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	#N/A
0.617	0:32:24	0.02	0.06	0.05	0.06	0.08	0.09	0.10	0.12	#N/A
	0:40:30	0.05	0.15	0.13	0.16	0.20	0.24	0.27	0.31	#N/A
	0:48:36	0.13	0.41	0.35	0.45	0.55	0.65	0.73	0.84	#N/A
	0:56:42	0.15	0.47	0.40	0.52	0.64	0.75	0.85	0.98	#N/A
	1:04:48	0.14	0.44	0.38	0.49	0.60	0.71	0.81	0.93	#N/A
	1:12:54	0.13	0.40	0.34	0.44	0.54	0.65	0.73	0.84	#N/A
	1:21:00	0.11	0.35	0.30	0.39	0.48	0.57	0.65	0.74	#N/A
	1:29:06	0.09	0.30	0.25	0.33	0.41	0.48	0.55	0.63	#N/A
	1:37:12	0.08	0.26	0.22	0.29	0.36	0.42	0.48	0.55	#N/A
	1:45:18	0.07	0.24	0.20	0.26	0.32	0.38	0.43	0.50	#N/A
	1:53:24	0.06	0.19	0.16	0.21	0.26	0.31	0.35	0.40	#N/A
	2:01:30	0.05	0.15	0.13	0.17	0.21	0.25	0.28	0.32	#N/A
	2:09:36	0.03	0.11	0.09	0.12	0.15	0.18	0.21	0.24	#N/A
	2:17:42	0.02	0.08	0.07	0.09	0.11	0.13	0.15	0.17	#N/A
	2:25:48	0.02	0.06	0.05	0.06	0.08	0.10	0.11	0.13	#N/A
	2:33:54	0.01	0.05	0.04	0.05	0.06	0.08	0.09	0.10	#N/A
	2:42:00	0.01	0.04	0.03	0.04	0.05	0.06	0.07	0.08	#N/A
	2:50:06	0.01	0.03	0.03	0.04	0.05	0.05	0.06	0.07	#N/A
	2:58:12	0.01	0.03	0.02	0.03	0.04	0.05	0.05	0.06	#N/A
	3:06:18	0.01	0.03	0.02	0.03	0.04	0.04	0.05	0.06	#N/A
	3:14:24	0.01	0.03	0.02	0.03	0.03	0.04	0.05	0.05	#N/A
	3:22:30	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.04	#N/A
	3:30:36	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	#N/A
	3:38:42	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	#N/A
	3:46:48	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	#N/A
	3:54:54	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	#N/A
	4:03:00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	#N/A
	4:11:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:19:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:27:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:35:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:43:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:51:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	4:59:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:07:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:15:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:24:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:32:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:40:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:48:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	5:56:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:04:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:12:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:20:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:28:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:36:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	6:53:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:01:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:09:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:17:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:25:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:33:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:41:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:49:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	7:57:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:06:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:14:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:22:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:30:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:38:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:46:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	8:54:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:02:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:10:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:18:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:27:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:35:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A
	9:43:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#N/A

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.22	inches	
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.75	inches	
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches	
Optional User Defined Storm	CUHP			
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.52		
Max Intensity for Optional User Defined Storm	2.51496			

Designer: AJH
Company: JR ENGINEERING
Date: August 28, 2017
Project: ACADEMY VILLAGE FILING NUMBER 3
Location: EL PASO COUNTY, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	A	B												
Receiving Pervious Area Soil Type	Loamy Sand	Loamy Sand												
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.460	0.220												
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000												
Unconnected Impervious Area (UIA, acres)	0.320	0.010												
Receiving Pervious Area (RPA, acres)	0.001	0.000												
Separate Pervious Area (SPA, acres)	0.139	0.210												
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	V	V												

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0	0.220												
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%												
Unconnected Impervious Area (UIA, %)	69.6%	4.5%												
Receiving Pervious Area (RPA, %)	0.1%	0.0%												
Separate Pervious Area (SPA, %)	30.3%	95.5%												
A_R (RPA / UIA)	0.002	0.000												
I_a Check	1.000	1.000												
f / I for WQCV Event:	8.7	8.7												
f / I for 10-Year Event:	0.5	0.5												
f / I for 100-Year Event:	0.4	0.4												
f / I for Optional User Defined Storm CUHP:	0.39	0.39												
IRF for WQCV Event:	0.00	0.00												
IRF for 10-Year Event:	1.00	1.00												
IRF for 100-Year Event:	1.00	1.00												
IRF for Optional User Defined Storm CUHP:	1.00	1.00												
Total Site Imperviousness: I_{total}	69.6%	4.5%												
Effective Imperviousness for WQCV Event:	0.0%	0.0%												
Effective Imperviousness for 10-Year Event:	69.6%	4.5%												
Effective Imperviousness for 100-Year Event:	69.6%	4.5%												
Effective Imperviousness for Optional User Defined Storm CUHP:	69.6%	4.5%												

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	0.0%	6.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	4.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	0.0%	0.0%												

Total Site Imperviousness:	48.5%
Total Site Effective Imperviousness for WQCV Event:	0.0%
Total Site Effective Imperviousness for 10-Year Event:	48.5%
Total Site Effective Imperviousness for 100-Year Event:	48.5%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	48.5%

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, May 3 2018

Emergency Spillway (Q100 = 2.8 cfs)

Trapezoidal

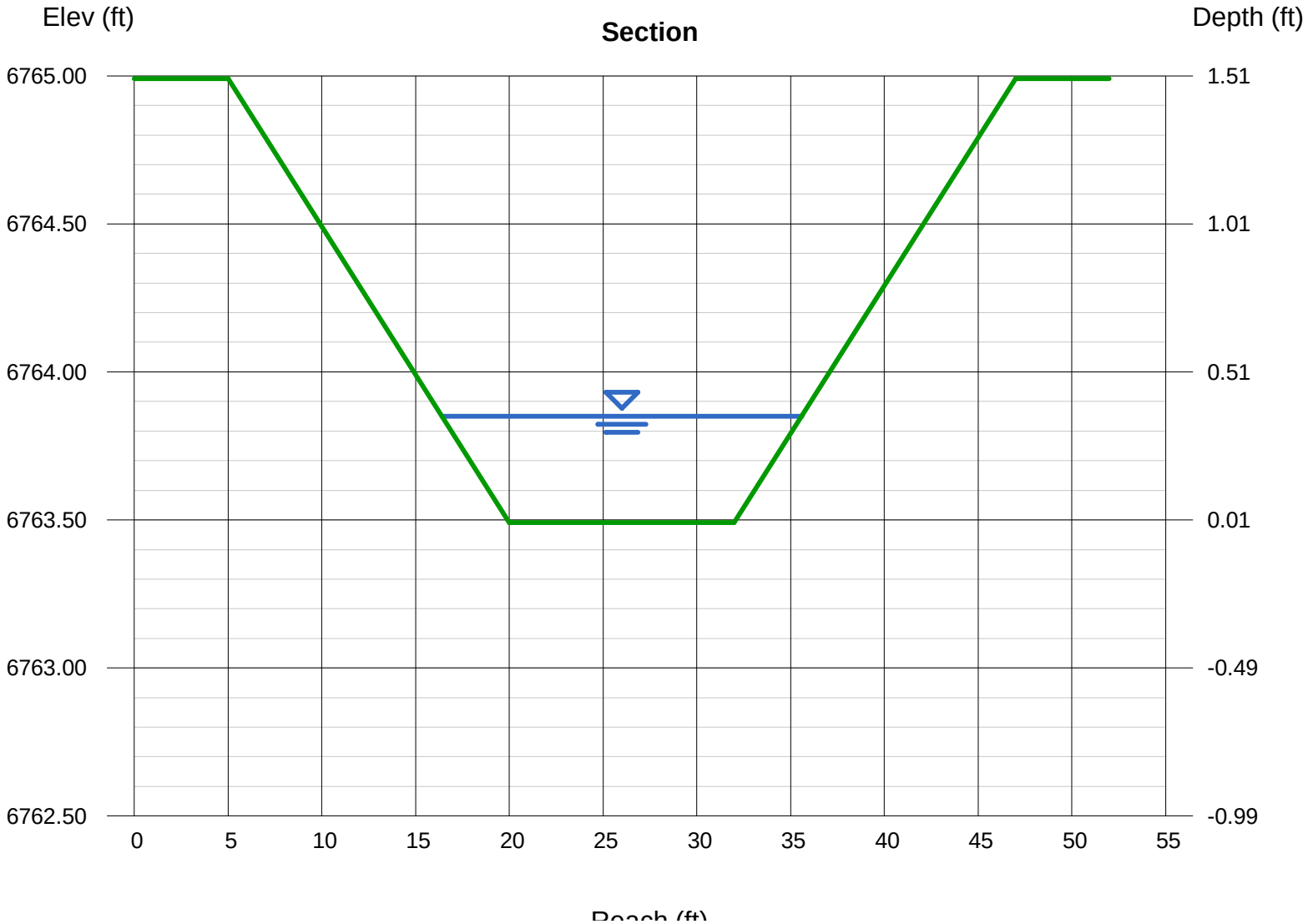
Bottom Width (ft)	= 12.00
Side Slopes (z:1)	= 10.00, 10.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 6763.49
Slope (%)	= 0.01
N-Value	= 0.013

Calculations

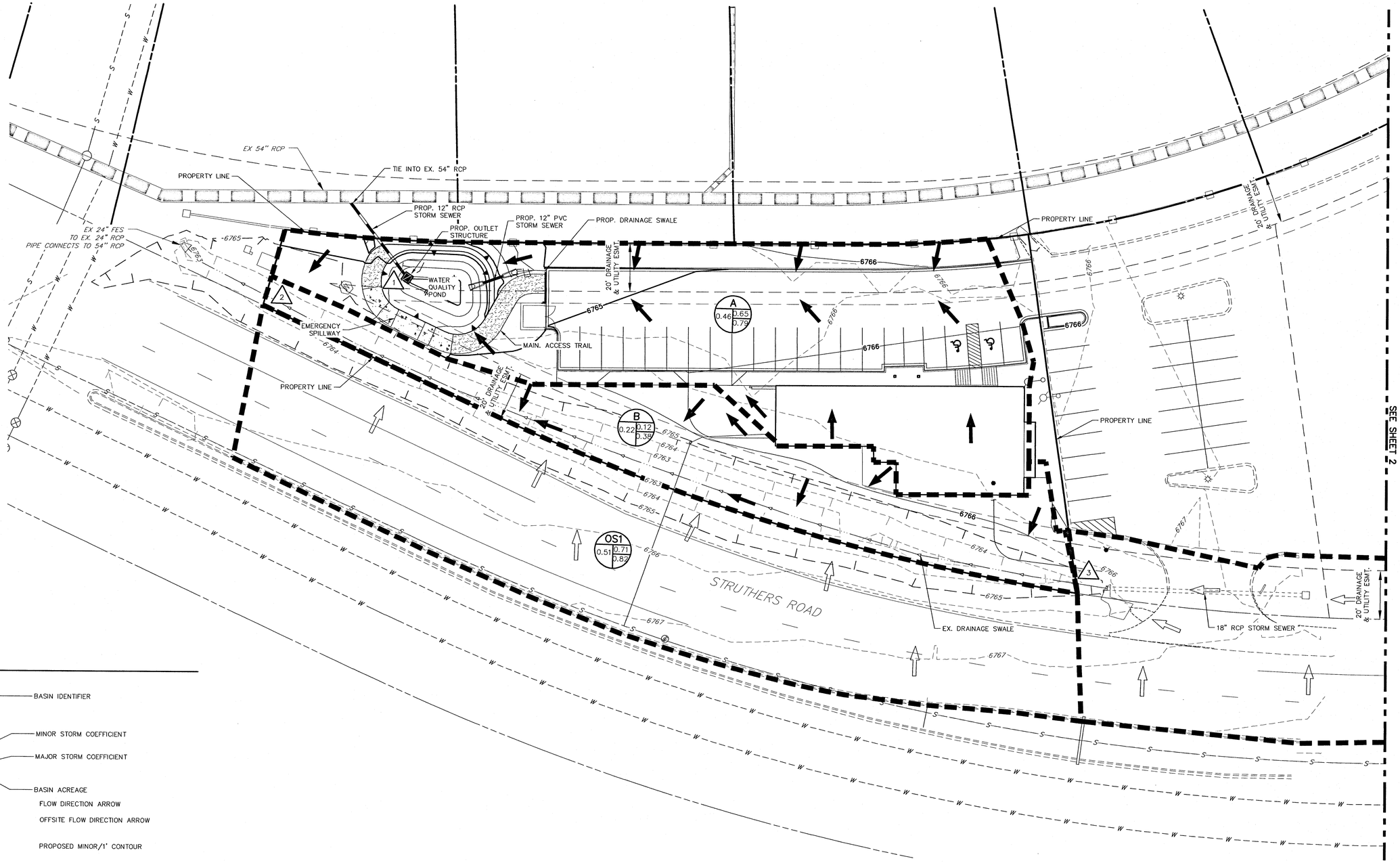
Compute by:	Known Q
Known Q (cfs)	= 2.80

Highlighted

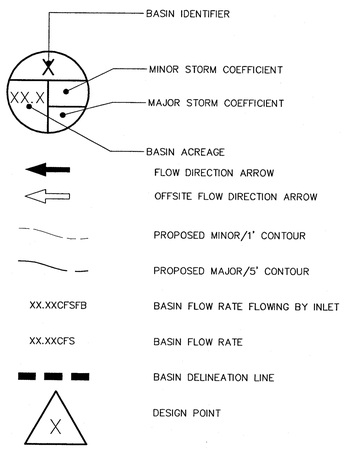
Depth (ft)	= 0.36
Q (cfs)	= 2.800
Area (sqft)	= 5.62
Velocity (ft/s)	= 0.50
Wetted Perim (ft)	= 19.24
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 19.20
EGL (ft)	= 0.36



Appendix B



LEGEND



BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A	0.46	86%	0.65	0.79	6.9	1.4	2.8
B	0.22	50%	0.12	0.38	10.1	0.1	0.6
OS1	0.51	88%	0.71	0.82	6.6	1.7	3.3
OS2	0.71	84%	0.65	0.77	7.1	2.1	4.3

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	1.4	2.8
2	3.5	7.3
3	2.2	4.4

THE LOCATIONS OF EXISTING ABOVE GROUND AND 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 ABOVE GROUND AND UNDERGROUND UTILITIES.

Know what's **below.** **Call** before you dig.

20 10 0 20 40
ORIGINAL SCALE: 1" = 20'

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

GLENN D. ELLIS, P.E.
COLORADO P.E. 38861
FOR AND ON BEHALF OF JR ENGINEERING

DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
RON COVINGTON HOMES
13725 STRUTHERS ROAD, SUITE 200
COLORADO SPRINGS, CO 80920
RON COVINGTON
719-491-1220
RCOVINGTON@COVINGTONHOME.COM

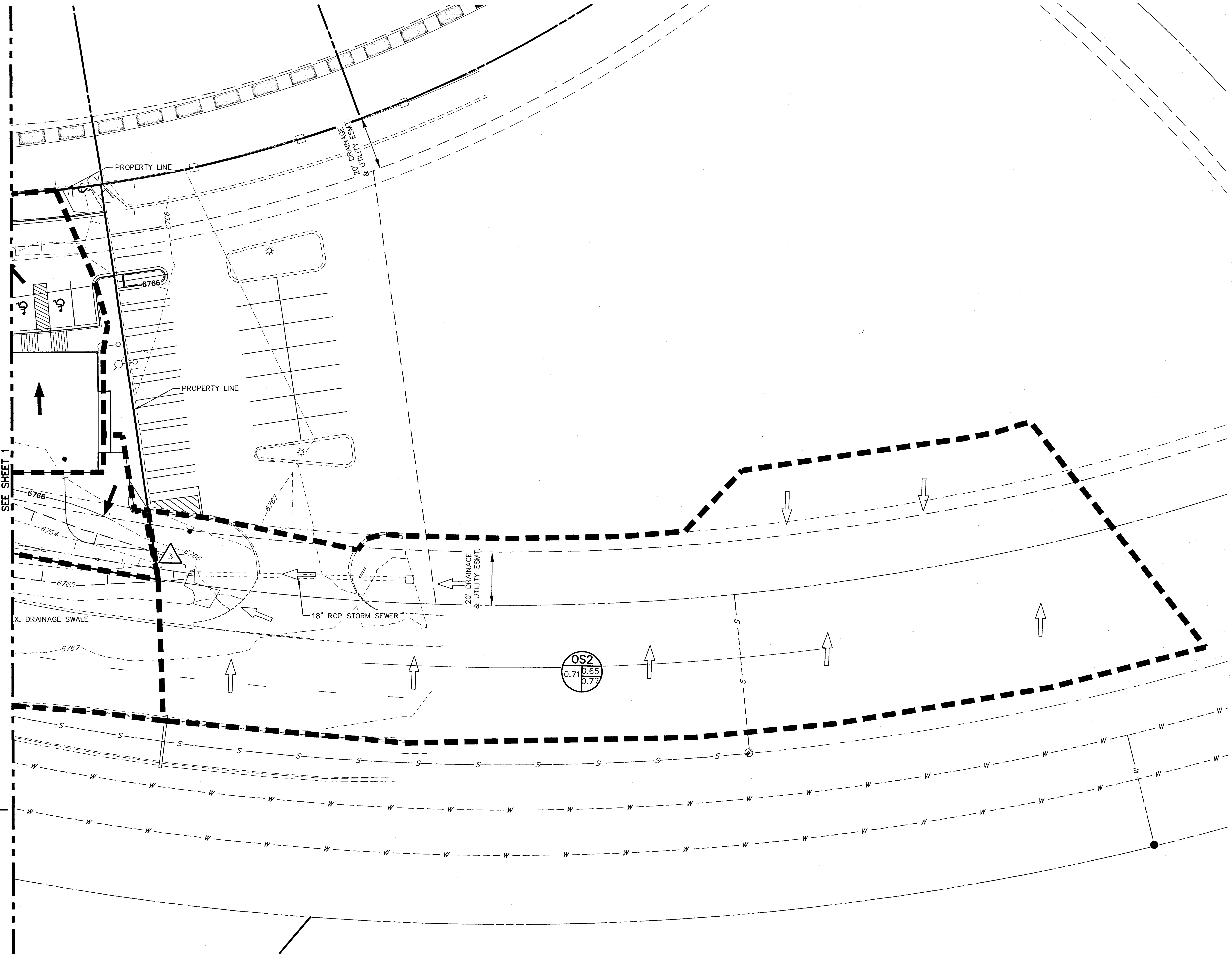
J·R ENGINEERING
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

No.	REVISION	BY	DATE
	RAB	RAB	

H-SCALE 1"=40' | V-SCALE N/A | DATE 01/03/18 | DESIGNED BY AJH | DRAWN BY AJH | CHECKED BY

ACADEMY VILLAGE
DRAINAGE PLAN

SHEET 1 OF 2
JOB NO. 25123.00



LEGEND

- BASIN IDENTIFIER
- MINOR STORM COEFFICIENT
- MAJOR STORM COEFFICIENT
- BASIN ACREAGE
- FLOW DIRECTION ARROW
- OFFSITE FLOW DIRECTION ARROW
- PROPOSED MINOR/1' CONTOUR
- PROPOSED MAJOR/5' CONTOUR
- XX.XXCFSFB — BASIN FLOW RATE FLOWING BY INLET
- XX.XXCFS — BASIN FLOW RATE
- BASIN DELINEATION LINE
- DESIGN POINT

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
A	0.46	86%	0.65	0.79	6.9	1.4	2.8
B	0.22	50%	0.12	0.38	10.1	0.1	0.6
OS1	0.51	88%	0.71	0.82	6.6	1.7	3.3
OS2	0.71	84%	0.65	0.77	7.1	2.1	4.3

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	1.4	2.8
2	3.5	7.3
3	2.2	4.4

THE LOCATIONS OF EXISTING ABOVE GROUND AND 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 ABOVE GROUND AND UNDERGROUND UTILITIES.

20 10 0 20 40
ORIGINAL SCALE: 1" = 20'

Know what's **below.**
Call before you dig.

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

GLENN D. ELLIS, P.E.
COLORADO P.E. 38861
FOR AND ON BEHALF OF JR ENGINEERING, LLC

21 Jun.'18
DATE

COLORADO REGISTERED PROFESSIONAL ENGINEER GLENN D. ELLIS 38861

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
RON COVINGTON HOMES
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719-491-1220
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J·R ENGINEERING
A Westrian Company
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Fort Collins 970-491-9888 • www.jrengineering.com

No.	REVISION	BY	DATE
RAB	RAB		

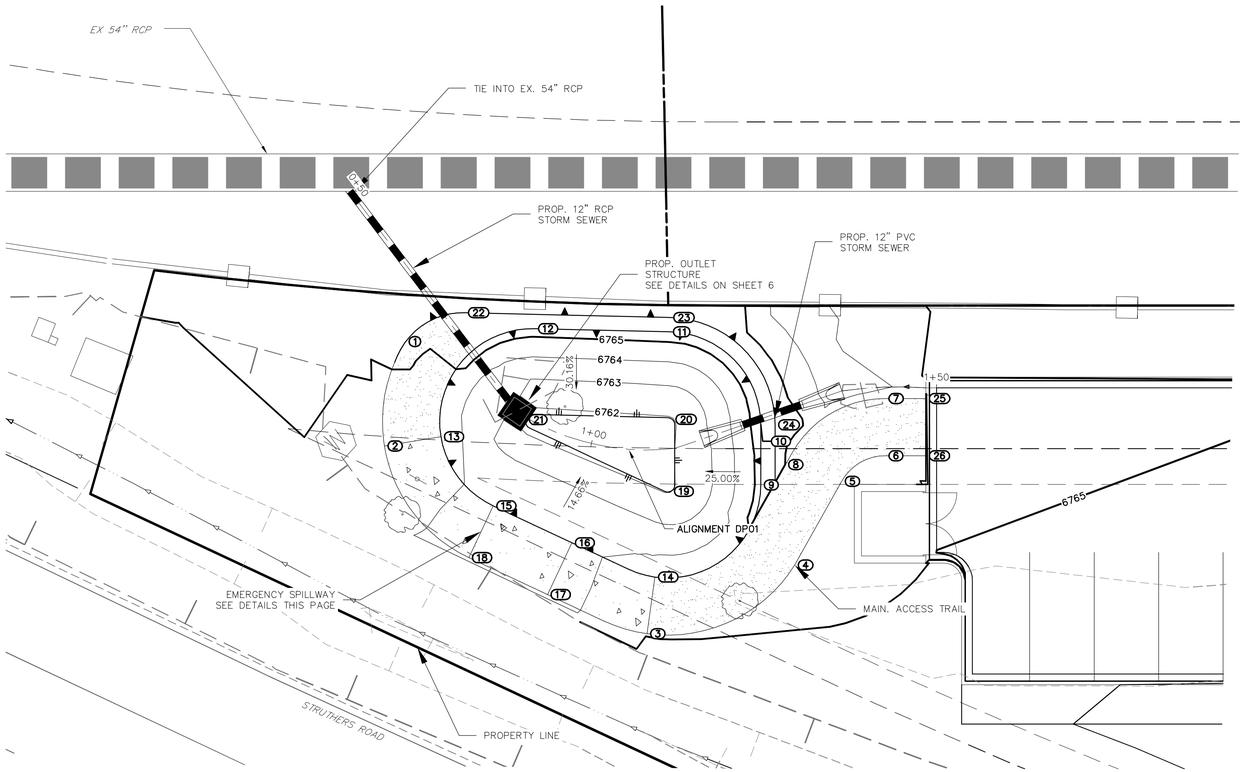
H-SCALE	1"=40'
V-SCALE	N/A
DATE	01/03/18
DESIGNED BY	AJH
DRAWN BY	AJH
CHECKED BY	

ACADEMY VILLAGE

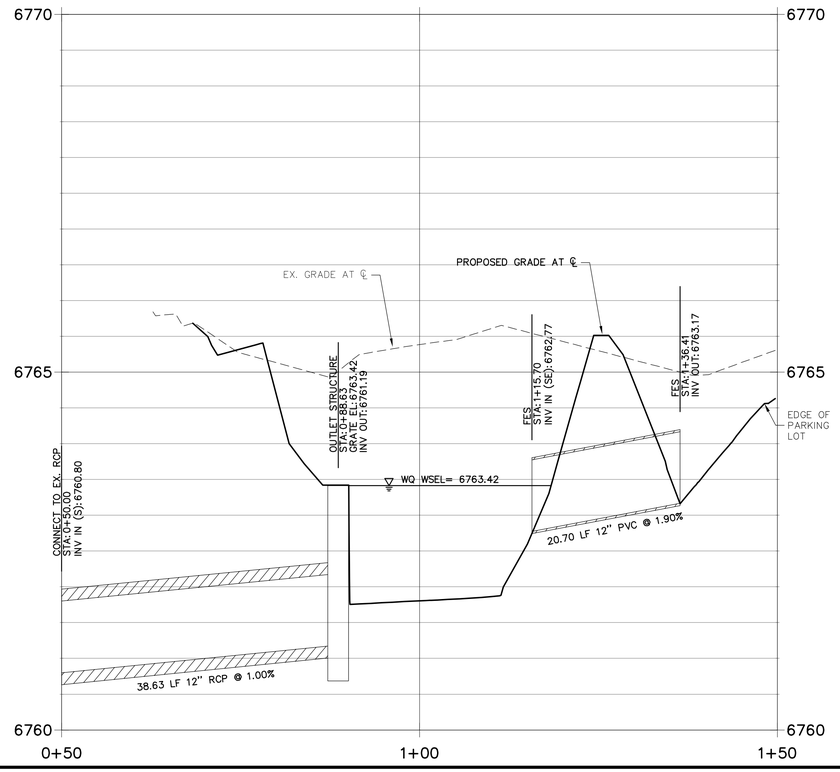
DRAINAGE PLAN

SHEET 2 OF 2

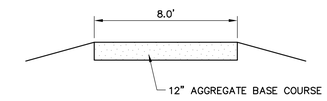
JOB NO. 25123.00



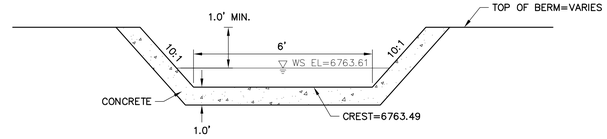
DP01 PROFILE
STA 0+50.00 TO 1+50.00



POINT TABULATION			
ID NO.	DESCRIPTION	NORTHING/EASTING	ELEVATION
1	MAINT. PATH	N: 6455.12 E: 9523.23	6765.15
2	MAINT. PATH	N: 6447.63 E: 9510.37	6764.93
3	MAINT. PATH	N: 6402.76 E: 9515.13	6764.84
4	MAINT. PATH	N: 6393.71 E: 9536.01	6764.84
5	MAINT. PATH	N: 6396.59 E: 9549.12	6764.84
6	MAINT. PATH	N: 6394.41 E: 9555.86	6764.84
7	MAINT. PATH	N: 6399.72 E: 9561.84	6764.83
8	MAINT. PATH	N: 6404.06 E: 9545.61	6765.00
9	TOP	N: 6404.71 E: 9541.23	6765.30
10	TOP	N: 6410.29 E: 9547.50	6765.51
11	TOP	N: 6428.41 E: 9548.79	6765.51
12	TOP	N: 6442.80 E: 9536.60	6765.41
13	TOP	N: 6442.59 E: 9516.58	6764.93
14	TOP	N: 6407.21 E: 9521.78	6764.84
15	OVERFLOW	N: 6430.71 E: 9514.21	6763.49
16	OVERFLOW	N: 6419.07 E: 9517.66	6763.49
17	OVERFLOW	N: 6416.80 E: 9509.99	6763.49
18	OVERFLOW	N: 6428.44 E: 9506.54	6763.49
19	TOE	N: 6413.50 E: 9532.23	6761.99
20	TOE	N: 6420.02 E: 9539.88	6761.96
21	TOE	N: 6435.32 E: 9526.24	6761.80
22	TOP	N: 6451.61 E: 9531.76	6765.28
23	TOP	N: 6429.71 E: 9550.31	6765.51
24	TOP	N: 6408.80 E: 9548.83	6765.51
25	MAINT. PATH	N: 6395.50 E: 9565.59	6764.84
26	MAINT. PATH	N: 6390.18 E: 9559.61	6764.84



GRAVEL MAINTENANCE ACCESS ROAD
N.T.S.



EMERGENCY SPILLWAY
SCALE: N.T.S.

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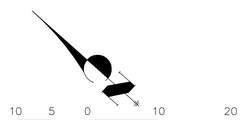

Know what's below. Call before you dig.

ACADEMY VILLAGE FILING NO. 3 SITE DEVELOPMENT PLAN
PROJECT NO: PPR-18-021

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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Fort Collins 970-491-9888 • www.jrengineering.com

No.	REVISION	BY	DATE

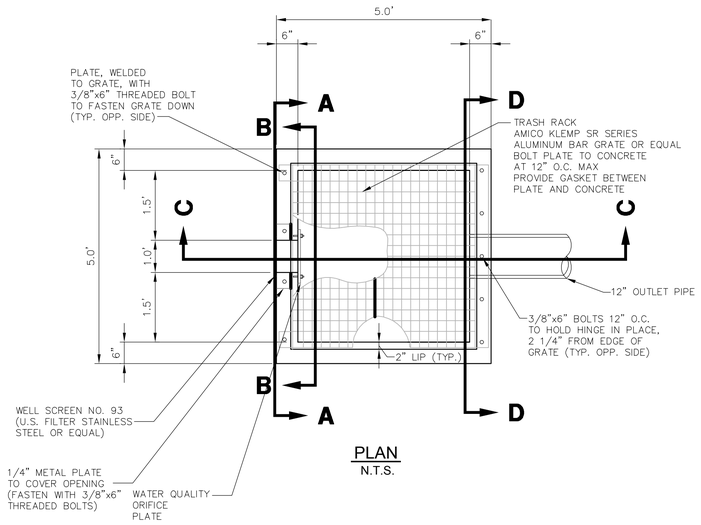
H-SCALE	1"=10'
V-SCALE	1"=1'
DATE	05/03/18
DESIGNED BY	AJH
DRAWN BY	RAB
CHECKED BY	

ACADEMY VILLAGE FILING NO. 3

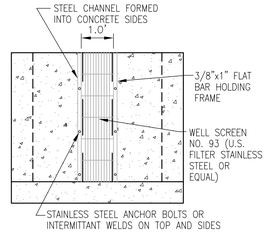
POND GRADING PLAN

SHEET 5 OF 6

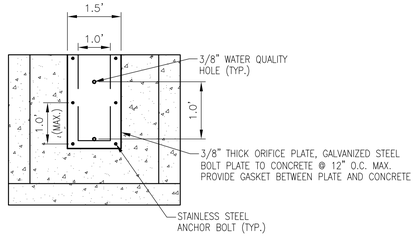
JOB NO. 25123.00



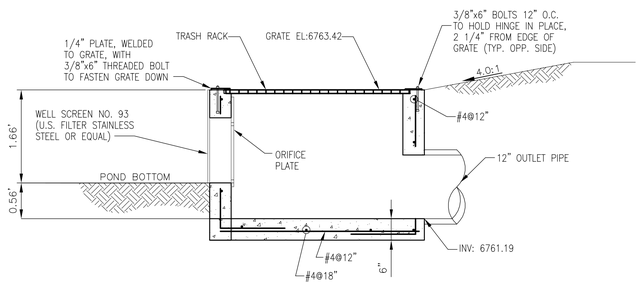
PLAN
N.T.S.



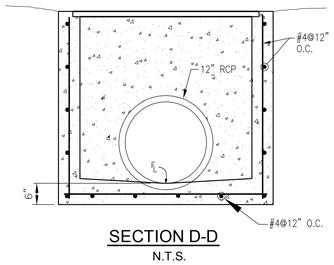
WELL SCREEN
SECTION A-A
N.T.S.



WATER QUALITY ORIFICE
SECTION B-B
N.T.S.



SECTION C-C
N.T.S.



SECTION D-D
N.T.S.

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No.	REVISION	BY	DATE
RAB			
RAB			

H-SCALE	NTS
V-SCALE	NTS
DATE	05/03/18
DESIGNED BY	AJH
DRAWN BY	RAB
CHECKED BY	

ACADEMY VILLAGE FILING NO. 3

OUTLET STRUCTURE DETAILS

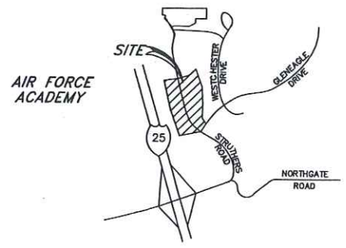
SHEET 6 OF 6

JOB NO. 25123.00

Know what's below. Call before you dig.

ACADEMY VILLAGE FILING NO. 3 SITE DEVELOPMENT PLAN
PROJECT NO: PPR-18-021

X:\25\25000.jir\25123\00\Drawings\Sheet Dwgs\SDP\25123000P01 pond.dwg, POND DETAILS (2), 6/27/2018 8:40:26 AM, CS



VICINITY MAP

NOT TO SCALE

N

100 50 0 100 200

SCALE: 1" = 100'

⊕ PROPOSED POND LOCATION
Q(5)/Q(100) = 116/288 c.f.s. (DEV.)
Q(5)/Q(100) = 70/198 c.f.s. (HIS.)
REQUIRED DETENTION VOLUMES
5-yr. EVENT – 1.87 Acre-feet
100-yr. EVENT – 3.93 Acre-feet

FOR BASIN NO. 5a
Q(5)/Q(100) = 12.1/20.8 c.f.s. (DEV.)
Q(5)/Q(100) = 2.5/8.3 c.f.s. (HIS.)
REQUIRED DETENTION VOLUMES
5-yr. EVENT – 0.52 Acre-feet
100-yr. EVENT – 0.85 Acre-feet

PROPOSED POND
LOW FLOW CHANNEL
FUTURE DEVELOPMENT COMMERCIAL / OFFICE
RIP-RAP CHANNEL
FUTURE DEVELOPMENT COMMERCIAL / OFFICE
END 54" R.C.P. CONST. REGRADE EXIST. SUMP AND RELOCATE EXIST. RIP-RAP ROCK
FUTURE DEVELOPMENT
ROAD
5 10.7
5a 3.3
FUTURE DEVELOPMENT HOTEL/RETAIL SITE
STRUTHERS
54" R.C.P. STORM DRAIN
GRASS SWALE
EXIST. INLET
EXIST. 8'x 4' RC BOX CULVERT EXTENDED TO EDGE OF R.O.W. WITH STRUTHERS ROAD L.I.D. IMPROVEMENTS
DESIGN PT. 'R' (DBPS)
Q(10)/Q(100) = 115/265 c.f.s. (DEV.)
Q(10)/Q(100) = 70/240 c.f.s. (HIS.)
CURRENT REPORT
Q(5)/Q(100) = 101/254 c.f.s. (DEV.)
Q(60)/Q(100) = 67/168 c.f.s. (HIS.)
CDOT TYPE 'R' CATCH BASIN Q(10)/Q(100) = 41.2 / 42.8 c.f.s.
30" R.C.P.
4 10.2
GRASS-LINED SWALE PER DBPS, Q(100) = 50 c.f.s.
5.9 20' DRAINAGE ESMT (OFFSITE)
ROAD SUPERELEVATED
1a 6.4
DEVELOPMENT
54" R.C.P. STORM
FUTURE
16' CDOT TYPE 'R' INLET (6" VERT. CURB @ FACE) Q(5)/Q(100) = 19.6 / 23.2 c.f.s.
BEGIN SWALE
HIGH SIDE 3.5 FT
1 7.5
CONNECT TO EXIST. PIPE
EXISTING CROSSPAN
EXIST. 54" R.C.P.
GLENEAGLE DRIVE
ADD ADDITIONAL BLOCK / TIE ABOVE EXISTING GROUND AT FACE OF PROPOSED WALL
EXISTING WALL ALONG PROPERTY LINE
BLOCKS REMOVED @ BOTTOM OF WALL TO FACILITATE DRAINAGE TO ADJOINING PROPERTY
APPROXIMATELY 1.1 ACRES OF SHEET FLOW FROM EXISTING SINGLE-FAMILY LOTS BACKYARD DRAINAGE TO FENCE, ASSUME 75' @ 2% OVERLAND FLOW
EXISTING POND SYSTEM ADJACENT TO PROPERTY LINE
SHOPS @ THE GLENN
MUIRFIELD SUBDIVISION

APPROXIMATE LOCATION OF PROPOSED 6'x 3' RC BOX CULVERT TO CHANNEL STORMWATER RUNOFF FROM BASIN '10' (DBPS) TO STRUTHERS RD. R.O.W., NOT CONSTRUCTED W/ SUN MESA TOWNHOMES

ULTIMATE OUTFALL FOR POND SYSTEM, 24" R.C.P.
Q(5) / Q(100) = 6.9 / 15.3 c.f.s.
PORTION OF BASIN '6' (DBPS)
NOTE: PIPE DISCHARGES TO EXIST. GROUND WITH NO EROSION PROTECTION

APPROXIMATE LOCATION OF DRAINAGE FACILITIES WHICH COLLECT STORMWATER RUNOFF FROM SUN MESA TOWNHOMES AND REMAINING PORTIONS OF BASIN '10' (DBPS). STORMWATER ROUTED EAST UNDER GLENEAGLE DRIVE TO SUBJECT PROPERTY WITHIN AN EXIST. 54" R.C.P. NOTE: END OF PIPE IS CONSTRUCTED @ ELEV. 66.2, WHICH IS APPROXIMATELY 8' BELOW EXIST. GRADE. NO ONSITE DETENTION OF DEVELOPED FLOWS.
DEVELOPED FLOWS (PREVIOUS REPORT)– Q(100) = 127.4 c.f.s.
DEVELOPED FLOWS (D.B.P.S.) Q(100) = 140 c.f.s.

SUN MESA TOWNHOMES

REVISION	DATE
ADD BASINS 2 & 3 TO BASIN 4, RECALC DEV. FLOWS AND REQ'D DETENTION.	03/16/99

JOB NUMBER	C0S179
DWG. NAME:	DMAGE
DWG. SCALE:	1"=100'
DATE:	12/16/98
PREPARED BY:	-
CHECKED BY:	

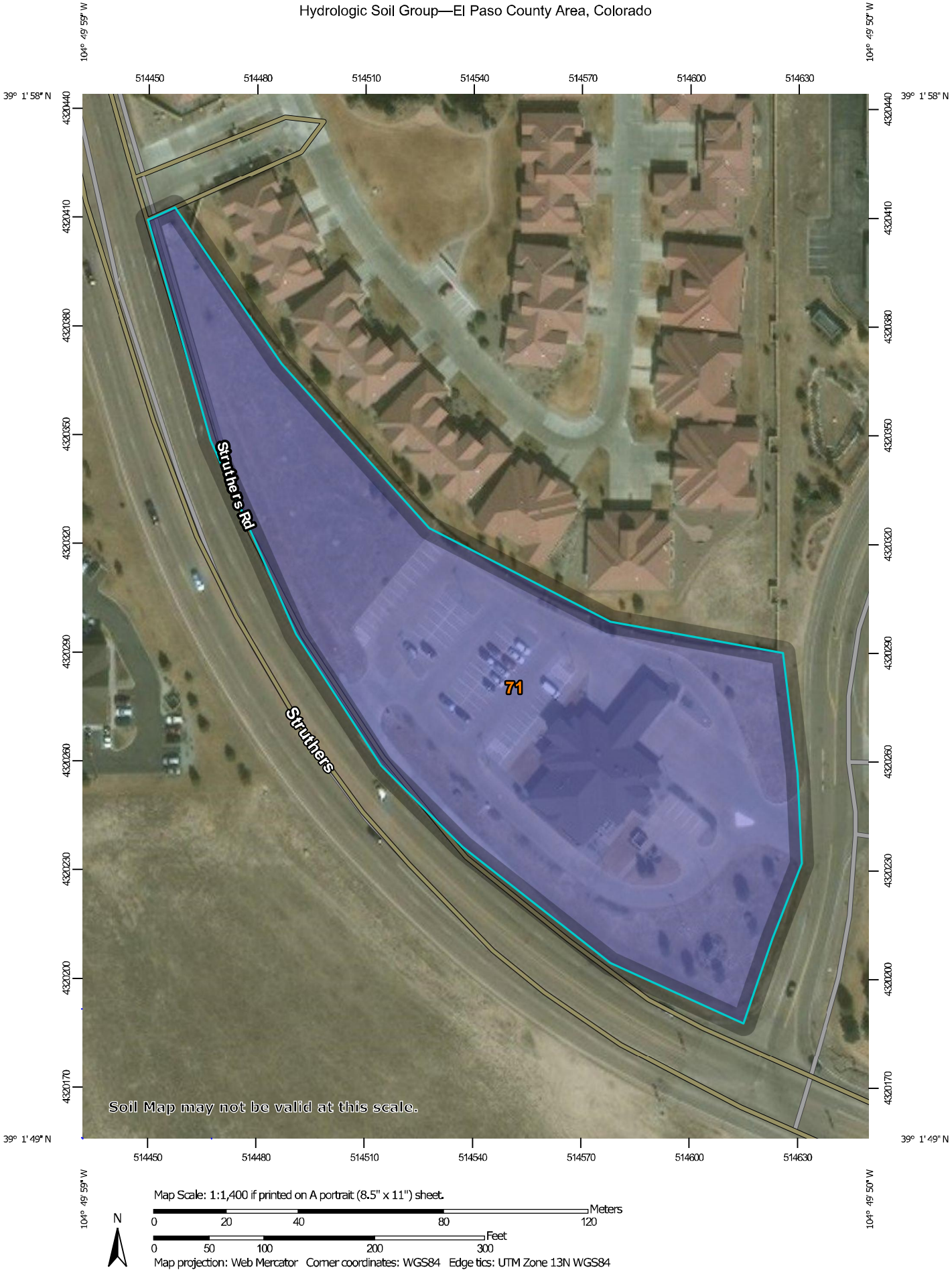
HMS Group, LLC
Civil Engineering & Design
2835 DOWNHILL DRIVE, COLORADO SPRINGS, COLORADO 80918
(719) 528-8554 (Office) (719) 528-8562 (FAX)

DRAINAGE MAP - DEVELOPED
ACADEMY VILLAGE
EL PASO COUNTY, COLORADO

PREPARED FOR:
EAGLE FLIGHT, LLC
TWO STEELE STREET, STE. 201, DENVER, CO 80206

SHEET 1 OF 1

Hydrologic Soil Group—El Paso County Area, Colorado



Map Scale: 1:1,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

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 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 15, Oct 10, 2017

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

Date(s) aerial images were photographed: Feb 22, 2014—Mar 9, 2017

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
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	3.5	100.0%
Totals for Area of Interest			**3.5**	**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