

Addendum to the Final Drainage Report
(Crossspan Removal)
The Glen at Widefield Filing No. 10
El Paso County, Colorado

PCD File SF1921

Prepared for:
Widefield Investment Group
3 Widefield Boulevard
Colorado Springs, Colorado 80911

Prepared by:
Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
Ph: (719)630-7342

Kiowa Project No. 19016

September 14, 2021


PCD Project No. SF-1921

STATEMENTS AND APPROVALS

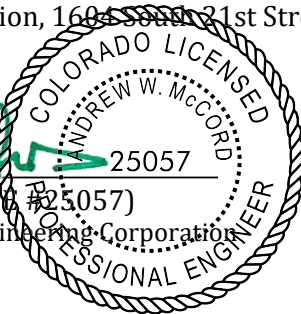
ENGINEER'S STATEMENT:

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 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.

Kiowa Engineering Corporation, 1685 South 21st Street, Colorado Springs, Colorado 80904



Andrew W. McCord (PE #25057)
For and on Behalf of Kiowa Engineering Corporation



Sept. 14, 2021

Date

DEVELOPER'S STATEMENT:

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

By:  _____

Sept. 14, 2021

Date

Print Name: J. Ryan Watson, Glen Development Company

Address: 3 Widefield Boulevard
Colorado Springs, Colorado 80911

EL PASO COUNTY:

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

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

APPROVED
Engineering Department

10/26/2021 4:25:00 PM
dsdnijkamp

**EPC Planning & Community
Development Department**

Date

General Description

The Glen at Widefield Filing No. 10 (Filing 10) subdivision is being developed as a single-family residential subdivision located in the Widefield area of El Paso County. The subject property is located to the west of Marksheffel Road and north of Mesa Ridge Parkway. A Vicinity Map of the site is shown on Amended Drainage Plan - Developed Conditions Onsite D-1 included in the Appendix.

The Filing 10 roadways have been partially constructed at the time of this Addendum.

Peaceful Valley Road extends through the filing and connects to Marksheffel Road. This roadway was constructed as a part of The Glen Filing No 8, and will be improved further with this development through the addition of attached sidewalks and pedestrian ramps. A crossspan was originally planned to convey as much surface area as possible to the extended detention basin lying to the north (Detention Basin 'D'), but this pan has now been omitted to preserve the integrity of the existing roadway intersection.

The overall site drains to the West Fork Jimmy Camp Creek Drainage Basin at a point just upstream of Mesa Ridge Parkway. Sub-Basin D20a will drain east and then south to the existing roadside ditch at Marksheffel Road. As a result, the developed drainage pattern is slightly altered for the site. The modification to Sub-Basin D20a is reflected on Sheet D-1 in the Appendix.

Sub-Basin D20a (Modified Discharge)

Sub-basin D20a is located along the southerly margin of Filing 10 and contains portions of residential lots, along with a portion of proposed Pennycress Drive. The basin contains 0.81 Acres. Runoff Volume is 0.9, and 2.5 cfs for the Minor and Major Storm Events, respectively.

Modified Discharging Flows are now to be conveyed via existing concrete curb & gutter at Peaceful Valley Road and then to a riprap rundown for stabilization prior to entering an existing natural channel which serves the west one-half of Marksheffel Road along with some flows entering the channel from upslope landforms adjacent to the roadway corridor. This channel is trapezoidal and is fully stabilized. Flows from Sub-Basin 20a are expected to enter the channel well ahead of Peak Discharging Flows from Detention Basin 'D' (See Time of Peak Discharge Exhibit at Appendix).

The Modified Flows will be directed across riprap at the point they depart from the existing curb & gutter section of Peaceful Valley Road and just ahead of the intersection with Marksheffel Road. The riprap will reduce Flow Velocity, and will allow for some suspended Solids and Sediments to drop out of the storm runoff. The existing channel receives these same flows at the bottom of the riprap rundown, and also provides some additional biofiltering, and velocity reduction benefit.

Design Point 10-2 increases from 130.4 to 132.9 cfs in the fully built out condition (Filings 10-12). The trapezoidal channel is sized for 175 cfs. Capacity is adequate to accommodate the 2.5 cfs increase.

Sub-Basin 20a Water Quality Treatment

The adjacent Sub-basins; E-5 through a portion of E-6 consist of vegetated hillsides which provide adequate water quality treatment through natural biofiltering. Remaining Runoff These areas will now combine with flows from Sub-Basin D20a.

An updated IRF Reduction Calculation combining Sub-basins E-5 and D-20a is provided to demonstrate adequate support for Water Quality treatment for this area.

IRF reduction analysis for this modified area resulted in a treatment value of at least 60% of the expected overall WQCV (See amended IRF calculations in the Appendix).

Conclusions

No adverse impacts are expected from the modified discharging flows due to stabilization, biofiltering, and due to the flows being advanced through the channel much more quickly than if they were routed through the extended detention basin. The existing roadside channel has sufficient capacity to accommodate the additional flow.

Appendix A

Amended Time of Concentration

Amended Detention Basin Peak Discharge Exhibit

Amended Trapezoidal Channel Conveyance (Adds 2.5 cfs for Major Event)

Amended IRF Calculations

Amended Drainage Plan - Developed Conditions Onsite D-1

The Glen at Widefield
Developed Condition
Runoff Coefficient and Percent Impervious Calculation

Filing 10 - Amended Condition (Crossspan Removal)					Sub-Basin Data					Time of Concentration Estimate							Min. Tc in Urban		Final t_c^*
Basin	Design Point	Contributing Basins	Area	C_5	Initial/Overland Time (t_i)				Travel Time (t_t)				Comp.		Tc Check (urban)				
					Length	Slope	t_i	Length	Slope	t_{Travel}	Cv	Velocity	t_t	t_c	Total	t_c Check			
D-20a	DP 92a	D-20a Amended	0.81ac	0.28	70lf	3.3%	8.4 min.	406lf	3.5%	PV	20	3.7 ft/sec	1.8 min.	10.2 min.	476lf	12.6 min.	10.2 min.		

Equations:

t_i (Overland) = $0.395(1.1 - C_5)L^{0.5}S^{-0.333}$

C_5 = Runoff coefficient for 5-year

L = Length of overland flow (ft)

S = Slope of flow path (ft/ft)

t_c Check = $(L/180)+10$ (Developed Cond. Only)

L = Overall Length

Velocity (Travel Time) = $CvS^{0.5}$

Cv = Conveyance Coef (see Table R0-2)

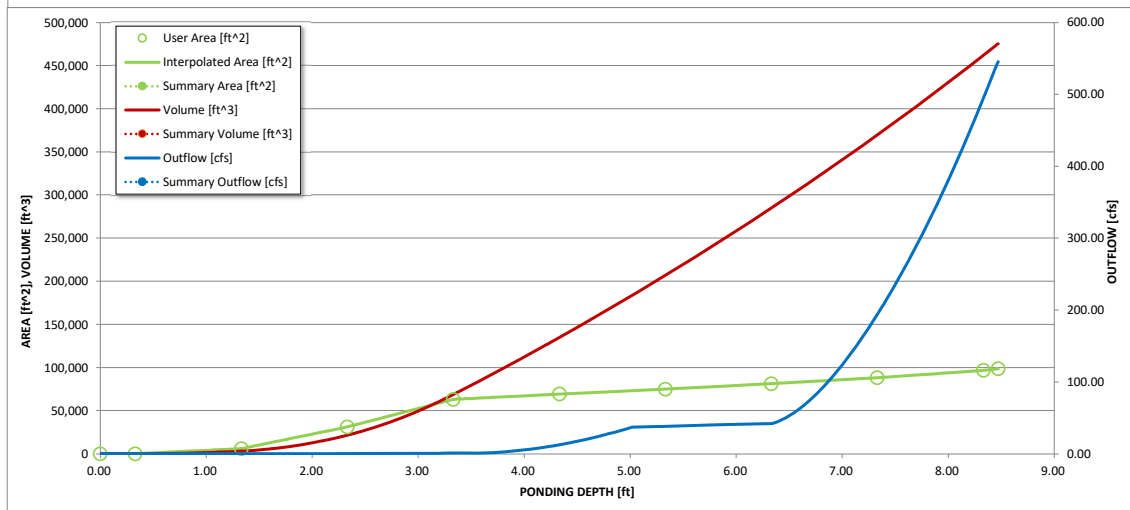
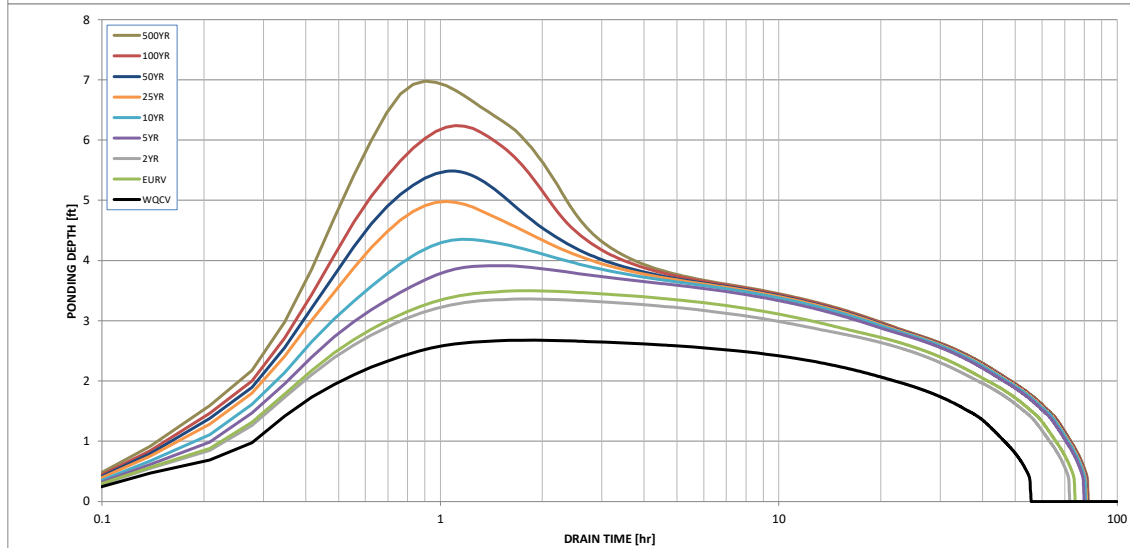
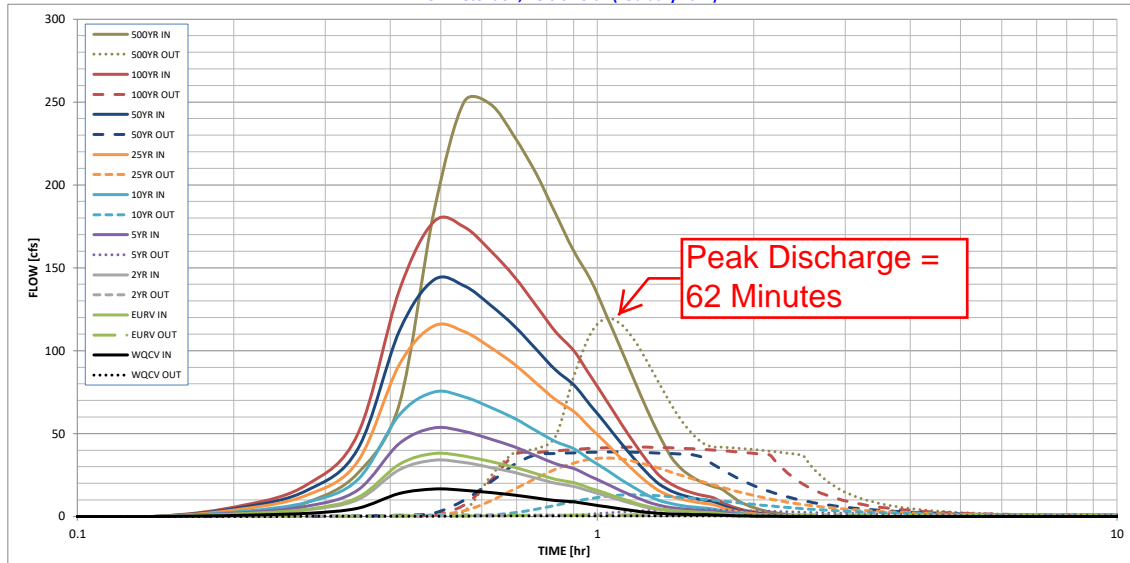
S = Watercourse slope (ft/ft)

Land Surface Type	Type	Cv
Grassed Waterway	GW	15
Heavy Meadow	HM	2.5
Nearly Bare Ground	NBG	10
Paved Area	PV	20
Riprap (Not Buried)	RR	6.5
Short Pasture/Lawns	SP	7
Tillage/Fields	TF	5

The Glen Detention Basin 'D' Ultimate Build-Out Condition

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

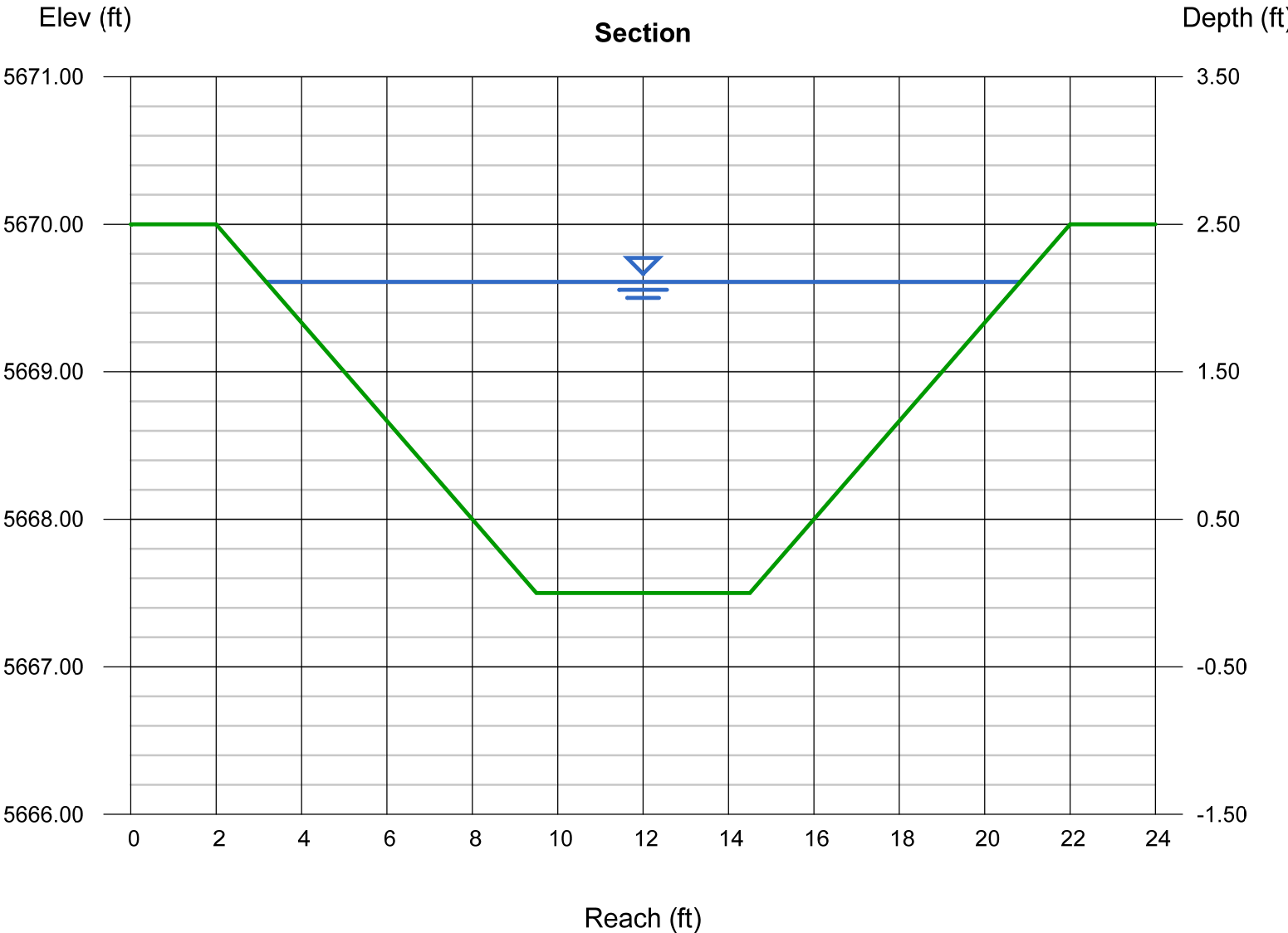


S-A-V-D Chart Axis Override
minimum bound

Channel Report

Existing Trapezoidal Channel S of Peaceful Valley Road

Trapezoidal		Highlighted	
Bottom Width (ft)	= 5.00	Depth (ft)	= 2.11
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 134.90
Total Depth (ft)	= 2.50	Area (sqft)	= 23.91
Invert Elev (ft)	= 5667.50	Velocity (ft/s)	= 5.64
Slope (%)	= 0.50	Wetted Perim (ft)	= 18.34
N-Value	= 0.022	Crit Depth, Yc (ft)	= 1.95
Calculations		Top Width (ft)	= 17.66
Compute by:		EGL (ft)	= 2.61
Known Q (cfs)			
Known Q			
= 134.90			



Design Procedure Form: Runoff Reduction

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: MJK
 Company: Kiowa Engineering Corporation
 Date: September 2, 2021
 Project: The Glen Filing No 10 Addendum - 'Runoff Reduction' for Basins D-20a and E-5 Combined
 Location: Widefield, CO

SITE INFORMATION (User Input in Blue Cells)

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

Area Type	UIA:RPA	DCIA	UIA:RPA	DCIA								
Area ID	E-5	E-5 DCIA	D-20A	D-20A DCIA								
Downstream Design Point ID	1	1	1	1								
Downstream BMP Type	None	None	None	None								
DCIA (ft ²)	--	1,000	--	19,779								
UIA (ft ²)	30,139	--	9,556	--								
RPA (ft ²)	26,173	--	4,822	--								
SPA (ft ²)	--	--	--	--								
HSG A (%)	0%	--	0%	--								
HSG B (%)	0%	--	0%	--								
HSG C/D (%)	100%	--	100%	--								
Average Slope of RPA (ft/ft)	0.250	--	0.020	--								
UIA:RPA Interface Width (ft)	320.00	--	240.00	--								

CALCULATED RUNOFF RESULTS

Area ID	E-5	E-5 DCIA	D-20A	D-20A DCIA								
UIA:RPA Area (ft ²)	56,312	--	14,378	--								
L / W Ratio	0.55	--	0.25	--								
UIA / Area	0.5352	--	0.6646	--								
Runoff (in)	0.00	0.50	0.11	0.50								
Runoff (ft ³)	0	42	134	824								
Runoff Reduction (ft ³)	1256	0	264	0								

CALCULATED WQCV RESULTS

Area ID	E-5	E-5 DCIA	D-20A	D-20A DCIA								
WQCV (ft ³)	1256	42	398	824								
WQCV Reduction (ft ³)	1256	0	264	0								
WQCV Reduction (%)	100%	0%	66%	0%								
Untreated WQCV (ft ³)	0	42	134	824								

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

Downstream Design Point ID	1	1	1	1								
DCIA (ft ²)	20,779	20,779	20,779	20,779								
UIA (ft ²)	39,695	39,695	39,695	39,695								
RPA (ft ²)	30,995	30,995	30,995	30,995								
SPA (ft ²)	0	0	0	0								
Total Area (ft ²)	91,469	91,469	91,469	91,469								
Total Impervious Area (ft ²)	60,474	60,474	60,474	60,474								
WQCV (ft ³)	2,520	2,520	2,520	2,520								
WQCV Reduction (ft ³)	1,520	1,520	1,520	1,520								
WQCV Reduction (%)	60%	60%	60%	60%								
Untreated WQCV (ft ³)	1,000	1,000	1,000	1,000								

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

Total Area (ft ²)	365,876
Total Impervious Area (ft ²)	241,896
WQCV (ft ³)	2,520
WQCV Reduction (ft ³)	1,520
WQCV Reduction (%)	60%
Untreated WQCV (ft ³)	1,000

THE GLEN AT WIDEFIELD
FILING NO. 10
DRAINAGE APPENDUM (CROSSSPAN REMOVAL)
El Paso, County, Colorado

LEGEND	
	Drainage Basin Designation
	Drainage Basin Acres
	Runoff Coefficient
	5-Year Runoff
	100-Year Runoff
	Directional Flow Arrow
	Drainage Basin C Boundary
	Drainage Basin D Boundary
	Interim (Filing 10) 100-Yr WSEL
	Ultimate (Filings 10-12) 100-Yr WSEL
	Design Point
	Time of Concentration Path
	Hydraulic Structure Identifier
	Storm Sewer Identifier
	Proposed Storm Sewer Pipe
	Proposed Storm Sewer Manhole
	Proposed Storm Drainage Curb Inlet
	Existing Contours
	Proposed Contours

INTERIM CONDITION (FILING NO. 10)	
DETENTION BASIN 'D' DATA	
REQUIRED VOLUME	RELEASE RATE
WOCV	0.192 AC-FT 0.2 CFS
EURV	0.066 AC-FT 0.2 CFS
100-YR	1.396 AC-FT 18.8 CFS
100-YR + 1/2 WOCV	1.525 AC-FT 18.8 CFS
TOP OF EMBANKMENT ELEVATION: 5679.14	

ULTIMATE CONDITION (FILINGS 10-12)	
DESIGN POINT FLOWS (INTERIM CONDITION)	
REQUIRED VOLUME	RELEASE RATE
WOCV	0.833 AC-FT 0.4 CFS
EURV	1.093 AC-FT 0.9 CFS
100-YR	0.885 AC-FT 41.8 CFS
100-YR + 1/2 WOCV	2.811 AC-FT 41.8 CFS
TOP OF EMBANKMENT ELEVATION: 5679.14	

SUBJECT TO FUTURE REVIEW. PROVIDED FOR PHASE OF CONCEPT.

AMENDED IRF for D-20a & E-5 COMBINED*	
	UPSTREAM IMPERVIOUS AREA
	RECEIVING PERVIOUS AREA
	DIRECTLY CONNECTED IMPERVIOUS AREA

*PROVIDES 60% WATER QUALITY TREATMENT FOR THIS AREA

DESIGN POINT FLOWS (INTERIM CONDITION)			
5-YEAR	100-YEAR	5-YEAR	100-YEAR
37	2.2 cfs	43.8	6.0 cfs
39	4.4 cfs	4.4	12.0 cfs
40	1.3 cfs	3.5	3.5 cfs
41	2.6 cfs	7.1	7.1 cfs
42	9.0 cfs	24.6	24.6 cfs
43	1.6 cfs	4.5	4.5 cfs
44	0.9 cfs	2.5	2.5 cfs
45	0.7 cfs	1.9	1.9 cfs
46	2.7 cfs	7.7	7.7 cfs
47	0.2 cfs	1.2	1.2 cfs
48	0.3 cfs	1.0	1.0 cfs

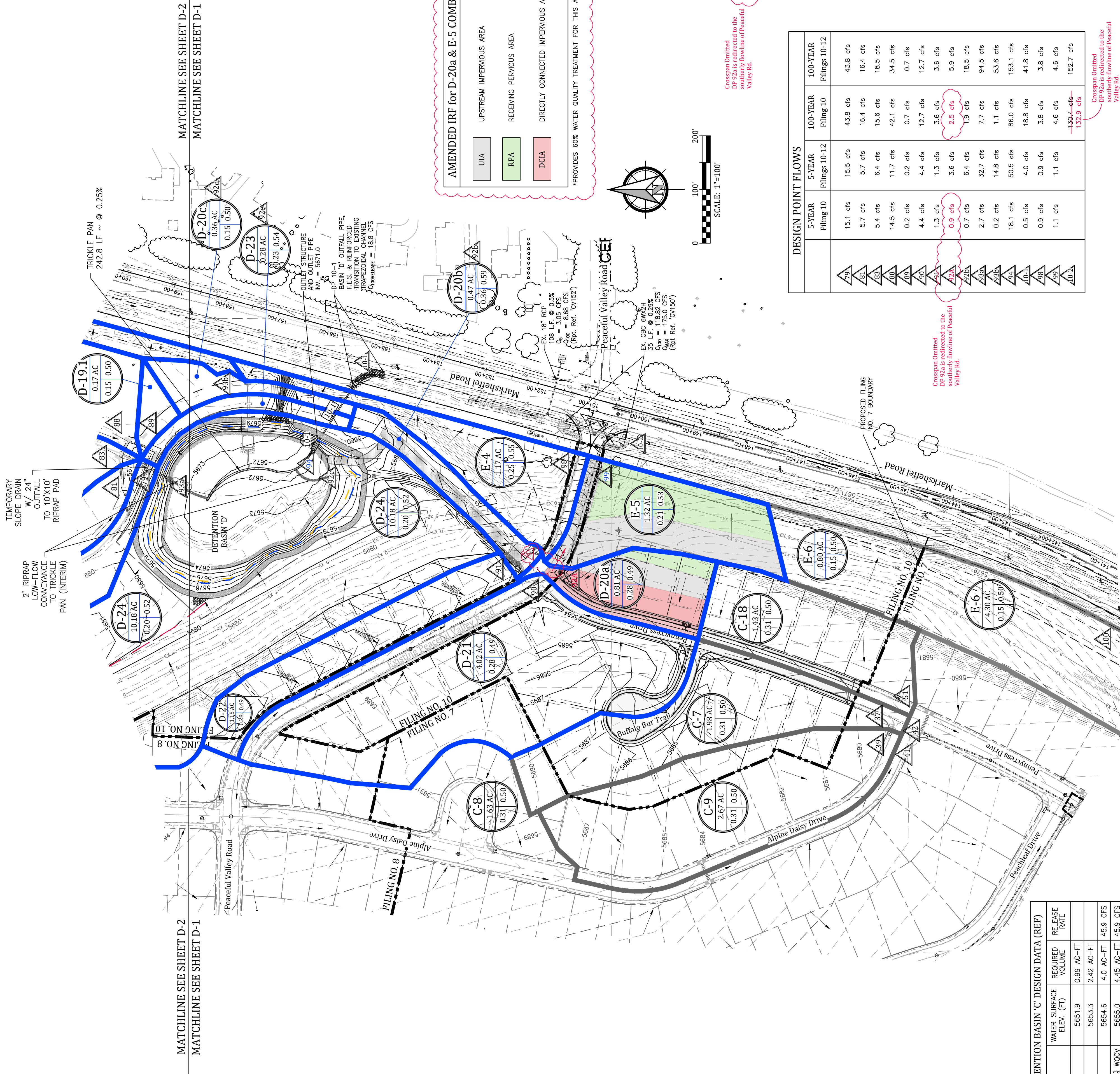
*HOR FINAL DRAINAGE REPORT VALUE FOR MARKSCHEFFEL IMPS PROJECT

DESIGN POINT FLOWS			
5-YEAR	100-YEAR	5-YEAR	100-YEAR
Filing 10	Filing 10	Filing 10-12	Filing 10-12
49	15.1 cfs	15.5 cfs	43.8 cfs
50	5.7 cfs	5.7 cfs	16.4 cfs
51	5.4 cfs	6.4 cfs	15.6 cfs
52	14.5 cfs	11.7 cfs	42.1 cfs
53	0.2 cfs	0.2 cfs	0.7 cfs
54	4.4 cfs	12.7 cfs	12.7 cfs
55	1.3 cfs	3.6 cfs	3.6 cfs
56	0.9 cfs	2.5 cfs	2.5 cfs
57	0.7 cfs	1.9 cfs	1.9 cfs
58	2.7 cfs	7.7 cfs	7.7 cfs
59	0.2 cfs	1.1 cfs	1.1 cfs
60	18.1 cfs	50.5 cfs	86.0 cfs
61	4.0 cfs	18.8 cfs	41.8 cfs
62	0.9 cfs	3.8 cfs	3.8 cfs
63	1.1 cfs	4.6 cfs	4.6 cfs
64	130.4 cfs	132.1 cfs	132.7 cfs

Crossspan Limited to the southern boundary of Peaceful Valley Rd.

Crossspan Limited to the southern boundary of Peaceful Valley Rd.

Crossspan Limited to the southern boundary of Peaceful Valley Rd.



EX DETENTION BASIN 'C' DESIGN DATA (REF)			
WATER SURFACE ELEV. (FT)	REQUIRED VOLUME	RELEASE RATE	
5651.9	0.99 AC-FT		
5653.3	2.42 AC-FT		
5654.6	4.0 AC-FT	45.9 CFS	
5655.0	4.45 AC-FT	45.9 CFS	
SPILLWAY CREST ELEVATION: 5655.0			
TOP OF EMBANKMENT MINIMUM ELEVATION: 5657.0			

