

June 1, 2018

Elizabeth Nijkamp, P.E.
PE, Engineering Review Manager
El Paso County
2880 International Circle
Colorado Springs, CO 80910

Please describe the condition of the existing pond and if maintenance needs to be performed prior to or at the end of this construction.

the reviewer did not confirm this, we do not require you to be in conformance with the City's criteria.

please add volume 1 and 2.

Re: Drainage Compliance Letter for Proposed Les Schwab Tire Center on Lot 1 – Meridian Crossing Filing Number 1A

Dear Elizabeth Nijkamp, P.E.,

This drainage conformance letter has been prepared for Lot 1 - Meridian Crossing Filing Number 1A located in the Southeast Quarter of Section 32, Township 12 South, Range 64 West of City of Falcon, County of El Paso, State of Colorado. The purpose of this letter is to demonstrate that the proposed drainage for the tire center site conforms to the current *El Paso County Drainage Criteria Manual*, *City of Colorado Springs Drainage Criteria Manual*, *Urban Drainage and Flood Control District Criteria Manual*, and the approved *the Final Drainage Report – Meridian Crossing* prepared by Springs Engineering, Inc. Dated July 2008. Runoff coefficient and grass swale calculations have been performed for the subject site and these calculations are attached herein.

A. General Property Description

The tire center is to be located on Lot 1 of the overall development, a combined 2.49-acre site. The existing lot drains from north to south varying in grades from 1% to 4%. The site is vegetated with low lying grasses on top of Blakeland loamy sand. Per the NRCS, these soils are classified as within Hydrologic Soil Groups A, and generally have high infiltration rates when thoroughly wet.

B. General Existing Drainage Characteristics

The project site is located within existing basin D-2 of the *Final Drainage Report – Meridian Crossing*. The current runoff is conveyed into the existing storm sewer at the southern end of basin D-2 which traverses underneath Old Meridian Road and discharges into the existing detention pond WU. The planned 5-year and 100-year runoff values for Basin D-2 from the *Final Drainage Report – Meridian Crossing* are 23.4cfs and 43.9cfs, respectively. Since the proposed developed acreage in this report is located entirely within existing Basin D-2 from *Final Drainage Report – Meridian Crossing*, we can use the Rational Method to calculate the existing runoff values for the site as 11.4cfs for the 5-year and 21.3cfs for the 100-year (see below).

El Paso County
Lot 1 – Meridian
June 1, 2018

please call out
someplace on this
chart all of the
sub-basins that this
area includes.

Basin 1A

water Quality will need to be provided for
Sub-basin OS-1

Please discuss the four step process.

Existing Conditions Flow Calculation - C and I Values from Appendix D (Rational Method)						
C Values		Intensity Values (in/hr)		Proposed Area (Acres)	Total Flows (cfs)	
C ₅	C ₁₀₀	I ₅	I ₁₀₀		Q ₅	Q ₁₀₀
0.9	0.95	5.1	9	2.49	11.4	21.3

C. General Proposed Drainage Characteristics

Per the *Final Drainage Report – Meridian Crossing*, post-development flows are expected to flow to existing water quality pond PLD at the west end of lot 5. Due to site constraints and efforts to stay within existing drainage easements, proposed flows are not able to drain to existing water quality pond PLD. To stay consistent with *Final Drainage Report – Meridian Crossing* a water quality swale is needed at the south and west end of lot 5. On-site flows will be collected in a series of basins and a storm sewer network and convey storm flows to the water quality swale located at the south and west end of existing basin D-2 of the *Final Drainage Report – Meridian Crossing*. The post-development flows will then be routed through a perforated pipe under the water quality swale and piped to the existing culvert that traverses underneath Old Meridian and discharges into existing detention pond WU of the *Final Drainage Report – Meridian Crossing*.

Water quality capture volume must be provided

The proposed drainage design for the tire center site consists of 5 on-site drainage basins that will enter the water quality swale, (A-1-A-4, and R-1), two on-site basins that will enter existing water quality pond PLD (OS-2 and OS-3), and one on-site pond that reflects existing conditions draining onto Meridian Rd. and Old Meridian Rd.

please label this as a
basin

The basins entering the proposed water quality swale consist mainly of asphalt areas with some landscaping, sidewalks, roofs, and curb and gutter. Runoff areas within basins A-1-A-4, will sheet flow and be collected by proposed Type R inlets located within the curb lines throughout the site. Roof areas in basin R-1 will be piped into the storm system network south of the building via roof drains which will be piped to the water quality swale and ultimately to existing detention pond WU of the *Final Drainage Report – Meridian Crossing*.

Basins OS-1, OS-2, and OS-3 reflect existing drainage conditions. OS-2 and OS-3 drain through Lot 5 and enter existing water quality pond PLD. Basin OS-1 drains to the intersection of Meridian Road and Old Meridian Road. These basins are not included in the grass swale water quality control volume as their flow paths divert the proposed pond.

this sentence doesn't

D. Hydrologic

Grassed swale does
not provide WQCV.

Per *El Paso County Drainage Criteria Manual Volume 2* - proposed runoff volumes for the 2-year storm are used to size the water quality swale. Using the calculated value of 4cfs – the geometry for the pond is selected (attached herein). The proposed water quality swale is sized to be wholly within the existing 20' drainage, utility, and public improvements easement located on the southwest side of Lot 5 Meridian Crossing Filing Number 1. Drainage that exceeds the water quality volume will either be contained in the freeboard of the water quality swale or will overtop the swale to the south and drain onto Old Meridian Road and into the existing storm

the use of the word
"through" would be
prudent here.

please provide an
exhibit that shows the
lot designations or add
to an existing exhibit.

El Paso County
Lot 1 – Meridian Crossing F
June 1, 2018

Please confirm if the proposed 42" pipe under old Meridian has been constructed per the approved FDR for Meridian Crossing. Your developed flow must be routed under Old Meridian, not over Old Meridian.

A maintenance agreement as well as an operations and maintenance manual must be submitted for the proposed permanent stormwater facility.

drainage system. The proposed water quality swale will be owned and maintained by the Meridian Crossing Property Association.

The combined runoff volumes for the project site are calculated to be 5.2cfs and 12.3cfs for the 5 and 100-year storms, respectively. These runoff volumes are below the planned values of existing basin D-2 (11.4cfs and 21.3cfs) from *Final Drainage Report – Meridian Crossing* and thus the runoff will be less than existing conditions. These findings indicate that this project should not negatively impact downstream properties or infrastructure. See below for summary tables of calculations for each basin.

please provide a chart (or add into the text) the historic flow, because the prior study was for a much greater area, you need to state what this sites historic/undeveloped flow is.

Post-Development C and A Values				
Business	Area (Acres)	C ₂	C ₅	C ₁₀₀
	0.51	0.81	0.83	0.91
	0.69	0.54	0.57	0.71
	0.24	0.86	0.87	0.94
	0.21	0.89	0.90	0.96
	0.06	0.71	0.73	0.81
	1.71	0.71	0.73	0.84

Post-Development I and Q Values						
Basin	I ₂ (in/hr)	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₂ (cfs)	Q ₅ (cfs)	Q ₁₀₀ (cfs)
A-1	3.11	4.03	8.35	1.29	1.71	3.89
A-2	2.46	3.18	6.60	0.91	1.25	3.22
A-3	3.22	4.17	8.65	0.66	0.86	1.93
A-4	3.22	4.17	8.65	0.60	0.78	1.73
R-1	3.22	4.17	8.65	0.14	0.19	0.43
Site Total	3.22	4.17	8.65	3.9	5.2	12.3

I affirm that the proposed drainage design of Lot 1 Meridian Crossing Filing Number 1A generally complies with – *Final Drainage Report – Meridian Crossing* prepared by Springs Engineering, Inc. Dated July 2008. The Grading and Erosion Control Plan (GEC) is currently being processed by El Paso County and is also expected to demonstrate compliance with the *Final Drainage Report – Meridian Crossing*.

Joseph D. Park, PE
Civil Engineering Project Manager
Galloway & Company, Inc.
Licensed Professional Engineer, State of Colorado No.

Provide license number

El Paso County
Lot 1 – Meridian Crossing Filing Number 1A
June 1, 2018

Attachments:

Les Schwab Tire Falcon, CO - Drainage Plan
Les Schwab Tire Falcon, CO - Hydrologic Computations
Final Drainage Report – Meridian Crossing – Drainage Plan
El Paso County Drainage Criteria Manual Volume 2 – Grass Swale Detail

Project: Les Schwab Tire Center, Falcon, CO

Date: 6/1/20118

Basin	Land Use	Percent Impervious	Area (FT ²)	Area (Ac.)	Soil Type	Composite C ₅	Composite C ₁₀₀	Composite C ₂
A-1	Paved Areas	100%	20,328	0.47		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%	1,948	0.04		0.08	0.35	0.02
	TOTAL	91%	22,275	0.511	A	0.83	0.91	0.81
A-2	Paved Areas	100%	17,774	0.41		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%	12,142	0.28		0.08	0.35	0.02
	TOTAL	59%	29,916	0.687	A	0.57	0.71	0.54
A-3	Paved Areas	100%	9,988	0.23		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%	353	0.01		0.08	0.35	0.02
	TOTAL	97%	10,341	0.237	A	0.87	0.94	0.86
A-4	Paved Areas	100%	9,052	0.21		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%		0.00		0.08	0.35	0.02
	TOTAL	100%	9,052	0.208	A	0.9	0.96	0.89
R-1	Paved Areas	100%		0.00		0.90	0.96	0.89
	Roofs	90%	2,694	0.06		0.73	0.81	0.71
	Landscape	0%		0.00		0.08	0.35	0.02
	TOTAL	90%	2,694	0.062	A	0.73	0.81	0.71
OS-1 (Not included in calculation)	Paved Areas	100%	1,715	0.04		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%	7,252	0.17		0.08	0.35	0.02
	TOTAL	19%	8,967	0.206	A	0.24	0.47	0.19
OS-2 (Not included in calculation)	Paved Areas	100%	4,556	0.10		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	2%	1,763	0.04		0.08	0.35	0.02
	TOTAL	73%	6,319	0.145	A	0.67	0.79	0.65
OS-3 (Not included in calculation)	Paved Areas	100%	8,593	0.20		0.90	0.96	0.89
	Roofs	90%		0.00		0.73	0.81	0.71
	Landscape	0%	5,275	0.12		0.08	0.35	0.02
	TOTAL	62%	13,867	0.318	A	0.59	0.73	0.56
Site Total	Paved Areas	100%	57,141	1.31		0.90	0.96	0.89
	Roofs	90%	2,694	0.06		0.73	0.81	0.71
	Landscape	2%	14,443	0.33		0.08	0.35	0.02
	TOTAL	81%	74,278	1.705	A	0.73	0.84	0.71

Basins OS-1 through OS0-3 must be included in the calculations.

please call out the historic flow values.

Project: Les Schwab Tire Center, Falcon, CO
 Address: Lot 1 Meridian Crossing Filing Number 1A
 Date: 6/1/20118

Basin Data			Initial/Overland Time (T _i)			Travel Time (T _t)					T _c Check Urbanized Basins			Final T _c
Basin	Area (acre)	C ₅	Length (ft)	Slope (%)	T _i (min)	Length (ft)	Slope (%)	Conv. Coeff. (Table 6-7)	Vel. (fps)	T _t (min)	Total Length (ft)	Comp. T _c (min)	T _c =(L/180)+10 (min)	Final T _c (min)
A-1	0.51	0.83	100	2.0%	3.9	299	2.0%	20	2.8	1.8	399	5.7	12.2	5.7
A-2	0.69	0.57	100	1.0%	9.7	176	1.0%	20	2.0	1.5	276	11.2	11.5	11.2
A-3	0.24	0.87	100	3.0%	2.9	125	3.0%	20	3.5	0.6	225	5.0	11.3	5.0
A-4	0.21	0.90	100	2.0%	2.9	31	2.0%	20	2.8	0.2	131	5.0	10.7	5.0
R-1	0.06	0.73	61	3.5%	3.5	150	2.0%	20	2.8	0.9	211	5.0	11.2	5.0
Site Total	1.71	0.73	218	3.0%	6.9						218	6.9	11.2	6.9
OS-1	0.21	0.24	100	3.0%	10.9	200	3.0%	20	3.5	1.0	300	11.9	11.7	11.7
OS-2	0.15	0.67	20	4.0%	2.2	200	2.0%	20	2.8	1.2	220	5.0	11.2	5.0
OS-3	0.32	0.59	30	2.0%	4.1						30	5.0	10.2	5.0

Project: Les Schwab Tire Center, Falcon, CO

Address: Lot 1 Meridian Crossing Filing Number 1A

Date: 6/1/20118

2	-YR EVENT ROUTING CALCULATIONS
0.95	P_1 Intensity = $(28.5 \cdot P_1) / (10 + T_c)^{0.786}$

	DIRECT RUNOFF								TOTAL RUNOFF				Notes
		Basin	AREA (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	
BASIN A-1	Inlet 1	A-1	0.51	0.81	5.7	0.41	3.11	1.29 cfs					
BASIN A-2	Inlet 2	A-2	0.69	0.54	11.2	0.37	2.46	0.91 cfs					
BASIN A-3	Inlet 3	A-3	0.24	0.86	5.0	0.20	3.22	0.66 cfs					
BASIN A-4	Inlet 4	A-4	0.21	0.89	5.0	0.18	3.22	0.60 cfs					
BASIN R-1	Basin	R-1	0.06	0.71	5.0	0.04	3.22	0.14 cfs					
OS-1	Basin	OS-1	0.21	0.19	11.7	0.04	2.41	0.09 cfs					
OS-2	Basin	OS-2	0.15	0.65	5.0	0.09	3.22	0.30 cfs					
OS-3	Basin	OS-3	0.32	0.56	5.0	0.18	3.22	0.57 cfs					
DP 1									5.0	0.41	3.22	1.3 cfs	Basins R-1, A-2
DP 2									5.0	0.60	3.22	1.9 cfs	Basins A-1, A-4
DP 3									5.0	1.22	3.22	3.9 cfs	Basins A-1 - A-4, R-1

Project: Les Schwab Tire Center, Falcon, CO

Address: Lot 1 Meridian Crossing Filing Number 1A

Date: 6/1/20118

5	-YR EVENT ROUTING CALCULATIONS
1.23	P_1 Intensity = $(28.5 \cdot P_1) / (10 + T_c)^{0.786}$

	DIRECT RUNOFF								TOTAL RUNOFF				Notes
		Basin	AREA (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	
BASIN A-1	Inlet 1	A-1	0.51	0.83	5.7	0.42	4.03	1.71 cfs					
BASIN A-2	Inlet 2	A-2	0.69	0.57	11.2	0.39	3.18	1.25 cfs					
BASIN A-3	Inlet 3	A-3	0.24	0.87	5.0	0.21	4.17	0.86 cfs					
BASIN A-4	Inlet 4	A-4	0.21	0.90	5.0	0.19	4.17	0.78 cfs					
BASIN R-1	Basin	R-1	0.06	0.73	5.0	0.05	4.17	0.19 cfs					
OS-1	Basin	OS-1	0.21	0.24	11.7	0.05	3.12	0.15 cfs					
OS-2	Basin	OS-2	0.15	0.67	5.0	0.10	4.17	0.41 cfs					
OS-3	Basin	OS-3	0.32	0.59	5.0	0.19	4.17	0.78 cfs					
DP 1									5.0	0.44	4.17	1.8 cfs	Basins R-1, A-2
DP 2									5.0	0.61	4.17	2.6 cfs	Basins A-1, A-4
DP 3									5.0	1.25	4.17	5.2 cfs	Basins A-1 - A-4, R-1

Project: Les Schwab Tire Center, Falcon, CO

Address: Lot 1 Meridian Crossing Filing Number 1A

Date: 6/1/20118

100	-YR EVENT ROUTING CALCULATIONS
2.55	P_1 Intensity = $(28.5 * P_1) / (10 + T_c)^{0.786}$

	DIRECT RUNOFF								TOTAL RUNOFF				Notes
		Basin	AREA (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	
BASIN A-1	Inlet 1	A-1	0.51	0.91	5.7	0.47	8.35	3.89 cfs					
BASIN A-2	Inlet 2	A-2	0.69	0.71	11.2	0.49	6.60	3.22 cfs					
BASIN A-3	Inlet 3	A-3	0.24	0.94	5.0	0.22	8.65	1.93 cfs					
BASIN A-4	Inlet 4	A-4	0.21	0.96	5.0	0.20	8.65	1.73 cfs					
BASIN R-1	Basin	R-1	0.06	0.81	5.0	0.05	8.65	0.43 cfs					
BASIN OS-1	Basin	OS-1	0.21	0.47	11.7	0.10	6.48	0.63 cfs					
BASIN OS-2	Basin	OS-2	0.15	0.79	5.0	0.11	8.65	0.99 cfs					
BASIN OS-3	Basin	OS-3	0.32	0.73	5.0	0.23	8.65	2.01 cfs					
DP 1									5.0	0.54	8.65	4.7 cfs	Basins R-1, A-2
DP 2									5.0	0.66	8.65	5.8 cfs	Basins A-1, A-4
DP 3									5.0	1.43	8.65	12.3 cfs	Basins A-1 - A-4, R-1

MERIDIAN CROSSING - FDR - PROPOSED CONDITIONS
(RATIONAL METHOD Q=CIA)

BASIN	TOTAL FLOWS				AREA TOTAL (Ac)	WEIGHTED		OVERLAND				CHANNEL				Tc TOTAL (min)	INTENSITY		COMMENTS
	Q5	Q100	CA(equiv.)			C5	C100	C5	Length	Slope	Tco	Length	Slope	Velocity	Tcc		I5	I100	
	(c.f.s.)	(c.f.s.)	5 YR	100 YR					(ft)	(ft)	(min)	(ft)	(%)	(fps)	(min)		(in/hr)	(in/hr)	
D-1	9.4	17.6	1.96	2.07	2.18	0.90	0.95	0.90	5	2.0%	0.7	867	1.6%	2.5	5.7	6.4	4.8	8.5	
D-2	23.4	43.9	4.63	4.88	5.14	0.90	0.95	0.90	10	2.0%	0.9	675	1.8%	2.6	4.3	5.2	5.1	9.0	
D-3	34.7	65.1	10.34	10.92	11.49	0.90	0.95	0.25	20	2.0%	5.7	1,370	1.2%	2.2	10.4	16.1	3.4	6.0	
D-4	9.3	17.5	1.94	2.04	2.15	0.90	0.95	0.90	5	2.0%	0.7	848	1.6%	2.5	5.6	6.3	4.8	8.5	
D-5	12.1	27.8	3.29	4.23	9.41	0.35	0.45	0.25	60	10.0%	5.8	1,020	1.4%	2.3	7.3	13.0	3.7	6.6	
D-6	11.6	21.7	2.36	2.49	2.62	0.90	0.95	0.90	5	2.0%	0.7	873	2.0%	2.8	5.1	5.8	4.9	8.7	
D-7	10.5	19.7	2.09	2.20	2.32	0.90	0.95	0.90	5	2.0%	0.7	797	2.0%	2.8	4.7	5.4	5.0	8.9	
D-8	82.8	155.5	21.50	22.70	23.89	0.90	0.95	0.25	10	2.0%	4.0	1,315	2.0%	2.8	7.7	11.7	3.8	6.9	
D-9	16.9	31.8	3.31	3.50	3.68	0.90	0.95	0.90	5	2.0%	0.7	525	1.2%	2.2	4.0	5.0	5.1	9.1	
D-10	1.9	3.6	0.38	0.40	0.42	0.90	0.95	0.90	5	2.0%	0.7	400	4.0%	4.0	1.7	5.0	5.1	9.1	
D-11	1.8	3.4	0.35	0.37	0.39	0.90	0.95	0.90	5	2.0%	0.7	400	4.0%	4.0	1.7	5.0	5.1	9.1	
D-12	1.8	3.3	0.43	0.45	0.48	0.90	0.95	0.90	5	2.0%	0.7	800	0.5%	1.4	9.4	10.1	4.1	7.3	
D-20	5.9	11.2	1.47	1.55	1.63	0.90	0.95	0.90	10	2.0%	0.9	800	0.5%	1.4	9.4	10.4	4.0	7.2	

Formula: C*I*A C*I*A Q/I Q/I 65.80 *1 *2 *3 Tco+Tcc *4 *6
20 1.5 2.67

- 1* $Tco = 1.87 * (1 - C_s) * (L^{0.5}) * ((S * 100)^{-0.33})$ (DCM page 5-11)
2* $Vc = 20 * S^{0.5}$ (USDCM RO-4)
3* $Tcc = 1 / V * L / 60$
4* $I_s = (26.65 * 1.50) / (10 + Tc)^{0.76}$ (City Letter of 1/7/2003)
6* $I_{100} = (26.65 * 2.67) / (10 + Tc)^{0.76}$ (City Letter of 1/7/2003)

Design Procedure Form: Grass Swale (GS)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: Jeff Palmer
Company: Galloway & Company
Date: May 31, 2018
Project: Les Schwab Tire Center
Location: 7105 N. Meridian Rd. Falcon, CO

1. Design Discharge for 2-Year Return Period	$Q_2 = $ <input style="width: 80px;" type="text" value="3.90"/> cfs
2. Hydraulic Residence Time A) : Length of Grass Swale B) Calculated Residence Time (based on design velocity below)	$L_S = $ <input style="width: 80px;" type="text" value="150.0"/> ft $T_{HR} = $ <input style="width: 80px;" type="text" value="2.6"/> minutes
3. Longitudinal Slope (vertical distance per unit horizontal) A) Available Slope (based on site constraints) B) Design Slope	$S_{avail} = $ <input style="width: 80px;" type="text" value="0.020"/> ft / ft $S_D = $ <input style="width: 80px;" type="text" value="0.010"/> ft / ft
4. Swale Geometry A) Channel Side Slopes (Z = 4 min., horiz. distance per unit vertical) B) Bottom Width of Swale (enter 0 for triangular section)	$Z = $ <input style="width: 80px;" type="text" value="4.00"/> ft / ft $W_B = $ <input style="width: 80px;" type="text" value="4.00"/> ft
5. Vegetation A) Type of Planting (seed vs. sod, affects vegetal retardance factor)	Choose One <div style="border: 1px solid black; padding: 5px; display: inline-block;"><input type="radio"/> Grass From Seed <input checked="" type="radio"/> Grass From Sod</div>
6. Design Velocity (0.5 ft / s maximum for desirable 5-minute residence time)	$V_2 = $ <input style="width: 80px;" type="text" value="0.97"/> ft / s
7. Design Flow Depth (1 foot maximum) A) Flow Area B) Top Width of Swale C) Froude Number (0.50 maximum) D) Hydraulic Radius E) Velocity-Hydraulic Radius Product for Vegetal Retardance F) Manning's n (based on SCS vegetal retardance curve D for sodded grass) G) Cumulative Height of Grade Control Structures Required	$D_2 = $ <input style="width: 80px;" type="text" value="0.62"/> ft $A_2 = $ <input style="width: 80px;" type="text" value="4.0"/> sq ft $W_T = $ <input style="width: 80px;" type="text" value="9.0"/> ft $F = $ <input style="width: 80px;" type="text" value="0.26"/> $R_H = $ <input style="width: 80px;" type="text" value="0.44"/> $VR = $ <input style="width: 80px;" type="text" value="0.43"/> $n = $ <input style="width: 80px;" type="text" value="0.089"/> $H_D = $ <input style="width: 80px;" type="text" value="1.50"/> ft
8. Underdrain (Is an underdrain necessary?)	Choose One <div style="border: 1px solid black; padding: 5px; display: inline-block;"><input checked="" type="radio"/> YES <input type="radio"/> NO</div> <div style="color: blue; font-size: small; margin-top: 5px;">AN UNDERDRAIN IS REQUIRED IF THE DESIGN SLOPE < 2.0%</div>
9. Soil Preparation (Describe soil amendment)	<div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div>
10. Irrigation	Choose One <div style="border: 1px solid black; padding: 5px; display: inline-block;"><input type="radio"/> Temporary <input type="radio"/> Permanent</div>

Notes: _____

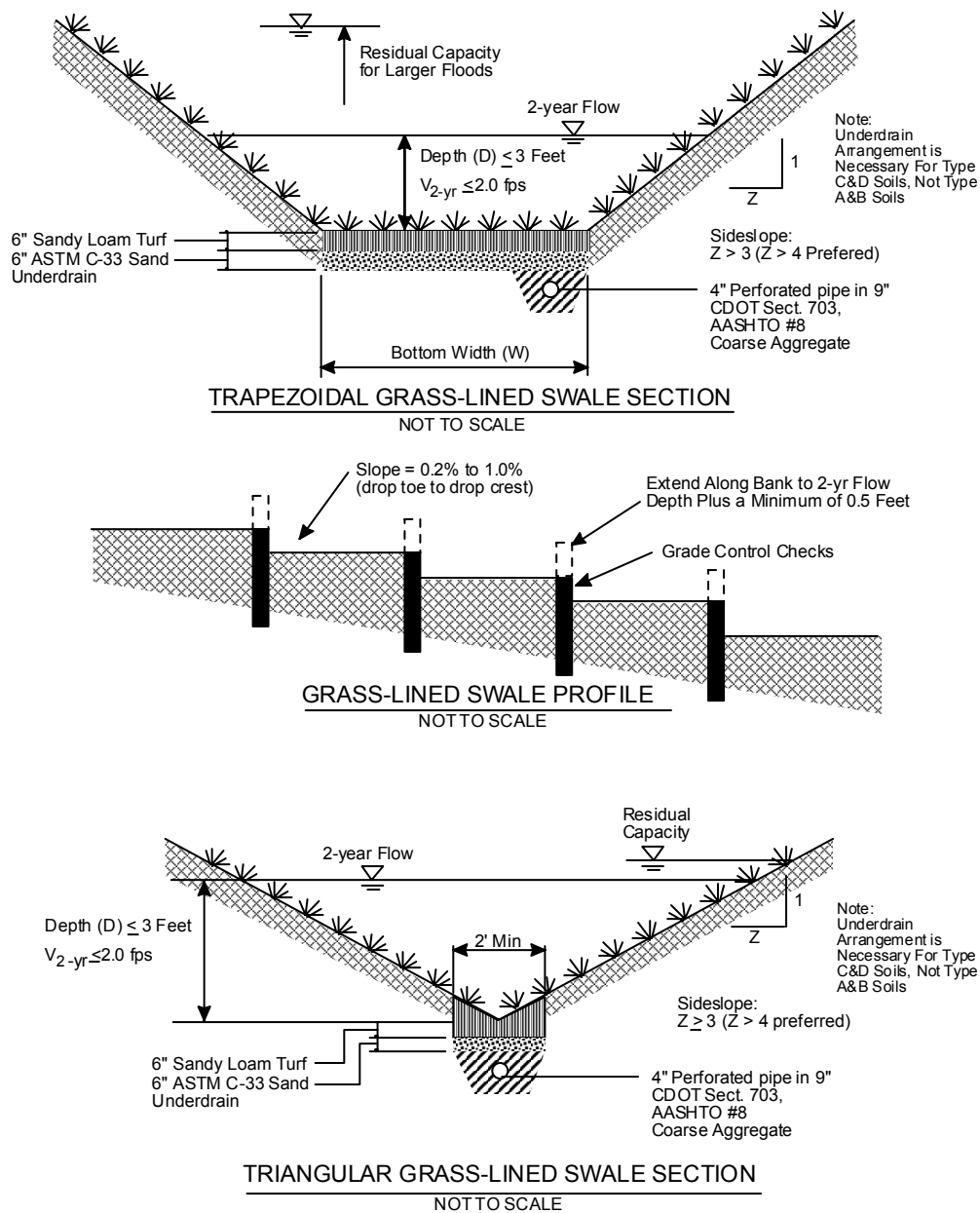


FIGURE GS-1
Profile and Sections of a Grass Swale



NOAA Atlas 14, Volume 8, Version 2
Location name: Peyton, Colorado, USA*
Latitude: 38.9352°, Longitude: -104.612°
Elevation: 6849.85 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

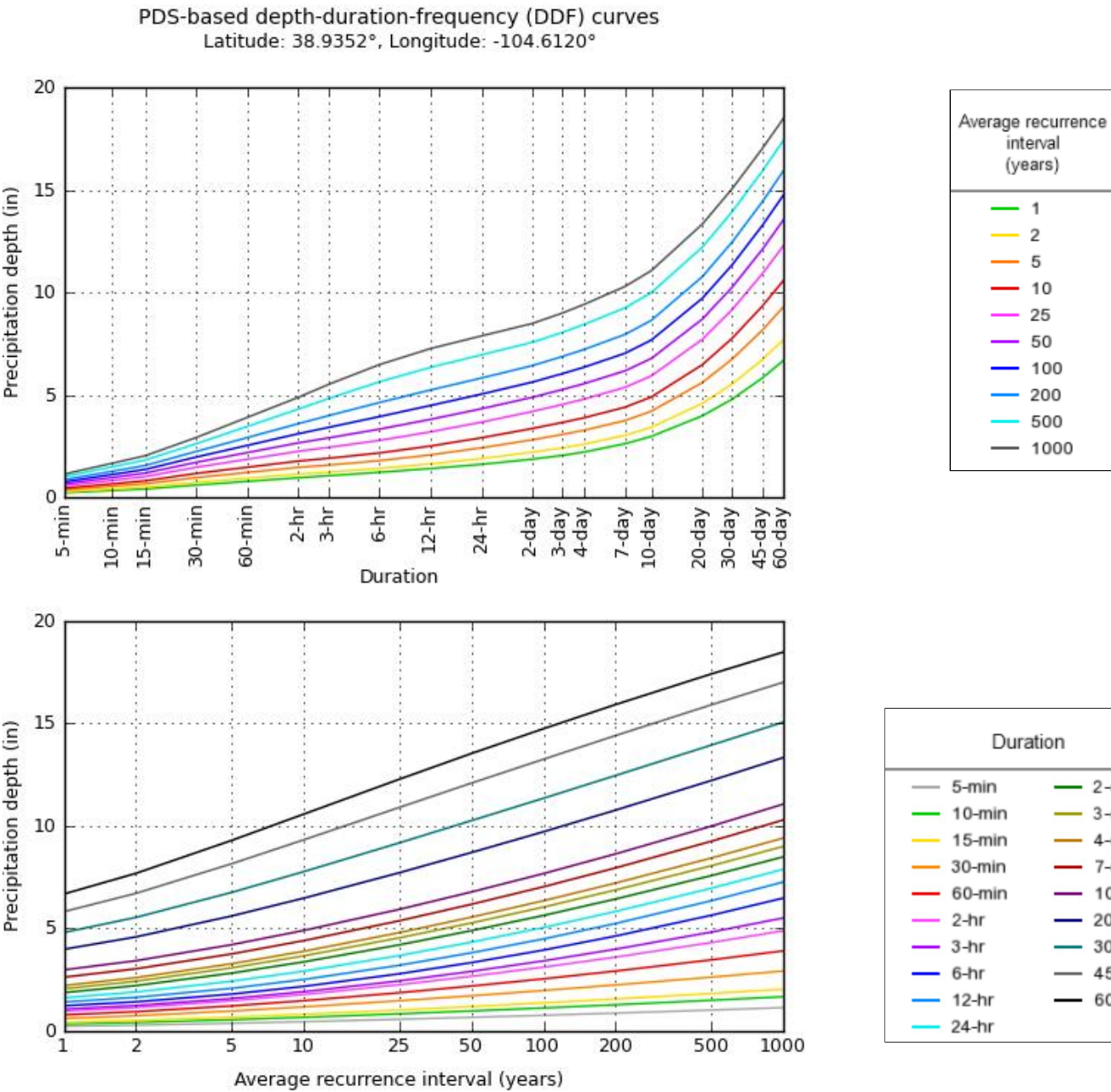
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.238 (0.193-0.295)	0.289 (0.234-0.360)	0.379 (0.306-0.473)	0.458 (0.368-0.574)	0.575 (0.448-0.752)	0.670 (0.508-0.886)	0.770 (0.564-1.04)	0.876 (0.614-1.22)	1.02 (0.690-1.46)	1.14 (0.747-1.65)
10-min	0.348 (0.282-0.433)	0.424 (0.343-0.527)	0.555 (0.448-0.693)	0.671 (0.539-0.841)	0.841 (0.656-1.10)	0.981 (0.744-1.30)	1.13 (0.825-1.53)	1.28 (0.899-1.78)	1.50 (1.01-2.14)	1.67 (1.09-2.41)
15-min	0.424 (0.344-0.528)	0.517 (0.419-0.643)	0.677 (0.547-0.845)	0.819 (0.657-1.02)	1.03 (0.800-1.34)	1.20 (0.908-1.58)	1.38 (1.01-1.86)	1.57 (1.10-2.18)	1.83 (1.23-2.61)	2.04 (1.33-2.94)
30-min	0.614 (0.498-0.763)	0.747 (0.605-0.929)	0.977 (0.789-1.22)	1.18 (0.947-1.48)	1.48 (1.15-1.93)	1.72 (1.31-2.28)	1.98 (1.45-2.68)	2.25 (1.58-3.13)	2.63 (1.77-3.75)	2.93 (1.91-4.22)
60-min	0.792 (0.643-0.985)	0.947 (0.767-1.18)	1.23 (0.990-1.53)	1.48 (1.19-1.86)	1.87 (1.46-2.46)	2.19 (1.67-2.92)	2.55 (1.87-3.46)	2.93 (2.06-4.09)	3.47 (2.34-4.97)	3.91 (2.55-5.64)
2-hr	0.971 (0.794-1.20)	1.15 (0.937-1.42)	1.48 (1.20-1.83)	1.78 (1.44-2.22)	2.26 (1.79-2.97)	2.67 (2.05-3.53)	3.12 (2.31-4.22)	3.61 (2.56-5.01)	4.31 (2.94-6.15)	4.89 (3.22-7.01)
3-hr	1.07 (0.876-1.31)	1.25 (1.02-1.53)	1.59 (1.30-1.95)	1.92 (1.56-2.37)	2.44 (1.95-3.21)	2.91 (2.25-3.85)	3.42 (2.55-4.63)	3.99 (2.85-5.54)	4.82 (3.31-6.87)	5.51 (3.65-7.87)
6-hr	1.24 (1.02-1.50)	1.43 (1.18-1.74)	1.80 (1.48-2.20)	2.18 (1.78-2.67)	2.79 (2.25-3.65)	3.34 (2.61-4.39)	3.95 (2.97-5.32)	4.63 (3.34-6.40)	5.64 (3.90-7.99)	6.48 (4.33-9.19)
12-hr	1.42 (1.18-1.71)	1.64 (1.37-1.99)	2.08 (1.73-2.53)	2.51 (2.08-3.06)	3.21 (2.60-4.15)	3.82 (3.00-4.98)	4.49 (3.41-6.00)	5.25 (3.81-7.19)	6.35 (4.42-8.92)	7.27 (4.89-10.2)
24-hr	1.62 (1.37-1.95)	1.91 (1.60-2.29)	2.43 (2.03-2.92)	2.92 (2.43-3.53)	3.68 (3.00-4.70)	4.33 (3.43-5.58)	5.05 (3.85-6.66)	5.83 (4.26-7.90)	6.96 (4.88-9.69)	7.89 (5.35-11.0)
2-day	1.88 (1.59-2.23)	2.22 (1.88-2.64)	2.82 (2.38-3.37)	3.37 (2.83-4.04)	4.20 (3.44-5.29)	4.89 (3.89-6.23)	5.64 (4.33-7.35)	6.44 (4.73-8.63)	7.58 (5.35-10.4)	8.49 (5.81-11.8)
3-day	2.06 (1.76-2.44)	2.43 (2.07-2.88)	3.08 (2.61-3.66)	3.67 (3.09-4.37)	4.54 (3.73-5.68)	5.27 (4.21-6.67)	6.04 (4.66-7.84)	6.88 (5.08-9.18)	8.06 (5.71-11.0)	9.00 (6.19-12.5)
4-day	2.22 (1.90-2.62)	2.60 (2.22-3.07)	3.28 (2.79-3.88)	3.89 (3.29-4.62)	4.80 (3.95-5.97)	5.55 (4.45-7.00)	6.35 (4.91-8.21)	7.22 (5.35-9.59)	8.43 (6.00-11.5)	9.41 (6.50-13.0)
7-day	2.63 (2.26-3.08)	3.04 (2.61-3.56)	3.76 (3.22-4.42)	4.41 (3.75-5.20)	5.37 (4.46-6.64)	6.18 (4.99-7.73)	7.03 (5.48-9.03)	7.95 (5.93-10.5)	9.25 (6.63-12.6)	10.3 (7.15-14.1)
10-day	2.98 (2.58-3.48)	3.43 (2.96-4.00)	4.21 (3.62-4.93)	4.90 (4.19-5.77)	5.93 (4.93-7.29)	6.78 (5.49-8.44)	7.68 (6.00-9.81)	8.64 (6.47-11.4)	9.98 (7.18-13.5)	11.1 (7.72-15.1)
20-day	3.99 (3.47-4.61)	4.59 (3.99-5.31)	5.61 (4.86-6.51)	6.48 (5.58-7.55)	7.72 (6.44-9.34)	8.70 (7.09-10.7)	9.72 (7.64-12.3)	10.8 (8.12-14.0)	12.2 (8.84-16.3)	13.3 (9.39-18.1)
30-day	4.80 (4.20-5.53)	5.54 (4.85-6.38)	6.76 (5.89-7.80)	7.77 (6.73-9.02)	9.17 (7.67-11.0)	10.3 (8.38-12.5)	11.3 (8.95-14.2)	12.5 (9.42-16.1)	13.9 (10.1-18.5)	15.1 (10.7-20.4)
45-day	5.82 (5.12-6.66)	6.72 (5.90-7.69)	8.15 (7.14-9.37)	9.32 (8.11-10.8)	10.9 (9.13-13.0)	12.1 (9.90-14.6)	13.2 (10.5-16.5)	14.4 (10.9-18.4)	15.9 (11.6-21.0)	17.0 (12.1-22.9)
60-day	6.68 (5.90-7.62)	7.69 (6.78-8.78)	9.29 (8.16-10.6)	10.6 (9.24-12.2)	12.3 (10.3-14.5)	13.5 (11.1-16.3)	14.7 (11.7-18.2)	15.9 (12.1-20.3)	17.4 (12.7-22.9)	18.5 (13.2-24.8)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

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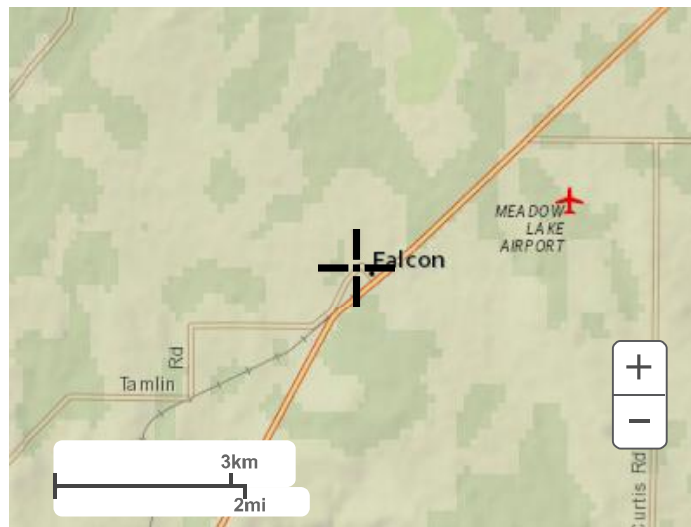
PF graphical

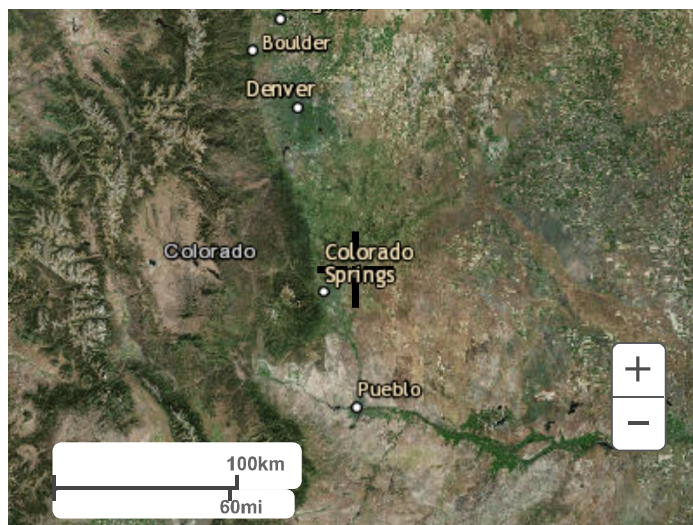


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Maps & aerials

Small scale terrain

**Large scale terrain****Large scale map****Large scale aerial**



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[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Please label this as
"from approved
FDR...(and name
report)."

LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- EXISTING DITCH CENTERLINE
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED DITCH CENTERLINE
- PROPOSED BASIN BOUNDARY
- PROPOSED FLOW PATH
- DESIGN POINT



BASIN LABEL

FALCON
HIGHLANDS
(FILING NO. 2 -
FUTURE)

EXISTING FEMA
FLOODPLAIN

DETENTION
POND WJ

US HWY 24

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft

WEST TRIBUTARY
CHANNEL

MERIDIAN ROAD

MERIDIAN ROAD

OLD MERIDIAN ROAD

HP

EXISTING FEMA
FLOODPLAIN

DETENTION
POND MW

MCLAUGHLIN ROAD

DESIGN POINT SUMMARY TABLE

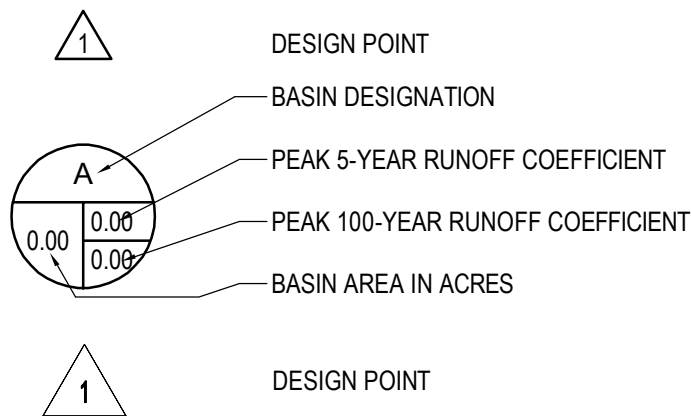
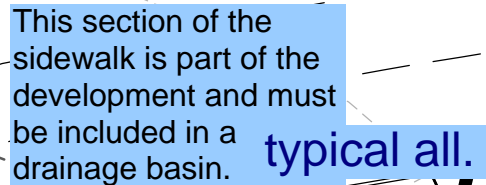
DESIGN POINT	5-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
1	9.4	17.6
J	3.7	7.0
B	4.7	8.9
X	10.9	31.6
Z	44.6	83.8
Y	34.7	65.1
3	9.3	17.5
E	46.9	88.2
5	10.5	19.7
4	11.6	21.7
6	127.7	238.9
7	140.2	264.6
8	208.4	1243.5

FIGURE

REVISIONS:	DESCRIPTION	DATE
NO.		

ENGINEER:
DESIGNED BY: CMS DATE: 3/14/07
DRAWN BY: CMS DATE: 3/14/07
CHECKED BY: DATE:
48 HOURS BEFORE YOU DIG,
CALL UTILITY LOCATORS
1-800-922-1987
CITY OF COLORADO SPRINGS, DEPT. OF UTILITIES
GAS, ELECTRIC, WATER AND WASTEWATER

SE Springs
Engineering
PROJECT MERIDIAN CROSSING FILING NO.1
SHEET TITLE PROPOSED DRAINAGE PLAN
FROM N/A TO N/A
JOB NO. 057-07-032 SHEET 1 OF 1



Markup Summary

Locked (26)



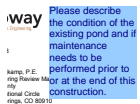
Subject: Engineer
Page Label: 1
Lock: Locked
Author: dsdnijkamp
Date: 7/12/2018 10:42:35 AM
Color: ■

the reviewer did not confirm this, we do not require you to be in conformance with the City's criteria.



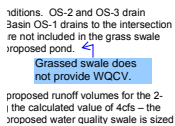
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please add volume 1 and 2.



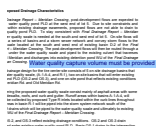
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Author: dsdnijkamp
Date: 7/12/2018 10:42:37 AM
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Please describe the condition of the existing pond and if maintenance needs to be performed prior to or at the end of this construction.



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Lock: Locked
Author: dsdgrimm
Date: 7/12/2018 10:42:44 AM
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Grassed swale does not provide WQCV.



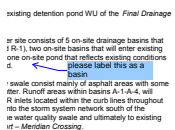
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Date: 7/12/2018 10:42:44 AM
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Water quality capture volume must be provided



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Lock: Locked
Author: dsdnijkamp
Date: 7/12/2018 10:42:45 AM
Color: ■

the use of the word "through" would be prudent here.



Subject: Engineer
Page Label: 2
Lock: Locked
Author: dsdnijkamp
Date: 7/12/2018 10:42:46 AM
Color: ■

please label this as a basin

²also County Drainage Criteria Manual Volume 1. The above information is used to size the water quality swale. The type of vegetation for the pond is selected (attached herein). The pond is located within the existing 20' drainage, utility, and

this sentence doesn't make sense.

Proposed Area (Acres)	Total Flows (cfs)	
	Q _i	Q _{ave}

water Quality will need to be provided for
Sub-basin OS-1

to examine as their flow paths differ from the proposed pond.

alternatives

1) Grange Gate Natural Wetland Volume 2: proposed runoff solutions for the 2nd cut from the water quality issue. Using the stipulated value of 60% of runoff is retained (detached) versus 1. The proposed water quality issue is based on the existing 20% drainage, utility, and public improvements associated located east of Lot 4, between Graveling Pond Number 1. Grange Gate exceeds the 60% of runoff is retained is the footprint of the water quality issue or will be to the south and drain into Old Meridian Road and into the existing storm

please provide an exhibit that shows the lot designations or add

303.705.8884 • 1542 E. Wilson Drive, Suite 325 • Greenwood, AR 72204 • info@myfl.com

please provide an exhibit that shows the lot designations or add to an existing exhibit.

please call out
Pasco County
= 1 - Merit
all of the
in 1, 2016
sub-basins that this
area includes.

Ex. 5A

C Values		Intensity Values (in/hr)		Proposed Area (Ac)
C ₁	C ₂₀₀	I ₁	I ₂₀₀	
0.9	0.95	5.1	9	2.49

please call out someplace on this chart all of the sub-basins that this area includes.

ing.

Provide license number

if Colorado No.

ow Drive, Suite 320 • Greenwood Village, CO 801

Provide license number

only after receiving prior written notice.

4. Maintenance agreements as well as operations and maintenance contracts will be awarded to the lowest priced, qualified contractor. Such selection of the lowest priced contractor will be based on the following criteria:

a. The proposed unit quality must be met or exceeded and maintained by the winning Proposer's description.

b. All cost estimates for the project are calculated to be 0.5% and 1.2 % less for the two lowest bidders, respectively. These unit estimates are before the addition of 10% and 20% of the unit cost. These figures represent a General Contractor and all in or out the same existing conditions. These findings indicate that this project requires a contractor with extensive experience in infrastructure. See below for summary findings for each issue.

	Proposer	Proposer	Proposer	Proposer	Proposer	Proposer
	1	2	3	4	5	6
Owner						
Design						
Construction						
Operation						
Maintenance						
Other						

A maintenance agreement as well as an operations and maintenance manual must be submitted for the proposed permanent stormwater facility.

Please confirm if the proposed ΔT (age under 18) and Δ (Maiden) has been considered per the approved FCM for Maiden Counting. Your developed Δ must be noted under Old Maiden, not over Old Maiden.

is in Counting?

no. The proposed count quality needs will be earned and maintained by the age Property Classification.

runoff values for the project are as calculated to be 12.2% and 12.2% for the returns, respectively. These runoff values are below the planned values of 20.0% (12.2% and 20.0% from Flood Damage Report). Maiden Counting and will be less than existing conditions. These findings indicate that this project actively improve downstream properties or infrastructure. See below for summary

Please confirm if the proposed 42" pipe under old Meridian has been constructed per the approved FDR for Meridian Crossing. Your developed flow must be routed under Old Meridian, not over Old Meridian.

please provide a chart (or add into the text) the historic flow, because the prior study was for a much greater area, you need to state what this sites historic/undeveloped flow is.

please provide a chart (or add into the text) the historic flow, because the prior study was for a much greater area, you need to state what this sites historic/undeveloped flow is.

Subject: Engineer
Page Label: 5
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Author: dsdgrimm
Date: 7/12/2018 10:43:02 AM
Color: ■

Basins OS-1 through OS0-3 must be included in the calculations.

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Page Label: 5
Lock: Locked
Author: dsdgrimm
Date: 7/12/2018 10:43:04 AM
Color: ■

Subject: Arrow
Page Label: 5
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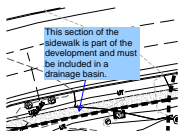
please call out the historic flow values.

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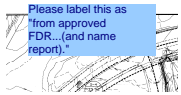
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Date: 7/12/2018 10:43:11 AM
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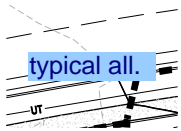
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This section of the sidewalk is part of the development and must be included in a drainage basin.



Subject: Engineer
Page Label: 17
Lock: Locked
Author: dsdnijkamp
Date: 7/12/2018 10:43:12 AM
Color: ■

Please label this as "from approved FDR...(and name report)."



Subject: Engineer
Page Label: 18
Lock: Locked
Author: dsdnijkamp
Date: 7/12/2018 10:43:17 AM
Color: ■

typical all.