Stormwater Management Report

Addition / Renovation
At Dryden Elementary School
722 S. Dryden Place
Arlington Heights IL

December 12, 2022

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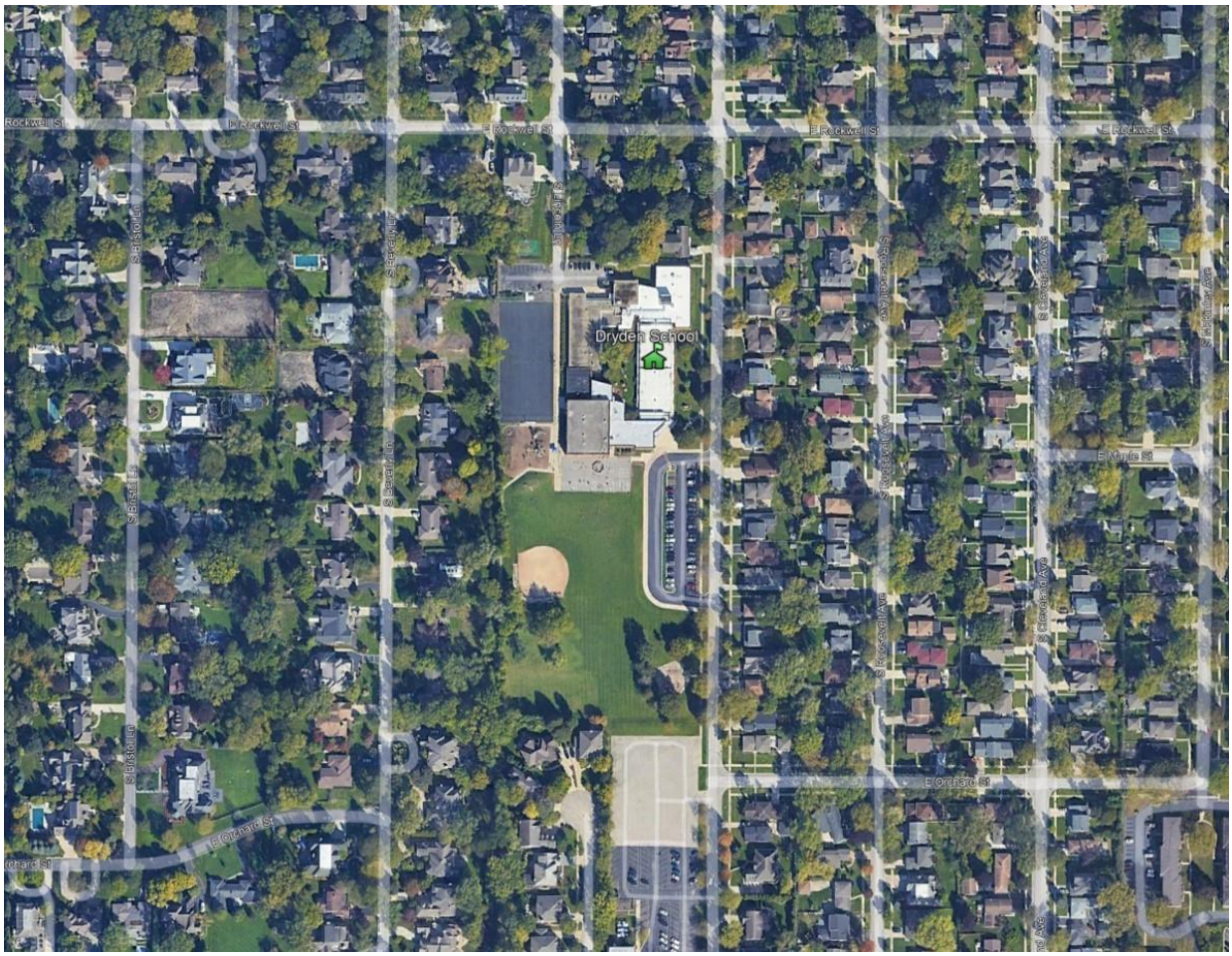
Reviewed by: Josh Cap, PE

Eriksson Engineering Associates, Ltd.



ERIKSSON ENGINEERING ASSOCIATES, LTD.

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COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: **AHSD 25 - Dryden School Addition** **PERMIT NUMBER:** **TBD**

LOCATION: **SOUTH DEVELOPMENT AREA** **DATE:** **11/17/2022**

TYPE OF AREA (SELECT WITH DROP-DOWN)

X DETAINED AREA

___ UNRESTRICTED AREA

___ UPSTREAM AREA

___ MAJOR STORMWATER SYSTEM

___ OTHER: _____

CONDITION (SELECT WITH DROP-DOWN)

X PROPOSED CONDITION

___ EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Building		98	0.27	26.46
Play Lot		98	0.35	34.30
Walks		98	0.02	1.96
Landscaped Areas		80	0.43	34.40
		TOTALS:	1.07	97.12

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{97.12}{1.07} \rightarrow \textbf{Composite CN} = \textbf{90.77}$$

ADJUSTED COMPOSITE RUNOFF CURVE NUMBER (CN_{ADJ})

PROJECT: AHSD 25 - Dryden School Addition **PERMIT NUMBER:** TBD

LOCATION: SOUTH DEVELOPMENT AREA **DATE:** 11/17/2022

DEVELOPMENT INFORMTION

1.	Area Detained, *A*	0.965	acres
2.	Total Impervious Area	0.640	acres
3.	Composite CN	90.77	
4.	Volume Control Storage Provided, VC_P	0.053	ac-ft
5.	Depth of Rainfall, *P*	8.57	inches

RUNOFF VOLUME (NRCS EQUATIONS)

6.	Maximum Retention, *S*	$S = \frac{1000}{CN} - 10$	1.02	inches
7.	Runoff Depth, Q_D	$Q_D = \frac{(P - 0.2S)^2}{(P + 0.8S)}$	7.46	inches
8.	Runoff Volume, V_R	$V_R = Q_D A \left(\frac{1}{12\frac{in}{ft}}\right)$	0.60	ac-ft

VOLUME CONTROL STORAGE

9.	Volume Control Storage Required, VC_R	0.053	ac-ft
10.	Additional Volume Control Storage Provided	0.000	ac-ft

ADJUSTED RUNOFF VOLUME

11.	Adjusted Runoff Volume, V_{ADJ}	$V_{ADJ} = V_R - VC_P$	0.547	ac-ft
12.	Adjusted Runoff Depth, Q_{ADJ}		6.80	inches
13.	Adjusted Maximum Retention, S_{ADJ}		1.72	inches

ADJUSTED COMPOSITE RUNOFF CURVE NUMBER

14.	Adjusted Runoff Curve Number, CN_{ADJ}	**85.29**

NOMOGRAPH: BULLETIN 75 RAINFALL DATA

PROJECT: AHSD 25 - Dryden School Addition | **PERMIT NUMBER:** TBD

LOCATION: SOUTH AREA | **DATE:** 11/17/2022

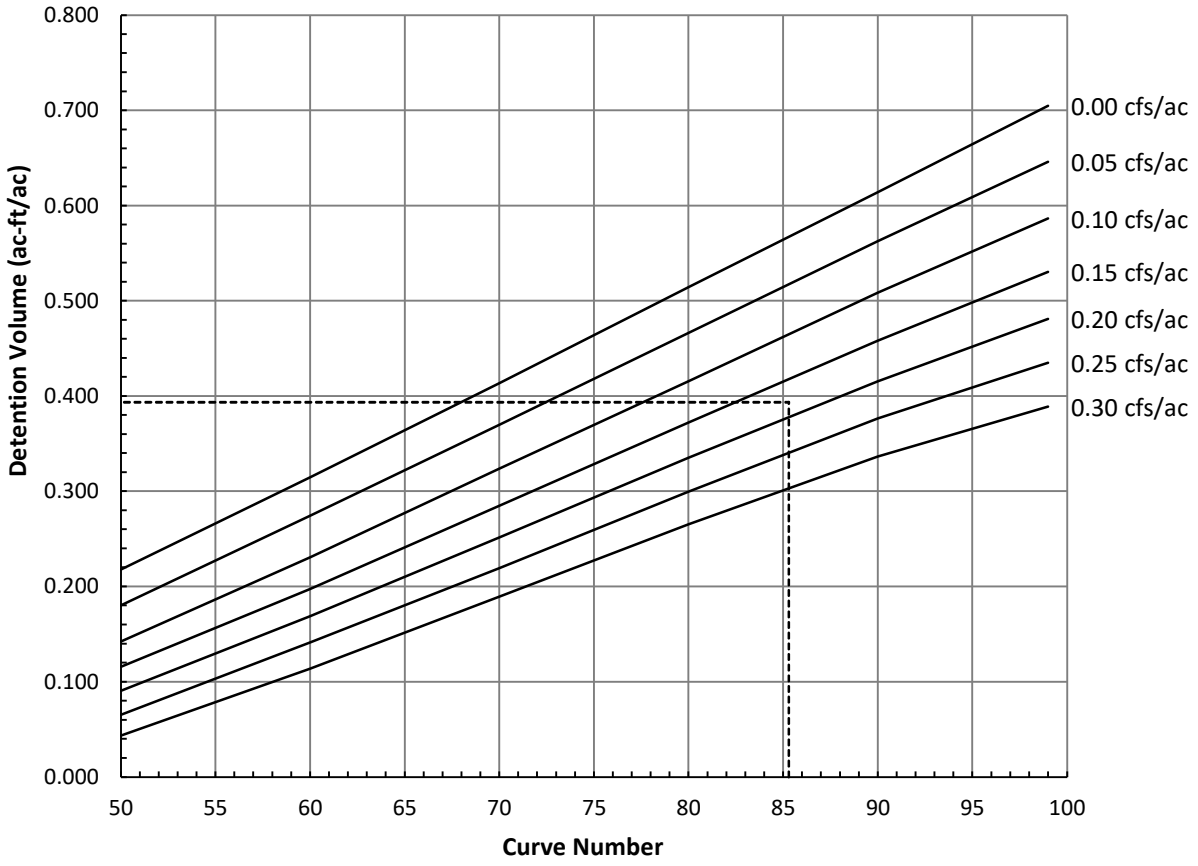
DEVELOPMENT INFORMATION

1.	Detained Area	1.070	acres
2.	Curve Number	85.29	
3.	Actual Release Rate	**0.193**	cfs

REQUIRED DETENTION VOLUME

4.	Required Detention Volume	**0.421**	ac-ft

NOMOGRAPH



ORIFICE DISCHARGE RATE

PROJECT: **AHSD 25 - Dryden School Additions & Alterations** **PERMIT NUMBER:** **TBD**

LOCATION: **SOUTH DEVELOPMENT AREA** **DATE:** **11/17/2022**

RESTRICTOR INFORMTION

1.	Orifice Number	1		
2.	Orifice diameter, *d*	1.85	in	
3.	Discharge Coefficient, C_d	0.61		
4.	Invert Elevation	679.30	ft	
5.	High Water Elevation, HWL	684.20	ft	
6.	Tail Water Elevation	680.10	ft	

ACTUAL RELEASE RATE

6.	Free Flow Actual Release Rate at HWL	**0.20**	cfs	
7.	Submerged Actual Release Rate at HWL	**0.19**	cfs	

STAGE-DISCHARGE TABLE CONDITION (SELECT FROM DROP-DOWN)

Free-flow

STAGE-DISCHARGE TABLE

Elevation (ft)	Orifice 1 (cfs)	Orifice 2 (cfs)	Total (cfs)
600.00	0.00		0.00
601.00	0.00		0.00
602.00	0.00		0.00
603.00	0.00		0.00
604.00	0.00		0.00
605.00	0.00		0.00
606.00	0.00		0.00
607.00	0.00		0.00
608.00	0.00		0.00
609.00	0.00		0.00
610.00	0.00		0.00
611.00	0.00		0.00
612.00	0.00		0.00

COMPOSITE RUNOFF COEFFICIENT (*C*)

PROJECT: **AHSD 25 - Dryden School Addition** **PERMIT NUMBER:** **TBD**

LOCATION: **NORTH REDEVELOPMENT AREA** **DATE:** **11/17/2022**

TYPE OF AREA (SELECT WITH DROP-DOWN)

___ DETAINED AREA

___ MAJOR STORMWATER SYSTEM

X UNRESTRICTED AREA

___ OTHER: _____

___ UPSTREAM AREA

CONDITION (SELECT WITH DROP-DOWN)

X PROPOSED CONDITION

___ EXISTING CONDITION

RUNOFF COEFFICIENT

Surface Description	C	Area (acres)	Product (C)(Area)
Parking Lots, Sidewalks	0.95	0.18	0.17
Grass	0.50	0.02	0.01
TOTALS:		0.20	0.18

COMPOSITE RUNOFF COEFFICIENT

$$\text{Composite C} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{0.18}{0.20} \rightarrow \text{Composite C} = \mathbf{0.91}$$

MODIFIED RATIONAL METHOD: BULLETIN 75 RAINFALL DATA

PROJECT: AHSD 25 - Dryden School Additions & Alterations **PERMIT NUMBER:** TBD

LOCATION: NORTH REDEVELOPMENT AREA **DATE:** 11/17/2022

DEVELOPMENT INFORMTION

1. Detained Area	0.200	acres
2. Composite Runoff Coefficient	0.910	
3. Actual Release Rate	0.036	cfs

REQUIRED DETENTION VOLUME

4. Required Detention Volume	**0.080**	ac-ft

CALCULATION TABLE

Storm Duration	Rainfall Intensity (in/hr)	Inflow Rate (cfs)	Stored Rate (cfs)	Required Storage (ac-ft)	
5 min	12.36	2.25	2.21	0.015	
10 min	10.80	1.97	1.93	0.027	
15 min	9.28	1.69	1.65	0.034	
20 min	8.04	1.46	1.43	0.039	
30 min	6.34	1.15	1.12	0.046	
40 min	5.28	0.96	0.92	0.051	
50 min	4.55	0.83	0.79	0.055	
1 hr	4.03	0.73	0.70	0.058	
1.5 hr	3.03	0.55	0.52	0.064	
2 hr	2.49	0.45	0.42	0.069	
3 hr	1.83	0.33	0.30	0.074	
4 hr	1.48	0.27	0.23	0.077	
5 hr	1.25	0.23	0.19	0.079	
6 hr	1.07	0.19	0.16	0.079	
7 hr	0.96	0.17	0.14	0.080	←
8 hr	0.86	0.16	0.12	0.080	
9 hr	0.79	0.14	0.11	0.080	
10 hr	0.72	0.13	0.10	0.079	
11 hr	0.67	0.12	0.09	0.078	
12 hr	0.62	0.11	0.08	0.076	
18 hr	0.45	0.08	0.05	0.068	
24 hr	0.36	0.06	0.03	0.057	

COMPOSITE RUNOFF COEFFICIENT (*C*)

PROJECT: **AHSD 25 - Dryden School Addition** **PERMIT NUMBER:** **TBD**

LOCATION: **SOUTH TRADE AREA** **DATE:** **11/17/2022**

TYPE OF AREA (SELECT WITH DROP-DOWN)

- **X** DETAINED AREA
- ___ UNRESTRICTED AREA
- ___ UPSTREAM AREA
- ___ MAJOR STORMWATER SYSTEM
- ___ OTHER: _____

CONDITION (SELECT WITH DROP-DOWN)

- ___ PROPOSED CONDITION
- **X** EXISTING CONDITION

RUNOFF COEFFICIENT

Surface Description	C	Area (acres)	Product (C)(Area)
Parking Lots, Sidewalks	0.95	0.48	0.46
Grass	0.50	0.29	0.15
TOTALS:		0.77	0.60

COMPOSITE RUNOFF COEFFICIENT

$$\text{Composite C} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{0.60}{0.77} \rightarrow \text{Composite C} = \mathbf{0.78}$$

MODIFIED RATIONAL METHOD: BULLETIN 75 RAINFALL DATA

PROJECT: AHSD 25 - Dryden School Additions & Alterations **PERMIT NUMBER:** TBD

LOCATION: SOUTH TRADE AREA **DATE:** 11/17/2022

DEVELOPMENT INFORMTION

1. Detained Area	0.760	acres
2. Composite Runoff Coefficient	0.780	
3. Actual Release Rate	0.137	cfs

REQUIRED DETENTION VOLUME

4. Required Detention Volume	**0.250**	ac-ft

CALCULATION TABLE

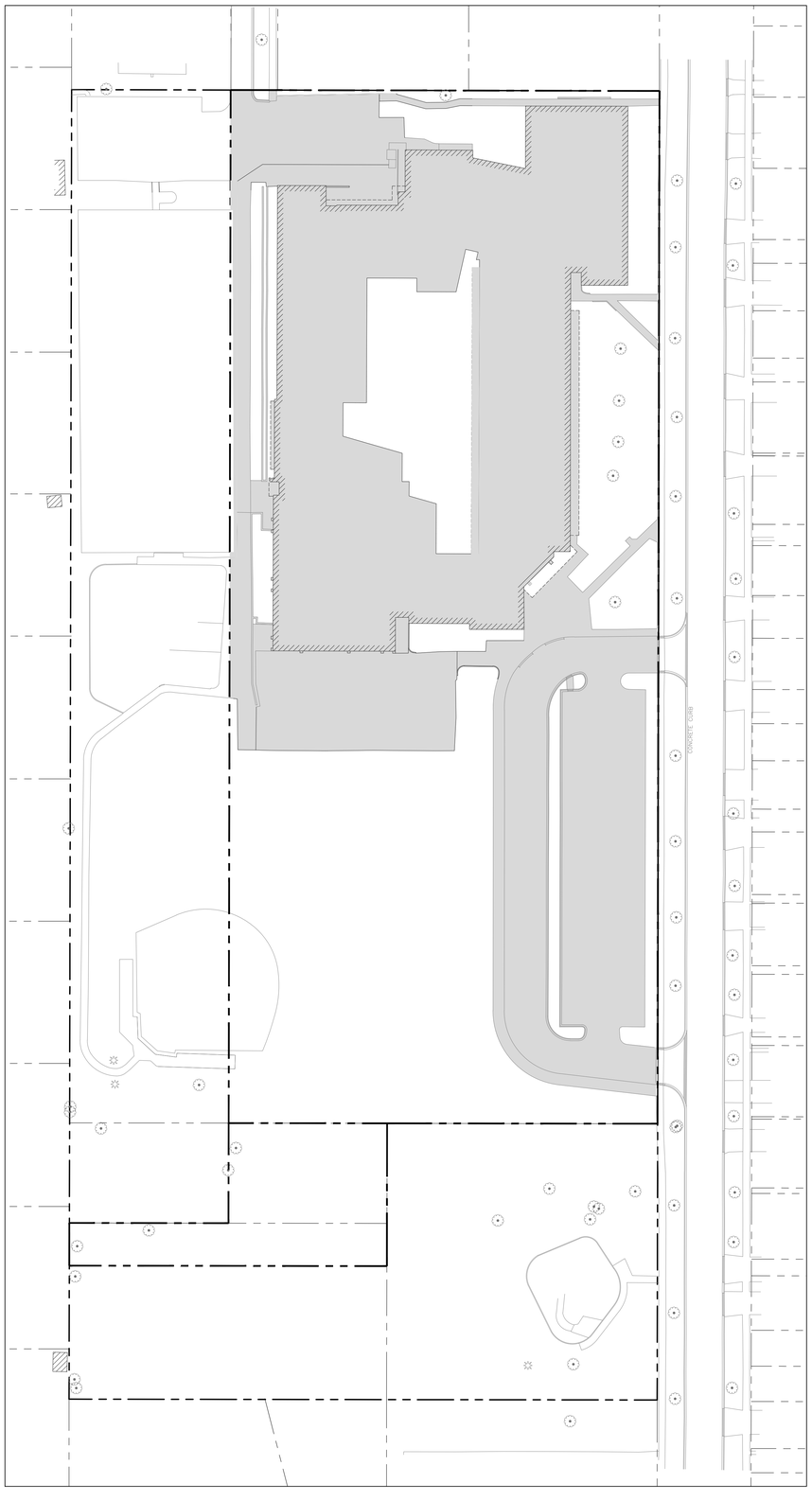
Storm Duration	Rainfall Intensity (in/hr)	Inflow Rate (cfs)	Stored Rate (cfs)	Required Storage (ac-ft)	
5 min	12.36	7.33	7.19	0.050	
10 min	10.80	6.40	6.27	0.086	
15 min	9.28	5.50	5.36	0.111	
20 min	8.04	4.77	4.63	0.128	
30 min	6.34	3.76	3.62	0.150	
40 min	5.28	3.13	2.99	0.165	
50 min	4.55	2.70	2.56	0.176	
1 hr	4.03	2.39	2.25	0.186	
1.5 hr	3.03	1.80	1.66	0.206	
2 hr	2.49	1.48	1.34	0.221	
3 hr	1.83	1.08	0.95	0.235	
4 hr	1.48	0.88	0.74	0.245	
5 hr	1.25	0.74	0.60	0.250	
6 hr	1.07	0.63	0.50	0.247	
7 hr	0.96	0.57	0.43	0.250	←
8 hr	0.86	0.51	0.37	0.247	
9 hr	0.79	0.47	0.33	0.247	
10 hr	0.72	0.43	0.29	0.240	
11 hr	0.67	0.40	0.26	0.237	
12 hr	0.62	0.37	0.23	0.230	
18 hr	0.45	0.27	0.13	0.191	
24 hr	0.36	0.21	0.07	0.149	

Project: **DRYDEN SCHOOL ADDITION**

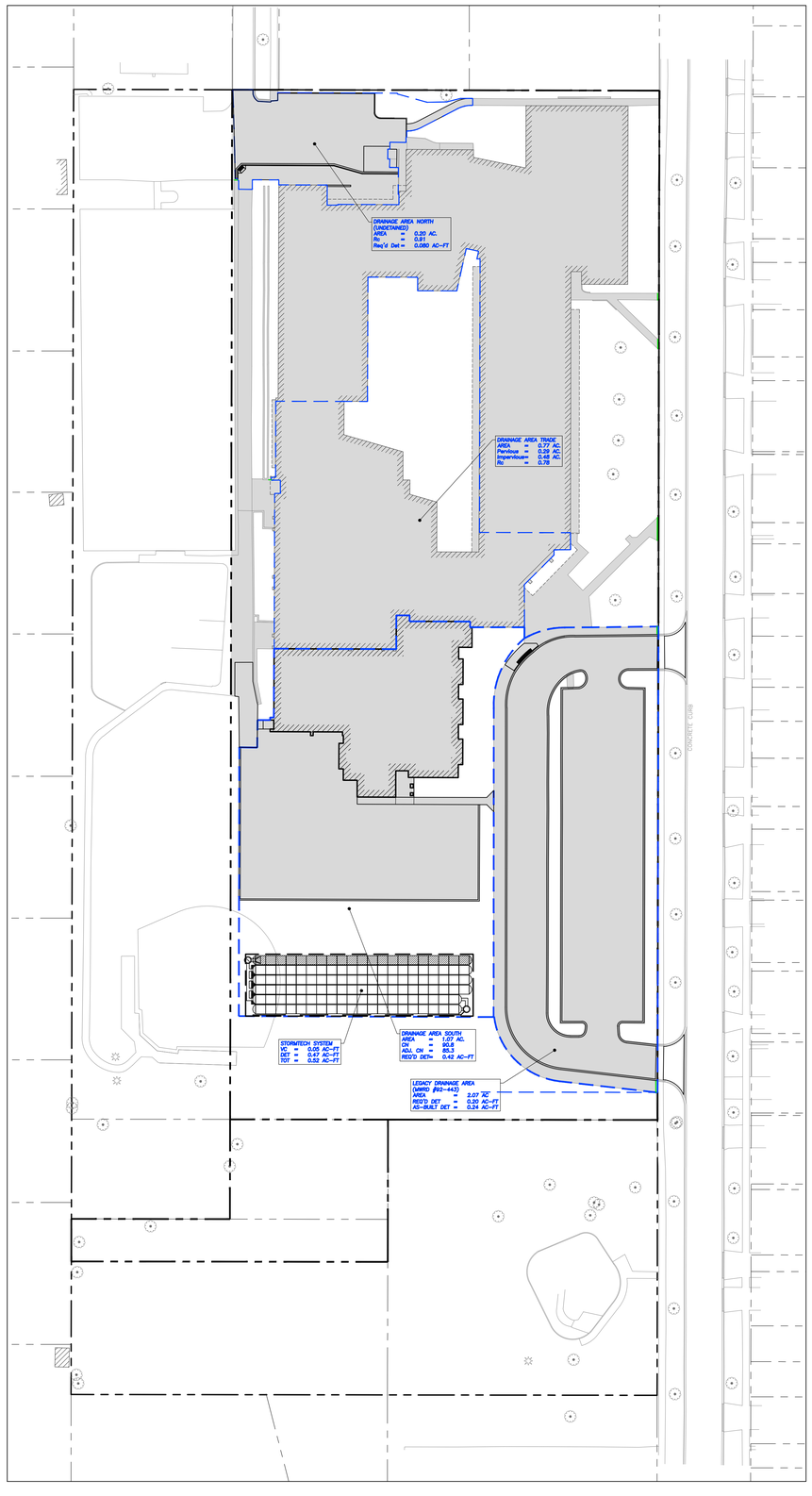
Chamber Model -	MC-3500	
Units -	Imperial	
Number of Chambers -	124	
Number of End Caps -	12	
Voids in the stone (porosity) -	36	%
Base of Stone Elevation -	678.55	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in
Area of system -	6993	sf Min. Area - 6342 sf min. area

StormTech MC-3500 Cumulative Storage Volumes

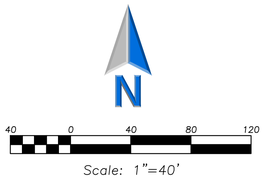
Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Single End Cap (cubic feet)	Incremental Chambers (cubic feet)	Incremental End Cap (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch, EC and Stone (cubic feet)	Cumulative System (cubic feet)	Elevation (feet)
66	0.00	0.00	0.00	0.00	209.79	209.79	22686.41	684.05
65	0.00	0.00	0.00	0.00	209.79	209.79	22476.62	683.97
64	0.00	0.00	0.00	0.00	209.79	209.79	22266.83	683.88
63	0.00	0.00	0.00	0.00	209.79	209.79	22057.04	683.80
62	0.00	0.00	0.00	0.00	209.79	209.79	21847.25	683.72
61	0.00	0.00	0.00	0.00	209.79	209.79	21637.46	683.63
60	0.00	0.00	0.00	0.00	209.79	209.79	21427.67	683.55
59	0.00	0.00	0.00	0.00	209.79	209.79	21217.88	683.47
58	0.00	0.00	0.00	0.00	209.79	209.79	21008.09	683.38
57	0.00	0.00	0.00	0.00	209.79	209.79	20798.30	683.30
56	0.00	0.00	0.00	0.00	209.79	209.79	20588.51	683.22
55	0.00	0.00	0.00	0.00	209.79	209.79	20378.72	683.13
54	0.06	0.00	7.20	0.00	207.20	214.40	20168.93	683.05
53	0.19	0.02	24.07	0.29	201.02	225.38	19954.53	682.97
52	0.29	0.04	36.45	0.45	196.51	233.41	19729.15	682.88
51	0.40	0.05	50.05	0.62	191.55	242.22	19495.75	682.80
50	0.69	0.07	85.21	0.81	178.82	264.84	19253.53	682.72
49	1.03	0.09	127.51	1.06	163.51	292.07	18988.68	682.63
48	1.25	0.11	154.94	1.29	153.55	309.78	18696.61	682.55
47	1.42	0.13	176.36	1.52	145.76	323.63	18386.83	682.47
46	1.57	0.14	195.07	1.73	138.94	335.74	18063.21	682.38
45	1.71	0.16	211.69	1.95	132.88	346.52	17727.46	682.30
44	1.83	0.18	226.73	2.18	127.38	356.30	17380.94	682.22
43	1.94	0.20	240.28	2.41	122.42	365.11	17024.65	682.13
42	2.04	0.22	253.06	2.62	117.74	373.43	16659.54	682.05
41	2.13	0.23	264.70	2.82	113.48	381.00	16286.11	681.97
40	2.22	0.25	275.80	3.01	109.42	388.23	15905.11	681.88
39	2.31	0.27	286.04	3.19	105.67	394.90	15516.88	681.80
38	2.38	0.28	295.71	3.36	102.12	401.20	15121.98	681.72
37	2.46	0.29	304.93	3.53	98.75	407.20	14720.79	681.63
36	2.53	0.31	313.49	3.69	95.60	412.79	14313.59	681.55
35	2.59	0.32	321.62	3.85	92.62	418.10	13900.80	681.47
34	2.66	0.33	329.35	4.01	89.78	423.14	13482.70	681.38
33	2.72	0.35	336.67	4.16	87.09	427.93	13059.56	681.30
32	2.77	0.36	343.64	4.32	84.52	432.48	12631.63	681.22
31	2.82	0.37	350.26	4.47	82.09	436.81	12199.15	681.13
30	2.88	0.38	356.56	4.61	79.77	440.94	11762.33	681.05
29	2.92	0.40	362.59	4.75	77.55	444.89	11321.39	680.97
28	2.97	0.41	368.27	4.89	75.45	448.61	10876.50	680.88
27	3.01	0.42	373.54	5.02	73.51	452.07	10427.89	680.80
26	3.05	0.43	378.60	5.16	71.64	455.40	9975.82	680.72
25	3.09	0.44	383.69	5.28	69.76	458.73	9520.42	680.63
24	3.13	0.45	388.19	5.41	68.09	461.69	9061.69	680.55
23	3.17	0.46	392.54	5.53	66.48	464.56	8600.00	680.47
22	3.20	0.47	396.73	5.65	64.93	467.31	8135.44	680.38
21	3.23	0.48	400.66	5.76	63.48	469.90	7668.13	680.30
20	3.26	0.49	404.41	5.87	62.09	472.37	7198.23	680.22
19	3.29	0.50	407.99	5.98	60.76	474.73	6725.86	680.13
18	3.32	0.51	411.43	6.08	59.49	476.99	6251.13	680.05
17	3.34	0.51	414.67	6.17	58.29	479.13	5774.13	679.97
16	3.37	0.52	417.71	6.27	57.16	481.13	5295.00	679.88
15	3.39	0.53	420.67	6.35	56.06	483.09	4813.87	679.80
14	3.41	0.54	423.40	6.44	55.05	484.89	4330.78	679.72
13	3.44	0.54	426.19	6.52	54.02	486.72	3845.89	679.63
12	3.46	0.55	428.76	6.59	53.06	488.41	3359.17	679.55
11	3.48	0.56	431.36	6.66	52.10	490.12	2870.76	679.47
10	3.51	0.59	434.63	7.14	50.75	492.52	2380.63	679.38
9	0.00	0.00	0.00	0.00	209.79	209.79	1888.11	679.30
8	0.00	0.00	0.00	0.00	209.79	209.79	1678.32	679.22
7	0.00	0.00	0.00	0.00	209.79	209.79	1468.53	679.13
6	0.00	0.00	0.00	0.00	209.79	209.79	1258.74	679.05
5	0.00	0.00	0.00	0.00	209.79	209.79	1048.95	678.97
4	0.00	0.00	0.00	0.00	209.79	209.79	839.16	678.88
3	0.00	0.00	0.00	0.00	209.79	209.79	629.37	678.80
2	0.00	0.00	0.00	0.00	209.79	209.79	419.58	678.72
1	0.00	0.00	0.00	0.00	209.79	209.79	209.79	678.63



EXISTING CONDITIONS



PROPOSED CONDITIONS



Scale: 1"=40'

EXHIBIT LEGEND

IMPERVIOUS AREA

PROPERTY LINE
5.01 ACRES

EXISTING SITE CONDITIONS

IMPERVIOUS AREA
122,136 SF = 2.80 ACRES

PERVIOUS AREA
96,306 SF = 2.21 ACRES

RUNOFF COEFFICIENT
C = 0.75

PROPOSED SITE CONDITIONS

IMPERVIOUS AREA
136,830 SF = 3.18 ACRES

PERVIOUS AREA
76,612 SF = 1.83 ACRES

RUNOFF COEFFICIENT
C = 0.79

SUMMARY

IMPERVIOUS AREA
= +0.38 ACRES

PERVIOUS AREA
= −0.38 ACRES

NOT FOR CONSTRUCTION

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EXPIRES: 04/30/2023

DRYDEN ELEMENTARY SCHOOL
BUILDING ADDITION AND RENOVATIONS

722 S. DRYDEN PLACE
ARLINGTON HEIGHTS, ILLINOIS

Reserved for Seal:

No.	Date	Description
	11/17/22	ISSUE FOR PLAN COMMISSION

Design By:	Approved By:	Date:
RMS	TLH	11/17/22

Sheet Title:
DRAINAGE EXHIBIT

Sheet No:
CX001