TRAILS AT CROWFOOT
INTERIM SWALE FOR POND C

DRAINAGE CONFORMANCE LETTER

Prepared by:
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Phone (720) 482-9526
Contact: Mark Scheurer, PE, CFM

CVL PROJECT NO. 8130283702
SEPTEMBER 2018

CVL CONSULTANTS

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September 6, 2018

Stacey Nerger
Town of Parker
Community Development Department
20120 East Mainstreet
Parker, CO 80138

Subject: Temporary Swale to Pond C

Dear Ms. Nerger,

The following Drainage Conformance Letter proposes interim solution to street flows on Scarlet Sage Ave and Alpine Philox Street. A portion of these streets will be constructed with Filing 1 and remaining segment will be constructed with Filing 9. In order to avoid any point discharge from the site, a temporary swale is proposed until F9 is constructed along with its storm infrastructure.

Approximately 15.44 acres of tributary area drains to temporary swale with an imperviousness of 12.7%. Flows from Scarlet Sage Ave, Alpine Philox street and existing offsite basins will be intercepted by inlets and piped to temporary swale. A riprap rundown is proposed at the downstream end of FES to provide energy dissipation. Swale will predominantly be Type M Soil riprap (Section B-B) with a section of grass swale (Section A-A).

SECTION A-A SWALE SUMMARY		
Q100	34.2	CFS
Bottom Width	5	FEET
Side Slope	5	
Depth	1.5	FEET
Top Width	20	FEET
Lining	Grass	

SECTION B-B SWALE SUMMARY		
Q100	38.5	CFS
Bottom Width	2	FEET
Side Slope	5	
Depth	1	FEET
Top Width	12	FEET
Lining	Riprap	

Swale calculations and construction plan details are provided in the appendix.

This letter demonstrates that swale design is in compliance with approved *Trails at Crowfoot Filing 1 Final Drainage report*.

If you have any additional questions please do not hesitate to contact me directly at 720.249.3545.

Sincerely,
CVL Consultants of Colorado, Inc.

Mark Scheurer, PE, CFM
Director of Water Resources

COMPOSITE BASIN COEFFICIENTS

Subdivision: Trails at Crowfoot

Soil Type B/C/D

Project Name: Trails at Crowfoot
Project No. 254103
Calculated By: MRS
Date: 9/6/2018

Soil Type B **49.80%**

Land Use	Imp.	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.42	0.67
School	55%	0.49	0.51	0.72
Business	95%	0.85	0.88	0.92
Residential (Multi Family)	75%	0.67	0.70	0.82
Streets	100%	0.89	0.93	0.94
Paved	90%	0.80	0.84	0.90
Parks	10%	0.09	0.09	0.50
Open Space / Lawns	2%	0.02	0.02	0.46
Mixed Use	30%	0.27	0.28	0.60

Soil Type C/D **50.20%**

Land Use	Imp.	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.44	0.71
School	55%	0.49	0.53	0.76
Business	95%	0.85	0.88	0.96
Residential (Multi Family)	75%	0.67	0.70	0.85
Streets	100%	0.89	0.92	0.96
Paved	90%	0.80	0.83	0.91
Parks	10%	0.09	0.14	0.55
Open Space / Lawns	2%	0.02	0.07	0.52
Mixed Use	30%	0.27	0.31	0.64

Composite Runoff Co-eff

Land Use	Imp.	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.43	0.69
School	55%	0.49	0.52	0.74
Business	95%	0.85	0.88	0.94
Residential (Multi Family)	75%	0.67	0.70	0.84
Streets	100%	0.89	0.92	0.95
Paved	90%	0.80	0.83	0.91
Parks	10%	0.09	0.12	0.53
Open Space / Lawns	2%	0.02	0.05	0.49
Mixed Use	30%	0.27	0.30	0.62

R.O.W. Imperviousness Average Imperviousness Calculation for R.O.W. (Bayou Gulch Road)

Total Area **120.00 Sq.ft** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	% C_2	% C_5	% C_{100}
Lawns, Sandy Soil (2-7%)	2	0.02	0.05	0.49	16	0.3	0.00	0.01	0.07
Walks	90	0.80	0.83	0.91	32	24.0	0.21	0.22	0.24
Street	100	0.89	0.92	0.95	72	60.0	0.53	0.55	0.57
TOTAL					**120.00**	**84.3**	**0.75**	**0.78**	**0.88**

R.O.W. Imperviousness Average Imperviousness Calculation for R.O.W. (N Pinery Parkway)

Total Area **80.00 Sq.ft** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	% C_2	% C_5	% C_{100}
Lawns, Sandy Soil (2-7%)	2	0.02	0.05	0.49	16	0.4	0.00	0.01	0.10
Walks	90	0.80	0.83	0.91	30	33.8	0.30	0.31	0.34
Street	100	0.89	0.92	0.95	34	42.5	0.38	0.39	0.40
TOTAL					**80.00**	**76.7**	**0.68**	**0.72**	**0.84**

R.O.W. Imperviousness Average Imperviousness Calculation for R.O.W. (Residential Local)

Total Area **65.00 Sq.ft** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	% C_2	% C_5	% C_{100}
Lawns, Sandy Soil (2-7%)	2	0.02	0.05	0.49	16	0.5	0.00	0.01	0.12
Walks	90	0.80	0.83	0.91	15	20.8	0.18	0.19	0.21
Street	100	0.89	0.92	0.95	34	52.3	0.47	0.48	0.50
TOTAL					**65.00**	**73.6**	**0.66**	**0.69**	**0.83**

Basin 1

Total Area **6.00 acres** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.43	0.69	0.00	0.0	0.00	0.00	0.00
Business	95%	0.85	0.88	0.94	0.00	0.0	0.00	0.00	0.00
Residential (Multi Family)	75%	0.67	0.70	0.84	0.00	0.0	0.00	0.00	0.00
ROW	77%	0.68	0.72	0.84	0.67	8.5	0.08	0.08	0.09
Open Space / Lawns	2%	0.02	0.05	0.49	5.33	1.8	0.02	0.04	0.44
TOTAL					**6.00**	**10.3**	**0.09**	**0.12**	**0.53**

Basin 2

Total Area **2.10 acres** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.43	0.69	0.00	0.0	0.00	0.00	0.00
Business	95%	0.85	0.88	0.94	0.00	0.0	0.00	0.00	0.00
Residential (Multi Family)	75%	0.67	0.70	0.84	0.00	0.0	0.00	0.00	0.00
ROW	77%	0.68	0.72	0.84	1.54	56.2	0.50	0.52	0.62
Open Space / Lawns	2%	0.02	0.05	0.49	0.56	0.5	0.01	0.01	0.13
TOTAL					**2.10**	**56.8**	**0.51**	**0.54**	**0.75**

Basin 3

Total Area **4.28 acres** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.43	0.69	0.00	0.0	0.00	0.00	0.00
Business	95%	0.85	0.88	0.94	0.00	0.0	0.00	0.00	0.00
Residential (Multi Family)	75%	0.67	0.70	0.84	0.00	0.0	0.00	0.00	0.00
ROW	77%	0.68	0.72	0.84	0.00	0.0	0.00	0.00	0.00
Open Space / Lawns	2%	0.02	0.05	0.49	4.28	2.0	0.02	0.05	0.49
TOTAL					**4.28**	**2.0**	**0.02**	**0.05**	**0.49**

Basin 4

Total Area **3.06 acres** Composite Calculations

Land Use	Imp.	C_2	C_5	C_{100}	Area	Imp%	C_2	C_5	C_{100}
Residential (Single Family)	45%	0.40	0.43	0.69	0.00	0.0	0.00	0.00	0.00
Business	95%	0.85	0.88	0.94	0.00	0.0	0.00	0.00	0.00
Residential (Multi Family)	75%	0.67	0.70	0.84	0.00	0.0	0.00	0.00	0.00
ROW	77%	0.68	0.72	0.84	0.00	0.0	0.00	0.00	0.00
Open Space / Lawns	2%	0.02	0.05	0.49	3.06	2.0	0.02	0.05	0.49
TOTAL					**3.06**	**2.0**	**0.02**	**0.05**	**0.49**

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Trails at Crowfoot

Project Name: Trails at Crowfoot
Project No. 254103
Calculated By: MRS
Date: 9/6/2018

SUB-BASIN DATA			INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)				Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	MIN. T_c (MIN)	T_c (MIN)
Basin 1	6.00	0.12	200	4.7	14.9	800	4.7	4.3	3.1	18.0	1000.0	15.6	15.6
Basin 2	2.10	0.54	200	4.5	8.7	700	4.5	4.2	2.7	11.4	900.0	15.0	11.4
Basin 3	4.28	0.05	200	5.0	15.7	644	5.0	4.5	2.4	18.1	844.0	14.7	14.7
Basin 4	3.06	0.05	200	1.7	22.5	550	1.7	2.6	3.5	26.0	750.0	14.2	14.2

NOTES:

$T_i = (1.8*(1.1 - C_5)*(L)^0.5)/(S^0.33)$

T_t=L/60V (Velocity From Fig. 3-2)

T_c Check = 10+L/180

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision Trails at Crowfoot

Design Storm 2 Yr
2-Year P1 = 0.99 in.

Project Name: Trails at Crowfoot
Project No. 254103
Calculated By: MRS
Date: 9/6/2018

	DIRECT RUNOFF								TOTAL RUNOFF							STREET		PIPE			TRAVEL TIME			
COMBINED BASINS	Design Point	Area Design.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Inlet Type	Q (Intercept)	Q (Carry-On)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
Basin 1	1A	Basin 1	6.00	0.09	15.6	0.56	2.2	1.2	2 @ 10' Type R Sump Inlet			15.6	0.56	2.2	1.2									
Basin 1,2	2A	Basin 2	2.10	0.51	11.4	1.06	2.5	2.7	1 @ 5' Type R Sump Inlet			16.9	1.62	2.1	3.4			1.2	0.50	36.00	500.0	6.00	1.4	Piped to DP 2A
Basin 1,2,3	3A	Basin 3	4.28	0.02	14.7	0.09	2.3	0.2				20.9	1.71	1.9	3.3	3.6	3.4				900.0	3.79	4.0	Swale to Dp 3A
Basin 1,2,3,4	4A	Basin 4	3.06	0.02	14.2	0.06	2.3	0.1				24.2	1.77	1.8	3.3	3.6	3.3				750.0	3.79	3.3	Swaled to DP 4A
																3.6	3.3				25.0	3.79	0.1	Swaled to Sediment Pond

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision Trails at Crowfoot

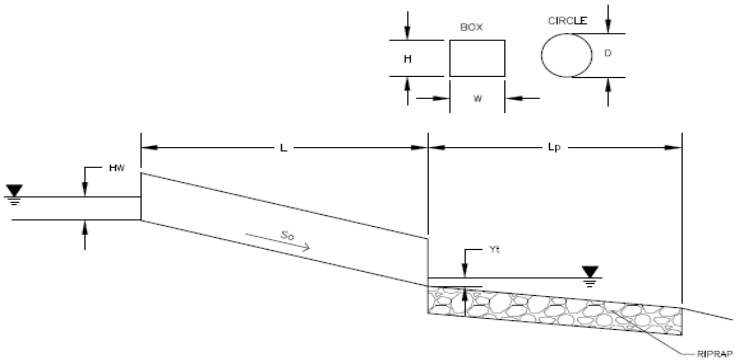
Design Storm 100 Yr
100-Year P1 = 2.6 in.

Project Name: Trails at Crowfoot
Project No. 254103
Calculated By: MRS
Date: 9/6/2018

	DIRECT RUNOFF								TOTAL RUNOFF							STREET		PIPE			TRAVEL TIME			
COMBINED BASINS	Design Point	Area Design.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Inlet Type	Q (Intercept)	Q (Carry-On)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
Basin 1	1A	Basin 1	6.00	0.53	15.6	3.18	5.8	18.4	2 @ 10' Type R Sump Inlet			15.6	3.18	5.8	18.4									
Basin 1,2	2A	Basin 2	2.10	0.75	11.4	1.57	6.7	10.4	1 @ 5' Type R Sump Inlet			16.9	4.74	5.6	26.4			18.4	0.50	36.00	500.0	6.00	1.4	Piped to DP 2A
Basin 1,2,3	3A	Basin 3	4.28	0.49	14.7	2.10	6.0	12.5				20.9	6.84	5.0	34.2	3.6	26.4				900.0	3.79	4.0	Swale to Dp 3A
Basin 1,2,3,4	4A	Basin 4	3.06	0.49	14.2	1.50	6.1	9.1				24.2	8.34	4.6	38.5	3.6	34.2				750.0	3.79	3.3	Swaled to DP 4A
																3.6	38.5				25.0	3.79	0.1	Swaled to Sediment Pond

Determination of Culvert Headwater and Outlet Protection

Project: TRAILS AT CROWFOOT
Basin ID: TEMPORARY SWALE TO POND C (DP 2A)



Soil Type:
Choose One:
(•) Sandy
( ) Non-Sandy

Supercritical Flow! Using Da to calculate protection type.

Design Information (Input):

	Design Discharge	Q =	26.4	cfs
Circular Culvert:				
	Barrel Diameter in Inches	D =	36	inches
	Inlet Edge Type (Choose from pull-down list)		Square End Projection	
Box Culvert:			**OR**	
	Barrel Height (Rise) in Feet	Height (Rise) =		ft
	Barrel Width (Span) in Feet	Width (Span) =		ft
	Inlet Edge Type (Choose from pull-down list)			
	Number of Barrels	No =	1	
	Inlet Elevation	Elev IN =	6057	ft
	Outlet Elevation **OR** Slope	So =	0.04	ft/ft
	Culvert Length	L =	175	ft
	Manning's Roughness	n =	0.013	
	Bend Loss Coefficient	k_b =	0	
	Exit Loss Coefficient	k_x =	1	
	Tailwater Surface Elevation	Elev Y_t =	6051	ft
	Max Allowable Channel Velocity	V =	7	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	1.00	ft
Flow Area at Max Channel Velocity	A_t =	3.77	ft^2
Culvert Cross Sectional Area Available	A =	7.07	ft^2
Entrance Loss Coefficient	k_e =	0.50	
Friction Loss Coefficient	k_f =	1.26	
Sum of All Losses Coefficients	k_s =	2.76	ft
Culvert Normal Depth	Y_n =	0.90	ft
Culvert Critical Depth	Y_c =	1.66	ft
Tailwater Depth for Design	d =	2.33	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	1.95	ft
Expansion Factor	1/(2*tan(Θ)) =	6.68	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	1.69	$ft^{0.5}/s$
Froude Number	Fr =	3.21	**Supercritical!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	0.51	
Inlet Control Headwater	HW_I =	2.43	ft
Outlet Control Headwater	HW_O =	-4.07	
Design Headwater Elevation	**HW =**	**6,059.43**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**0.81**	
Minimum Theoretical Riprap Size	d_{50} =	6	in
Nominal Riprap Size	d_{50} =	6	in
UDFCD Riprap Type	**Type =**	**VL**	
Length of Protection	**L_p =**	**9**	**ft**
Width of Protection	**T =**	**5**	**ft**

SECTION A-A

Q100= 34.2 CFS
Bottom Width= 5 FEET
Side Slope= 5
Depth=1.5 FEET
Top Width=20 FEET
Lining= Grass

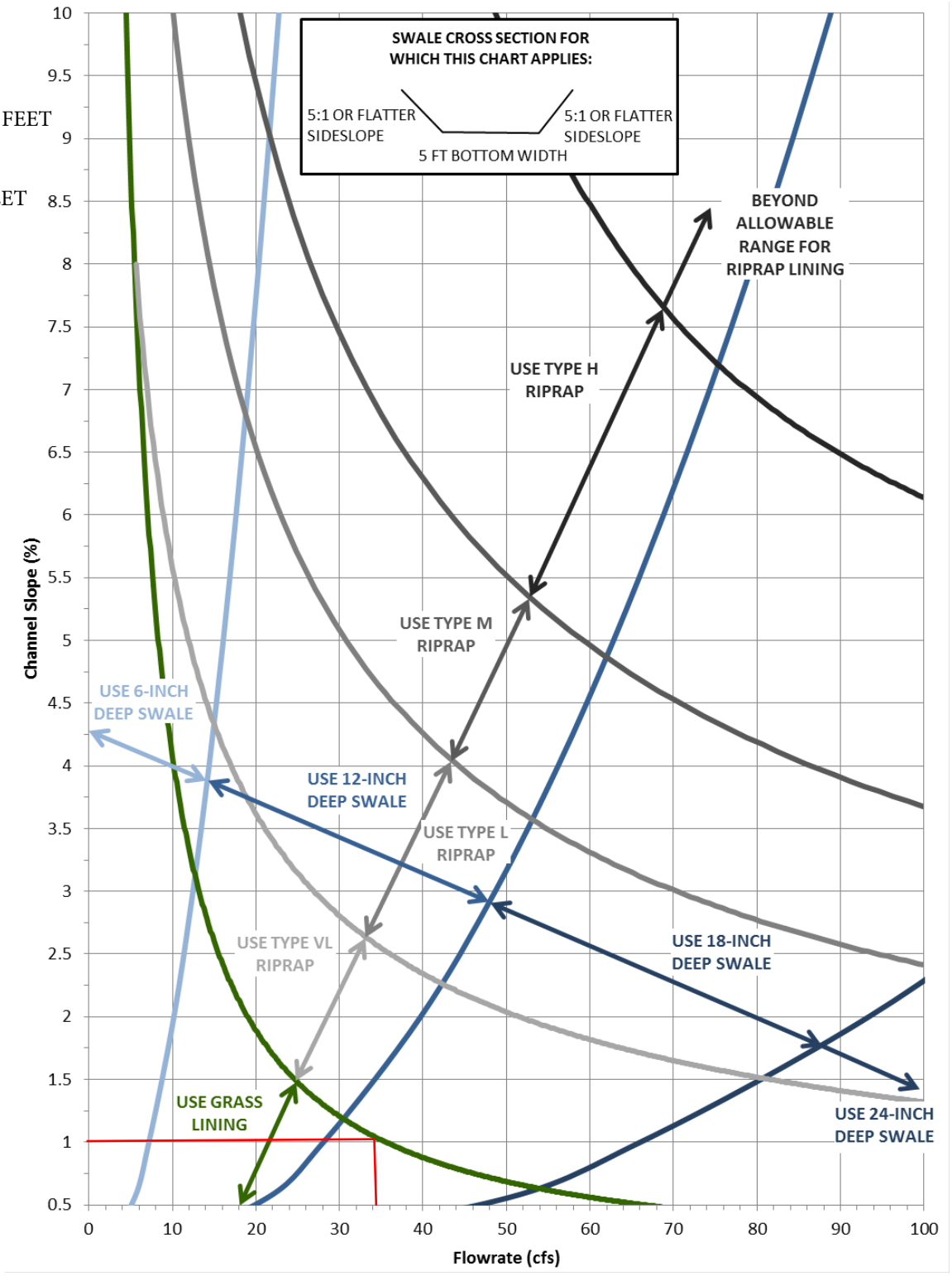


Figure 8-24. Swale stability chart: greater than 4-foot bottom width and side slopes between 5:1 and 10:1

(Note: Riprap classifications refer to gradation for riprap used in soil riprap or void-filled riprap. See Figure 8-34 for gradations.) (Source: Muller Engineering Company)

SECTION B-B

Q100= 38.5 CFS
Bottom Width= 2 FEET
Side Slope= 5
Depth=1.0 FEET
Top Width=12 FEET
Lining= Riprap

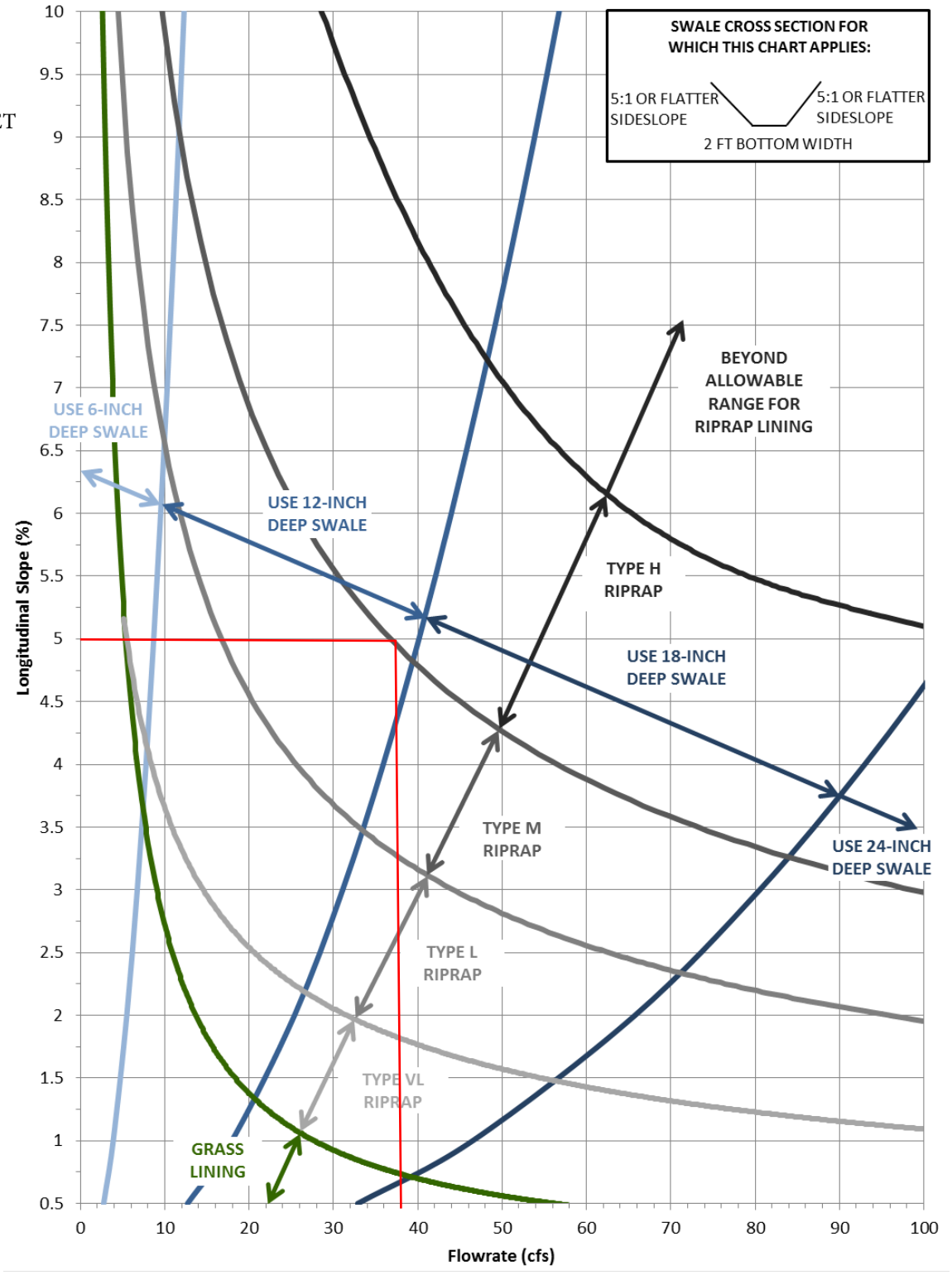
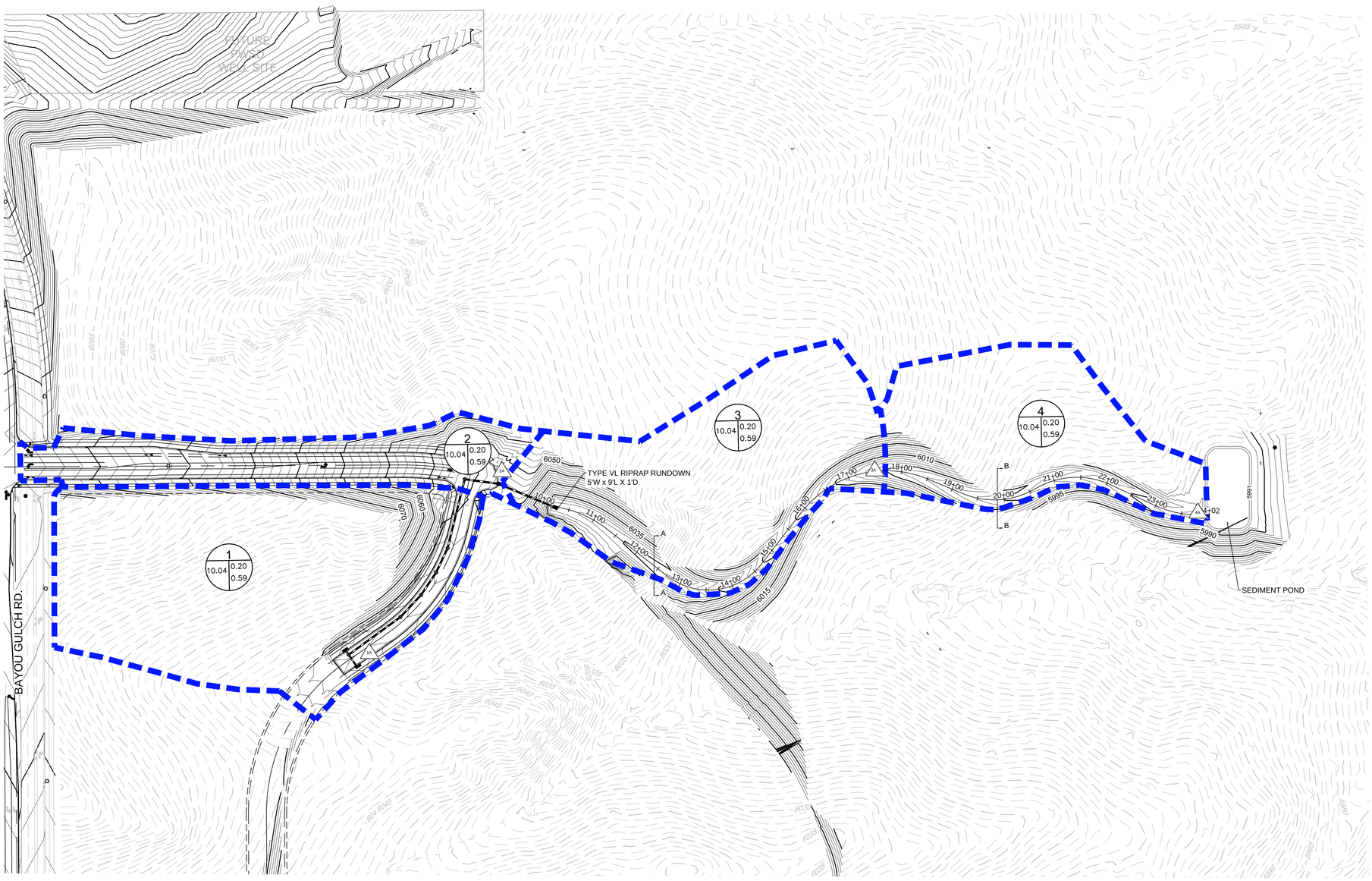
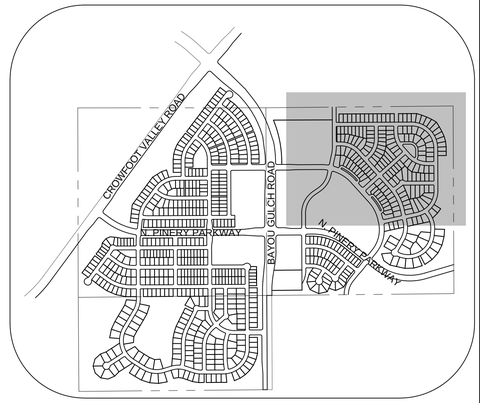


Figure 8-22. Swale stability chart; 2- to 4-foot bottom width and side slopes between 5:1 and 10:1 (Note: Riprap classifications refer to gradation for riprap used in soil riprap or void-filled riprap. See Figure 8-34 for gradations.) (Source: Muller Engineering Company)





KEYMAP
N.T.S.

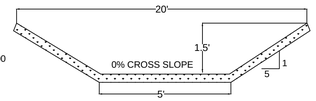
100 50 0 100 200

SCALE: 1" = 100'

NOTE:

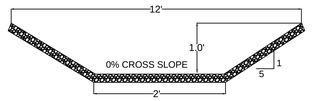
1. THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES, SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.
2. PONDS ARE MAINTAINED BY METRO DISTRICT.
3. OUTLET STRUCTURE AND OVERFLOW WEIR DETAILS ARE PROVIDED WITH CIVIL PLANS.
4. DROP STRUCTURE DETAILS ARE PROVIDED IN CHANNEL PLAN AND PROFILE SHEET .

Q100 = 34.2 CFS
S_{MAX} = 1.0%
STA = 10+00 TO 13+00
LINING = GRASS



DRAINAGE SWALE
SECTION A-A

Q100 = 38.5 CFS
S_{MAX} = 5.0%
STA = 13+00 TO 24+02
LINING = RIPRAP



DRAINAGE SWALE
SECTION B-B

LEGEND

- DESIGN POINT
- XX = BASIN ID A= AREA; R2= 2 YR RUNOFF CO-EFF; R100= 100 YR RUNOFF CO-EFF
- POND — DETENTION POND
- CHANNEL DROP STRUCTURE
- BASIN LINE
- MAJOR BASIN LINE
- PROPOSED MAJOR CONTOURS
- PROPOSED MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- PROPOSED FLOW ARROW

BENCHMARK
DOUGLAS COUNTY CONTROL POINT KNOWN AS 1.060032, BEING A 3-1/4" ALUMINUM CAP, BEING LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 6 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, HAVING A PUBLISHED ELEVATION OF 1799.2870 METERS (5903.13 FEET) NAVD '88 DATUM.

BASIS OF BEARINGS:
THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 9 BEING MONUMENTED AT THE NORTHEAST CORNER OF SAID SECTION 9 BY A 3-1/4" ALUMINUM CAP STAMPED LS 23053 AND AT THE EAST QUARTER CORNER OF SAID SECTION 9 BY A 2-1/2" ALUMINUM CAP STAMPED LS 6935 BEING CONSIDERED TO BEAR SOUTH 00°15'06" EAST, 2648.70 FEET.

CALL 811
TWO WORKING DAYS
BEFORE YOU DIG
UNCC 1-800-922-1987
UTILITY NOTIFICATION CENTER OF COLORADO

PREPARED UNDER THE SUPERVISION OF

MARK SCHEURER
COLORADO P.E. 48988

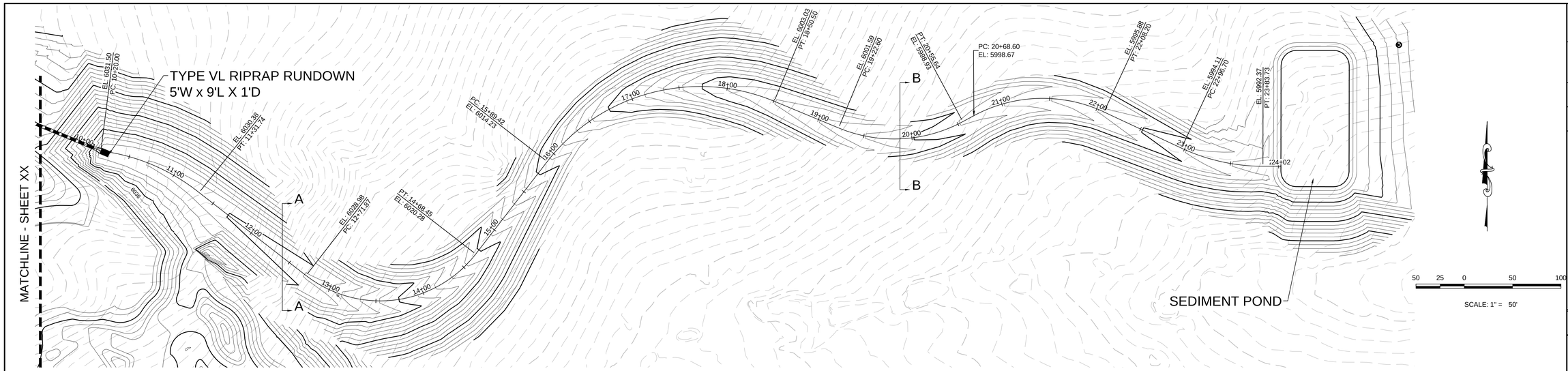
No.	Revisions	Date	Init.	Appr.	Date

CVL CONSULTANTS
10333 E. Dry Creek Rd.
Suite 240
Englewood, CO 80112
Tel: (720) 482-9526
Fax: (720) 482-9546

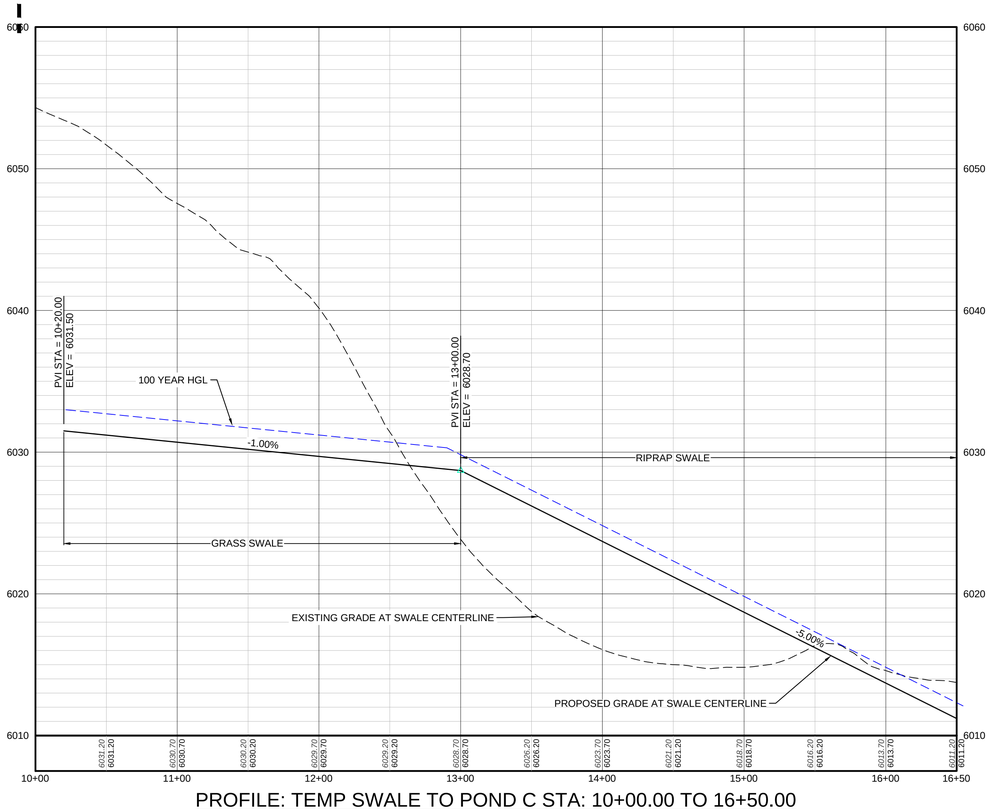
E5X MANAGEMENT
7933 S. WAYNE WAY
CENTENNIAL, CO 80112

TRAILS AT CROWFOOT
FINAL DRAINAGE MAP

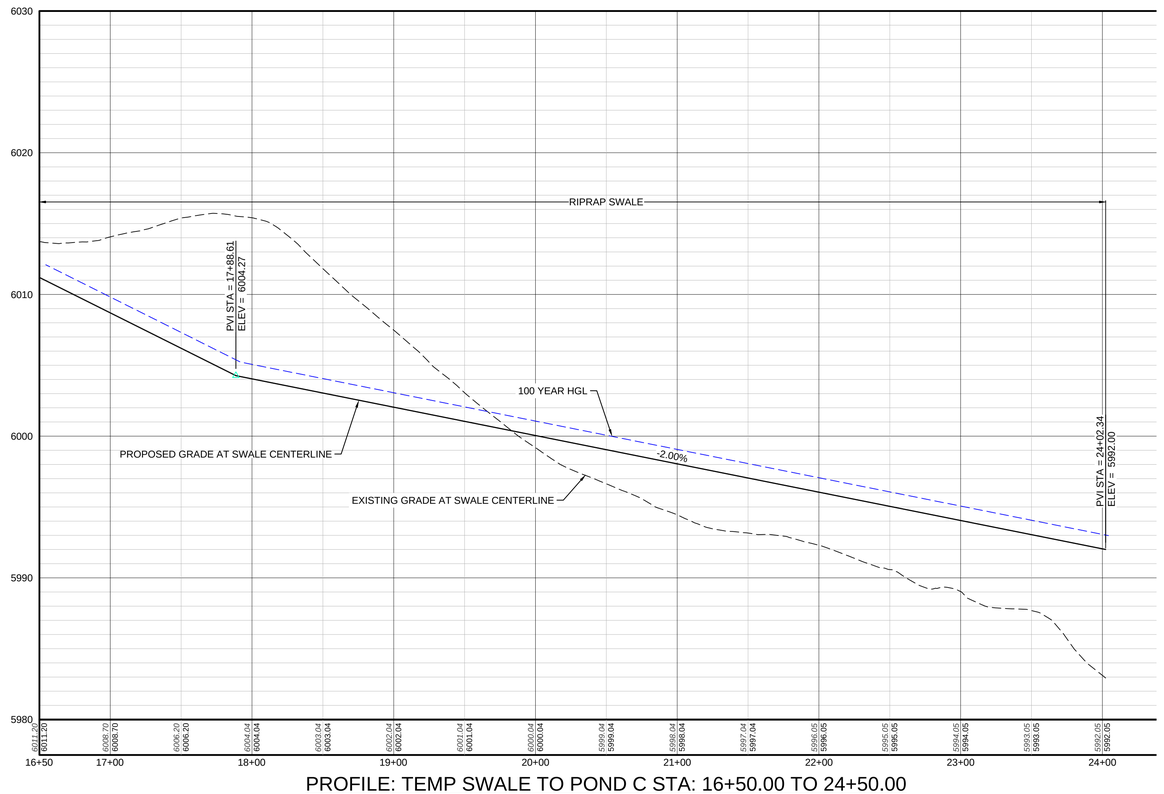
SCALE: AS SHOWN
FILE NO: 81302837O1
DRAWN BY: AYK
CHECKED BY: JJJ
DATE: MAY 2017
SHEET NUMBER



PLAN: INTERIM SWALE TO POND C STA: 10+20 TO 24+50
HORIZONTAL SCALE: 1" = 50'

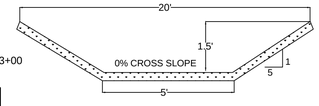


PROFILE: TEMP SWALE TO POND C STA: 10+00.00 TO 16+50.00
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'



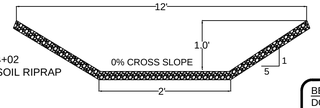
PROFILE: TEMP SWALE TO POND C STA: 16+50.00 TO 24+50.00
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 5'

Q100 = 34.2 CFS
S_{MAX} = 1.0%
STA = 10+00 TO 13+00
LINING = GRASS



DRAINAGE SWALE
SECTION A-A

Q100 = 38.5 CFS
S_{MAX} = 5.0%
STA = 13+00 TO 24+02
LINING = TYPE M SOIL RIPRAP



DRAINAGE SWALE
SECTION B-B

CALL 811
TWO WORKING DAYS
BEFORE YOU DIG
1-800-922-1987
UNCC UTILITY NOTIFICATION CENTER OF COLORADO

BENCHMARK
DOUGLAS COUNTY CONTROL POINT KNOWN AS 1.060032, BEING A 3-1/4" ALUMINUM CAP, BEING LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 6 SOUTH, RANGE 66 WEST OF THE SIXTH PRINCIPAL MERIDIAN, HAVING A PUBLISHED ELEVATION OF 1799.2870 METERS (5903.13 FEET) NAVD '88 DATUM.

BASIS OF BEARINGS:
THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 9 BEING MONUMENTED AT THE NORTHEAST CORNER OF SAID SECTION 9 BY A 3-1/4" ALUMINUM CAP STAMPED LS 23053 AND AT THE EAST QUARTER CORNER OF SAID SECTION 9 BY A 2-1/2" ALUMINUM CAP STAMPED LS 6935 BEING CONSIDERED TO BEAR SOUTH 00°15'06" EAST, 2648.70 FEET.

PREPARED UNDER THE SUPERVISION OF

BRIAN P. WILSON
COLORADO P.E. 0050067

No.	Revisions	Date	Init.	Appr.	Date

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7251 S. Gun Club Way
CENTENNIAL, CO 80112

TRAILS AT CROWFOOT
FILING 1 CONSTRUCTION DRAWINGS
INTERIM SWALE TO POND C

SCALE: AS SHOWN
FILE NO: 8130283701
DRAWN BY: AK
CHECKED BY: JJJ
DATE: APRIL 2017
SHEET NUMBER 96C