July 10, 2024

Aurora Water
15151 E. Alameda Parkway
Aurora, CO 80012

RE: Lot 3, Block 2, Springhill Industrial Park Subdivision Filing No. 1 - MFH Environmental

Dear Aurora Water Drainage Supervisor,

This Final Drainage Letter for MFH Environmental will address the on-site stormwater conveyance for the development in accordance with criteria set forth by applicable governing agencies as well as previously approved relevant drainage studies.

The site is situated in Lot 3, Block 2, Springhill Industrial Park Subdivision Filing No. 1, in Section 4, Township 4 South, Range 66 West of the 6th Principal Meridian, within the City of Aurora, Arapahoe County, Colorado. The site is bounded to the south by Salida Way, to the east by Lot 2, Block 2 (an industrial office and storage space), and to the west and north by unplatted open space. Please refer to Appendix A for a vicinity map.

Previously analyzed in the approved Final Drainage Report (COA approval 10/12/202 – 222269FD1) by Proof Civil, the site currently encompasses a single building, drive lanes, parking, paved storage area, and a water quality and detention pond. It spans approximately 2.48 acres with an imperviousness of 78%. The water quality and detention pond is currently under review for certification.

Proposed improvements include additional parking with landscape islands on the southwest side and a new building with associated sidewalks and parking on the northeast corner. The improvements will alter the basin delineations and imperviousness of basins A-1, A-2, A-3, and A-4. The basins are described as follows:

Basin A-1
Basin A-1, situated on the southwest side, includes parking spaces, paved areas with a swale, sidewalks, and landscape features, with an 87% imperviousness over 0.72 acres. Runoff will be directed to Basin A-2 through sheet flow and swale at DP01, with peak runoff rates expected to be 1.7 cfs and 5.1 cfs during minor and major storm events, respectively. Previously calculated rates were 1.8 cfs and 5.2 cfs during minor and major storm events, respectively.

Basin A-2
Basin A-2, situated on the north side, includes parking spaces, paved areas, sidewalks, and landscape features, with a 97% imperviousness over 0.96 acres. Runoff will be directed to the pond outlet structure at DP02 via sheet flow, curb and gutter, and pond trickle channel. Peak runoff rates from this basin are expected to be 2.7 cfs and 7.7 cfs during minor and major storm events, respectively. Previously calculated rates were 2.6 cfs and 7.4 cfs during minor and major storm events, respectively.

This basin receives runoff from basins A-1, A-3, A-4, A-5, OS-1, and OS-2. Anticipated total peak runoff rates to DP02 are 5.2 cfs and 15.1 cfs during minor and major storm events, respectively. Previously calculated rates were 5.3 cfs and 15.4 cfs during minor and major storm events, respectively. Runoff captured in the proposed outlet structure at DP02 will outfall to the level spreader and will be dispersed downstream to properties to the north and west of the site.

Basin A-3
Basin A-3, situated on the northeast side, includes landscape and a concrete pan, with a 16% imperviousness over 0.03 acres. Runoff will be directed to Basin A-2 through sheet flow and concrete pan at DP03, with peak runoff rates expected to be 0.03 cfs and 0.1 cfs during minor and major storm events, respectively. Previously calculated rates were 0.7 cfs and 1.9 cfs during minor and major storm events, respectively.

This basin receives runoff from basins A-4, A-5, OS-1, and OS-2. Anticipated total peak runoff rates to DP03 are 0.9 cfs and 2.9 cfs during minor and major storm events, respectively. Previously calculated rates were 1.2 cfs and 3.4 cfs during minor and major storm events, respectively.

Basin A-4
Basin A-4, situated on the northeast side, includes the west half of the proposed building, paved areas, landscape features, and concrete pan, with a 62% imperviousness over 0.25 acres. Runoff will be directed to Basin A-3 through sheet flow and concrete pan at DP04, with peak runoff rates expected to be 0.5 cfs and 1.5 cfs during minor and major storm events, respectively. Previously calculated rates were 0.1 cfs and 0.2 cfs during minor and major storm events, respectively.

This basin receives runoff from basins A-5, OS-1, and OS-2. Anticipated total peak runoff rates to DP03 are 0.9 cfs and 2.8 cfs during minor and major storm events, respectively. Previously calculated rates were 0.5 cfs and 1.6 cfs during minor and major storm events, respectively.

Total runoff has decreased at design points 01 and 02, and storm conveyance infrastructure remains unchanged, no additional analysis has been provided for these points. However, sections at design points 03 and 04 have been revised and total runoff at design point 04 has increased. Therefore, these sections have been reanalyzed. The 100-year water surface elevation (WSEL) at design points 03 and 04 are 0.34' and 0.36', respectively, providing a freeboard of 1.78' and 1.21' to the adjacent properties, meeting the required minimum of 1'.

Water quality and detention for the site are provided by an existing pond located at the northwest corner. Originally designed to serve a tributary area of 2.29 acres at an 84% imperviousness, post-development conditions will maintain the same tributary area but with a reduced imperviousness of 82%. The proposed improvements mostly lie outside the pond's drainage easement, except for a minor addition of maintenance path for access and upkeep, with grades restored to existing levels. Given the consistent tributary area, decreased imperviousness, and minimal alterations within the pond, it will continue to function as intended post-development.

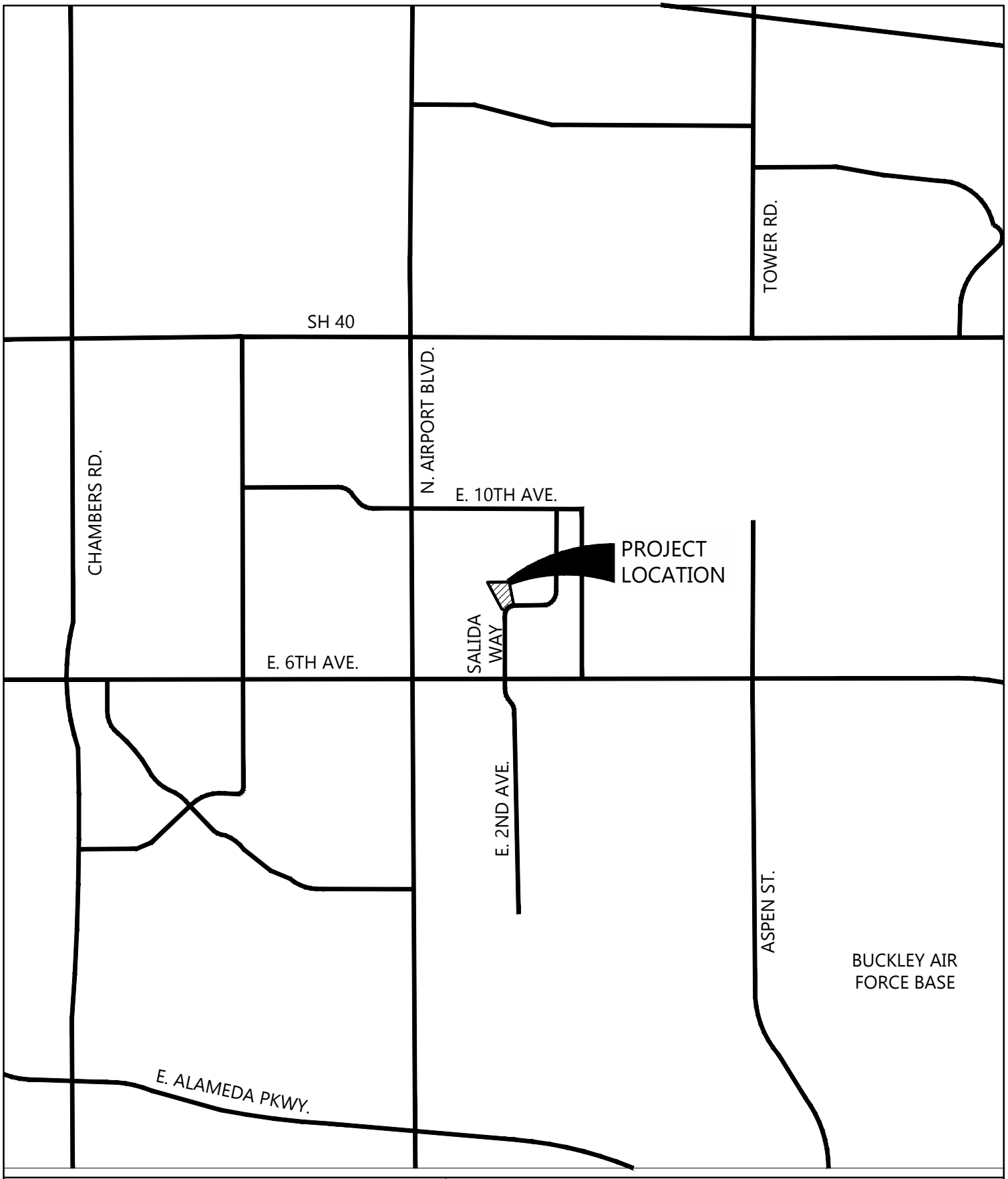
The proposed improvements will reduce the site's overall imperviousness and total runoff rates. They will not have adverse effects on upstream or downstream drainage facilities or other structures. The existing detention pond will continue to meet the water quality and detention needs of the development, aligning with City of Aurora and Mile High Flood District requirements. Therefore, these improvements will adhere to the previously approved drainage report.

If you have additional questions, please contact me at madams@proofcivil.com or at 303-325-5709.

Best Regards,

Mathew A. Adams, PE
Principal
Proof Civil

- APPENDIX A- VICINITY MAP



PROOFCIVIL
consulting engineers
600 Grant Street | Suite 210 | Denver, CO

VICINITY MAP

MFH Environmental (703 Salida Way)

REF. NO.:	SCALE:	DRAWING NO.
21075	1"=2000'	V1
DATE: 10/22/2021	DRAWN BY: WBP	

- APPENDIX B- HYDROLOGIC AND HYDRAULIC CALCULATIONS

Project : MFH Environmental
Project No. : 24019

Date : 7/10/2024
By : KYS

Drainage Basin Imperviousness

Soil Type : **C**

	Roof	Concrete	Asphalt	Gravel	Landscape (2-7%)			
C_2	0.80	0.87	0.87	0.15	0.18	Note:		
C_5	0.85	0.87	0.88	0.25	0.19	Runoff Coefficients and Percent Imperviousness values are from table 1 of the City of Aurora Storm Drainage Design Criteria		
C_{10}	0.90	0.88	0.90	0.35	0.20			
C_{100}	0.90	0.89	0.93	0.65	0.22			
% Impervious	90%	96%	100%	40%	5%			

Basin Name	Areas (sq.ft.)								Total Area (sq.ft.)	Composite % Imp.	Runoff Coefficients			
											C_2	C_5	C_{10}	C_{100}
A-1	64	4,294	22,794		4,259				31,411	87%	0.78	0.79	0.80	0.83
A-2	4,527	14,832	22,437						41,796	97%	0.86	0.87	0.89	0.91
A-3		169			1,198				1,367	16%	0.27	0.27	0.28	0.30
A-4	4,515	300	2,304		3,925				11,044	62%	0.60	0.62	0.65	0.66
A-5	6,000	327			5,201				11,528	52%	0.52	0.55	0.58	0.59
B-1				550	2,950				3,500	4%	0.15	0.16	0.17	0.19
B-2				550	6,953				7,503	5%	0.17	0.18	0.19	0.20
Total Site	15,106	19,922	47,535	1,100	24,486				108,149	75%	0.70	0.71	0.73	0.75
OS-1				289	1,503				1,792	4%	0.15	0.16	0.17	0.18
OS-2					904				904	5%	0.18	0.19	0.20	0.22
EXOS-1					50,387				50,387	5%	0.18	0.19	0.20	0.22
EXOS-2					18,456				18,456	5%	0.18	0.19	0.20	0.22
Total to Pond	15,106	19,922	47,535	289	16,990				99,842	81%	0.74	0.75	0.77	0.79

TABLE 1
RUNOFF COEFFICIENTS AND PERCENTS IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
Business:					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	85	.60	.65	.70	.80
Residential:					
Single-Family (**)	(*)	.40	.45	.50	.60
Multi-Unit (detached)	60	.45	.50	.60	.70
Multi-Unit (attached)	75	.60	.65	.70	.80
1/2 Acre Lot or Larger	(*)	.30	.35	.40	.60
Apartments	80	.65	.70	.70	.80
Industrial:					
Light Areas	80	.71	.72	.76	.82
Heavy Areas	90	.80	.80	.85	.90
Parks, Cemeteries	5	.10	.10	.35	.60
Playgrounds	10	.15	.25	.35	.65
Schools	50	.45	.50	.60	.70
Railroad Yard Areas	15	.40	.45	.50	.60
Undeveloped Areas:					
Historic Flow Analysis, Greenbelts, Agricultural	2	(See "Lawns")			
Off-Site Flow Analysis (when land use not defined)	45	.43	.47	.55	.65

TABLE 1 (continued)

RUNOFF COEFFICIENTS AND PERCENTS IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
Streets:					
Paved	100	.87	.88	.90	.93
Gravel	40	.15	.25	.35	.65
Concrete Drive and Walks	96	.87	.87	.88	.89
Roofs	90	.80	.85	.90	.90
Lawns, Sandy Soil (A and B Soils):	2				
2% Slope		.05	.06	.08	.10
2-7% Slope		.10	.11	.13	.15
>7% Slope		.15	.16	.18	.20
Lawns, Clay Soil (C and D Soils):	5				
2% Slope		.13	.14	.15	.17
2-7% Slope		.18	.19	.20	.22
>7% Slope		.25	.27	.30	.35

NOTE: These Rational Formula coefficients may not be valid for large basins

(*)See Figures *RO-3 through RO-5* of USDCM Volume 1 for percent impervious.

(**)Up to 5 units per acre. Single-family with more than 5 units per acre, use values for multi-unit/detached

Project : MFH Environmental
Project No. : 24019

Date : 7/10/2024
By : KYS

SF1 - Time of Concentration

			Initial/Overland Time			Travel Time					Time of Concentration		Final
Basin ID	Area (AC.)	C_5	L_i (ft.)	S (%)	T_i (min.)[1]	L_t (ft.)	S (%)	Conveyance Factor (K)	Vel (fps)[4]	T_t (min.)[2]	Comp. T_C (min.)	Regional T_C (Min.)[3]	T_C (Min.)
A-1	0.72	0.79	130	3.20	4.5	190	1.4	20	2.4	1.3	5.8	11.8	5.8
A-2	0.96	0.87	175	3.50	3.6	113	0.5	20	1.4	1.3	5.0	11.6	5.0
A-3	0.03	0.27	16	6.00	3.3	60	1.0	20	2.0	0.5	3.8	10.4	5.0
A-4	0.25	0.62	38	3.20	3.7	76	1.0	20	2.0	0.6	4.3	10.6	5.0
A-5	0.26	0.55	40	2.50	4.7	195	1.6	15	1.9	1.7	6.4	11.3	6.4
B-1	0.08	0.16	13	26.00	2.1	1	1.0	7	0.7	0.0	2.1	10.1	5.0
B-2	0.17	0.18	20	25.00	2.6	1	1.0	7	0.7	0.0	2.6	10.1	5.0
OS-1	0.04	0.16	12	1.50	5.2	1	2.0	7	1.0	0.0	5.2	10.1	5.2
OS-2	0.02	0.19	12	1.90	4.7	1	2.0	7	1.0	0.0	4.7	10.1	5.0

1. $t_i = \frac{0.395(1.1-C)L^{1/2}}{S^{1/3}}$

2. $t_t = \frac{L}{Vel}$

3. $T_c = \left(\frac{L'}{180}\right) + 10$

4. $Vel = KS^{1/2}$

Project : MFH Environmental
Project No. : 24019

Date : 7/10/2024
By : KYS

SF2 - Minor Storm

1-hr Point Rainfall **0.96** in. (2-year Event)

		Direct Runoff						Total Runoff				Street		Travel Time			
Description	Design Point	Area (ac.)	C_2	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Length (ft)	Vel. (fps)	tt (min.)	Comments
A-1	1	0.72	0.78	5.8	0.56	3.12	1.7										Sheet Flows to paved swale to DP1 into Basin A-2
A-2	2	0.96	0.86	5.0	0.83	3.26	2.7	6.2	1.69	3.07	5.2						Sheet flows to Drainage Pan in Pond.
A-3	3	0.03	0.27	5.0	0.01	3.26	0.03	6.4	0.31	3.04	0.9						Sheet Flows to paved swale to DP3 into Basin A-2
A-4	4	0.25	0.60	5.0	0.15	3.26	0.5	6.4	0.30	3.04	0.9						Concrete pan to DP4 to Basin A-3
A-5	5	0.26	0.52	6.4	0.14	3.04	0.4	6.4	0.14	3.04	0.4						Building roof to grassed swale to DP5 to Basin A-4
B-1	6	0.08	0.15	5.0	0.01	3.26	0.04										Flows offsite to DP6
B-2	7	0.17	0.17	5.0	0.03	3.26	0.09										Flows offsite to DP7
OS-1	4	0.04	0.15	5.2	0.01	3.22	0.02										Offsite flows to Basin A-4
OS-2	5	0.02	0.18	5.0	0.00	3.26	0.01										Offsite flows to Basin A-5

$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$ *(City of Aurora Storm Drainage Criteria Equation 5.5)*

Project : MFH Environmental
Project No. : 24019

Date : 7/10/2024
By : KYS

SF2 - Minor Storm

1-hr Point Rainfall **1.62** in. (10-year Event)

		Direct Runoff						Total Runoff				Street		Travel Time			
Description	Design Point	Area (ac.)	C_{10}	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Length (ft)	Vel. (fps)	tt (min.)	Comments
A-1	1	0.72	0.80	5.8	0.58	5.27	3.1										Sheet Flows to paved swale to DP1 into Basin A-2
A-2	2	0.96	0.89	5.0	0.86	5.49	4.7	6.2	1.77	5.17	9.2						Sheet flows to Drainage Pan in Pond.
A-3	3	0.03	0.28	5.0	0.01	5.49	0.0	6.4	0.34	5.13	1.7						Sheet Flows to paved swale to DP3 into Basin A-2
A-4	4	0.25	0.65	5.0	0.16	5.49	0.9	6.4	0.33	5.13	1.7						Concrete pan to DP4 to Basin A-3
A-5	5	0.26	0.58	6.4	0.15	5.13	0.8	6.4	0.16	5.13	0.8						Building roof to grassed swale to DP5 to Basin A-4
B-1	6	0.08	0.17	5.0	0.01	5.49	0.1										Flows offsite to DP6
B-2	7	0.17	0.19	5.0	0.03	5.49	0.2										Flows offsite to DP7
OS-1	4	0.04	0.17	5.2	0.01	5.43	0.04										Offsite flows to Basin A-4
OS-2	5	0.02	0.20	5.0	0.00	5.49	0.02										Offsite flows to Basin A-5

$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$ *(City of Aurora Storm Drainage Criteria Equation 5.5)*

Project : MFH Environmental
Project No. : 24019

Date : 7/10/2024
By : KYS

SF2 - Major Storm

1-hr Point Rainfall **2.6** in. (100-year Event)

		Direct Runoff						Total Runoff				Street		Travel Time			
Description	Design Point	Area (ac.)	C_{100}	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Length (ft)	Vel. (fps)	tt (min.)	Comments
A-1	1	0.72	0.83	5.8	0.60	8.46	5.1										Sheet Flows to paved swale to DP1 into Basin A-2
A-2	2	0.96	0.91	5.0	0.88	8.82	7.7	6.2	1.82	8.30	15.1						Sheet flows to Drainage Pan in Pond.
A-3	3	0.03	0.30	5.0	0.01	8.82	0.1	6.4	0.35	8.23	2.9						Sheet Flows to paved swale to DP3 into Basin A-2
A-4	4	0.25	0.66	5.0	0.17	8.82	1.5	6.4	0.34	8.23	2.8						Concrete pan to DP4 to Basin A-3
A-5	5	0.26	0.59	6.4	0.16	8.23	1.3	6.4	0.16	8.23	1.3						Building roof to grassed swale to DP5 to Basin A-4
B-1	6	0.08	0.19	5.0	0.01	8.82	0.1										Flows offsite to DP6
B-2	7	0.17	0.20	5.0	0.04	8.82	0.3										Flows offsite to DP7
OS-1	4	0.04	0.18	5.2	0.01	8.71	0.1										Offsite flows to Basin A-4
OS-2	5	0.02	0.22	5.0	0.00	8.82	0.04										Offsite flows to Basin A-5

$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$ *(City of Aurora Storm Drainage Criteria Equation 5.5)*

Hydraulic Analysis Report

Project Data

Project Title: 24019 MFH Environmental

Designer: KYS

Project Date: Monday, June 20, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Concrete Pan @ DP03

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Station (ft	Elevation (ft)	Manning's n
0.00	2.00	0.0130
0.10	1.00	0.0130
1.10	0.92	0.0130
2.10	1.00	0.0250
6.10	2.00	-----

Longitudinal Slope: 0.0090 ft/ft

Flow 2.9000 cfs

Result Parameters

Depth 0.3417 ft

Area of Flow 0.7377 ft^2

Wetted Perimeter 3.3337 ft

Hydraulic Radius 0.2213 ft

Average Velocity 3.9311 ft/s

Top Width 3.0608 ft

Froude Number: 1.4111

Critical Depth 0.4098 ft

Critical Velocity 3.0352 ft/s

Critical Slope: 0.0045 ft/ft

Critical Top Width 3.34 ft

Calculated Max Shear Stress 0.1919 lb/ft^2

Calculated Avg Shear Stress 0.1243 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0131

Channel Analysis: Concrete Pan @ DP 04

Notes:

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Station (ft	Elevation (ft)	Manning's n
0.00	2.00	0.0250
4.00	1.00	0.0130
5.00	0.92	0.0130
6.00	1.00	0.0250
10.00	2.00	-----

Longitudinal Slope: 0.0050 ft/ft

Flow 2.8000 cfs

Result Parameters

Depth 0.3641 ft

Area of Flow 0.9614 ft^2

Wetted Perimeter 4.3252 ft

Hydraulic Radius 0.2223 ft

Average Velocity 2.9123 ft/s

Top Width 4.2491 ft

Froude Number: 1.0789

Critical Depth 0.3777 ft

Critical Velocity 2.7452 ft/s

Critical Slope: 0.0043 ft/ft

Critical Top Width 4.36 ft

Calculated Max Shear Stress 0.1136 lb/ft^2

Calculated Avg Shear Stress 0.0694 lb/ft^2

Composite Manning's n Equation: Lotter method

Manning's n: 0.0132

- APPENDIX C- PREVIOUS DRAINAGE REPORT

222269FD1
1980-3038
06L

Final Drainage Report

Lot 3, Block 2, Springhill Industrial Park Subdivision Filing No. 1

MFH Environmental
(JN: 21075)
703 Salida Way
Aurora, CO

FACSIMILE

This electronic plan is a facsimile of the signed and sealed PDF set.

9-16-2022
Signature Date

September 16, 2022
Revised:

Prepared for:

Intergroup Architects
2000 W. Littleton Blvd.
Littleton, CO 80120
303.738.8877

Prepared by:

Proof Civil
Mathew A. Adams, PE
600 Grant Street, Ste. 210
Denver, CO 80203
303.325.5709

APPROVED FOR ONE YEAR FROM THIS DATE

10.13.2022

SLB

CITY ENGINEER 10/12/2022 DATE

WATER DEPARTMENT 10/12/2022 DATE

Project : MFH Environmental
Project No. : 21075

Date : 6/16/2022
By : WBP

Drainage Basin Imperviousness

Soil Type : **C**

	Roof	Concrete	Asphalt	Gravel	Landscape (2-7%)
C_2	0.80	0.87	0.87	0.15	0.18
C_5	0.85	0.87	0.88	0.25	0.19
C_{10}	0.90	0.88	0.90	0.35	0.20
C_{100}	0.90	0.89	0.93	0.65	0.22
% Impervious	90%	96%	100%	40%	5%

Note:
Runoff Coefficients and Percent Imperviousness values are from table 1 of the City of Aurora Storm Drainage Design Criteria

108,149

Basin Name	Areas (sq.ft.)					Total Area (sq.ft.)	Composite % Imp.	Runoff Coefficients			
								C_2	C_5	C_{10}	C_{100}
A-1		1,578	26,036		3,492	31,106	89%	0.79	0.80	0.82	0.85
A-2	64	298	38,984			39,346	100%	0.87	0.88	0.90	0.93
A-3			10,019		1,400	11,419	88%	0.79	0.80	0.81	0.84
A-4		369			3,378	3,747	14%	0.25	0.26	0.27	0.29
A-5	6,000	327			5,201	11,528	52%	0.52	0.55	0.58	0.59
B-1				550	6,953	7,503	5%	0.17	0.18	0.19	0.20
B-2				550	2,950	3,500	4%	0.15	0.16	0.17	0.19
Total Site	6,064	2,572	75,039	1,100	23,374	108,149	78%	0.71	0.72	0.74	0.76
OS-1				289	1,503	1,792	4%	0.15	0.16	0.17	0.18
OS-2					904	904	5%	0.18	0.19	0.20	0.22
EXOS-1					50,387	50,387	5%	0.18	0.19	0.20	0.22
EXOS-2					18,456	18,456	5%	0.18	0.19	0.20	0.22
Total to Pond	6,064	2,572	75,039	289	15,878	99,842	84%	0.75	0.77	0.79	0.81

PROOFCIVIL consulting engineers

Project : MFH Environmental
Project No. : 21075

Date : 6/16/2022
By : WBP

SF2 - Minor Storm

1-hr Point Rainfall **0.96** in. (2-year Event)

		Direct Runoff						Total Runoff				Street		Travel Time			
Description	Design Point	Area (ac.)	C_2	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Length (ft)	Vel. (fps)	tt (min.)	Comments
A-1	1	0.71	0.79	5.6	0.57	3.16	1.8										Sheet Flows to paved swale to DP1 into Basin A-2
A-2	2	0.90	0.87	5.0	0.79	3.26	2.6	6.2	1.73	3.07	5.3						Sheet flows to Drainage Pan in Pond.
A-3	3	0.26	0.79	5.5	0.21	3.17	0.7	6.2	0.38	3.06	1.2						Sheet Flows to paved swale to DP3 into Basin A-2
A-4	4	0.09	0.25	5.0	0.02	3.26	0.1	6.2	0.17	3.06	0.5						Concrete pan to DP4 to Basin A-3
A-5	5	0.26	0.52	6.2	0.14	3.06	0.4	6.2	0.14	3.06	0.4						Building roof to grassed swale to DP5 to Basin A-4
B-1	6	0.17	0.17	5.0	0.03	3.26	0.1										Flows offsite to DP6
B-2	7	0.08	0.15	5.0	0.01	3.26	0.04										Flows offsite to DP7
OS-1	4	0.04	0.15	5.2	0.01	3.22	0.02										Offsite flows to Basin A-4
OS-2	5	0.02	0.18	5.0	0.00	3.26	0.01										Offsite flows to Basin A-5

$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$ *(City of Aurora Storm Drainage Criteria Equation 5.5)*

Project : MFH Environmental
Project No. : 21075

Date : 6/16/2022
By : WBP

SF2 - Major Storm

1-hr Point Rainfall **2.6** in. (100-year Event)

		Direct Runoff						Total Runoff				Street		Travel Time			
Description	Design Point	Area (ac.)	C_{100}	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Tc (min.)	CA (ac.)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Length (ft)	Vel. (fps)	tt (min.)	Comments
A-1	1	0.71	0.85	5.6	0.61	8.57	5.2										Sheet Flows to paved swale to DP1 into Basin A-2
A-2	2	0.90	0.93	5.0	0.84	8.82	7.4	6.2	1.86	8.30	15.4						Sheet flows to Drainage Pan in Pond.
A-3	3	0.26	0.84	5.5	0.22	8.58	1.9	6.2	0.41	8.30	3.4						Sheet Flows to paved swale to DP3 into Basin A-2
A-4	4	0.09	0.29	5.0	0.02	8.82	0.2	6.2	0.19	8.30	1.6						Concrete pan to DP4 to Basin A-3
A-5	5	0.26	0.59	6.2	0.16	8.30	1.3	6.2	0.16	8.30	1.3						Building roof to grassed swale to DP5 to Basin A-4
B-1	6	0.17	0.20	5.0	0.04	8.82	0.3										Flows offsite to DP6
B-2	7	0.08	0.19	5.0	0.01	8.82	0.1										Flows offsite to DP7
OS-1	4	0.04	0.18	5.2	0.01	8.71	0.1										Offsite flows to Basin A-4
OS-2	5	0.02	0.22	5.0	0.00	8.82	0.04										Offsite flows to Basin A-5

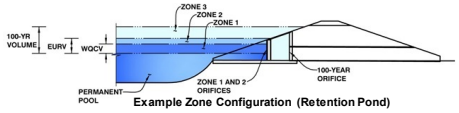
$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$ *(City of Aurora Storm Drainage Criteria Equation 5.5)*

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

Project: MFH Environmental

Basin ID: Detention Pond



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	2.29	acres
Watershed Length =	450	ft
Watershed Length to Centroid =	220	ft
Watershed Slope =	0.035	ft/ft
Watershed Imperviousness =	84.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	24.0	hours
Location for 1-hr Rainfall Depths =	User Input	

Drain Time Too Short

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.068	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.190	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 0.96 in.) =	0.140	acre-feet	0.96 inches
5-yr Runoff Volume (P1 = 1.37 in.) =	0.215	acre-feet	1.37 inches
10-yr Runoff Volume (P1 = 1.62 in.) =	0.261	acre-feet	1.62 inches
25-yr Runoff Volume (P1 = 2 in.) =	0.335	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.3 in.) =	0.392	acre-feet	2.30 inches
100-yr Runoff Volume (P1 = 2.6 in.) =	0.451	acre-feet	2.60 inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.554	acre-feet	inches
Approximate 2-yr Detention Volume =	0.139	acre-feet	
Approximate 5-yr Detention Volume =	0.212	acre-feet	
Approximate 10-yr Detention Volume =	0.248	acre-feet	
Approximate 25-yr Detention Volume =	0.284	acre-feet	
Approximate 50-yr Detention Volume =	0.297	acre-feet	
Approximate 100-yr Detention Volume =	0.314	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.068	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.122	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.125	acre-feet
Total Detention Basin Volume =	0.314	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = 0.50 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
5483	--	0.54	--	--	--	2,598	0.060	701	0.016
5483.5	--	1.04	--	--	--	6,972	0.160	3,094	0.071
5484	--	1.54	--	--	--	10,552	0.242	7,475	0.172
5484.5	--	2.04	--	--	--	13,110	0.301	13,390	0.307
5485	--	2.54	--	--	--	17,831	0.409	21,125	0.485
5485.5	--	3.04	--	--	--	22,016	0.505	31,087	0.714

- APPENDIX D- POND CERTIFICAITON LETTER

APPROVED
Pond Certification
By: Janet Bender on Jul 09,2024

222269POND1
1980-3038
06L

PROOFCIVIL
consulting engineers

June 28, 2024

City of Aurora
Drainage Supervisor – Aurora Water
15151 E. Alameda Pkwy, Ste 2300
Aurora, CO 80012

Re: Lot 3, Block 2, Springhill Industrial Park Sub. Fil. No. 1 (EDN: 222269)
As-Built Pond Certification

To whom it may concern:

Proof Civil was provided the following information regarding the construction of the water quality and detention pond, for the proposed development known as Lot 3, Block 2, Springhill Industrial Park Sub. Fil. No. 1 (MFH Environmental), located at 703 N Salida Way., COA EDN: 222269.

- Pond As-Built Survey from ESC dated June 26, 2024.

Based on my review of this document, the water quality and detention pond was constructed in general conformance with the approved design as shown sheet C4.1 of the approved construction plans dated 10/3/2022 and will function as intended.

The hydraulics of the as-built condition of the pond have been analyzed and the results are also attached to this letter. The hydraulics of the pond in the as-built condition comply with City of Aurora and State of Colorado requirements. The Stormwater Detention and Infiltration Design Data Sheet has been uploaded to the Colorado Stormwater Detention and Infiltration Facilities database per CRS Section 37-92-602 requirements and can be located under Facility ID SWDF-20240314113832.

Per the original review of this project the State Engineer's Office dam requirements do not apply to this project. This is not required since the project does not meet the state requirements of a dam which includes a spillway crest greater than 10', creates a reservoir of more than 100 acre-feet of water or covers more than 20 acres at the high waterline.

Should you have any questions regarding this letter, please feel free to contact me at 303.325.5709.

Sincerely,

PROOF CIVIL CO.

COLORADO LICENSED
MATHEW AVERY ADAMS
42628
6-28-2024
PROFESSIONAL ENGINEER

Mathew A. Adams, P.E.
Principal