

**FINAL DRAINAGE REPORT
ADDENDUM NO. 2**

for

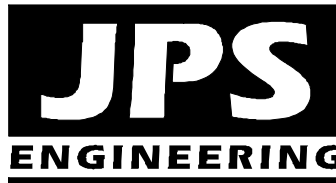
**MONUMENT ACADEMY TRACK AND FIELD
LOT 1, MONUMENT ACADEMY SUBDIVISION**

Prepared for:

Monument Academy Foundation
1150 Village Ridge Point
Monument, CO 80132

July 21, 2026

Prepared by:



19 E. Willamette Avenue
Colorado Springs, CO 80903
(719)-477-9429
www.jpsengr.com

JPS Project No. 040201
PCD File Nos. EGP-261 / PPR-19-009

**MONUMENT ACADEMY SUBDIVISION
FINAL DRAINAGE REPORT - ADDENDUM NO. 2
DRAINAGE STATEMENTS**

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 liability caused by negligent acts, errors or omissions on my part in preparing this report.

John P. Schwab, P.E. #29891

Developer's Statement:

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

By:

Printed Name:

Date

Title:

Monument Academy Foundation
1150 Village Ridge Point
Monument, CO 80132

El Paso County's Statement:

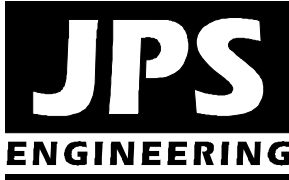
Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual, Volumes 1 and 2, and Engineering Criteria Manual as amended.

Joshua J. Palmer, P.E.

Date

County Engineer / ECM Administrator

Conditions:



19 E. Willamette Avenue
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MONUMENT ACADEMY FINAL DRAINAGE REPORT - ADDENDUM NO. 2

Monument Academy (MA) is proposing a phased program of improvements to the existing charter school campus on the 19.9-acre parcel (EPC Parcel No. 61150-09-033) at the southeast corner of Walker Road and Jane Lundeen Drive. The property is described as Lot 1, MA Subdivision.

Phase 2 improvements to the MA campus include completion of the Track and Field at the north end of the campus (approved in the original Site Development Plan). MA is also planning construction of a new Performing Arts Center Addition at the northwest corner of the existing school building.

Future phases of campus improvements are planned to include a Field Building along the west side of the Track, North Parking Lot Expansion, Gym Addition (northeast corner of existing school building), 3-Story Academic Addition (west side of existing school building), and Southwest Parking Lot. The proposed program of phased campus improvements is consistent with the originally approved Site Development Plan.

The proposed drainage plans for the Track and Field, Performing Arts Center, and future phases of school campus improvements to be constructed on the Monument Academy campus are in full conformance with the previously approved "Master Development Drainage Plan & Final Drainage Report for Monument Academy" dated April 9, 2020 (approved by El Paso County on 4/28/20; CDR-20-001).

Detention Pond C14

The initial phase of school development included construction of the existing "Detention Pond C14" at the northeast corner of the site, which was designed to provide stormwater detention and water quality for the north side of the school campus. Initial site development also included an existing 18"-24" private storm sewer system conveying stormwater from the north side of the school building area to the existing Detention Pond C14.

Based on review of the impervious areas associated with final design of the track and field and related improvements on the north side of the MA campus, we have updated the detention pond calculations for the existing "Detention Pond C14" at the northeast corner of the site (enclosed in Appendix B).

The proposed Track and Field project will include expansion on the south side of the existing pond to meet 100-year pond volume requirements in accordance with the current detention pond calculations. Additionally, the orifice plate on the existing pond outlet structure will be upgraded per the enclosed detention pond calculations.

Drainage improvements for Phase 2 and future phases of campus improvements will also include private 8"-12" storm sewer improvements connecting to the existing trunk storm sewer lines constructed during the initial phase of development (as originally planned).

Detention Pond M3

The initial phase of school development also included construction of the existing "Detention Pond M3" along the west side of Tract A, MA Subdivision, which was designed to provide stormwater detention and water quality for the south side of the school campus. Initial site development included an existing 18"-30" private storm sewer system conveying stormwater from the south side of the school building area to the existing Detention Pond M3. No changes are proposed to the existing Detention Pond M3 as part of this Addendum.

Summary

In summary, the proposed Track and Field and Performing Arts Center projects will include an upgrade of the existing Detention Pond C14 based on final design of the site improvements at the north end of the MA campus.

APPENDIX A

HYDROLOGIC CALCULATIONS

MONUMENT ACADEMY COMPOSITE RUNOFF COEFFICIENTS											
DEVELOPED CONDITIONS - INTERIM (PHASE 1-2 DEVELOPMENT)											
5-YEAR C VALUES											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
C14	15.67	5.20	BUILDING / PAVEMENT	0.90	10.47	LANDSCAPED	0.08				0.352
C15	1.20	0.33	ROADWAY	0.90	0.87	LANDSCAPED	0.08				0.306
C16	1.09	0.68	ROADWAY	0.90	0.41	LANDSCAPED	0.08				0.592
C14-C16	17.96										0.364
M1	7.06	7.06	MEADOW	0.08							0.080
M2	7.50	4.80	BUILDING / PAVEMENT	0.90	2.70	LANDSCAPED	0.08				0.605
M2.2A	0.18	0.10	PAVEMENT	0.90	0.08	LANDSCAPED	0.08				0.536
M3	7.73	0.23	ROADWAY	0.90	7.50	POND / LANDSCAPE	0.08				0.104
M4	3.02	0.34	ROADWAY	0.90	2.68	POND / LANDSCAPE	0.08				0.172
M2,M3,M4	18.43										0.323
OM1	2.00	2.00	MEADOW	0.08							0.080
M5	21.24	0.49	ROADWAY	0.90	20.75	FOREST / MEADOW	0.08				0.099
OM1,M5	23.24										0.097
100-YEAR C VALUES											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
C14	15.67	5.20	BUILDING / PAVEMENT	0.96	10.47	LANDSCAPED	0.35				0.552
C15	1.20	0.33	ROADWAY	0.90	0.87	LANDSCAPED	0.08				0.306
C16	1.09	0.68	ROADWAY	0.90	0.41	LANDSCAPED	0.08				0.592
C14-C16	17.96										0.538
M1	7.06	7.06	MEADOW	0.35							0.350
M2	7.50	4.80	BUILDING / PAVEMENT	0.96	2.70	LANDSCAPED	0.35				0.740
M2.2A	0.18	0.10	PAVEMENT	0.96	0.08	LANDSCAPED	0.35				0.689
M3	7.73	0.23	ROADWAY	0.96	7.50	POND / LANDSCAPE	0.35				0.368
M4	3.02	0.34	ROADWAY	0.96	2.68	POND / LANDSCAPE	0.35				0.419
M2,M3,M4	18.43										0.531
OM1	2.00	2.00	MEADOW	0.35							0.350
M5	21.24	0.49	ROADWAY	0.96	20.75	FOREST / MEADOW	0.35				0.364
OM1,M5	23.24										0.363

MONUMENT ACADEMY
RATIONAL METHOD

DEVELOPED FLOWS - INTERIM CONDITIONS (PHASE 1-2)

BASIN	DESIGN POINT	AREA (AC)	C		Overland Flow			Channel flow					TOTAL T _c ⁽⁴⁾ (MIN)	TOTAL T _c ⁽⁴⁾ (MIN)	INTENSITY ⁽⁵⁾		PEAK FLOW	
			5-YEAR	100-YEAR	LENGTH (FT)	SLOPE (FT/FT)	T _{co} ⁽¹⁾ (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT C	SLOPE (FT/FT)	SCS ⁽²⁾ VELOCITY (FT/S)	T _t ⁽³⁾ (MIN)			5-YR (IN/HR)	100-YR (IN/HR)	Q5 ⁽⁶⁾ (CFS)	Q100 ⁽⁶⁾ (CFS)
MA SITE:																		
C14	C14	15.67	0.352	0.552	100	0.020	10.9	1550	20	0.044	4.20	6.2	17.0	17.0	3.33	5.59	18.4	48.4
C15	C15	1.20	0.306	0.306	20	0.020	5.2	760	20	0.028	3.35	3.8	8.9	8.9	4.30	7.21	1.6	2.6
C16	C16	1.09	0.592	0.592	30	0.020	4.0	870	20	0.028	3.35	4.3	8.4	8.4	4.39	7.38	2.8	4.8
C14-C16	C16.1	17.96	0.364	0.538									17.0	17.0	3.33	5.59	21.8	54.0
M1	M1	5.94	0.080	0.350	300	0.037	20.9	400	15	0.075	4.11	1.6	22.5	22.5	2.91	4.88	1.4	10.2
M2	M2	7.50	0.605	0.740	100	0.040	5.7	670	20	0.031	3.52	3.2	8.9	8.9	4.31	7.23	19.5	40.1
M2.2A	M2.2A	0.18	0.536	0.689	25	2.000	0.9	165	20	0.010	2.00	1.4	2.3	5.0	5.17	8.68	0.5	1.1
M3		7.14	0.104	0.368	100	0.020	14.5	600	20	0.053	4.60	2.2	16.6	16.6	3.36	5.65	2.5	14.8
M4	M4	3.02	0.172	0.419	100	0.020	13.5	450	15	0.084	4.35	1.7	15.2	15.2	3.50	5.88	1.8	7.4
M2,M3,M4	M3.1	17.84	0.323	0.531									16.6	16.6	3.36	5.65	19.4	53.5
OM1	OM1	2.90	0.080	0.350	100	0.060	10.3	450	15	0.053	3.45	2.2	12.5	12.5	3.80	6.38	0.9	6.5
M5	M5	21.24	0.099	0.364			0.0	1350	15	0.049	3.32	6.8	6.8	6.8	4.71	7.91	9.9	61.2
OM1,M5	M5.1	24.14	0.097	0.363									19.2	19.2	3.15	5.28	7.4	46.3
WALKER ROAD & SH83:																		
OM2	OM2	1.10	0.272	0.493	30	0.067	4.4	560	15	0.043	3.11	3.0	7.4	7.4	4.58	7.69	1.4	4.2
M6	M6	1.46	0.280	0.499	30	0.320	2.6	620	15	0.014	1.77	5.8	8.4	8.4	4.39	7.37	1.8	5.4
M1,M6	M6.1	7.40	0.119	0.379				350	15	0.023	2.27	2.6	25.1	25.1	2.75	4.61	2.4	12.9
OM3	OM3	2.80	0.175	0.421	30	0.067	4.9	510	15	0.047	3.25	2.6	7.5	7.5	4.55	7.65	2.2	9.0
M1,M6,OM3	OM3.1	10.20	0.135	0.391				120	20	0.009	1.90	1.1	26.2	26.2	2.69	4.51	3.7	18.0

- 1) OVERLAND FLOW $T_{co} = (0.395 * (1.1 - \text{RUNOFF COEFFICIENT}) * (\text{OVERLAND FLOW LENGTH}^{0.5}) / (\text{SLOPE}^{0.333}))$
- 2) SCS VELOCITY = $C * ((\text{SLOPE (FT/FT)})^{0.5})$
 C = 2.5 FOR HEAVY MEADOW
 C = 5 FOR TILLAGE/FIELD
 C = 7 FOR SHORT PASTURE AND LAWNS
 C = 10 FOR NEARLY BARE GROUND
 C = 15 FOR GRASSED WATERWAY
 C = 20 FOR PAVED AREAS AND SHALLOW PAVED SWALES
- 3) MANNING'S CHANNEL TRAVEL TIME = L/V (WHEN CHANNEL VELOCITY IS KNOWN)
- 4) $T_c = T_{co} + T_t$
 *** IF TOTAL TIME OF CONCENTRATION IS LESS THAN 5 MINUTES, THEN 5 MINUTES IS USED
- 5) INTENSITY BASED ON I-D-F EQUATIONS IN CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
 $I_5 = -1.5 * \ln(T_c) + 7.583$
 $I_{100} = -2.52 * \ln(T_c) + 12.735$
- 6) $Q = C_i A$

MONUMENT ACADEMY COMPOSITE RUNOFF COEFFICIENTS											
DEVELOPED CONDITIONS - ULTIMATE											
5-YEAR C VALUES											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
C14	15.67	5.20	BUILDING / PAVEMENT	0.90	10.47	LANDSCAPED	0.08				0.352
C15	1.20	0.33	ROADWAY	0.90	0.87	LANDSCAPED	0.08				0.306
C16	1.09	0.68	ROADWAY	0.90	0.41	LANDSCAPED	0.08				0.592
C14-C16	17.96										0.364
M1	7.06	7.06	NH BUSINESS	0.49							0.490
M2	7.50	4.80	BUILDING / PAVEMENT	0.90	2.70	LANDSCAPED	0.08				0.605
M2.2A	0.18	0.10	PAVEMENT	0.90	0.08	LANDSCAPED	0.08				0.536
M3	7.73	6.08	NH BUSINESS	0.49	1.65	POND / LANDSCAPE	0.08				0.402
M4	3.02	3.02	NH BUSINESS	0.49							0.490
M2,M3,M4	18.43										0.500
OM1	2.00	2.00	RESIDENTIAL-1-AC	0.20							0.200
M5	21.24	10.62	RESIDENTIAL-0.5-AC	0.22	10.62	RESIDENTIAL-1-AC	0.2				0.210
OM1,M5	23.24										0.209
100-YEAR C VALUES											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
C14	15.67	5.20	BUILDING / PAVEMENT	0.96	10.47	LANDSCAPED	0.35				0.552
C15	1.20	0.33	ROADWAY	0.90	0.87	LANDSCAPED	0.08				0.306
C16	1.09	0.68	ROADWAY	0.90	0.41	LANDSCAPED	0.08				0.592
C14-C16	17.96										0.538
M1	7.06	7.06	NH BUSINESS	0.62							0.620
M2	7.50	4.80	BUILDING / PAVEMENT	0.96	2.70	LANDSCAPED	0.35				0.740
M2.2A	0.18	0.10	PAVEMENT	0.96	0.08	LANDSCAPED	0.35				0.689
M3	7.73	6.08	NH BUSINESS	0.62	1.65	POND / LANDSCAPE	0.35				0.562
M4	3.02	3.02	NH BUSINESS	0.62							0.620
M2,M3,M4	18.43										0.645
OM1	2.00	2.00	RESIDENTIAL-1-AC	0.44							0.440
M5	21.24	10.62	RESIDENTIAL-0.5-AC	0.46	10.62	RESIDENTIAL-1-AC	0.44				0.450
OM1,M5	23.24										0.449

**MONUMENT ACADEMY
RATIONAL METHOD**

DEVELOPED FLOWS - ULTIMATE CONDITIONS

					Overland Flow			Channel flow										
BASIN	DESIGN POINT	AREA (AC)	C		LENGTH (FT)	SLOPE (FT/FT)	Tco ⁽¹⁾ (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT C	SLOPE (FT/FT)	SCS ⁽²⁾ VELOCITY (FT/S)	Tt ⁽³⁾ (MIN)	TOTAL Tc ⁽⁴⁾ (MIN)	TOTAL Tc ⁽⁴⁾ (MIN)	INTENSITY ⁽⁵⁾		PEAK FLOW	
			5-YEAR	100-YEAR											5-YR (IN/HR)	100-YR (IN/HR)	Q5 ⁽⁶⁾ (CFS)	Q100 ⁽⁶⁾ (CFS)
MA SITE:																		
C14	C14	15.67	0.352	0.552	100	0.020	10.9	1550	20	0.044	4.20	6.2	17.0	17.0	3.33	5.59	18.4	48.4
C15	C15	1.20	0.306	0.306	20	0.020	5.2	760	20	0.028	3.35	3.8	8.9	8.9	4.30	7.21	1.6	2.6
C16	C16	1.09	0.592	0.592	30	0.020	4.0	870	20	0.028	3.35	4.3	8.4	8.4	4.39	7.38	2.8	4.8
C14-C16	C16.1	17.96	0.364	0.538									17.0	17.0	3.33	5.59	21.8	54.0
M1	M1	5.94	0.490	0.620	100	0.010	11.2	680	20	0.052	4.56	2.5	13.7	13.7	3.66	6.15	10.7	22.6
M2	M2	7.50	0.605	0.740	100	0.040	5.7	670	20	0.031	3.52	3.2	8.9	8.9	4.31	7.23	19.5	40.1
M2.2A	M2.2A	0.18	0.536	0.689	25	2.000	0.9	165	20	0.010	2.00	1.4	2.3	5.0	5.17	8.68	0.5	1.1
M3	M3	7.14	0.402	0.562	100	0.020	10.1	600	20	0.053	4.60	2.2	12.3	12.3	3.82	6.41	11.0	25.7
M4	M4	3.02	0.490	0.620	100	0.020	8.9	450	15	0.084	4.35	1.7	10.6	10.6	4.04	6.79	6.0	12.7
M2,M3,M4	M3.1	17.84	0.500	0.645									12.3	12.3	3.82	6.41	34.0	73.7
OM1	OM1	2.90	0.200	0.440	100	0.060	9.1	450	15	0.053	3.45	2.2	11.2	11.2	3.95	6.64	2.3	8.5
M5	M5	21.24	0.210	0.450	0		0.0	1350	15	0.049	3.32	6.8	6.8	6.8	4.71	7.91	21.0	75.6
OM1,M5	M5.1	24.14	0.209	0.449									18.0	18.0	3.25	5.45	16.4	59.1
WALKER ROAD & SH83:																		
OM2	OM2	1.10	0.272	0.493	30	0.130	3.5	540	15	0.039	2.96	3.0	6.6	6.6	4.76	7.99	1.4	4.3
M6	M6	1.46	0.280	0.499	30	0.320	2.6	620	15	0.014	1.77	5.8	8.4	8.4	4.39	7.37	1.8	5.4
M1,M6	M6.1	7.40	0.119	0.379				100	20	0.100	6.32	0.3	13.9	13.9	3.63	6.10	3.2	17.1
OM3	OM3	2.80	0.175	0.421	30	0.067	4.9	510	15	0.047	3.25	2.6	7.5	7.5	4.55	7.65	2.2	9.0
M1,M6,OM3	OM3.1	10.20	0.135	0.391				120	20	0.009	1.90	1.1	15.0	15.0	3.52	5.92	4.9	23.6

1) OVERLAND FLOW T_{co} = (0.395*(1.1-RUNOFF COEFFICIENT)*(OVERLAND FLOW LENGTH^(0.5)/(SLOPE^(0.333)))

2) SCS VELOCITY = C * ((SLOPE(FT/FT)^{0.5})

C = 2.5 FOR HEAVY MEADOW

C = 5 FOR TILLAGE/FIELD

C = 7 FOR SHORT PASTURE AND LAWNS

C = 10 FOR NEARLY BARE GROUND

C = 15 FOR GRASSED WATERWAY

C = 20 FOR PAVED AREAS AND SHALLOW PAVED SWALES

3) MANNING'S CHANNEL TRAVEL TIME = L/V (WHEN CHANNEL VELOCITY IS KNOWN)

4) T_c = T_{co} + T_t

*** IF TOTAL TIME OF CONCENTRATION IS LESS THAN 5 MINUTES, THEN 5 MINUTES IS USED

5) INTENSITY BASED ON I-D-F EQUATIONS IN CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL

$$I_5 = -1.5 * \ln(T_c) + 7.583$$

$$I_{100} = -2.52 * \ln(T_c) + 12.735$$

6) Q = C_iA

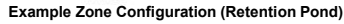
APPENDIX B

DETENTION POND CALCULATIONS – POND C14

MONUMENT ACADEMY DEVELOPED IMPERVIOUS AREAS											
IMPERVIOUS AREAS - INTERIM (PHASE 1-2) DEVELOPMENT											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	WEIGHTED % IMP
C14	15.67	5.20	BUILDING / PAVEMENT	100	10.47	LANDSCAPED	0				33.184
C15	1.20	0.33	ROADWAY	100	0.87	LANDSCAPED	0				27.500
C16	1.09	0.68	ROADWAY	100	0.41	LANDSCAPED	0				62.385
C14-C16	17.96										34.577
M1	7.06	7.06	NH BUSINESS	70							70.000
M2	7.50	4.80	BUILDING / PAVEMENT	100	2.70	LANDSCAPED	0				64.000
M2.2A	0.18	0.10	PAVEMENT	100	0.08	LANDSCAPED	0				55.556
M3	7.73	0.23	ROADWAY	100	7.50	POND / LANDSCAPE	0				2.975
M4	3.02	0.34	ROADWAY	100	2.68	POND / LANDSCAPE	0				11.258
M2,M3,M4	18.43										29.680
OM1	2.00	2.00	MEADOW	0							0.000
M5	21.24	0.49	ROADWAY	100	20.75	FOREST / MEADOW	0				2.307
OM1,M5	23.24										2.108
IMPERVIOUS AREAS - ULTIMATE DEVELOPMENT											
BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	PERCENT IMPERVIOUS	WEIGHTED % IMP
C14	15.67	5.20	BUILDING / PAVEMENT	100	10.47	LANDSCAPED	0				33.184
C15	1.26	0.39	ROADWAY	100	0.87	LANDSCAPED	0				30.952
C16	1.03	0.62	ROADWAY	100	0.41	LANDSCAPED	0				60.194
C14-C16	17.96										34.577
M1	7.06	7.06	NH BUSINESS	70							70.000
M2	7.50	4.80	BUILDING / PAVEMENT	100	2.70	LANDSCAPED	0				64.000
M2.2A	0.18	0.10	PAVEMENT	100	0.08	LANDSCAPED	0				55.556
M3	7.73	6.08	NH BUSINESS	70	1.65	POND / LANDSCAPE	0				55.058
M4	3.02	3.02	NH BUSINESS	70							70.000
M2,M3,M4	18.43										61.150
OM1	2.00	2.00	RESIDENTIAL-1-AC	20							20.000
M5	21.24	10.62	RESIDENTIAL-0.5-AC	25	10.62	RESIDENTIAL-1-AC	20				22.500
OM1,M5	23.24										22.285

MHFD-Detention, Version 4.07 (June 2025)

Basin ID: Detention Pond C14



Location for 1-hr Rainfall Depths = User Input

Optional User Overrides

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.14	inches

Zone 1 Volume (WQCV) =	0.249	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.405	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.664	acre-feet
Total Detention Basin Volume =	1.318	acre-feet

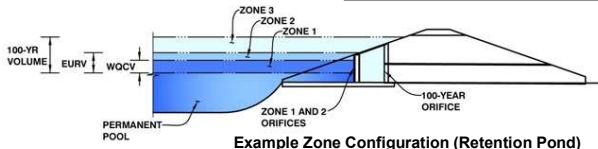
Depth Increment =		ft
-------------------	--	----

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Monument Academy Phase 2

Basin ID: Detention Pond C14



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.55	0.249	Orifice Plate
Zone 2 (EURV)	3.96	0.405	Orifice Plate
Zone 3 (100-year)	5.78	0.664	Weir&Pipe (Restrict)
Total (all zones)		1.318	

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

Underdrain Orifice Invert Depth = ft (distance below the filtration media surface)
Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = 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 SCM)

Calculated Parameters for Plate

Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = sq. inches (diameter = 1-3/16 inches)

WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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	1.32	2.64					
Orifice Area (sq. inches)	1.08	1.08	1.08					

	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)

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected		Not Selected	Not Selected
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A ft ²
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A feet
Vertical Orifice Diameter =	N/A	N/A	inches		

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, H _o =	4.50	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H _u =	4.50 feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	4.00 feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.30 ft ²
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	11.14 ft ²
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	5.57 ft ²
Debris Clogging % =	50%	N/A	%		

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.34	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77 ft ²
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.75 feet
Restrictor Plate Height Above Pipe Invert =	18.00	N/A	inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage =	6.00	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth = 0.93 feet
Spillway Crest Length =	10.00	feet	Stage at Top of Freeboard = 7.93 feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard = 0.47 acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard = 2.27 acre-ft

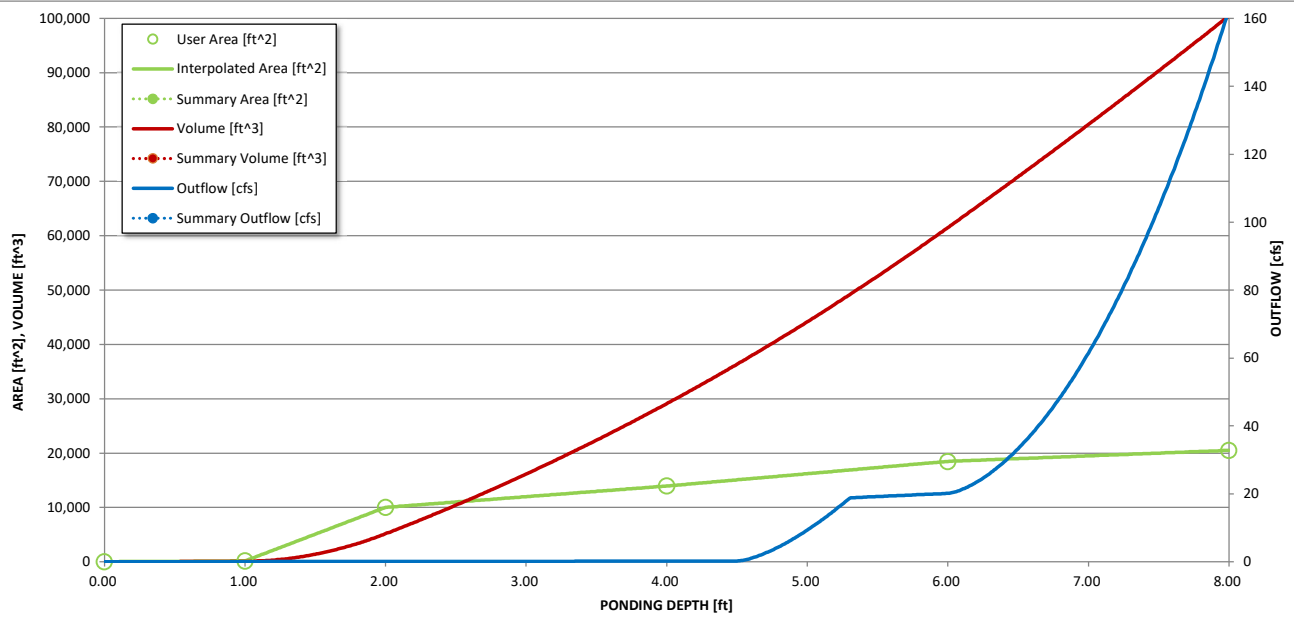
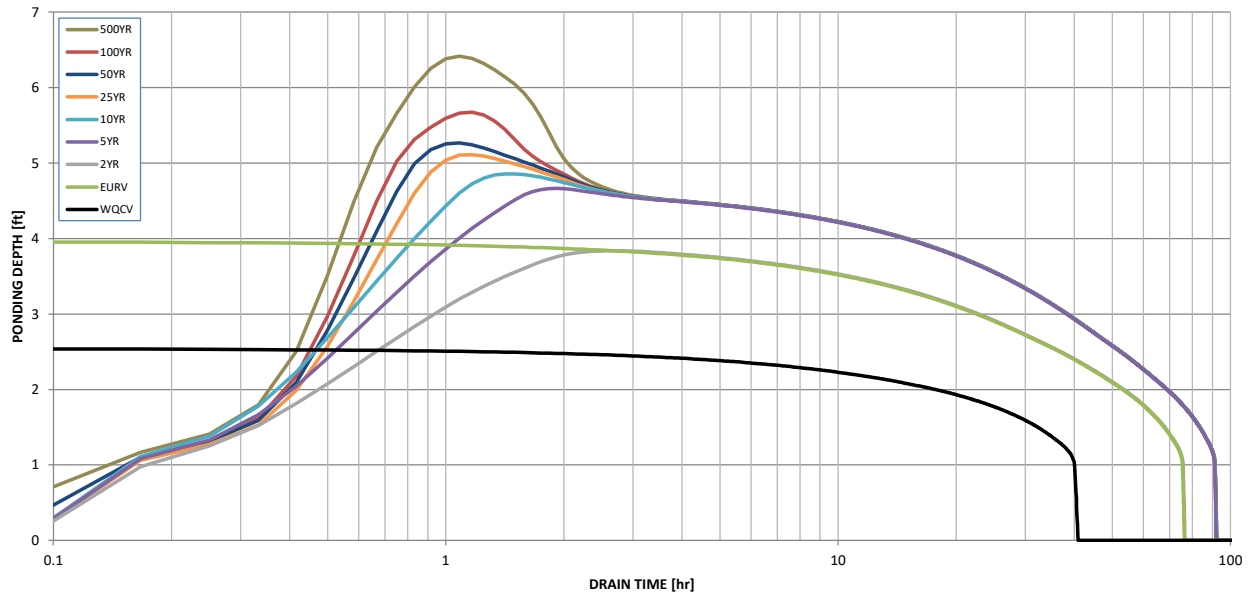
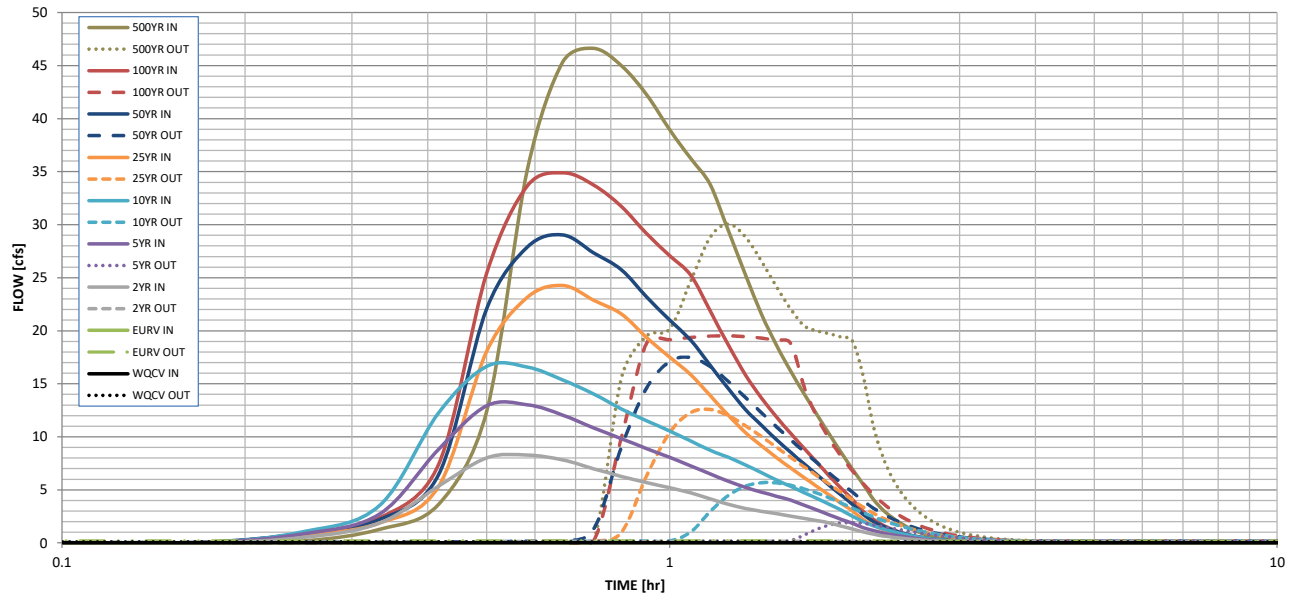
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in) =	0.249	0.655	0.649	1.008	1.334	1.811	2.181	2.667	3.617
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.649	1.008	1.334	1.811	2.181	2.667	3.617
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.2	5.5	8.1	14.2	17.7	22.6	31.4
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.12	0.31	0.45	0.79	0.99	1.26	1.74
Peak Inflow Q (cfs) =	N/A	N/A	8.3	13.0	16.6	24.3	29.0	34.9	46.6
Peak Outflow Q (cfs) =	0.1	0.2	0.2	1.9	5.7	12.6	17.5	19.5	30.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.7	0.9	1.0	0.9	1.0
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.5	1.1	1.6	1.7	1.9
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) =	38	70	71	84	82	79	77	75	71
Time to Drain 99% of Inflow Volume (hours) =	40	74	74	89	88	87	86	85	83
Maximum Ponding Depth (ft) =	2.55	3.96	3.84	4.66	4.86	5.11	5.27	5.67	6.42
Area at Maximum Ponding Depth (acres) =	0.25	0.32	0.31	0.35	0.36	0.38	0.39	0.41	0.43
Maximum Volume Stored (acre-ft) =	0.251	0.655	0.614	0.890	0.959	1.055	1.112	1.275	1.588

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)



S-A-V-D Chart Axis Override

minimum bound

maximum bound

X-axis	Left Y-Axis	Right Y-Axis

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

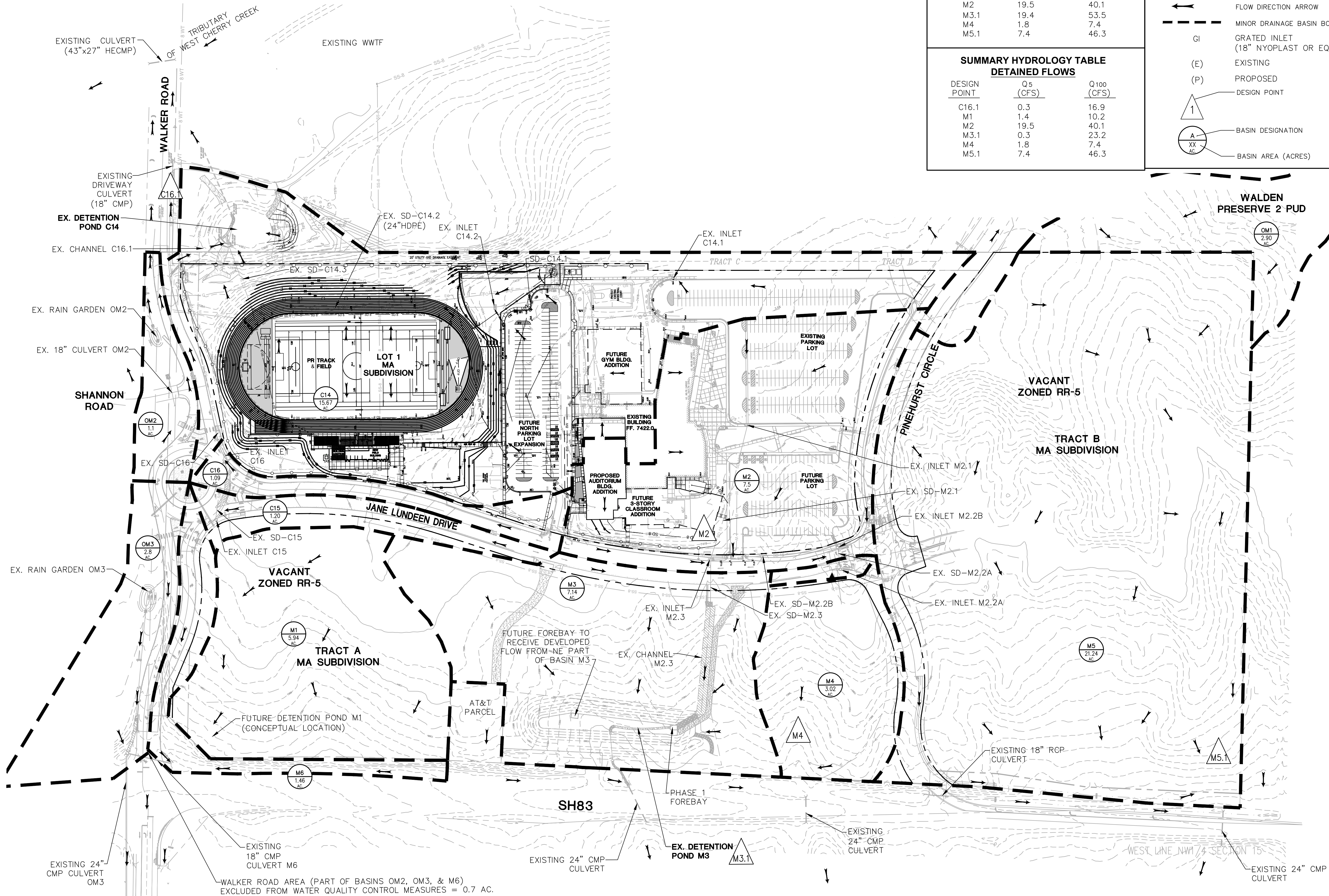
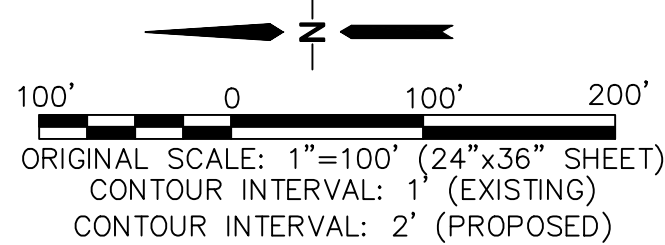
Inflow Hydrographs

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

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	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]
5.00 min	0:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.19
	0:15:00	0	0.00	0.52	0.85	1.06	0.71	0.90	0.88	1.28
	0:20:00	0	0.00	1.88	2.73	3.55	1.88	2.21	2.36	3.64
	0:25:00	0	0.00	5.35	8.83	12.26	5.33	6.42	7.40	12.39
	0:30:00	0	0.00	8.02	12.92	16.64	18.04	22.07	25.42	35.16
	0:35:00	0	0.00	8.28	13.02	16.59	23.14	27.88	33.64	45.29
	0:40:00	0	0.00	7.83	12.06	15.37	24.27	29.02	34.89	46.60
	0:45:00	0	0.00	7.00	10.84	14.04	22.88	27.34	33.74	44.97
	0:50:00	0	0.00	6.27	9.83	12.63	21.57	25.74	31.70	42.25
	0:55:00	0	0.00	5.68	8.88	11.52	19.35	23.17	29.15	38.95
	1:00:00	0	0.00	5.20	8.05	10.55	17.51	21.02	27.08	36.23
	1:05:00	0	0.00	4.73	7.26	9.61	15.86	19.10	25.24	33.77
	1:10:00	0	0.00	4.14	6.51	8.72	13.88	16.74	21.86	29.38
	1:15:00	0	0.00	3.63	5.80	8.05	12.01	14.52	18.63	25.27
	1:20:00	0	0.00	3.26	5.23	7.36	10.38	12.57	15.82	21.55
	1:25:00	0	0.00	2.98	4.79	6.62	9.16	11.09	13.66	18.62
	1:30:00	0	0.00	2.75	4.40	5.93	8.04	9.73	11.86	16.16
	1:35:00	0	0.00	2.53	4.03	5.31	7.05	8.52	10.30	14.02
	1:40:00	0	0.00	2.31	3.55	4.73	6.14	7.42	8.88	12.06
	1:45:00	0	0.00	2.09	3.09	4.18	5.30	6.40	7.55	10.23
	1:50:00	0	0.00	1.88	2.64	3.64	4.49	5.42	6.30	8.51
	1:55:00	0	0.00	1.59	2.23	3.08	3.73	4.50	5.15	6.94
	2:00:00	0	0.00	1.32	1.84	2.52	3.02	3.64	4.08	5.52
	2:05:00	0	0.00	1.03	1.44	2.00	2.20	2.67	2.96	4.08
	2:10:00	0	0.00	0.81	1.15	1.63	1.65	2.02	2.20	3.07
	2:15:00	0	0.00	0.66	0.93	1.32	1.26	1.55	1.65	2.32
	2:20:00	0	0.00	0.54	0.75	1.07	0.98	1.20	1.24	1.75
	2:25:00	0	0.00	0.44	0.61	0.86	0.75	0.93	0.92	1.31
	2:30:00	0	0.00	0.35	0.49	0.69	0.59	0.72	0.68	0.97
	2:35:00	0	0.00	0.28	0.39	0.54	0.45	0.55	0.50	0.71
	2:40:00	0	0.00	0.22	0.30	0.41	0.34	0.42	0.37	0.53
	2:45:00	0	0.00	0.18	0.24	0.32	0.27	0.32	0.29	0.41
	2:50:00	0	0.00	0.14	0.18	0.25	0.21	0.25	0.23	0.32
	2:55:00	0	0.00	0.11	0.14	0.19	0.16	0.20	0.18	0.25
	3:00:00	0	0.00	0.09	0.11	0.15	0.12	0.15	0.14	0.19
	3:05:00	0	0.00	0.06	0.08	0.11	0.09	0.11	0.10	0.14
	3:10:00	0	0.00	0.05	0.05	0.07	0.07	0.08	0.07	0.10
	3:15:00	0	0.00	0.03	0.04	0.05	0.04	0.05	0.05	0.06
	3:20:00	0	0.00	0.02	0.02	0.03	0.03	0.03	0.03	0.04
	3:25:00	0	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	3:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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APPENDIX C

FIGURES



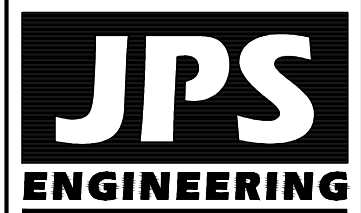
SUMMARY HYDROLOGY TABLE DEVELOPED FLOWS (INTERIM)		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
C16.1	21.8	54.0
M1	1.4	10.2
M2	19.5	40.1
M3.1	19.4	53.5
M4	1.8	7.4
M5.1	7.4	46.3

SUMMARY HYDROLOGY TABLE DETAINED FLOWS		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
C16.1	0.3	16.9
M1	1.4	10.2
M2	19.5	40.1
M3.1	0.3	23.2
M4	1.8	7.4
M5.1	7.4	46.3

DRAINAGE LEGEND

— · — · — FLOWLINE
→ FLOW DIRECTION ARROW
- - - MINOR DRAINAGE BASIN BOUNDARY
GI GRATED INLET (18" NYOPLAST OR EQUAL)
(E) EXISTING
(P) PROPOSED
1 DESIGN POINT
A XX AC BASIN DESIGNATION
A XX AC BASIN AREA (ACRES)

MONUMENT ACADEMY - PHASE 2
4303 PINEHURST CIRCLE, COLORADO SPRINGS, CO 80908



19 E. Willamette Ave.
Colorado Springs, CO
80903
PH: 719-477-9429
FAX: 719-471-0766
www.jpseng.com



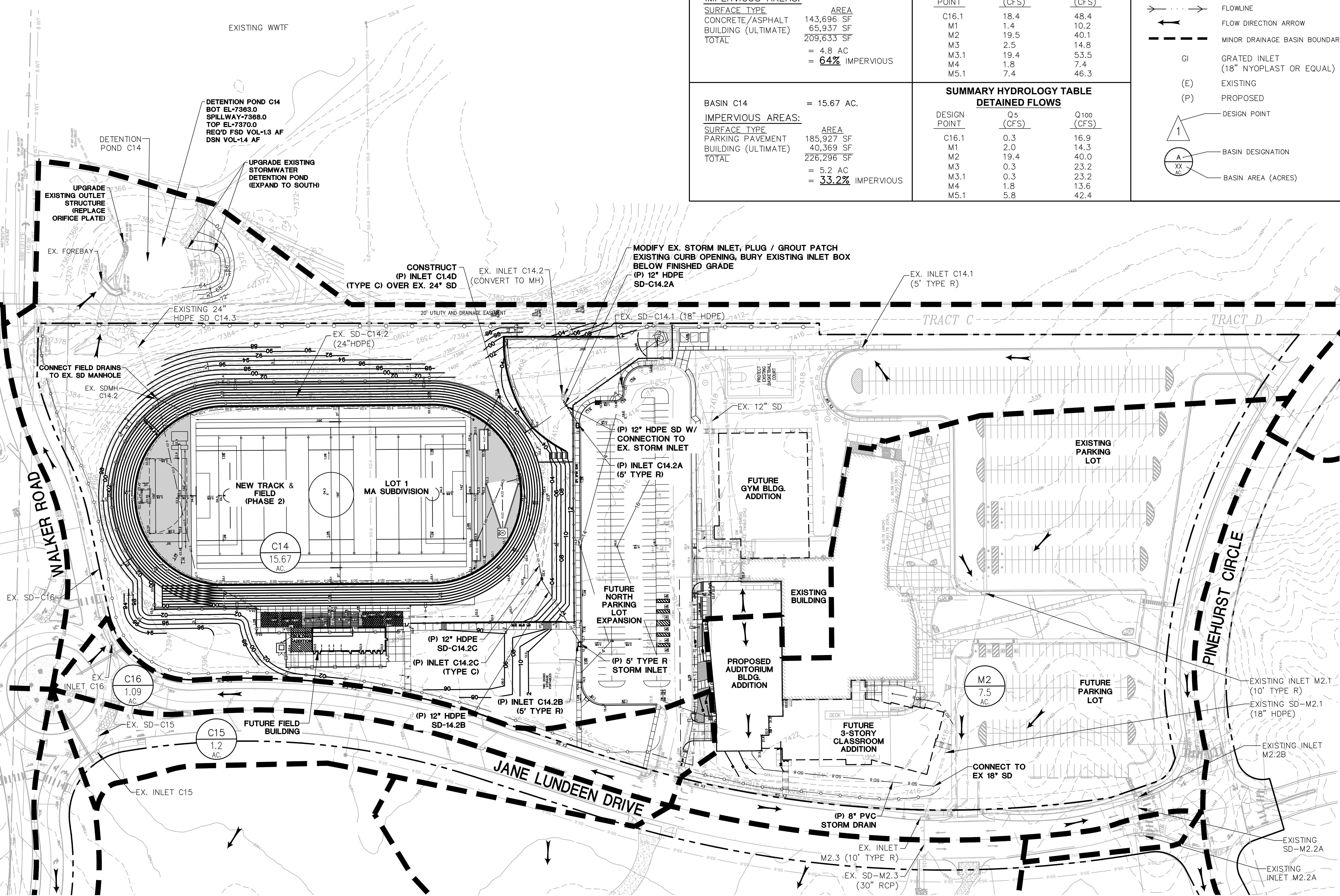
CALL UTILITY NOTIFICATION
CENTER OF COLORADO
1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.

No.	REVISION	BY	DATE
1			
2			
3			
4			
5			

DEVELOPED
DRAINAGE PLAN

HORZ. SCALE: 1"=100'	DRAWN: PV
VERT. SCALE: N/A	DESIGNED: JPS
SURVEYED: RAMPART	CHECKED: JPS
CREATED: 09/18/25	LAST MODIFIED: 07/23/26
PROJECT NO: 040201	MODIFIED BY: PV

60' 0 60' 120'
ORIGINAL SCALE: 1"=60' (24"x36" SHEET)
CONTOUR INTERVAL: 1' (EXISTING)
CONTOUR INTERVAL: 2' (PROPOSED)

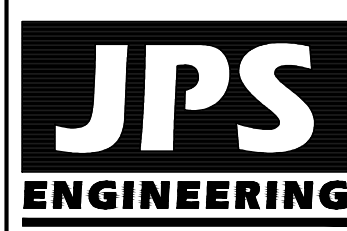


BASIN M2 = 7.50 AC. IMPERVIOUS AREAS: SURFACE TYPE AREA CONCRETE/ASPHALT 143,696 SF BUILDING (ULTIMATE) 65,937 SF TOTAL 209,633 SF = 4.8 AC = 64% IMPERVIOUS	SUMMARY HYDROLOGY TABLE DEVELOPED FLOWS (INTERIM)		
	DESIGN POINT	Q5 (CFS)	Q100 (CFS)
	C16.1	18.4	48.4
	M1	1.4	10.2
	M2	19.5	40.1
	M3	2.5	14.8
	M3.1	19.4	53.5
	M4	1.8	7.4
	M5.1	7.4	46.3

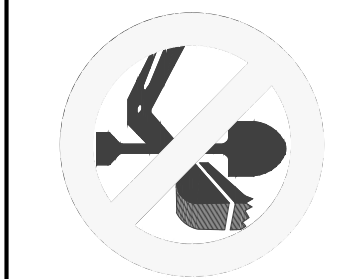
BASIN C14 = 15.67 AC. IMPERVIOUS AREAS: SURFACE TYPE AREA PARKING PAVEMENT 185,927 SF BUILDING (ULTIMATE) 40,369 SF TOTAL 226,296 SF = 5.2 AC = 33.2% IMPERVIOUS	SUMMARY HYDROLOGY TABLE DETAINED FLOWS		
	DESIGN POINT	Q5 (CFS)	Q100 (CFS)
	C16.1	0.3	16.9
	M1	2.0	14.3
	M2	19.4	40.0
	M3	0.3	23.2
	M3.1	0.3	23.2
	M4	1.8	13.6
	M5.1	5.8	42.4

DRAINAGE LEGEND	
	FLOWLINE
	FLOW DIRECTION ARROW
	MINOR DRAINAGE BASIN BOUNDARY
GI	GRATED INLET (18" NYOPLAST OR EQUAL)
(E)	EXISTING
(P)	PROPOSED
	DESIGN POINT
	BASIN DESIGNATION
	BASIN AREA (ACRES)

MONUMENT ACADEMY - PHASE 2
4303 PINEHURST CIRCLE, COLORADO SPRINGS, CO 80908



19 E. Willamette Ave.
Colorado Springs, CO
80903
PH: 719-477-9429
FAX: 719-471-0766
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CALL UTILITY NOTIFICATION
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1-800-922-1987
CALL 2-BUSINESS DAYS IN ADVANCE
BEFORE YOU DIG, GRADE, OR EXCAVATE
FOR THE MARKING OF UNDERGROUND
MEMBER UTILITIES.

REVISION	BY	DATE

SCHOOL SITE DEVELOPED
DRAINAGE PLAN

HORZ. SCALE: 1"=60'	DRAWN: PV
VERT. SCALE: N/A	DESIGNED: JPS
SURVEYED: RAMPART	CHECKED: JPS
CREATED: 09/18/25	LAST MODIFIED: 07/23/26
PROJECT NO: 040201	MODIFIED BY: PV

SHEET: D1.1