CITY OF SOMERVILLE ZONING BOARD OF APPEALS

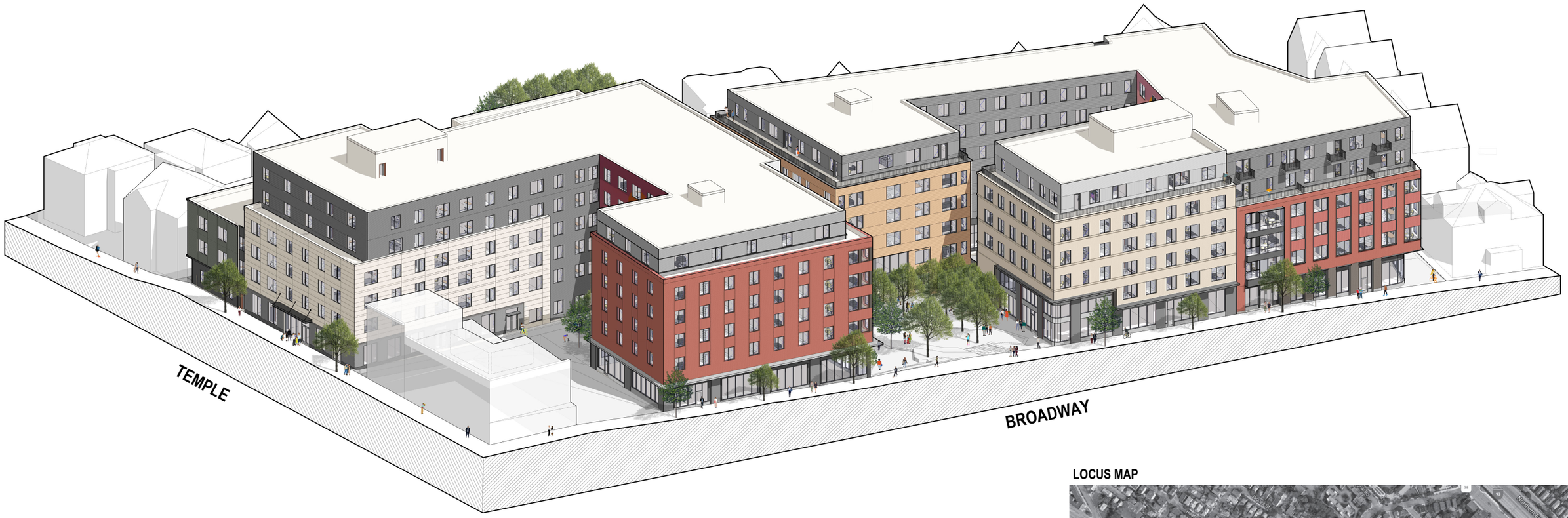
COMPREHENSIVE PERMIT APPLCATION

REVISION TO ILLUSTRATIVE SITE PLAN PREVIOUSLY FILED ON NOVEMBER 8, 2022

APPLICANT:	Mark Development, LLC, Beacon Communities Services LLC and RISE Together, LLC
SUBJECT PROPERTY:	299 Broadway, Somerville, Massachusetts 15 Temple Street, Somerville, Massachusetts
PROJECT NAME:	"299 Broadway"

The Applicant is replacing the previously submitted file entitled "Broadway 299-Packages 01 and 02 Site Plans Site Wide-2022 11 08" "with this new file entitled "Broadway 299-Packages 01 and 02 Site Plans Site Wide-2023 01 12" to make the following changes:

- Design revisions to the Lot 1 Pocket Park and Lot 2 Pocket Plaza on Sheet "G001 Illustrative Site Plan" in response to feedback received from the Public Space and Urban Forestry ("PSUF") division of OSPCD



299 BROADWAY

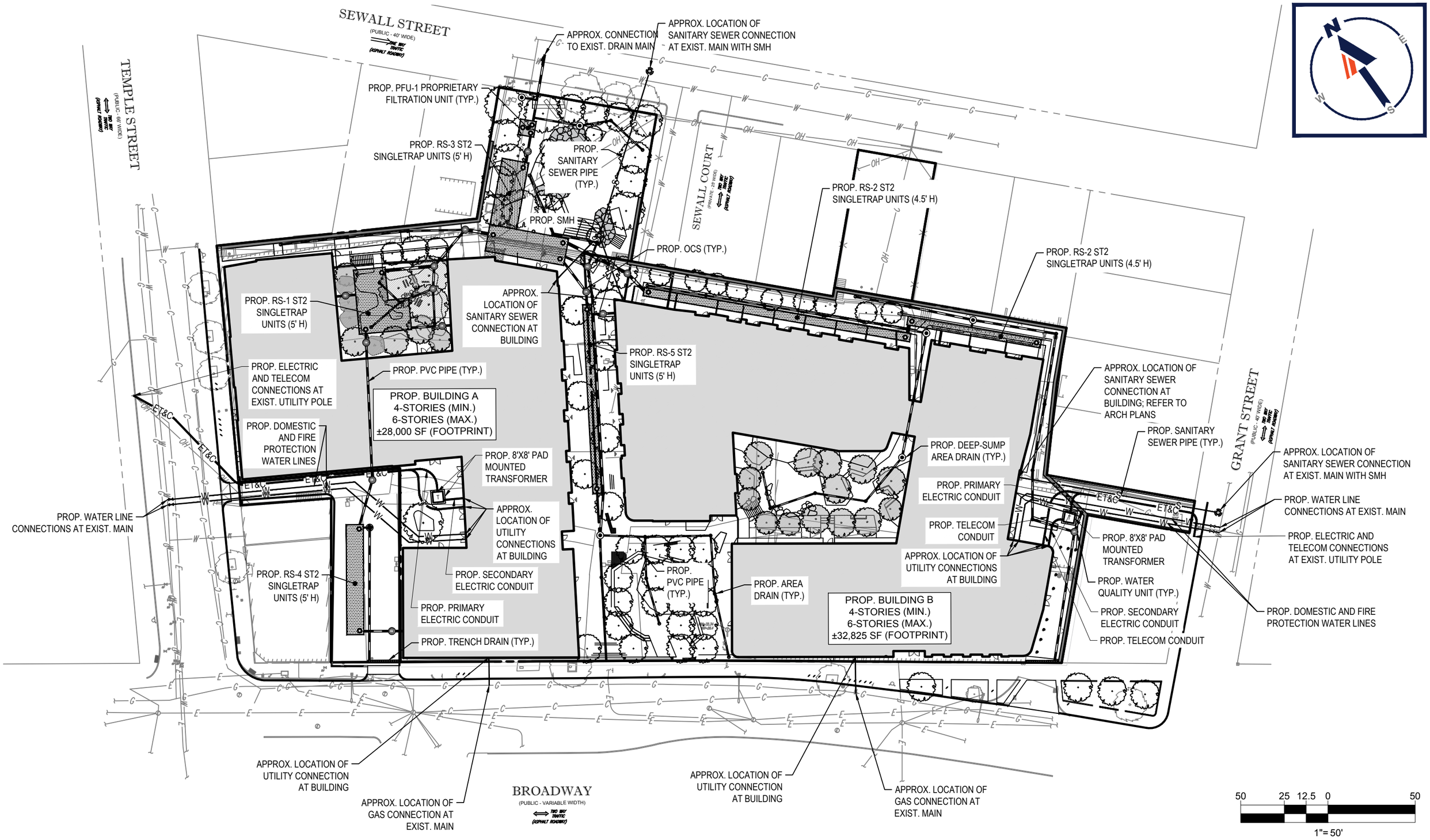
P&Z #22-092

COMPREHENSIVE PERMIT APPLICATION
SITE WIDE DOCUMENTS

NOVEMBER 8, 2022

COMPREHENSIVE PERMIT APPLICATION DRAWING LIST

LOCUS MAP



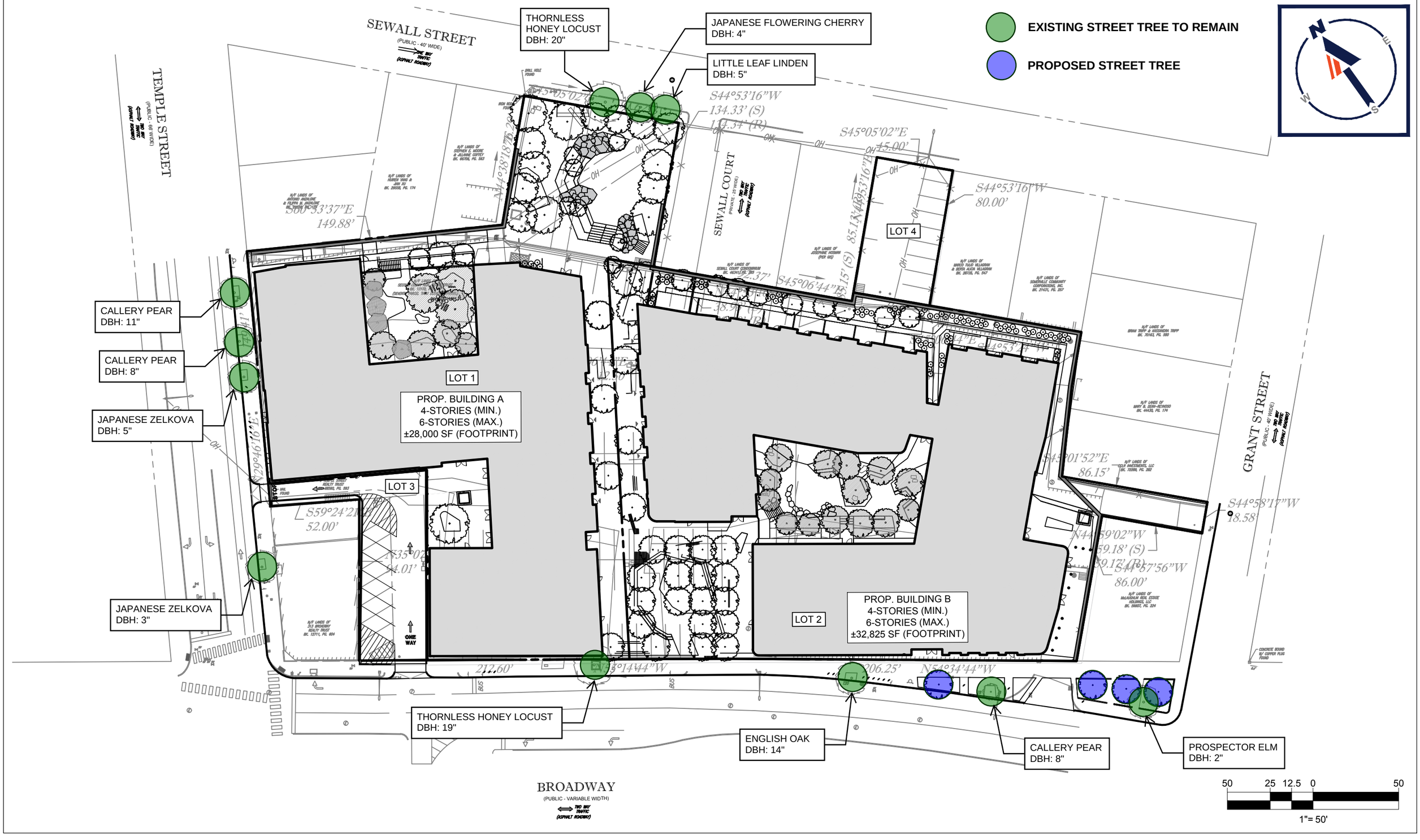
299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION
P&Z 22-092 November 8, 2022
299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G003
DRAINAGE & UTILITY PLAN

DRAFT
NOT FOR CONSTRUCTION

utile
Architecture & Planning



299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION

P&Z 22-092 November 8, 2022

299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

L001.A1
EXISTING TREE PLAN

DRAFT
NOT FOR CONSTRUCTION

utile
Architecture & Planning

299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION

P&Z 22-092 November 8, 2022, Revised January 12, 2023

299 Broadway
Somerville, MA, 02145

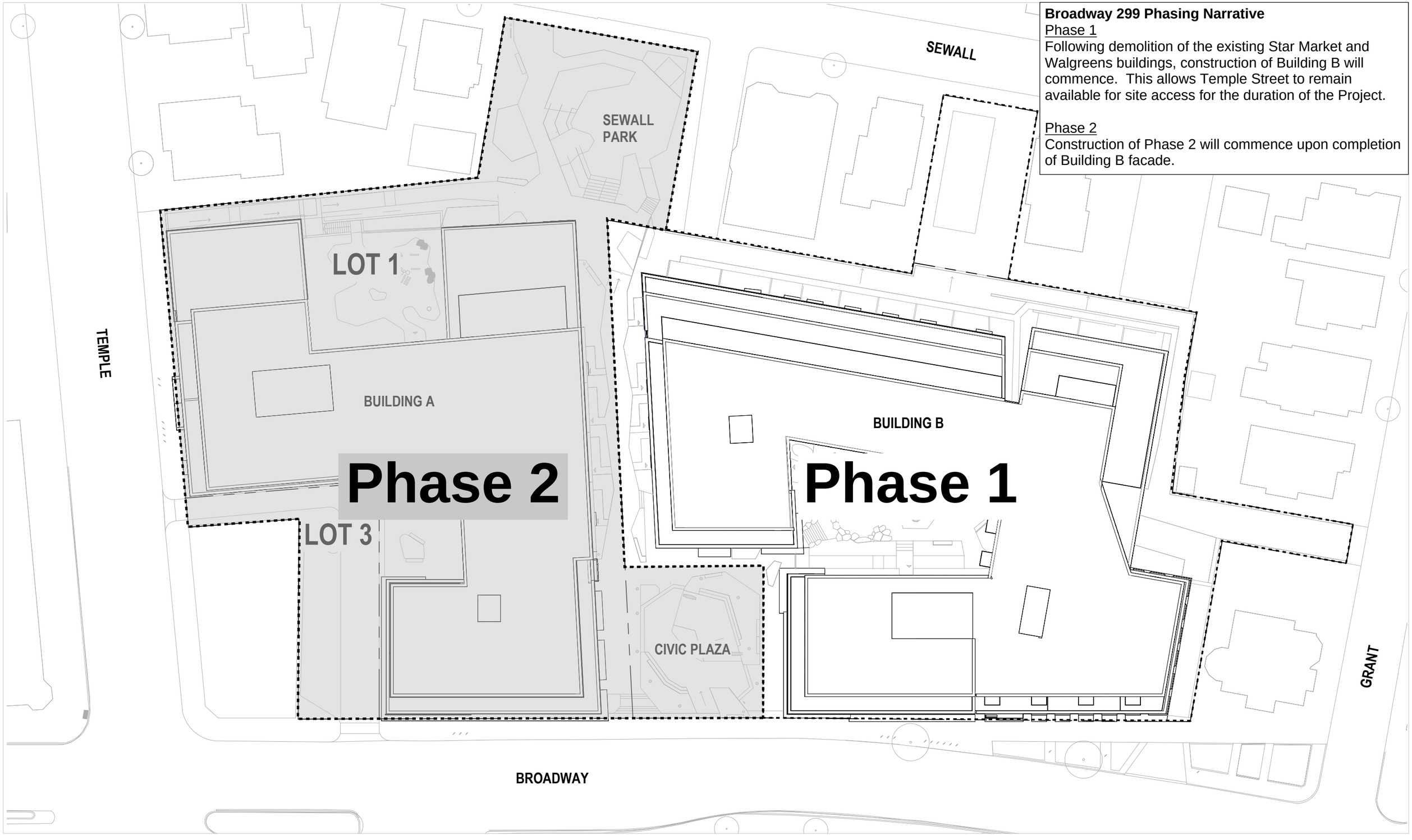
Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G001
ILLUSTRATIVE SITE PLAN

NOT FOR CONSTRUCTION

FUTURE | GREEN

utile
Architecture & Planning



Broadway 299 Phasing Narrative

Phase 1

Following demolition of the existing Star Market and Walgreens buildings, construction of Building B will commence. This allows Temple Street to remain available for site access for the duration of the Project.

Phase 2

Construction of Phase 2 will commence upon completion of Building B facade.

299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION
P&Z 22-092
299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G004
PHASING PLAN

DISCLAIMER: These plans are conceptual only. They have not been subject to a comprehensive code and regulatory review, nor have they been tested against any as-built surveys. Discoveries in such an analysis may result in fundamental changes to the original concept. This scheme assumes zoning relief will be required. As with all zoning relief, the architect cannot guarantee zoning relief will be achieved.

0 20' 40' 80'

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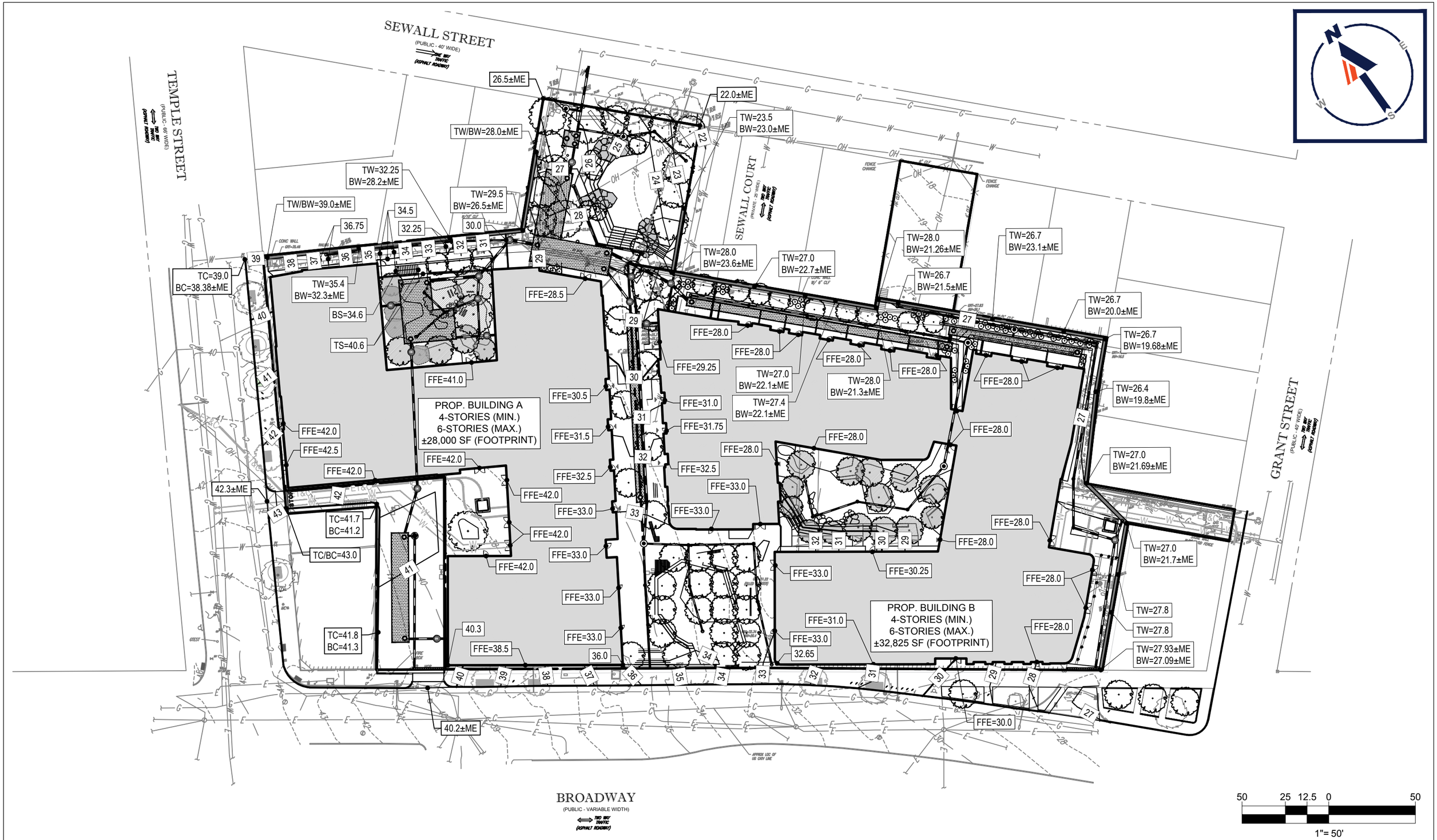
Architecture & Planning



299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION
P&Z 22-092 November 8, 2022
299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G004
GRADING PLAN

DRAFT
NOT FOR CONSTRUCTION

utile
Architecture & Planning

SITE INFORMATION

1. APPLICANT:
   MARK DEVELOPMENT, LLC
   275 GROVE STREET, SUITE 2-150
   NEWTON, MA 02466

2. OWNER:
   COHEN JAMES ET AL TRUSTEES
   C/O COMAR REAL ESTATE TRUST
   89 WINCHESTER STREET
   BROOKLINE, MA 02466

3. PARCEL:
   MAP 70, BLOCK D, LOTS 5 & 27
   299 BROADWAY
   CITY OF SOMERVILLE
   MIDDLESEX COUNTY, MASSACHUSETTS

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

ALWAYS CALL 811

It's fast. It's free. It's the law.

ISSUED FOR MUNICIPAL & AGENCY REVIEW & APPROVAL

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	M211074
DRAWN BY:	JJW
CHECKED BY:	SPM
DATE:	10/19/22
CAD I.D.:	M211074-SUBD-1A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

MARK DEVELOPMENT, LLC

PROPOSED SUBDIVISION PLAN

MAP 70, BLOCK D, LOTS 5 & 27
299 BROADWAY,
CITY OF SOMERVILLE,
MIDDLESEX COUNTY,
MASSACHUSETTS

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
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SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

45 FRANKLIN STREET, 5th FLOOR
BOSTON, MA 02110
Phone: (617) 849-8040
www.BohlerEngineering.com

S.P. MARTORANO
PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE No. 45942

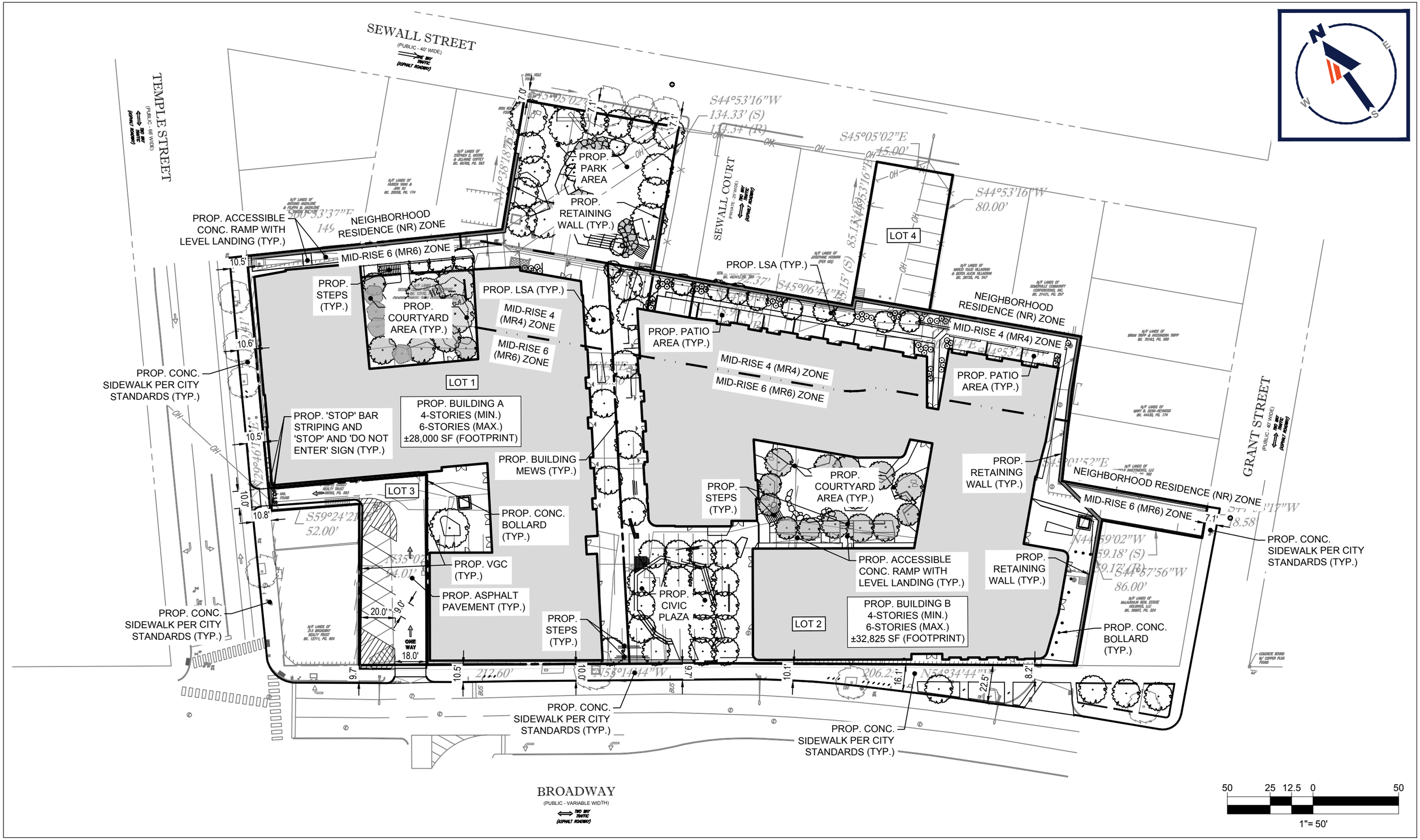
SHEET TITLE:

OVERALL LOT SPLIT PLAN

SHEET NUMBER:

C-001

ORG. DATE - 10/19/22



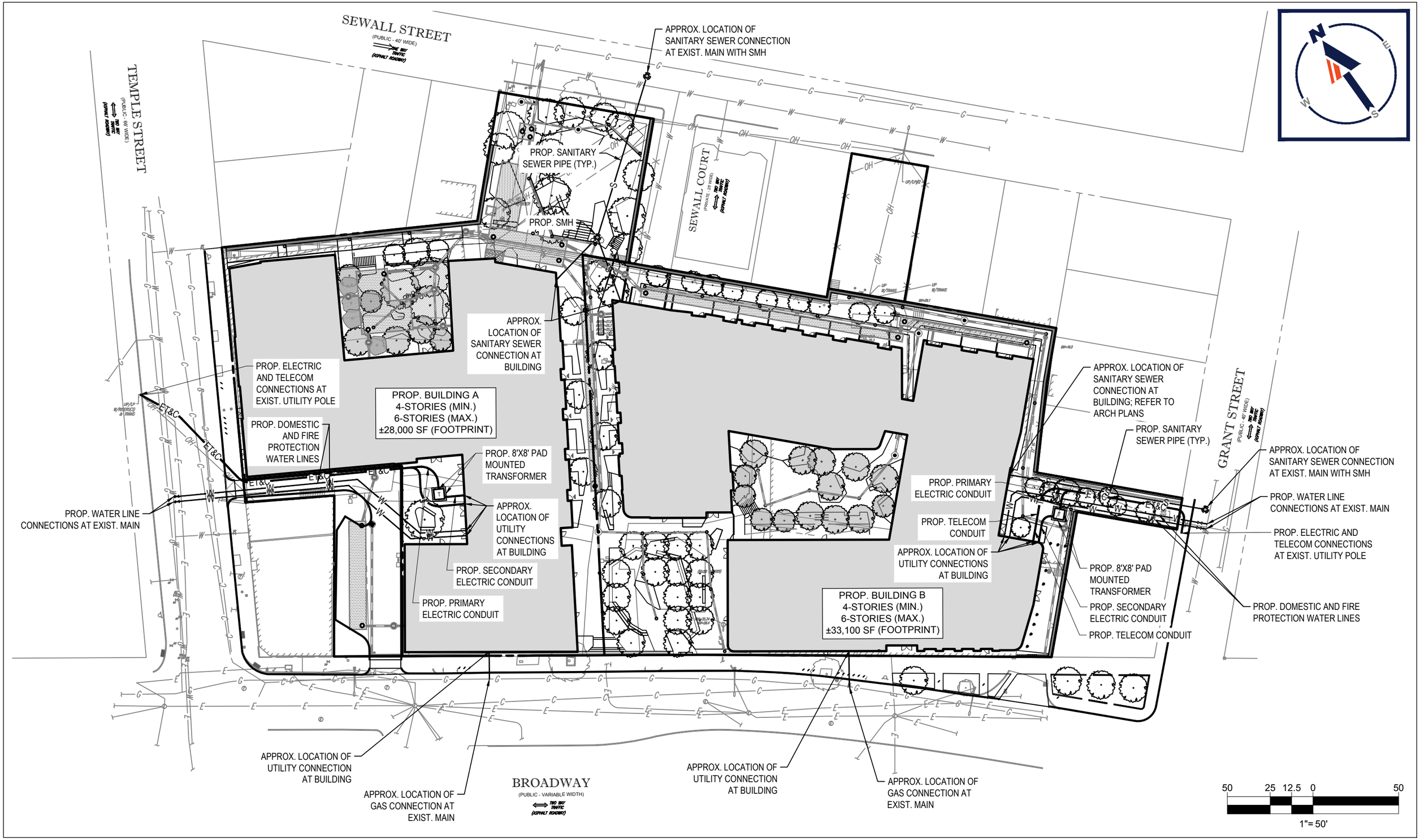
299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION
P&Z 22-092 November 8, 2022
299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G002
SCALED SITE PLAN

DRAFT
NOT FOR CONSTRUCTION

utile
Architecture & Planning



299 BROADWAY - COMPREHENSIVE PERMIT APPLICATION
P&Z 22-092 November 8, 2022
299 Broadway
Somerville, MA, 02145

Owner: Mark Development & Beacon Communities
Architect: Utile
Landscape Architect: Future Green
Civil Engineer: Bohler
Traffic Engineer: VHB

G003
UTILITY PLAN

DRAFT
NOT FOR CONSTRUCTION

utile
Architecture & Planning

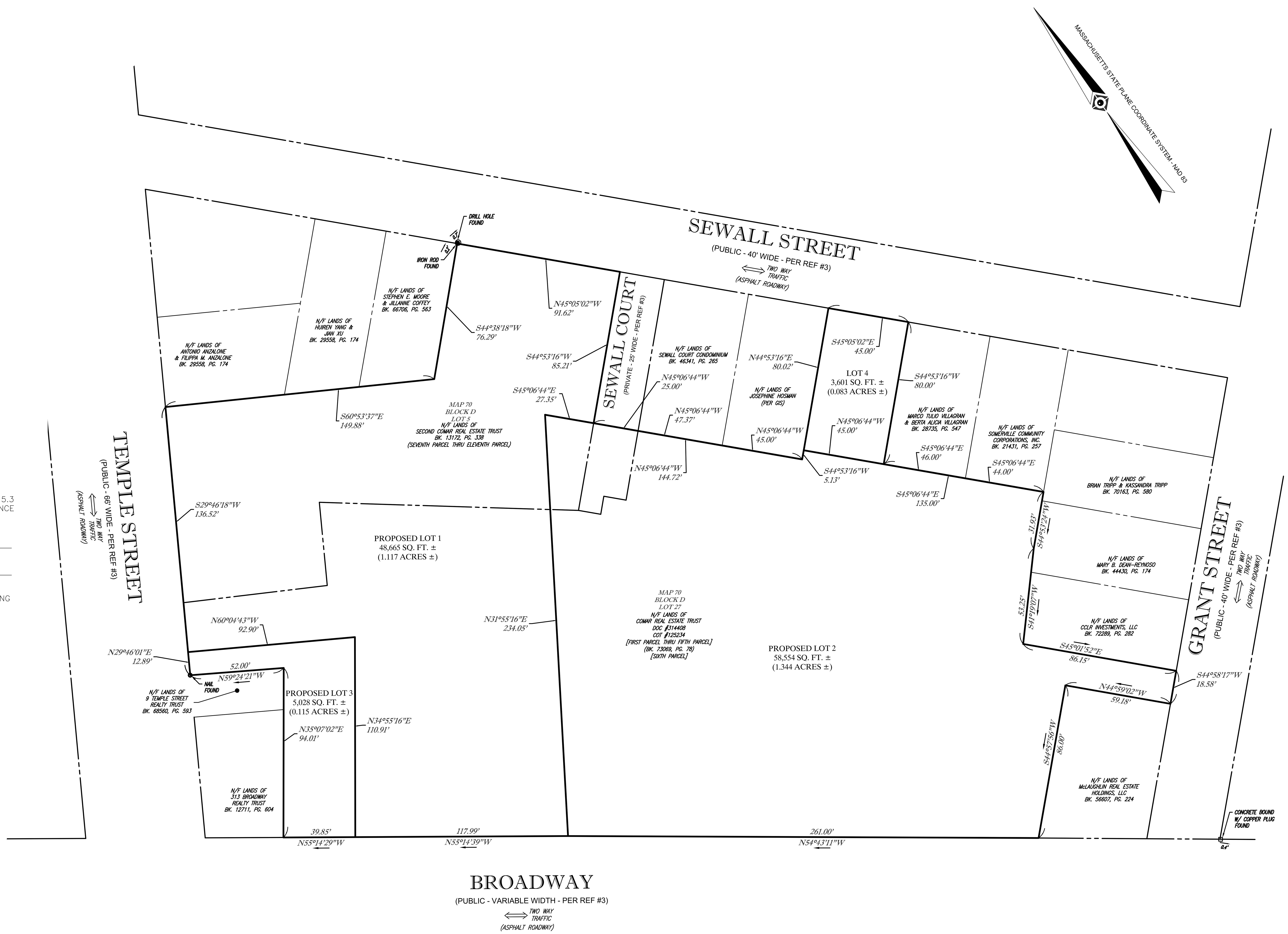
FOR REGISTRY USE

APPROVAL PER SECTION 10.1 AND 15.3 OF THE SOMERVILLE ZONING ORDINANCE

DATE

SARAH A. LEWIS, DIRECTOR OF PLANNING AND ZONING, ON BEHALF OF THE SOMERVILLE PLANNING BOARD

CASE NUMBER: P&Z 22-013



LOCUS MAP
NOT TO SCALE

NOTES:

1. PROPERTY KNOWN AS LOTS 5, & 27, BLOCK D, AS SHOWN ON THE CITY OF SOMERVILLE, MIDDLESEX COUNTY, COMMONWEALTH OF MASSACHUSETTS MAP NO. 70.
2. EXISTING AREA: 112,247 SQ FT OR 2.576 ACRES ±

   PROPOSED LOT 1 AREA: 48,665 SQ FT OR 1.117 ACRES ±
   PROPOSED LOT 2 AREA: 58,544 SQ FT OR 1.344 ACRES ±
   PROPOSED LOT 3 AREA: 5,028 SQ FT OR .115 ACRES ±
   PROPOSED LOT 4 AREA: 3,601 SQ FT OR .083 ACRES ±
3. UNDERGROUND UTILITIES HAVE NOT BEEN SHOWN. BEFORE ANY SITE EVALUATION, PREPARATION OF DESIGN DOCUMENTS OR EXCAVATION IS TO BEGIN, THE LOCATION OF UNDERGROUND UTILITIES SHOULD BE VERIFIED BY THE PROPER UTILITY COMPANIES.
4. THIS PLAN IS BASED ON INFORMATION PROVIDED BY A SURVEY PREPARED IN THE FIELD BY CONTROL POINT ASSOCIATES, INC. AND OTHER REFERENCE MATERIAL AS LISTED HEREON.
5. THIS SURVEY WAS PREPARED WITH REFERENCE TO A COMMITMENT FOR TITLE INSURANCE PREPARED BY CHICAGO TITLE INSURANCE COMPANY, HAVING A COMMITMENT NO. 2121-0144, WITH AN EFFECTIVE DATE OF JUNE 10, 2021, WHERE THE FOLLOWING SURVEY RELATED EXCEPTIONS APPEAR IN SCHEDULE B - PART II:
6. BY GRAPHIC PLOTTING ONLY PROPERTY IS LOCATED IN FLOOD HAZARD ZONE "X-UNSHADED" (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) PER REF #2.
7. THE OFFSETS SHOWN ARE NOT TO BE USED FOR THE CONSTRUCTION OF ANY STRUCTURE, FENCE, PERMANENT ADDITION, ETC.

REFERENCES:

1. THE TAX ASSESSOR'S MAP OF CITY OF SOMERVILLE, MIDDLESEX COUNTY, MAP 70.
2. MAP ENTITLED "NATIONAL FLOOD INSURANCE PROGRAM, FIRM, FLOOD INSURANCE RATE MAP, MIDDLESEX COUNTY, MASSACHUSETTS (ALL JURISDICTIONS), PANEL 439 OF 656," MAP NUMBER 25017C0439E, EFFECTIVE DATE: JUNE 4, 2010.
3. MAP ENTITLED "PLAN OF LAND IN SOMERVILLE, MASS.", PREPARED BY: SCHOFIELD BROTHERS, INC., DATED: SEPTEMBER 25, 1975, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS AS PLAN 622 OF 1976.
4. MAP ENTITLED "SUBDIVISION OF LOTS 1, 2, 3 & 4 SHOWN ON PLAN 11193B FILED WITH CERT. OF TITLE NO. 24301 SOUTH REGISTRY DISTRICT OF MIDDLESEX COUNTY LAND IN SOMERVILLE", PREPARED BY: WILLIAM S. CROCKER, CIVIL ENGINEER, DATED: APRIL 8, 1946, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS LAND COURT AS PLAN 11193C.
5. MAP ENTITLED "SUBDIVISION OF LAND SHOWN ON PLANS 4706A & 11193A FILED WITH CERT. OF TITLE NOS. 4905 & 23119 SO. REGISTRY DISTRICT OF MIDDLESEX CO. LAND IN SOMERVILLE", PREPARED BY: ALFRED MILLHOUSE, C.E., DATED: NOVEMBER 1925, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS LAND COURT AS PLAN 11193B.
6. MAP ENTITLED "PLAN OF LAND IN SOMERVILLE", PREPARED BY: ALFRED MILLHOUSE, C.E., DATED: NOVEMBER 1925, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS LAND COURT AS PLAN 11193A.
7. MAP ENTITLED "PLAN OF BUILDING LOTS IN SOMERVILLE, MASS. OWNED BY RUFUS B. STICKNEY", PREPARED BY: GEO A. KIMBALL, CIVIL ENGINEER, DATED: FEBRUARY 18, 1888, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS IN PLAN BOOK 54, PLAN 39.
8. MAP ENTITLED "BUILDING LOTS IN SOMERVILLE, MASS. FORMERLY OWNED BY RUFUS B. STICKNEY", PREPARED BY: GEO A. KIMBALL, CIVIL ENGINEER, DATED: FEBRUARY 28, 1889, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS AT THE END OF PLAN BOOK 1900 AS PLAN 32 OF 1889.
9. UNDERGROUND GAS MAPPING PROVIDED BY: NATIONAL GRID, DATED: JUNE 7, 2021, MAP NO. SOM 2056.
10. UNDERGROUND ELECTRIC MAPPING PROVIDED BY: EVERSOURCE, ENTITLED "299-313 BROADWAY SOMERVILLE, MA T-PLAN".
11. UNDERGROUND WATER MAPPING PROVIDED BY THE CITY OF SOMERVILLE ENGINEERING DEPARTMENT, ENTITLED "CITY OF SOMERVILLE WATER WORKS SYSTEM", PREPARED BY: TIMOTHY F. HARRINGTON, WATER COMMISSIONER, DATED: OCTOBER 1937, LAST REVISED: JULY 2005.
12. MAP ENTITLED "SUBDIVISION OF LOTS A & B SHOWN ON PLAN FILED WITH CERT. OF TITLE 17138 SOUTH REGISTRY DISTRICT OF MIDDLESEX COUNTY LAND IN SOMERVILLE", PREPARED BY: CHAS J. ELLIOT, ENGINEER & SURVEYOR, DATED: FEBRUARY 3, 1926, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS LAND COURT AS PLAN 9976B.
13. MAP OF LAND IN SOMERVILLE ENTITLED "PLAN OF TON HILLS FRAM", PREPARED BY: ALEXANDER WARDSWORTH, DATED: MAY 18, 1942, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS IN PLAN BOOK 1-B, PLAN 48.
14. MAP ENTITLED "PLAN OF LAND IN SOMERVILLE, MASS", PREPARED BY: FRED W. GOULD, SURVEYOR, DATED: JULY 22, 1957, AND RECORDED WITH THE MIDDLESEX COUNTY REGISTRY OF DEEDS AS PLAN 1087 OF 1967.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

THE COMMONWEALTH OF MASSACHUSETTS REQUIRES NOTIFICATION BY EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE COMMONWEALTH.

THIS IS TO CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS. NO NEW RIGHT OF WAY LINES ARE BEING CREATED AND THOSE SHOWN ARE EXISTING AND ARE NOT BEING CHANGED OR ALTERED.

NOT A VALID ORIGINAL DOCUMENT UNLESS EMBOSSED WITH RAISED IMPRESSION OR STAMPED WITH A BLACK INK SEAL

COMMONWEALTH OF MASSACHUSETTS
GERRY L. HOLDRIGHT
NO. 49211
REGISTERED
PROFESSIONAL LAND SURVEYOR

10-31-2022
DATE

GERRY L. HOLDRIGHT, PLS
MASSACHUSETTS PROFESSIONAL LAND SURVEYOR #49211

FIELD DATE	LOT SPLIT PLAN OF LAND
6-18-2021	MARK DEVELOPMENT, LLC
FIELD BOOK NO. 21-01 MA	299 BROADWAY & 15 TEMPLE STREET LOT 27, BLOCK D, MAP 70 LOT 5, BLOCK D, MAP 70 CITY OF SOMERVILLE, MIDDLESEX COUNTY COMMONWEALTH OF MASSACHUSETTS
FIELD BOOK PG. 149-151	
FIELD CREW S.B.H.	CONTROL POINT ASSOCIATES, INC. 352 TURNPIKE ROAD SOUTHBOROUGH, MA 01772 508.948.3000 - 508.948.3003 FAX WWW.CPASURVEY.COM ALBANY, NY 518-217-5010 CHALFONT, PA 215-712-9800 HAUPPAUGE, NY 631-580-2645 MANHATTAN, NY 646-780-0411 MT LAUREL, NJ 609-857-2099 WARREN, NJ 908-668-0099
DRAWN: B.A.V./C.C	

REVIEWED:	APPROVED:	DATE	SCALE	FILE NO.	DWG. NO.
E-LOC	G.L.H.	10-31-2022	1" = 30'	03-210201-00	1 OF 1

45 Franklin Street, 5th Floor
Boston, MA 02110
617.849.8040

November 8, 2022

Brian C. Postlewaite, P.E., Assistant Director of Engineering
City of Somerville, Engineering Department
1 Franey Road
Somerville, MA 02145

Re: Preliminary Hydrology Analysis
299 Broadway, Somerville, MA

Dear Mr. Postlewaite:

On behalf of the Applicant, Mark Development, LLC, we are pleased to submit the Preliminary Hydrology Analysis and supporting materials for the proposed mixed-use development located at 299 Broadway, Somerville, MA (the "Site"). The provided analysis is based on the proposed site improvements detailed in the separately enclosed Site Development Plans dated November 8, 2022 prepared by Bohler. These preliminary calculations are based on the following assumptions and preliminary investigations performed in the field or via plans on record:

1. All soils assumed to be HSG C.
2. Minimum time of concentrations (t_c) assumed to be 5 minutes.
3. Under existing conditions, there are assumed to be two defined Design Points (DP). DP1 is defined as the series of combined sewer drain mains that collects stormwater from Temple Street, Sewall Street, and Grant Street. DP2 is defined as the downstream catch basin(s) on Broadway that appears to convey runoff to the combined sewer drain main in Broadway.
4. Existing and proposed areas is assumed to have approximately 116,610 square feet of impervious area with a Curve Number (CN) of 98. The proposed project is expected to result in a net decrease in impervious area.

Per the City of Sommerville "Engineering Site Permit Rules & Regulations," dated August 2020, the proposed analysis was completed using NOAA Point Precipitation Frequency Estimates at the Boston Logan International Airport obtained on 10/24/2022 for the following storm events:

- 1-yr, 6h = 1.64"
- 1-yr, 24h = 2.55"
- 2-yr, 24h = 3.16"
- 5-yr, 24h = 4.17"
- 10-yr, 24h = 5.01"
- 25-yr, 24h = 6.16"
- 100-yr, 24h = 7.94"

Table 1.1: Design Point 1 (DP1) Peak Runoff Rate Summary*

DP1	1-yr, 6h	1-yr, 24h	2-yr, 24h	5-yr, 24h	10-yr, 24h	25-yr, 24h	100-yr, 24h
Pre	11.12	6.75	8.42	11.18	13.46	16.58	21.41
Post	4.00	3.35	4.32	5.78	6.18	6.77	8.03
Δ	**-7.12**	**-3.40**	**-4.10**	**-5.40**	**-7.28**	**-9.81**	**-13.38**

**Flows are represented in cubic feet per second (cfs)*

Table 1.2: Design Point 2 (DP2) Peak Runoff Rate Summary*

DP2	1-yr, 6h	1-yr, 24h	2-yr, 24h	5-yr, 24h	10-yr, 24h	25-yr, 24h	100-yr, 24h
Pre	0.11	0.07	0.08	0.11	0.13	0.16	0.21
Post	0.07	0.04	0.05	0.07	0.08	0.10	0.13
Δ	**-0.04**	**-0.03**	**-0.03**	**-0.04**	**-0.05**	**-0.06**	**-0.08**

**Flows are represented in cubic feet per second (cfs)*

As outlined in **Table 1.1 & Table 1.2**, the development of the Site and the proposed stormwater management system have been designed so that post-development peak runoff rates are equal-to or below that of the pre-development conditions for the analyzed storm events. As required by the City of Sommerville, the peak runoff rates for the proposed 10-yr, 24h storm event are qual-to or below that of the existing 2-yr, 24h storm event.

Per preliminary analysis and recommendation provided by the project's Environmental Engineer, the presence of unsuitable soil throughout the Site prevents the safe infiltration of stormwater. Due to this, the proposed stormwater management system will not be able to reduce the total volume of runoff from the Site. The project requests a waiver for the requirement listed in the City of Sommerville "Engineering Site Permit Rules & Regulations," dated August 2020, stating that the proposed runoff volume for the 10-yr, 24h storm event meets that of the existing 2-yr, 24h storm event. The proposed stormwater management system will still provide a net reduction of peak flow for the analyzed storm events as required by the City of Sommerville. In addition, the net runoff volume from the project Site is expected to be reduced with the decrease in impervious area made by the proposed site improvements.

The proposed site improvements for the project Site will provide removal of Total Suspended Solids (TSS) via "treatment trains" which includes both non-structural and structural techniques. Street sweeping, deep sump manholes, hydrodynamic separators, and a propriety filtration unit will be used to improve water quality and provide TSS removal of at least 80%. As the project Site is unable to provide

BOHLER

treatment of Total Phosphorous (TP) via infiltration, a proprietary filtration unit is proposed to meet the required 50% removal rate required by the City of Sommerville.

The following is a summary of the proposed Retention Systems (RS) located throughout the project Site.

- RS1 – Retention System consisting of StormTrap SingleTrap 5'-0" units providing approximately 3,816 cubic feet of available storage.
- RS2 - Retention System consisting of StormTrap SingleTrap 4'-6" units providing approximately 3,012 cubic feet of available storage.
- RS3 – Retention System consisting of StormTrap SingleTrap 5'-0" units providing approximately 4,215 cubic feet of available storage.
- RS4 – Retention System consisting of StormTrap SingleTrap 5'-0" units providing approximately 2,511 cubic feet of available storage.
- RS5 – Retention System consisting of StormTrap SingleTrap 5'-0" units providing approximately 2,093 cubic feet of available storage.

The stormwater management system proposed for the project Site is expected to change as the design progresses further and more information is made available to the project. The updated designs and calculations will be provided accordingly. Should you have any questions or require additional information, please do not hesitate to contact by telephone at (617) 849-8040 or via email at apramanik@bohlereng.com.

Very truly yours,

BOHLER

Avi Pramanik, E.I.T.

Stephen Martorano, P.E.

Attachment A

NOAA Point Precipitation Data

NOAA Atlas 14, Volume 10, Version 3
Location name: East Boston, Massachusetts, USA*
Latitude: 42.3662°, Longitude: -71.0246°
Elevation: -7.54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.297 (0.242-0.364)	0.367 (0.298-0.449)	0.480 (0.389-0.591)	0.574 (0.462-0.711)	0.703 (0.545-0.922)	0.799 (0.606-1.08)	0.903 (0.661-1.28)	1.03 (0.699-1.48)	1.21 (0.790-1.82)	1.37 (0.869-2.11)
10-min	0.421 (0.343-0.516)	0.520 (0.423-0.637)	0.681 (0.551-0.838)	0.813 (0.654-1.01)	0.996 (0.772-1.31)	1.13 (0.857-1.53)	1.28 (0.937-1.81)	1.46 (0.990-2.10)	1.72 (1.12-2.58)	1.95 (1.23-2.99)
15-min	0.496 (0.404-0.607)	0.611 (0.497-0.749)	0.800 (0.648-0.984)	0.956 (0.769-1.18)	1.17 (0.908-1.54)	1.33 (1.01-1.80)	1.50 (1.10-2.13)	1.71 (1.17-2.47)	2.02 (1.32-3.04)	2.29 (1.45-3.51)
30-min	0.664 (0.541-0.813)	0.820 (0.667-1.00)	1.08 (0.871-1.32)	1.29 (1.03-1.59)	1.58 (1.22-2.07)	1.79 (1.36-2.42)	2.03 (1.49-2.87)	2.31 (1.57-3.33)	2.73 (1.78-4.10)	3.10 (1.96-4.75)
60-min	0.833 (0.679-1.02)	1.03 (0.838-1.26)	1.35 (1.09-1.66)	1.62 (1.30-2.00)	1.98 (1.54-2.60)	2.26 (1.71-3.04)	2.55 (1.87-3.61)	2.90 (1.98-4.18)	3.44 (2.24-5.17)	3.90 (2.47-5.99)
2-hr	1.08 (0.884-1.31)	1.35 (1.10-1.64)	1.79 (1.46-2.18)	2.15 (1.74-2.65)	2.66 (2.07-3.47)	3.03 (2.31-4.06)	3.43 (2.54-4.84)	3.94 (2.69-5.62)	4.72 (3.08-7.01)	5.40 (3.43-8.20)
3-hr	1.26 (1.03-1.52)	1.58 (1.30-1.91)	2.09 (1.71-2.55)	2.53 (2.05-3.09)	3.12 (2.44-4.05)	3.55 (2.72-4.75)	4.03 (3.00-5.67)	4.63 (3.17-6.57)	5.57 (3.64-8.22)	6.38 (4.06-9.63)
6-hr	1.64 (1.36-1.98)	2.05 (1.69-2.46)	2.71 (2.23-3.27)	3.25 (2.66-3.96)	4.00 (3.16-5.16)	4.56 (3.51-6.04)	5.16 (3.85-7.18)	5.92 (4.07-8.32)	7.10 (4.66-10.4)	8.13 (5.19-12.1)
12-hr	2.12 (1.77-2.53)	2.61 (2.17-3.12)	3.42 (2.83-4.10)	4.09 (3.37-4.93)	5.01 (3.97-6.39)	5.68 (4.40-7.45)	6.43 (4.81-8.82)	7.34 (5.07-10.2)	8.74 (5.75-12.6)	9.95 (6.37-14.7)
24-hr	2.55 (2.14-3.02)	3.16 (2.66-3.76)	4.17 (3.49-4.98)	5.01 (4.16-6.01)	6.16 (4.92-7.82)	7.01 (5.46-9.13)	7.94 (5.99-10.8)	9.11 (6.31-12.5)	10.9 (7.22-15.6)	12.5 (8.03-18.2)
2-day	2.87 (2.43-3.39)	3.65 (3.08-4.31)	4.92 (4.14-5.82)	5.97 (4.98-7.11)	7.42 (5.97-9.37)	8.48 (6.66-11.0)	9.65 (7.36-13.2)	11.2 (7.78-15.3)	13.7 (9.05-19.3)	15.9 (10.2-22.9)
3-day	3.14 (2.67-3.69)	3.98 (3.38-4.68)	5.34 (4.51-6.30)	6.48 (5.43-7.68)	8.04 (6.49-10.1)	9.17 (7.24-11.9)	10.4 (8.00-14.2)	12.1 (8.44-16.4)	14.8 (9.84-20.8)	17.3 (11.1-24.7)
4-day	3.40 (2.90-3.98)	4.26 (3.63-4.99)	5.67 (4.80-6.66)	6.83 (5.74-8.08)	8.44 (6.83-10.6)	9.60 (7.60-12.4)	10.9 (8.38-14.8)	12.6 (8.82-17.0)	15.5 (10.3-21.6)	18.0 (11.6-25.6)
7-day	4.12 (3.53-4.79)	5.00 (4.28-5.83)	6.45 (5.49-7.54)	7.65 (6.46-8.99)	9.30 (7.57-11.6)	10.5 (8.35-13.4)	11.9 (9.13-15.9)	13.6 (9.55-18.2)	16.6 (11.0-22.9)	19.2 (12.4-27.0)
10-day	4.77 (4.10-5.53)	5.68 (4.88-6.59)	7.16 (6.12-8.34)	8.39 (7.12-9.83)	10.1 (8.22-12.4)	11.3 (9.00-14.3)	12.7 (9.76-16.8)	14.5 (10.2-19.2)	17.4 (11.6-23.8)	19.9 (12.9-27.9)
20-day	6.67 (5.78-7.68)	7.67 (6.63-8.84)	9.29 (7.99-10.7)	10.6 (9.08-12.4)	12.5 (10.2-15.2)	13.9 (11.0-17.2)	15.4 (11.7-19.8)	17.1 (12.1-22.4)	19.6 (13.2-26.6)	21.7 (14.1-30.1)
30-day	8.25 (7.17-9.46)	9.31 (8.08-10.7)	11.1 (9.55-12.7)	12.5 (10.7-14.5)	14.5 (11.8-17.4)	16.0 (12.7-19.6)	17.5 (13.3-22.2)	19.2 (13.7-25.0)	21.5 (14.5-28.9)	23.3 (15.2-32.0)
45-day	10.2 (8.93-11.7)	11.4 (9.91-13.0)	13.2 (11.5-15.2)	14.8 (12.7-17.0)	16.9 (13.9-20.1)	18.6 (14.7-22.5)	20.2 (15.2-25.1)	21.8 (15.5-28.1)	23.8 (16.1-31.8)	25.3 (16.5-34.4)
60-day	11.9 (10.4-13.6)	13.1 (11.5-14.9)	15.1 (13.1-17.2)	16.7 (14.4-19.2)	18.9 (15.5-22.4)	20.7 (16.4-24.9)	22.3 (16.9-27.6)	23.9 (17.1-30.7)	25.7 (17.5-34.2)	27.0 (17.7-36.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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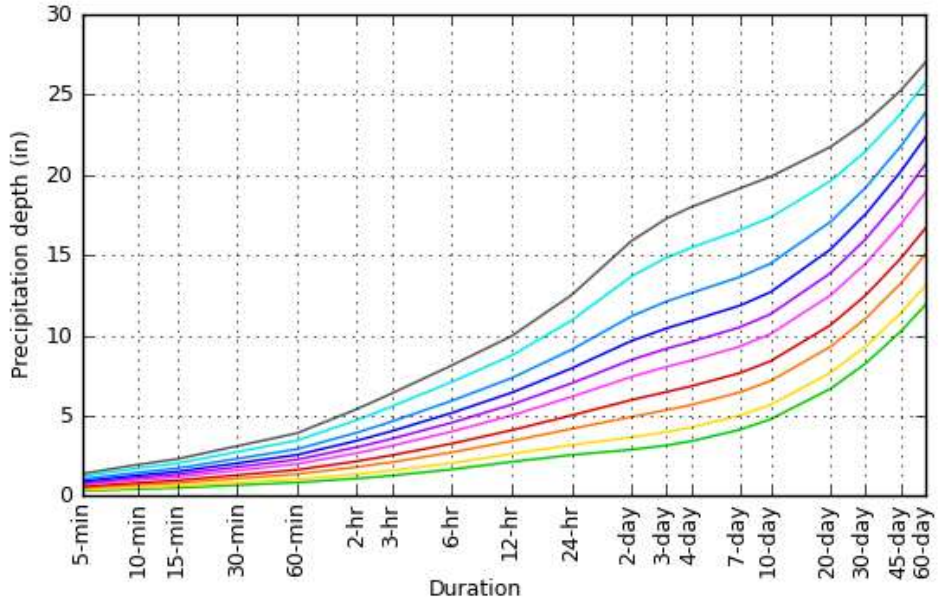
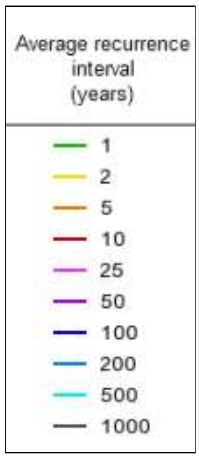
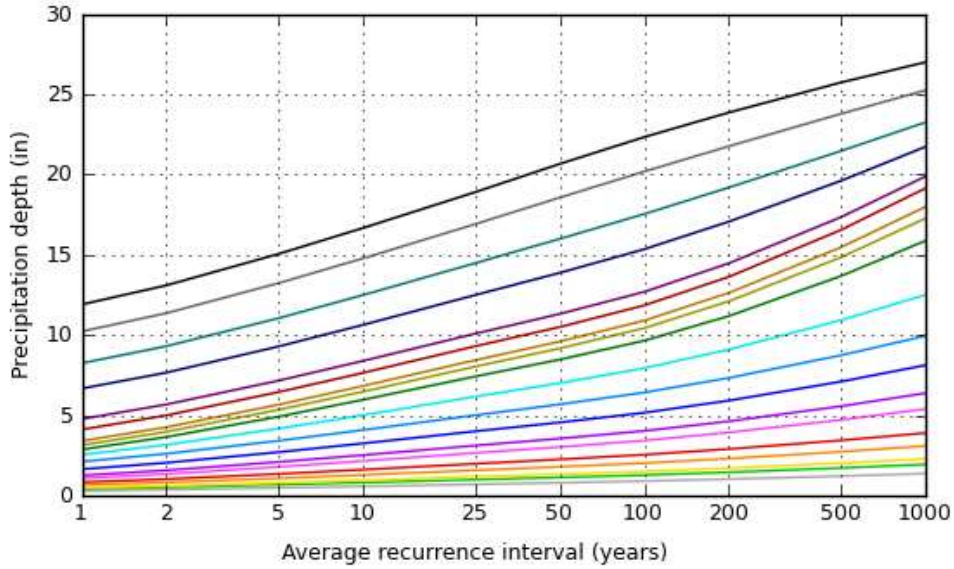
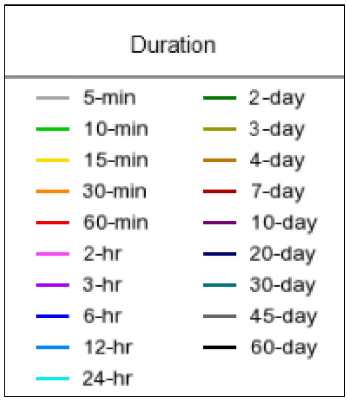
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.3662°, Longitude: -71.0246°









NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Mon Oct 24 17:19:35 2022

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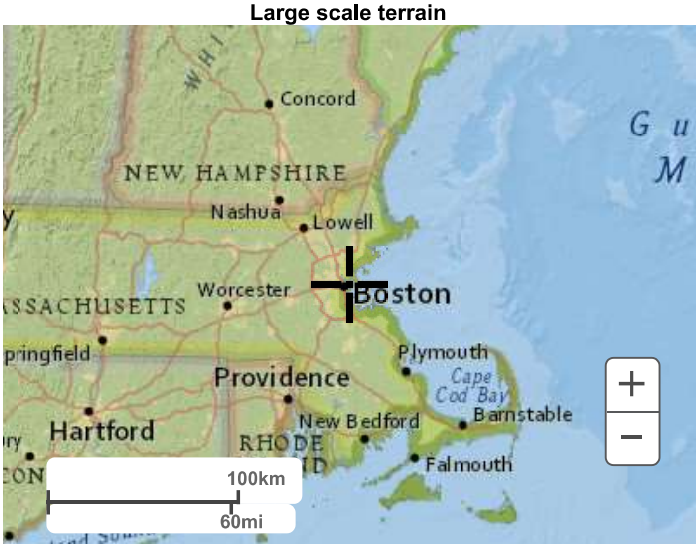
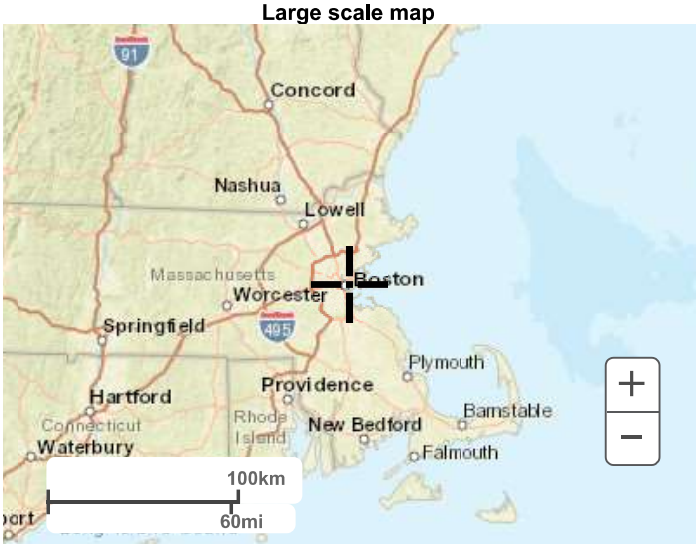
Maps & aerials

Small scale terrain

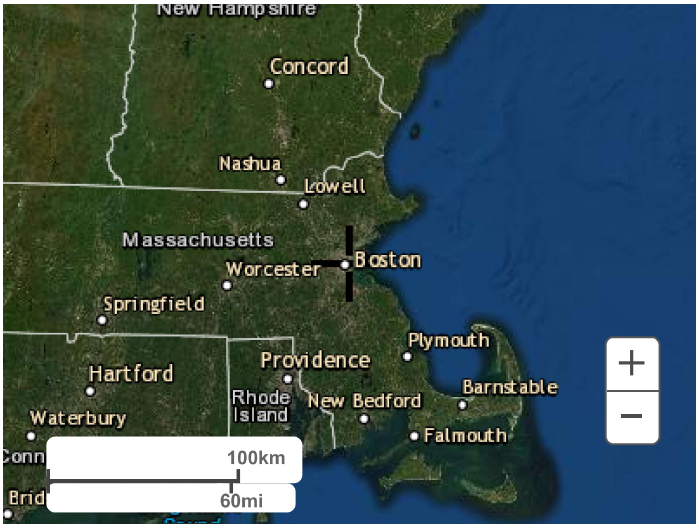
Large scale terrain



Large scale map



Large scale aerial



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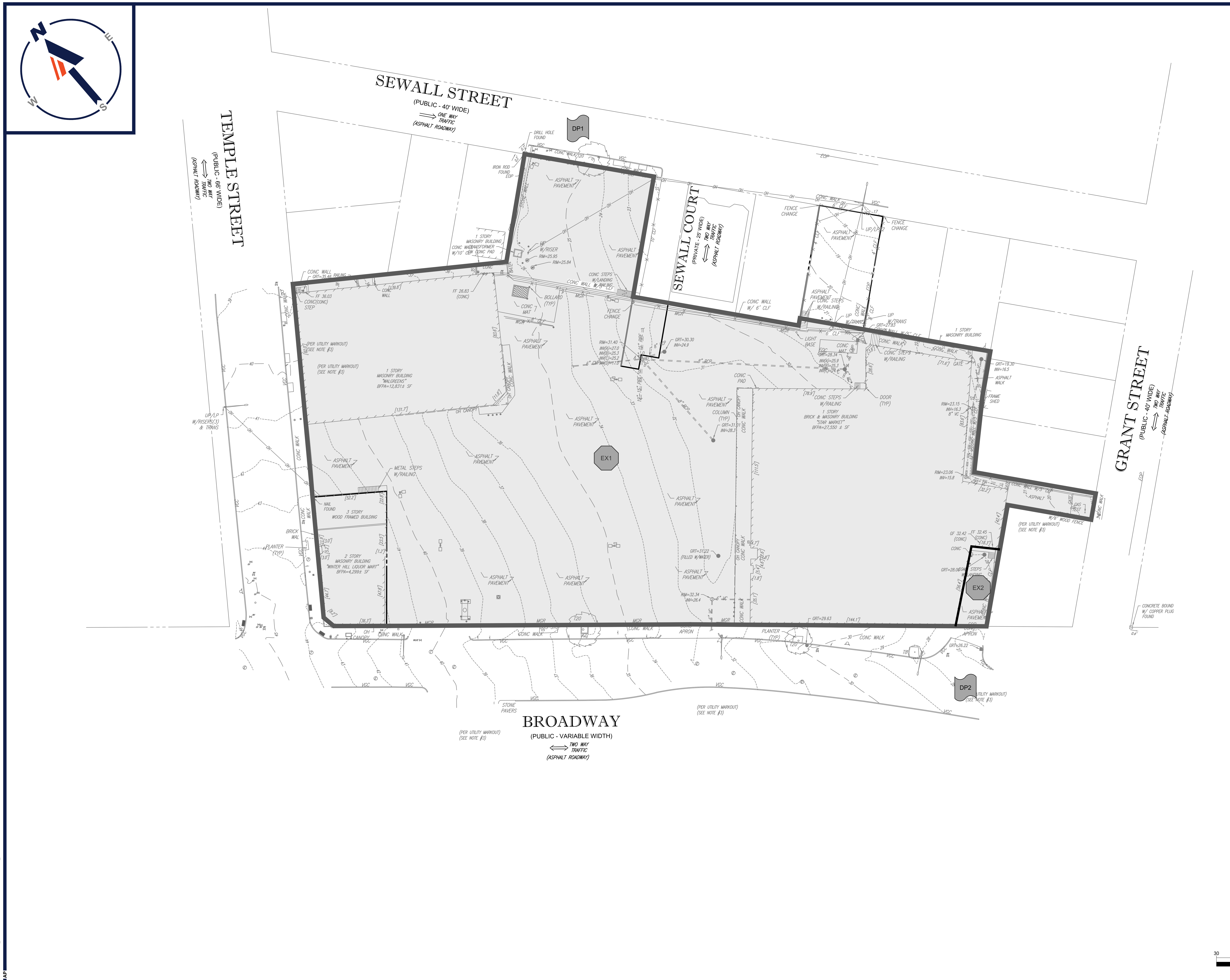
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Attachment B

Pre-Development Stormwater Analysis



LEGEND

DP#	DESIGN POINT
EX-#	EXISTING SUBCATCHMENT
XX#	BASIN OR MODELED DRAINAGE STRUCTURE
A/B/C/D	HYDROLOGIC SOIL GROUP RATING
UNIT	NRCS SOIL MAP UNIT
X-#	SWALE OR MODELED JUNCTION
	OVERALL ANALYSIS BOUNDARY
	SUBCATCHMENT BOUNDARY
	NRCS SOIL BOUNDARY
	TIME OF CONCENTRATION
	CONCRETE OR PAVEMENT
	ROOF
	SURFACE WATER (IMPERVIOUS)
	GRASS OR LANDSCAPED AREA
	UNIT PAVER OR GRAVEL (PERVIOUS)
	WOODS OR UNDEVELOPED AREA

BOHLER//

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

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ALWAYS CALL 811
It's fast. It's free. It's the law.

FOR EXHIBIT PURPOSES ONLY

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	M211074
DRAWN BY:	JJW
CHECKED BY:	SPM
DATE:	11/01/22
CAD I.D.:	M211074-X-TTB

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

MARK DEVELOPMENT, LLC

PROPOSED DEVELOPMENT

MAP: 70, BLOCK: D, LOTS: 5 & 27
299 BROADWAY,
CITY OF SOMERVILLE,
MIDDLESEX COUNTY,
MASSACHUSETTS 02145

BOHLER//
45 FRANKLIN STREET, 5th FLOOR
BOSTON, MA 02110
Phone: (617) 849-8040
www.BohlerEngineering.com

SHEET TITLE:

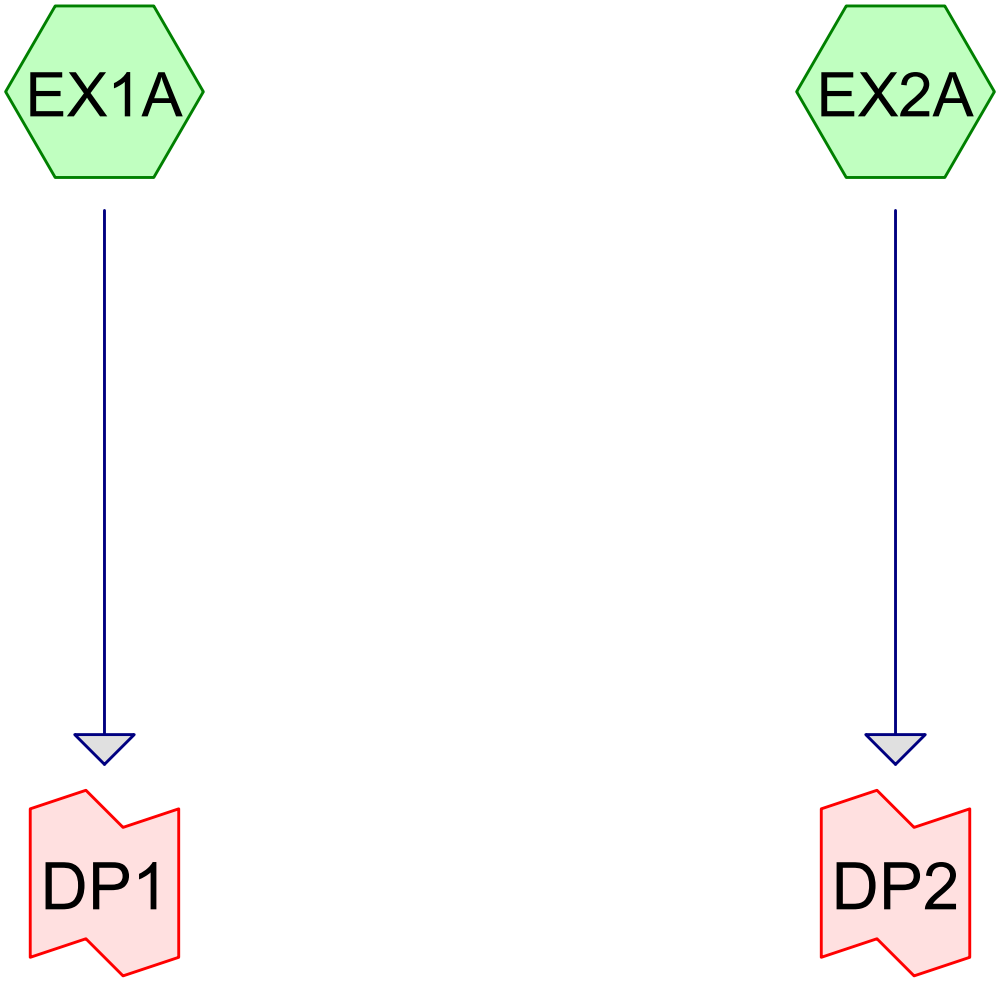
EXISTING CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:

EXDAM

ORG. DATE - 11/01/22

C:\PROGRAMDATA_BOHLER\C3D2022NE\TEMP\ACPUBLISH_15660\UNSAVED DRAWING1----->LAYOUT: EXDAM



Subcat Reach Pond Link

Routing Diagram for M211074_Pre-2c
Prepared by Bohler Engineering, Printed 11/2/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.649	98	Paved parking, HSG C (EX1A, EX2A)
1.028	98	Roofs, HSG C (EX1A)
2.677	**98**	**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=11.12 cfs 0.313 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.11 cfs 0.003 af

Link DP1: Inflow=11.12 cfs 0.313 af
Primary=11.12 cfs 0.313 af

Link DP2: Inflow=0.11 cfs 0.003 af
Primary=0.11 cfs 0.003 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.316 af Average Runoff Depth = 1.42"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 11.12 cfs @ 3.07 hrs, Volume= 0.313 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.11 cfs @ 3.07 hrs, Volume= 0.003 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 11.12 cfs @ 3.07 hrs, Volume= 0.313 af
Primary = 11.12 cfs @ 3.07 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 0.11 cfs @ 3.07 hrs, Volume= 0.003 af
Primary = 0.11 cfs @ 3.07 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=6.75 cfs 0.513 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.07 cfs 0.005 af

Link DP1: Inflow=6.75 cfs 0.513 af
Primary=6.75 cfs 0.513 af

Link DP2: Inflow=0.07 cfs 0.005 af
Primary=0.07 cfs 0.005 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.518 af Average Runoff Depth = 2.32"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 6.75 cfs @ 12.07 hrs, Volume= 0.513 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 6.75 cfs @ 12.07 hrs, Volume= 0.513 af
Primary = 6.75 cfs @ 12.07 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af
Primary = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=8.42 cfs 0.647 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.08 cfs 0.006 af

Link DP1: Inflow=8.42 cfs 0.647 af
Primary=8.42 cfs 0.647 af

Link DP2: Inflow=0.08 cfs 0.006 af
Primary=0.08 cfs 0.006 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.653 af Average Runoff Depth = 2.93"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 8.42 cfs @ 12.07 hrs, Volume= 0.647 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 8.42 cfs @ 12.07 hrs, Volume= 0.647 af
Primary = 8.42 cfs @ 12.07 hrs, Volume= 0.647 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
Primary = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=11.18 cfs 0.869 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.11 cfs 0.009 af

Link DP1: Inflow=11.18 cfs 0.869 af
Primary=11.18 cfs 0.869 af

Link DP2: Inflow=0.11 cfs 0.009 af
Primary=0.11 cfs 0.009 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.878 af Average Runoff Depth = 3.93"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 11.18 cfs @ 12.07 hrs, Volume= 0.869 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 0.009 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 11.18 cfs @ 12.07 hrs, Volume= 0.869 af
Primary = 11.18 cfs @ 12.07 hrs, Volume= 0.869 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.009 af
Primary = 0.11 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=13.46 cfs 1.054 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.13 cfs 0.010 af

Link DP1: Inflow=13.46 cfs 1.054 af
Primary=13.46 cfs 1.054 af

Link DP2: Inflow=0.13 cfs 0.010 af
Primary=0.13 cfs 0.010 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.065 af Average Runoff Depth = 4.77"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 13.46 cfs @ 12.07 hrs, Volume= 1.054 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 13.46 cfs @ 12.07 hrs, Volume= 1.054 af
Primary = 13.46 cfs @ 12.07 hrs, Volume= 1.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af
Primary = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=16.58 cfs 1.308 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.16 cfs 0.013 af

Link DP1: Inflow=16.58 cfs 1.308 af
Primary=16.58 cfs 1.308 af

Link DP2: Inflow=0.16 cfs 0.013 af
Primary=0.16 cfs 0.013 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.321 af Average Runoff Depth = 5.92"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 16.58 cfs @ 12.07 hrs, Volume= 1.308 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.16 cfs @ 12.07 hrs, Volume= 0.013 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 16.58 cfs @ 12.07 hrs, Volume= 1.308 af
Primary = 16.58 cfs @ 12.07 hrs, Volume= 1.308 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 0.16 cfs @ 12.07 hrs, Volume= 0.013 af
Primary = 0.16 cfs @ 12.07 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1A: Runoff Area=115,480 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=21.41 cfs 1.701 af

Subcatchment EX2A: Runoff Area=1,130 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=0.21 cfs 0.017 af

Link DP1: Inflow=21.41 cfs 1.701 af
Primary=21.41 cfs 1.701 af

Link DP2: Inflow=0.21 cfs 0.017 af
Primary=0.21 cfs 0.017 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.718 af Average Runoff Depth = 7.70"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment EX1A:

Runoff = 21.41 cfs @ 12.07 hrs, Volume= 1.701 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
44,800	98	Roofs, HSG C
70,680	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
115,480		Weighted Average
115,480		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment EX2A:

Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,130	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
1,130		Weighted Average
1,130		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Link DP1:

Inflow Area = 2.651 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 21.41 cfs @ 12.07 hrs, Volume= 1.701 af
Primary = 21.41 cfs @ 12.07 hrs, Volume= 1.701 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

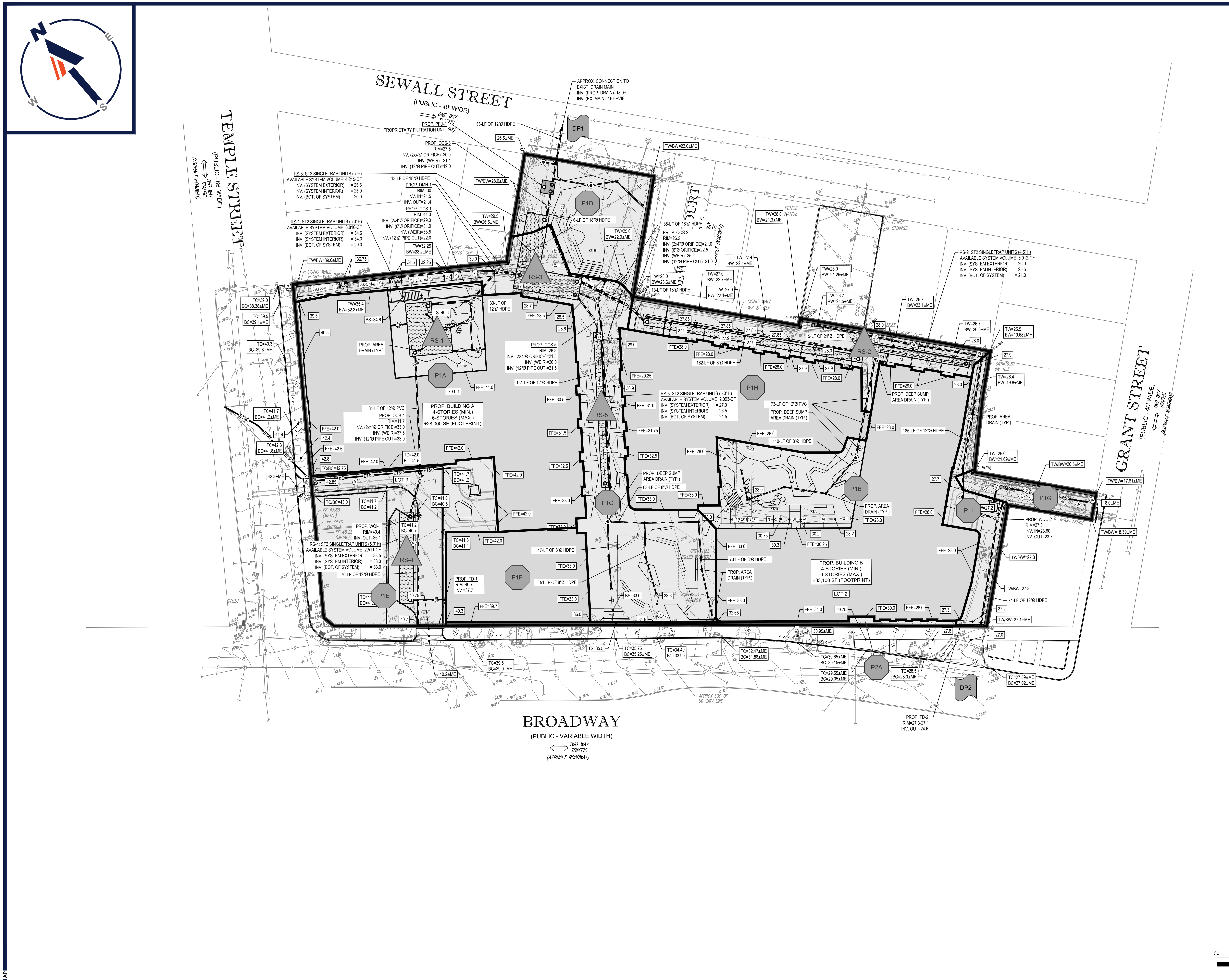
Summary for Link DP2:

Inflow Area = 0.026 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af
Primary = 0.21 cfs @ 12.07 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Attachment C

Post-Development Stormwater Analysis



LEGEND

Symbol	Description
DP#	DESIGN POINT
EX-#	EXISTING SUBCATCHMENT
XX#	BASIN OR MODELED DRAINAGE STRUCTURE
A/B/C/D	HYDROLOGIC SOIL GROUP RATING
UNIT	NRCS SOIL MAP UNIT
X-#	SWALE OR MODELED JUNCTION
	OVERALL ANALYSIS BOUNDARY
	SUBCATCHMENT BOUNDARY
	NRCS SOIL BOUNDARY
	TIME OF CONCENTRATION
	CONCRETE OR PAVEMENT
	ROOF
	SURFACE WATER (IMPERVIOUS)
	GRASS OR LANDSCAPED AREA
	UNIT PAVER OR GRAVEL (PERVIOUS)
	WOODS OR UNDEVELOPED AREA

BOHLER//

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

811
Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

FOR EXHIBIT PURPOSES ONLY

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	M211074
DRAWN BY:	JJW
CHECKED BY:	SPM
DATE:	11/01/22
CAD I.D.:	M211074-X-TTB

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

MARK DEVELOPMENT, LLC

PROPOSED DEVELOPMENT

MAP: 70, BLOCK: D, LOTS: 5 & 27
299 BROADWAY,
CITY OF SOMERVILLE,
MIDDLESEX COUNTY,
MASSACHUSETTS 02145

BOHLER//

45 FRANKLIN STREET, 5th FLOOR
BOSTON, MA 02110
Phone: (617) 849-8040

www.BohlerEngineering.com

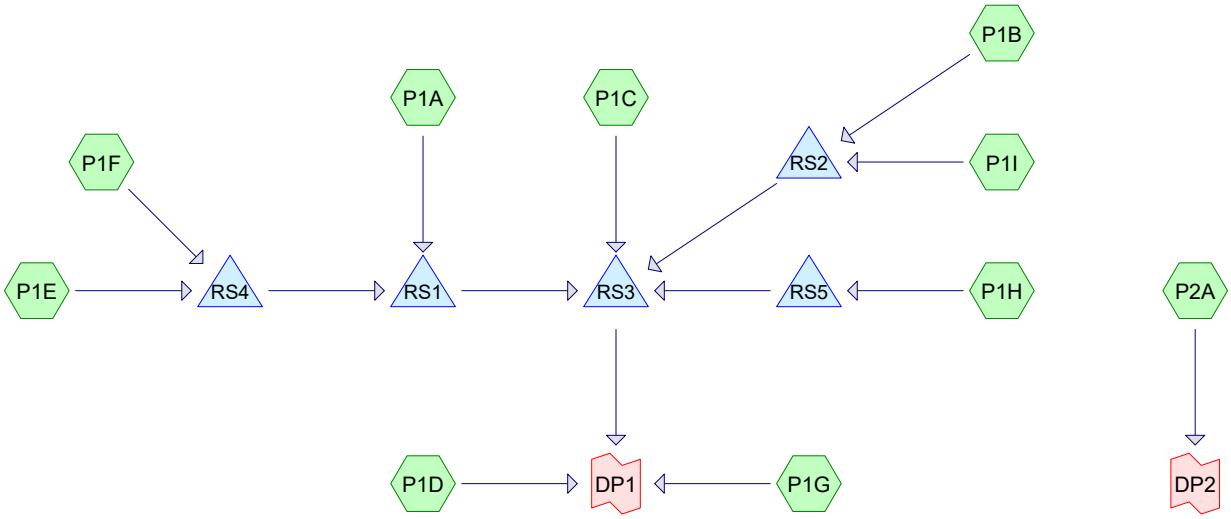
SHEET TITLE:

PROPOSED CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:

PRDAM

ORG. DATE - 11/01/22



Subcat Reach Pond Link

Routing Diagram for M211074_Post-2c
Prepared by Bohler Engineering, Printed 11/2/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.175	98	Paved parking, HSG C (P1A, P1B, P1C, P1D, P1E, P1G, P1I, P2A)
1.502	98	Roofs, HSG C (P1A, P1B, P1E, P1F, P1H)
2.677	**98**	**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=2.55 cfs 0.072 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=2.95 cfs 0.083 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=1.54 cfs 0.043 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.60 cfs 0.017 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=1.10 cfs 0.031 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.61 cfs 0.017 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.16 cfs 0.004 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=1.38 cfs 0.039 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.28 cfs 0.008 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=1.42"
Tc=5.0 min CN=WQ Runoff=0.07 cfs 0.002 af

Pond RS1: Peak Elev=30.67' Storage=1,296 cf Inflow=2.92 cfs 0.120 af
Outflow=1.03 cfs 0.120 af

Pond RS2: Peak Elev=22.87' Storage=1,277 cf Inflow=3.23 cfs 0.091 af
Outflow=1.22 cfs 0.091 af

Pond RS3: Peak Elev=21.74' Storage=1,502 cf Inflow=3.67 cfs 0.293 af
Outflow=3.61 cfs 0.293 af

Pond RS4: Peak Elev=34.48' Storage=762 cf Inflow=1.71 cfs 0.048 af
Outflow=0.48 cfs 0.048 af

Pond RS5: Peak Elev=22.42' Storage=397 cf Inflow=1.38 cfs 0.039 af
Outflow=0.69 cfs 0.039 af

Link DP1: Inflow=4.00 cfs 0.314 af
Primary=4.00 cfs 0.314 af

Link DP2: Inflow=0.07 cfs 0.002 af
Primary=0.07 cfs 0.002 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.316 af Average Runoff Depth = 1.42"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 2.55 cfs @ 3.07 hrs, Volume= 0.072 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 2.95 cfs @ 3.07 hrs, Volume= 0.083 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 1.54 cfs @ 3.07 hrs, Volume= 0.043 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.60 cfs @ 3.07 hrs, Volume= 0.017 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 1.10 cfs @ 3.07 hrs, Volume= 0.031 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.61 cfs @ 3.07 hrs, Volume= 0.017 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.16 cfs @ 3.07 hrs, Volume= 0.004 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 1.38 cfs @ 3.07 hrs, Volume= 0.039 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.28 cfs @ 3.07 hrs, Volume= 0.008 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.07 cfs @ 3.07 hrs, Volume= 0.002 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 6.00 hrs 1-Year 6hr Rainfall=1.64"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 2.92 cfs @ 3.07 hrs, Volume= 0.120 af
Outflow = 1.03 cfs @ 3.22 hrs, Volume= 0.120 af, Atten= 65%, Lag= 9.2 min
Primary = 1.03 cfs @ 3.22 hrs, Volume= 0.120 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 30.67' @ 3.22 hrs Surf.Area= 882 sf Storage= 1,296 cf

Plug-Flow detention time= 19.1 min calculated for 0.120 af (100% of inflow)
Center-of-Mass det. time= 19.0 min (225.5 - 206.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.03 cfs @ 3.22 hrs HW=30.67' TW=21.71' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.03 cfs of 9.54 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 1.03 cfs @ 5.91 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 3.23 cfs @ 3.07 hrs, Volume= 0.091 af
Outflow = 1.22 cfs @ 3.17 hrs, Volume= 0.091 af, Atten= 62%, Lag= 6.3 min
Primary = 1.22 cfs @ 3.17 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.87' @ 3.17 hrs Surf.Area= 795 sf Storage= 1,277 cf

Plug-Flow detention time= 21.5 min calculated for 0.091 af (100% of inflow)
Center-of-Mass det. time= 21.8 min (218.2 - 196.4)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.22 cfs @ 3.17 hrs HW=22.87' TW=21.74' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.22 cfs of 6.92 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.90 cfs @ 5.13 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.33 cfs @ 2.08 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 3.67 cfs @ 3.13 hrs, Volume= 0.293 af
Outflow = 3.61 cfs @ 3.15 hrs, Volume= 0.293 af, Atten= 2%, Lag= 1.5 min
Primary = 3.61 cfs @ 3.15 hrs, Volume= 0.293 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.74' @ 3.15 hrs Surf.Area= 974 sf Storage= 1,502 cf

Plug-Flow detention time= 16.0 min calculated for 0.293 af (100% of inflow)

Center-of-Mass det. time= 15.0 min (232.3 - 217.3)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.60 cfs @ 3.15 hrs HW=21.74' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.60 cfs of 4.99 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.05 cfs @ 6.04 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.55 cfs @ 1.91 fps)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 1.71 cfs @ 3.07 hrs, Volume= 0.048 af
Outflow = 0.48 cfs @ 3.19 hrs, Volume= 0.048 af, Atten= 72%, Lag= 7.7 min
Primary = 0.48 cfs @ 3.19 hrs, Volume= 0.048 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 34.48' @ 3.19 hrs Surf.Area= 601 sf Storage= 762 cf

Plug-Flow detention time= 24.6 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 25.0 min (221.4 - 196.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.48 cfs @ 3.19 hrs HW=34.48' TW=30.66' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.48 cfs of 3.30 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.52 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 1.38 cfs @ 3.07 hrs, Volume= 0.039 af
Outflow = 0.69 cfs @ 3.14 hrs, Volume= 0.039 af, Atten= 50%, Lag= 4.7 min
Primary = 0.69 cfs @ 3.14 hrs, Volume= 0.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.42' @ 3.15 hrs Surf.Area= 504 sf Storage= 397 cf

Plug-Flow detention time= 16.1 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 16.5 min (212.9 - 196.4)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.69 cfs @ 3.14 hrs HW=22.42' TW=21.74' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.69 cfs of 1.51 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.69 cfs @ 3.97 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 4.00 cfs @ 3.14 hrs, Volume= 0.314 af
Primary = 4.00 cfs @ 3.14 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 1.42" for 1-Year 6hr event
Inflow = 0.07 cfs @ 3.07 hrs, Volume= 0.002 af
Primary = 0.07 cfs @ 3.07 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=1.55 cfs 0.118 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=1.79 cfs 0.136 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.93 cfs 0.071 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.36 cfs 0.028 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.67 cfs 0.051 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.37 cfs 0.028 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.10 cfs 0.007 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.83 cfs 0.063 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.17 cfs 0.013 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=2.32"
Tc=5.0 min CN=WQ Runoff=0.04 cfs 0.003 af

Pond RS1: Peak Elev=30.52' Storage=1,179 cf Inflow=1.92 cfs 0.196 af
Outflow=0.98 cfs 0.196 af

Pond RS2: Peak Elev=22.67' Storage=1,141 cf Inflow=1.96 cfs 0.149 af
Outflow=0.92 cfs 0.149 af

Pond RS3: Peak Elev=21.68' Storage=1,454 cf Inflow=3.03 cfs 0.480 af
Outflow=2.99 cfs 0.479 af

Pond RS4: Peak Elev=34.26' Storage=651 cf Inflow=1.04 cfs 0.079 af
Outflow=0.44 cfs 0.079 af

Pond RS5: Peak Elev=22.18' Storage=294 cf Inflow=0.83 cfs 0.063 af
Outflow=0.59 cfs 0.063 af

Link DP1: Inflow=3.35 cfs 0.514 af
Primary=3.35 cfs 0.514 af

Link DP2: Inflow=0.04 cfs 0.003 af
Primary=0.04 cfs 0.003 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.518 af Average Runoff Depth = 2.32"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 1.55 cfs @ 12.07 hrs, Volume= 0.118 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 1.79 cfs @ 12.07 hrs, Volume= 0.136 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 0.93 cfs @ 12.07 hrs, Volume= 0.071 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.051 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 0.83 cfs @ 12.07 hrs, Volume= 0.063 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 0.013 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year 24hr Rainfall=2.55"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 1.92 cfs @ 12.07 hrs, Volume= 0.196 af
Outflow = 0.98 cfs @ 12.31 hrs, Volume= 0.196 af, Atten= 49%, Lag= 14.4 min
Primary = 0.98 cfs @ 12.31 hrs, Volume= 0.196 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 30.52' @ 12.31 hrs Surf.Area= 882 sf Storage= 1,179 cf

Plug-Flow detention time= 20.5 min calculated for 0.196 af (100% of inflow)
Center-of-Mass det. time= 20.3 min (791.9 - 771.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.98 cfs @ 12.31 hrs HW=30.52' TW=21.65' (Dynamic Tailwater)
↑└─**1=Culvert** (Passes 0.98 cfs of 9.45 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.98 cfs @ 5.60 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 1.96 cfs @ 12.07 hrs, Volume= 0.149 af
Outflow = 0.92 cfs @ 12.21 hrs, Volume= 0.149 af, Atten= 53%, Lag= 8.6 min
Primary = 0.92 cfs @ 12.21 hrs, Volume= 0.149 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.67' @ 12.21 hrs Surf.Area= 795 sf Storage= 1,141 cf

Plug-Flow detention time= 24.1 min calculated for 0.149 af (100% of inflow)
Center-of-Mass det. time= 24.0 min (784.6 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.92 cfs @ 12.21 hrs HW=22.67' TW=21.68' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.92 cfs of 6.06 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.84 cfs @ 4.80 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.42 fps)
  - **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 3.03 cfs @ 12.11 hrs, Volume= 0.480 af
Outflow = 2.99 cfs @ 12.15 hrs, Volume= 0.479 af, Atten= 1%, Lag= 2.3 min
Primary = 2.99 cfs @ 12.15 hrs, Volume= 0.479 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.68' @ 12.15 hrs Surf.Area= 974 sf Storage= 1,454 cf

Plug-Flow detention time= 17.4 min calculated for 0.479 af (100% of inflow)

Center-of-Mass det. time= 16.4 min (800.0 - 783.6)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.99 cfs @ 12.15 hrs HW=21.68' TW=0.00' (Dynamic Tailwater)
↑└─**1=Culvert** (Passes 2.99 cfs of 4.93 cfs potential flow)
↑ ├─**2=Orifice/Grate** (Orifice Controls 1.04 cfs @ 5.93 fps)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.96 cfs @ 1.74 fps)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 1.04 cfs @ 12.07 hrs, Volume= 0.079 af
Outflow = 0.44 cfs @ 12.24 hrs, Volume= 0.079 af, Atten= 58%, Lag= 10.3 min
Primary = 0.44 cfs @ 12.24 hrs, Volume= 0.079 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 34.26' @ 12.24 hrs Surf.Area= 601 sf Storage= 651 cf

Plug-Flow detention time= 27.8 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 27.8 min (788.3 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.44 cfs @ 12.24 hrs HW=34.26' TW=30.50' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.44 cfs of 2.92 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.44 cfs @ 5.04 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 0.063 af
Outflow = 0.59 cfs @ 12.14 hrs, Volume= 0.063 af, Atten= 29%, Lag= 4.2 min
Primary = 0.59 cfs @ 12.14 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.18' @ 12.14 hrs Surf.Area= 504 sf Storage= 294 cf

Plug-Flow detention time= 21.2 min calculated for 0.063 af (100% of inflow)
Center-of-Mass det. time= 20.9 min (781.4 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.59 cfs @ 12.14 hrs HW=22.18' TW=21.68' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.59 cfs of 0.84 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.59 cfs @ 3.40 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 3.35 cfs @ 12.12 hrs, Volume= 0.514 af
Primary = 3.35 cfs @ 12.12 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 2.32" for 1-Year 24hr event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af
Primary = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=1.93 cfs 0.148 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=2.23 cfs 0.171 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=1.16 cfs 0.089 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.45 cfs 0.035 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.84 cfs 0.064 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.46 cfs 0.035 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.12 cfs 0.009 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=1.04 cfs 0.080 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.21 cfs 0.016 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=2.93"
Tc=5.0 min CN=WQ Runoff=0.05 cfs 0.004 af

Pond RS1: Peak Elev=30.99' Storage=1,541 cf Inflow=2.36 cfs 0.248 af
Outflow=1.13 cfs 0.248 af

Pond RS2: Peak Elev=23.01' Storage=1,372 cf Inflow=2.45 cfs 0.188 af
Outflow=1.42 cfs 0.188 af

Pond RS3: Peak Elev=21.77' Storage=1,524 cf Inflow=3.96 cfs 0.605 af
Outflow=3.91 cfs 0.605 af

Pond RS4: Peak Elev=34.65' Storage=851 cf Inflow=1.30 cfs 0.100 af
Outflow=0.51 cfs 0.099 af

Pond RS5: Peak Elev=22.40' Storage=386 cf Inflow=1.04 cfs 0.080 af
Outflow=0.67 cfs 0.080 af

Link DP1: Inflow=4.32 cfs 0.649 af
Primary=4.32 cfs 0.649 af

Link DP2: Inflow=0.05 cfs 0.004 af
Primary=0.05 cfs 0.004 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.653 af Average Runoff Depth = 2.93"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 1.93 cfs @ 12.07 hrs, Volume= 0.148 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 2.23 cfs @ 12.07 hrs, Volume= 0.171 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 1.16 cfs @ 12.07 hrs, Volume= 0.089 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.035 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 0.84 cfs @ 12.07 hrs, Volume= 0.064 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.035 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 0.009 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 1.04 cfs @ 12.07 hrs, Volume= 0.080 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year 24hr Rainfall=3.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 2.36 cfs @ 12.07 hrs, Volume= 0.248 af
Outflow = 1.13 cfs @ 12.34 hrs, Volume= 0.248 af, Atten= 52%, Lag= 16.1 min
Primary = 1.13 cfs @ 12.34 hrs, Volume= 0.248 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 30.99' @ 12.34 hrs Surf.Area= 882 sf Storage= 1,541 cf

Plug-Flow detention time= 20.4 min calculated for 0.248 af (100% of inflow)
Center-of-Mass det. time= 20.1 min (786.7 - 766.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.13 cfs @ 12.34 hrs HW=30.99' TW=21.71' (Dynamic Tailwater)
↑**1=Culvert** (Passes 1.13 cfs of 9.72 cfs potential flow)
- **2=Orifice/Grate** (Orifice Controls 1.13 cfs @ 6.50 fps)
- **3=Orifice/Grate** (Controls 0.00 cfs)
- **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 2.45 cfs @ 12.07 hrs, Volume= 0.188 af
Outflow = 1.42 cfs @ 12.17 hrs, Volume= 0.188 af, Atten= 42%, Lag= 6.0 min
Primary = 1.42 cfs @ 12.17 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.01' @ 12.17 hrs Surf.Area= 795 sf Storage= 1,372 cf

Plug-Flow detention time= 22.6 min calculated for 0.188 af (100% of inflow)
Center-of-Mass det. time= 22.4 min (778.1 - 755.7)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.42 cfs @ 12.17 hrs HW=23.01' TW=21.76' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.42 cfs of 6.99 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.94 cfs @ 5.38 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.48 cfs @ 2.46 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 3.96 cfs @ 12.13 hrs, Volume= 0.605 af
Outflow = 3.91 cfs @ 12.15 hrs, Volume= 0.605 af, Atten= 1%, Lag= 1.4 min
Primary = 3.91 cfs @ 12.15 hrs, Volume= 0.605 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.77' @ 12.15 hrs Surf.Area= 974 sf Storage= 1,524 cf

Plug-Flow detention time= 16.0 min calculated for 0.605 af (100% of inflow)

Center-of-Mass det. time= 15.1 min (793.0 - 777.9)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.91 cfs @ 12.15 hrs HW=21.77' TW=0.00' (Dynamic Tailwater)
↑└─**1=Culvert** (Passes 3.91 cfs of 5.02 cfs potential flow)
↑ ├─**2=Orifice/Grate** (Orifice Controls 1.06 cfs @ 6.09 fps)
└─**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.85 cfs @ 1.98 fps)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 1.30 cfs @ 12.07 hrs, Volume= 0.100 af
Outflow = 0.51 cfs @ 12.27 hrs, Volume= 0.099 af, Atten= 60%, Lag= 11.8 min
Primary = 0.51 cfs @ 12.27 hrs, Volume= 0.099 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 34.65' @ 12.27 hrs Surf.Area= 601 sf Storage= 851 cf

Plug-Flow detention time= 27.3 min calculated for 0.099 af (100% of inflow)
Center-of-Mass det. time= 27.1 min (782.8 - 755.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.51 cfs @ 12.27 hrs HW=34.65' TW=30.96' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.51 cfs of 3.58 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.51 cfs @ 5.87 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 1.04 cfs @ 12.07 hrs, Volume= 0.080 af
Outflow = 0.67 cfs @ 12.16 hrs, Volume= 0.080 af, Atten= 36%, Lag= 5.2 min
Primary = 0.67 cfs @ 12.16 hrs, Volume= 0.080 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.40' @ 12.15 hrs Surf.Area= 504 sf Storage= 386 cf

Plug-Flow detention time= 19.2 min calculated for 0.080 af (100% of inflow)
Center-of-Mass det. time= 19.2 min (775.0 - 755.7)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.67 cfs @ 12.16 hrs HW=22.40' TW=21.77' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.67 cfs of 1.40 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.67 cfs @ 3.82 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 4.32 cfs @ 12.14 hrs, Volume= 0.649 af
Primary = 4.32 cfs @ 12.14 hrs, Volume= 0.649 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 2.93" for 2-Year 24hr event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af
Primary = 0.05 cfs @ 12.07 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=2.56 cfs 0.199 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=2.96 cfs 0.230 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=1.55 cfs 0.120 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.60 cfs 0.047 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=1.11 cfs 0.086 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.61 cfs 0.048 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.16 cfs 0.012 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=1.38 cfs 0.107 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.28 cfs 0.022 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=WQ Runoff=0.07 cfs 0.005 af

Pond RS1: Peak Elev=31.49' Storage=1,929 cf Inflow=3.07 cfs 0.333 af
Outflow=1.74 cfs 0.333 af

Pond RS2: Peak Elev=23.59' Storage=1,768 cf Inflow=3.25 cfs 0.252 af
Outflow=1.96 cfs 0.252 af

Pond RS3: Peak Elev=21.92' Storage=1,656 cf Inflow=5.39 cfs 0.813 af
Outflow=5.19 cfs 0.813 af

Pond RS4: Peak Elev=35.35' Storage=1,208 cf Inflow=1.72 cfs 0.134 af
Outflow=0.62 cfs 0.134 af

Pond RS5: Peak Elev=22.79' Storage=555 cf Inflow=1.38 cfs 0.107 af
Outflow=0.79 cfs 0.107 af

Link DP1: Inflow=5.78 cfs 0.872 af
Primary=5.78 cfs 0.872 af

Link DP2: Inflow=0.07 cfs 0.005 af
Primary=0.07 cfs 0.005 af

Total Runoff Area = 2.677 ac Runoff Volume = 0.878 af Average Runoff Depth = 3.93"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 2.56 cfs @ 12.07 hrs, Volume= 0.199 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 2.96 cfs @ 12.07 hrs, Volume= 0.230 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 1.55 cfs @ 12.07 hrs, Volume= 0.120 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.047 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 1.11 cfs @ 12.07 hrs, Volume= 0.086 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.61 cfs @ 12.07 hrs, Volume= 0.048 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.16 cfs @ 12.07 hrs, Volume= 0.012 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 1.38 cfs @ 12.07 hrs, Volume= 0.107 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.28 cfs @ 12.07 hrs, Volume= 0.022 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year 24hr Rainfall=4.17"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 3.07 cfs @ 12.07 hrs, Volume= 0.333 af
Outflow = 1.74 cfs @ 12.23 hrs, Volume= 0.333 af, Atten= 43%, Lag= 9.4 min
Primary = 1.74 cfs @ 12.23 hrs, Volume= 0.333 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 31.49' @ 12.23 hrs Surf.Area= 882 sf Storage= 1,929 cf

Plug-Flow detention time= 19.3 min calculated for 0.333 af (100% of inflow)
Center-of-Mass det. time= 19.1 min (780.1 - 761.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.74 cfs @ 12.23 hrs HW=31.49' TW=21.91' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.74 cfs of 10.00 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 1.28 cfs @ 7.33 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.37 fps)
  - **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 3.25 cfs @ 12.07 hrs, Volume= 0.252 af
Outflow = 1.96 cfs @ 12.16 hrs, Volume= 0.252 af, Atten= 40%, Lag= 5.4 min
Primary = 1.96 cfs @ 12.16 hrs, Volume= 0.252 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.59' @ 12.16 hrs Surf.Area= 795 sf Storage= 1,768 cf

Plug-Flow detention time= 20.8 min calculated for 0.252 af (100% of inflow)
Center-of-Mass det. time= 20.6 min (770.8 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.96 cfs @ 12.16 hrs HW=23.59' TW=21.91' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.96 cfs of 8.12 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.09 cfs @ 6.25 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.87 cfs @ 4.42 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 5.39 cfs @ 12.14 hrs, Volume= 0.813 af
Outflow = 5.19 cfs @ 12.20 hrs, Volume= 0.813 af, Atten= 4%, Lag= 3.6 min
Primary = 5.19 cfs @ 12.20 hrs, Volume= 0.813 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 21.92' @ 12.20 hrs Surf.Area= 974 sf Storage= 1,656 cf

Plug-Flow detention time= 14.2 min calculated for 0.813 af (100% of inflow)

Center-of-Mass det. time= 13.8 min (785.0 - 771.2)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.19 cfs @ 12.20 hrs HW=21.92' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.19 cfs @ 6.61 fps)
↑—**2=Orifice/Grate** (Passes < 1.11 cfs potential flow)
—**3=Sharp-Crested Rectangular Weir** (Passes < 4.79 cfs potential flow)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 1.72 cfs @ 12.07 hrs, Volume= 0.134 af
Outflow = 0.62 cfs @ 12.30 hrs, Volume= 0.134 af, Atten= 64%, Lag= 13.9 min
Primary = 0.62 cfs @ 12.30 hrs, Volume= 0.134 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 35.35' @ 12.30 hrs Surf.Area= 601 sf Storage= 1,208 cf

Plug-Flow detention time= 27.1 min calculated for 0.134 af (100% of inflow)
Center-of-Mass det. time= 26.9 min (777.2 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.62 cfs @ 12.30 hrs HW=35.35' TW=31.46' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.62 cfs of 4.54 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.62 cfs @ 7.11 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 1.38 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow = 0.79 cfs @ 12.15 hrs, Volume= 0.107 af, Atten= 43%, Lag= 5.1 min
Primary = 0.79 cfs @ 12.15 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.79' @ 12.17 hrs Surf.Area= 504 sf Storage= 555 cf

Plug-Flow detention time= 17.6 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 17.6 min (767.8 - 750.3)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.79 cfs @ 12.15 hrs HW=22.78' TW=21.90' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.79 cfs of 2.25 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.79 cfs @ 4.51 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 5.78 cfs @ 12.11 hrs, Volume= 0.872 af
Primary = 5.78 cfs @ 12.11 hrs, Volume= 0.872 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 3.93" for 5-Year 24hr event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af
Primary = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=3.09 cfs 0.242 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=3.57 cfs 0.280 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=1.86 cfs 0.146 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.73 cfs 0.057 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=1.33 cfs 0.105 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.74 cfs 0.058 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.19 cfs 0.015 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=1.66 cfs 0.130 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.34 cfs 0.027 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=4.77"
Tc=5.0 min CN=WQ Runoff=0.08 cfs 0.006 af

Pond RS1: Peak Elev=31.89' Storage=2,242 cf Inflow=3.66 cfs 0.404 af
Outflow=2.14 cfs 0.404 af

Pond RS2: Peak Elev=24.12' Storage=2,128 cf Inflow=3.91 cfs 0.306 af
Outflow=2.24 cfs 0.306 af

Pond RS3: Peak Elev=22.43' Storage=2,088 cf Inflow=6.52 cfs 0.986 af
Outflow=5.68 cfs 0.986 af

Pond RS4: Peak Elev=35.96' Storage=1,526 cf Inflow=2.07 cfs 0.162 af
Outflow=0.70 cfs 0.162 af

Pond RS5: Peak Elev=23.22' Storage=743 cf Inflow=1.66 cfs 0.130 af
Outflow=0.80 cfs 0.130 af

Link DP1: Inflow=6.18 cfs 1.058 af
Primary=6.18 cfs 1.058 af

Link DP2: Inflow=0.08 cfs 0.006 af
Primary=0.08 cfs 0.006 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.065 af Average Runoff Depth = 4.77"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 3.09 cfs @ 12.07 hrs, Volume= 0.242 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 3.57 cfs @ 12.07 hrs, Volume= 0.280 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 1.86 cfs @ 12.07 hrs, Volume= 0.146 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.73 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 1.33 cfs @ 12.07 hrs, Volume= 0.105 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.058 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 1.66 cfs @ 12.07 hrs, Volume= 0.130 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 0.027 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year 24hr Rainfall=5.01"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 3.66 cfs @ 12.07 hrs, Volume= 0.404 af
Outflow = 2.14 cfs @ 12.21 hrs, Volume= 0.404 af, Atten= 41%, Lag= 8.2 min
Primary = 2.14 cfs @ 12.21 hrs, Volume= 0.404 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 31.89' @ 12.21 hrs Surf.Area= 882 sf Storage= 2,242 cf

Plug-Flow detention time= 18.6 min calculated for 0.404 af (100% of inflow)
Center-of-Mass det. time= 18.4 min (776.4 - 758.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.14 cfs @ 12.21 hrs HW=31.89' TW=22.39' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.14 cfs of 10.23 cfs potential flow)
├**2=Orifice/Grate** (Orifice Controls 1.39 cfs @ 7.95 fps)
├**3=Orifice/Grate** (Orifice Controls 0.76 cfs @ 3.85 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 3.91 cfs @ 12.07 hrs, Volume= 0.306 af
Outflow = 2.24 cfs @ 12.15 hrs, Volume= 0.306 af, Atten= 43%, Lag= 5.1 min
Primary = 2.24 cfs @ 12.15 hrs, Volume= 0.306 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.12' @ 12.17 hrs Surf.Area= 795 sf Storage= 2,128 cf

Plug-Flow detention time= 20.0 min calculated for 0.306 af (100% of inflow)
Center-of-Mass det. time= 19.9 min (767.0 - 747.1)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.24 cfs @ 12.15 hrs HW=24.11' TW=22.27' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.24 cfs of 8.48 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.14 cfs @ 6.53 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.10 cfs @ 5.61 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 6.52 cfs @ 12.11 hrs, Volume= 0.986 af
Outflow = 5.68 cfs @ 12.26 hrs, Volume= 0.986 af, Atten= 13%, Lag= 8.9 min
Primary = 5.68 cfs @ 12.26 hrs, Volume= 0.986 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 22.43' @ 12.26 hrs Surf.Area= 974 sf Storage= 2,088 cf

Plug-Flow detention time= 13.7 min calculated for 0.986 af (100% of inflow)

Center-of-Mass det. time= 13.2 min (780.7 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.68 cfs @ 12.26 hrs HW=22.43' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 5.68 cfs @ 7.24 fps)
↑—**2=Orifice/Grate** (Passes < 1.26 cfs potential flow)
—**3=Sharp-Crested Rectangular Weir** (Passes < 12.89 cfs potential flow)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 0.70 cfs @ 12.32 hrs, Volume= 0.162 af, Atten= 66%, Lag= 15.3 min
Primary = 0.70 cfs @ 12.32 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 35.96' @ 12.32 hrs Surf.Area= 601 sf Storage= 1,526 cf

Plug-Flow detention time= 27.4 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 27.2 min (774.3 - 747.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.70 cfs @ 12.32 hrs HW=35.96' TW=31.79' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.70 cfs of 5.21 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.70 cfs @ 8.05 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 1.66 cfs @ 12.07 hrs, Volume= 0.130 af
Outflow = 0.80 cfs @ 12.12 hrs, Volume= 0.130 af, Atten= 52%, Lag= 3.3 min
Primary = 0.80 cfs @ 12.12 hrs, Volume= 0.130 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.22' @ 12.22 hrs Surf.Area= 504 sf Storage= 743 cf

Plug-Flow detention time= 17.2 min calculated for 0.130 af (100% of inflow)
Center-of-Mass det. time= 17.3 min (764.3 - 747.1)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.80 cfs @ 12.12 hrs HW=23.07' TW=22.15' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.80 cfs of 2.19 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.60 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 6.18 cfs @ 12.12 hrs, Volume= 1.058 af
Primary = 6.18 cfs @ 12.12 hrs, Volume= 1.058 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 4.77" for 10-Year 24hr event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
Primary = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=3.80 cfs 0.300 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=4.40 cfs 0.347 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=2.29 cfs 0.181 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.89 cfs 0.070 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=1.64 cfs 0.130 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.91 cfs 0.072 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.24 cfs 0.019 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=2.05 cfs 0.162 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.42 cfs 0.033 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=WQ Runoff=0.10 cfs 0.008 af

Pond RS1: Peak Elev=32.50' Storage=2,714 cf Inflow=4.46 cfs 0.501 af
Outflow=2.59 cfs 0.501 af

Pond RS2: Peak Elev=24.89' Storage=2,654 cf Inflow=4.82 cfs 0.380 af
Outflow=2.55 cfs 0.380 af

Pond RS3: Peak Elev=23.19' Storage=2,738 cf Inflow=7.72 cfs 1.224 af
Outflow=6.28 cfs 1.224 af

Pond RS4: Peak Elev=36.85' Storage=1,984 cf Inflow=2.55 cfs 0.201 af
Outflow=0.81 cfs 0.201 af

Pond RS5: Peak Elev=23.97' Storage=1,066 cf Inflow=2.05 cfs 0.162 af
Outflow=0.83 cfs 0.162 af

Link DP1: Inflow=6.77 cfs 1.313 af
Primary=6.77 cfs 1.313 af

Link DP2: Inflow=0.10 cfs 0.008 af
Primary=0.10 cfs 0.008 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.321 af Average Runoff Depth = 5.92"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 3.80 cfs @ 12.07 hrs, Volume= 0.300 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 4.40 cfs @ 12.07 hrs, Volume= 0.347 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 2.29 cfs @ 12.07 hrs, Volume= 0.181 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.070 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 1.64 cfs @ 12.07 hrs, Volume= 0.130 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 0.91 cfs @ 12.07 hrs, Volume= 0.072 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 2.05 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 0.008 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year 24hr Rainfall=6.16"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 4.46 cfs @ 12.07 hrs, Volume= 0.501 af
Outflow = 2.59 cfs @ 12.21 hrs, Volume= 0.501 af, Atten= 42%, Lag= 8.1 min
Primary = 2.59 cfs @ 12.21 hrs, Volume= 0.501 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 32.50' @ 12.21 hrs Surf.Area= 882 sf Storage= 2,714 cf

Plug-Flow detention time= 18.0 min calculated for 0.501 af (100% of inflow)
Center-of-Mass det. time= 17.9 min (773.0 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.59 cfs @ 12.21 hrs HW=32.50' TW=23.06' (Dynamic Tailwater)
1=Culvert (Passes 2.59 cfs of 10.25 cfs potential flow)
2=Orifice/Grate (Orifice Controls 1.53 cfs @ 8.79 fps)
3=Orifice/Grate (Orifice Controls 1.06 cfs @ 5.38 fps)
4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 4.82 cfs @ 12.07 hrs, Volume= 0.380 af
Outflow = 2.55 cfs @ 12.14 hrs, Volume= 0.380 af, Atten= 47%, Lag= 4.2 min
Primary = 2.55 cfs @ 12.14 hrs, Volume= 0.380 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.89' @ 12.19 hrs Surf.Area= 795 sf Storage= 2,654 cf

Plug-Flow detention time= 19.7 min calculated for 0.380 af (100% of inflow)
Center-of-Mass det. time= 19.7 min (763.5 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.55 cfs @ 12.14 hrs HW=24.79' TW=22.75' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.55 cfs of 8.94 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.20 cfs @ 6.88 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.35 cfs @ 6.88 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 7.72 cfs @ 12.10 hrs, Volume= 1.224 af
Outflow = 6.28 cfs @ 12.31 hrs, Volume= 1.224 af, Atten= 19%, Lag= 12.2 min
Primary = 6.28 cfs @ 12.31 hrs, Volume= 1.224 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.19' @ 12.31 hrs Surf.Area= 974 sf Storage= 2,738 cf

Plug-Flow detention time= 13.0 min calculated for 1.223 af (100% of inflow)

Center-of-Mass det. time= 12.8 min (777.0 - 764.2)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.28 cfs @ 12.31 hrs HW=23.19' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 6.28 cfs @ 8.00 fps)
└─**2=Orifice/Grate** (Passes < 1.46 cfs potential flow)
└─**3=Sharp-Crested Rectangular Weir** (Passes < 28.41 cfs potential flow)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 2.55 cfs @ 12.07 hrs, Volume= 0.201 af
Outflow = 0.81 cfs @ 12.35 hrs, Volume= 0.201 af, Atten= 68%, Lag= 16.8 min
Primary = 0.81 cfs @ 12.35 hrs, Volume= 0.201 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 36.85' @ 12.35 hrs Surf.Area= 601 sf Storage= 1,984 cf

Plug-Flow detention time= 28.1 min calculated for 0.201 af (100% of inflow)
Center-of-Mass det. time= 28.1 min (772.0 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.81 cfs @ 12.35 hrs HW=36.85' TW=32.32' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.81 cfs of 5.94 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.81 cfs @ 9.25 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 2.05 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 0.83 cfs @ 12.11 hrs, Volume= 0.162 af, Atten= 60%, Lag= 2.4 min
Primary = 0.83 cfs @ 12.11 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 23.97' @ 12.30 hrs Surf.Area= 504 sf Storage= 1,066 cf

Plug-Flow detention time= 17.8 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 17.7 min (761.5 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.83 cfs @ 12.11 hrs HW=23.49' TW=22.52' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.83 cfs of 2.25 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.83 cfs @ 4.74 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 6.77 cfs @ 12.12 hrs, Volume= 1.313 af
Primary = 6.77 cfs @ 12.12 hrs, Volume= 1.313 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year 24hr event
Inflow = 0.10 cfs @ 12.07 hrs, Volume= 0.008 af
Primary = 0.10 cfs @ 12.07 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1A: Runoff Area=26,490 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=4.91 cfs 0.390 af

Subcatchment P1B: Runoff Area=30,610 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=5.67 cfs 0.451 af

Subcatchment P1C: Runoff Area=15,970 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=2.96 cfs 0.235 af

Subcatchment P1D: Runoff Area=6,220 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=1.15 cfs 0.092 af

Subcatchment P1E: Runoff Area=11,450 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=2.12 cfs 0.169 af

Subcatchment P1F: Runoff Area=6,320 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=1.17 cfs 0.093 af

Subcatchment P1G: Runoff Area=1,640 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=0.30 cfs 0.024 af

Subcatchment P1H: Runoff Area=14,280 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=2.65 cfs 0.210 af

Subcatchment P1I: Runoff Area=2,930 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=0.54 cfs 0.043 af

Subcatchment P2A: Runoff Area=700 sf 100.00% Impervious Runoff Depth=7.70"
Tc=5.0 min CN=WQ Runoff=0.13 cfs 0.010 af

Pond RS1: Peak Elev=33.63' Storage=3,595 cf Inflow=5.68 cfs 0.652 af
Outflow=3.87 cfs 0.652 af

Pond RS2: Peak Elev=25.61' Storage=3,062 cf Inflow=6.22 cfs 0.494 af
Outflow=5.90 cfs 0.494 af

Pond RS3: Peak Elev=24.91' Storage=4,214 cf Inflow=12.14 cfs 1.592 af
Outflow=7.47 cfs 1.591 af

Pond RS4: Peak Elev=37.67' Storage=2,405 cf Inflow=3.29 cfs 0.262 af
Outflow=1.78 cfs 0.262 af

Pond RS5: Peak Elev=25.62' Storage=1,777 cf Inflow=2.65 cfs 0.210 af
Outflow=0.92 cfs 0.210 af

Link DP1: Inflow=8.03 cfs 1.707 af
Primary=8.03 cfs 1.707 af

Link DP2: Inflow=0.13 cfs 0.010 af
Primary=0.13 cfs 0.010 af

Total Runoff Area = 2.677 ac Runoff Volume = 1.718 af Average Runoff Depth = 7.70"
0.00% Pervious = 0.000 ac 100.00% Impervious = 2.677 ac

Summary for Subcatchment P1A:

Runoff = 4.91 cfs @ 12.07 hrs, Volume= 0.390 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
21,680	98	Roofs, HSG C
4,810	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
26,490		Weighted Average
26,490		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1B:

Runoff = 5.67 cfs @ 12.07 hrs, Volume= 0.451 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
18,820	98	Roofs, HSG C
11,790	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
30,610		Weighted Average
30,610		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1C:

Runoff = 2.96 cfs @ 12.07 hrs, Volume= 0.235 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
15,970	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
15,970		Weighted Average
15,970		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1D:

Runoff = 1.15 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
6,220	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,220		Weighted Average
6,220		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1E:

Runoff = 2.12 cfs @ 12.07 hrs, Volume= 0.169 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
4,340	98	Roofs, HSG C
7,110	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
11,450		Weighted Average
11,450		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1F:

Runoff = 1.17 cfs @ 12.07 hrs, Volume= 0.093 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
6,320	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
6,320		Weighted Average
6,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1G:

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
1,640	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
1,640		Weighted Average
1,640		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1H:

Runoff = 2.65 cfs @ 12.07 hrs, Volume= 0.210 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
14,280	98	Roofs, HSG C
0	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
14,280		Weighted Average
14,280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P1I:

Runoff = 0.54 cfs @ 12.07 hrs, Volume= 0.043 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
2,930	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
2,930		Weighted Average
2,930		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment P2A:

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 7.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year 24hr Rainfall=7.94"

Area (sf)	CN	Description
0	98	Roofs, HSG C
700	98	Paved parking, HSG C
0	79	50-75% Grass cover, Fair, HSG C
0	89	Gravel roads, HSG C
700		Weighted Average
700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond RS1:

Inflow Area = 1.016 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 5.68 cfs @ 12.07 hrs, Volume= 0.652 af
Outflow = 3.87 cfs @ 12.22 hrs, Volume= 0.652 af, Atten= 32%, Lag= 8.6 min
Primary = 3.87 cfs @ 12.22 hrs, Volume= 0.652 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 33.63' @ 12.22 hrs Surf.Area= 882 sf Storage= 3,595 cf

Plug-Flow detention time= 17.4 min calculated for 0.652 af (100% of inflow)
Center-of-Mass det. time= 17.4 min (768.9 - 751.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	29.00'	0 cf	**30.27'W x 28.71'L x 5.50'H Field A** 4,780 cf Overall - 4,780 cf Embedded = 0 cf x 30.0% Voids
#2A	29.00'	3,816 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 2 Rows of 1 Chambers 16.96' x 15.40' Core + 6.66' Border = 30.27' x 28.71' System
#3	29.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**
		3,929 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	22.00'	**12.0" Round Culvert** L= 57.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 22.00' / 21.50' S= 0.0088 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	29.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	31.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	33.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.87 cfs @ 12.22 hrs HW=33.63' TW=24.69' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.87 cfs of 9.98 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.78 cfs @ 10.18 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.46 cfs @ 7.43 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.63 cfs @ 1.19 fps)

Summary for Pond RS2:

Inflow Area = 0.770 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 6.22 cfs @ 12.07 hrs, Volume= 0.494 af
Outflow = 5.90 cfs @ 12.12 hrs, Volume= 0.494 af, Atten= 5%, Lag= 3.0 min
Primary = 5.90 cfs @ 12.12 hrs, Volume= 0.494 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 25.61' @ 12.12 hrs Surf.Area= 795 sf Storage= 3,062 cf

Plug-Flow detention time= 19.5 min calculated for 0.494 af (100% of inflow)
Center-of-Mass det. time= 19.6 min (760.0 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.00'	0 cf	**6.90'W x 113.50'L x 5.17'H Field B** 4,044 cf Overall - 4,044 cf Embedded = 0 cf x 40.0% Voids
#2B	21.00'	3,012 cf	**StormTrap ST1 SingleTrap 4-6** x 8 Inside #1 Inside= 82.7"W x 54.0"H => 26.77 sf x 14.06'L = 376.5 cf Outside= 82.7"W x 62.0"H => 35.63 sf x 14.06'L = 501.0 cf 6.90' x 112.50' Core + 0.00' x 0.50' Border = 6.90' x 113.50' System
#3	21.00'	50 cf	**4.00'D x 4.00'H Vertical Cone/Cylinder**
		3,062 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.00'	**18.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.00' / 20.20' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	21.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	22.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	25.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=5.81 cfs @ 12.12 hrs HW=25.60' TW=23.59' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.81 cfs of 8.87 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.19 cfs @ 6.83 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.34 cfs @ 6.83 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 3.27 cfs @ 2.07 fps)

Summary for Pond RS3:

Inflow Area = 2.480 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 12.14 cfs @ 12.12 hrs, Volume= 1.592 af
Outflow = 7.47 cfs @ 12.30 hrs, Volume= 1.591 af, Atten= 38%, Lag= 10.6 min
Primary = 7.47 cfs @ 12.30 hrs, Volume= 1.591 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 24.91' @ 12.30 hrs Surf.Area= 974 sf Storage= 4,214 cf

Plug-Flow detention time= 12.8 min calculated for 1.591 af (100% of inflow)

Center-of-Mass det. time= 12.5 min (773.2 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1B	20.00'	0 cf	**21.79'W x 44.10'L x 5.50'H Field B** 5,286 cf Overall - 5,286 cf Embedded = 0 cf x 40.0% Voids
#2B	20.00'	4,215 cf	**StormTrap ST2 SingleTrap 5-0** x 2 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 8.48' x 30.79' Core + 6.66' Border = 21.79' x 44.10' System
#3	19.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		4,303 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	19.00'	**12.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 19.00' / 18.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	20.00'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	21.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=7.47 cfs @ 12.30 hrs HW=24.91' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 7.47 cfs @ 9.51 fps)
↑**2=Orifice/Grate** (Passes < 1.83 cfs potential flow)
3=Sharp-Crested Rectangular Weir (Passes < 70.92 cfs potential flow)

Summary for Pond RS4:

Inflow Area = 0.408 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 3.29 cfs @ 12.07 hrs, Volume= 0.262 af
Outflow = 1.78 cfs @ 12.18 hrs, Volume= 0.262 af, Atten= 46%, Lag= 6.6 min
Primary = 1.78 cfs @ 12.18 hrs, Volume= 0.262 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.67' @ 12.18 hrs Surf.Area= 601 sf Storage= 2,405 cf

Plug-Flow detention time= 27.7 min calculated for 0.262 af (100% of inflow)
Center-of-Mass det. time= 27.6 min (768.0 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	33.00'	0 cf	**6.90'W x 85.38'L x 5.67'H Field A** 3,336 cf Overall - 3,336 cf Embedded = 0 cf x 40.0% Voids
#2A	33.00'	2,511 cf	**StormTrap ST1 SingleTrap 5-0** x 6 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 84.38' Core + 0.00' x 0.50' Border = 6.90' x 85.38' System
#3	33.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		2,599 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	**12.0" Round Culvert** L= 84.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 33.00' / 32.00' S= 0.0119 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	33.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	37.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.78 cfs @ 12.18 hrs HW=37.67' TW=33.57' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.78 cfs of 6.13 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 9.76 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.93 cfs @ 1.36 fps)

Summary for Pond RS5:

Inflow Area = 0.328 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 2.65 cfs @ 12.07 hrs, Volume= 0.210 af
Outflow = 0.92 cfs @ 12.66 hrs, Volume= 0.210 af, Atten= 65%, Lag= 35.2 min
Primary = 0.92 cfs @ 12.66 hrs, Volume= 0.210 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 25.62' @ 12.38 hrs Surf.Area= 504 sf Storage= 1,777 cf

Plug-Flow detention time= 19.4 min calculated for 0.210 af (100% of inflow)
Center-of-Mass det. time= 19.5 min (759.9 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1B	21.50'	0 cf	**6.90'W x 71.31'L x 5.67'H Field B** 2,787 cf Overall - 2,787 cf Embedded = 0 cf x 40.0% Voids
#2B	21.50'	2,093 cf	**StormTrap ST1 SingleTrap 5-0** x 5 Inside #1 Inside= 82.7"W x 60.0"H => 29.76 sf x 14.06'L = 418.5 cf Outside= 82.7"W x 68.0"H => 39.08 sf x 14.06'L = 549.5 cf 6.90' x 70.31' Core + 0.00' x 0.50' Border = 6.90' x 71.31' System
#3	21.50'	63 cf	**4.00'D x 5.00'H Vertical Cone/Cylinder**
		2,155 cf	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	21.50'	**12.0" Round Culvert** L= 188.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 21.50' / 20.70' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	21.50'	**4.0" Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 1	26.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.92 cfs @ 12.66 hrs HW=24.69' TW=23.51' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.92 cfs of 2.49 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.92 cfs @ 5.25 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP1:

Inflow Area = 2.661 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 8.03 cfs @ 12.26 hrs, Volume= 1.707 af
Primary = 8.03 cfs @ 12.26 hrs, Volume= 1.707 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link DP2:

Inflow Area = 0.016 ac,100.00% Impervious, Inflow Depth = 7.70" for 100-Year 24hr event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af
Primary = 0.13 cfs @ 12.07 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

BOHLER

45 Franklin Street, 5th Floor
Boston, MA 02110
617.849.8040

October 25, 2022

Brian C. Postlewaite, P.E.
Director of Engineering
City of Somerville, Engineering Department
1 Franey Road
Somerville, MA 02145

Re: Preliminary Wastewater Calculations
299 Broadway
Somerville, Massachusetts

Dear Mr. Postlewaite:

Bohler has prepared preliminary wastewater flow calculations for the proposed development at 299 Broadway per the *Policy for New Connections to and Modifications to Existing Connections to the Municipal Sewer and Drain System, Stormwater Management, and Infiltration/Inflow Mitigation*, updated May 14, 2018.

The attached calculations below have been determine using Title V flows estimates and result in a WW_{flow} of 46,319 GPD

If you have any questions, please do not hesitate to reach out to our office at (617) 849-8040.

Sincerely,

BOHLER

Stephen Martorano, P.E.

Wastewater Flow Calculation:

Existing Conditions:

Type of Establishment	Star Market (SF)	Walgreens (SF)	Total (SF)
Supermarket	27,550	0	27,550
Retail	0	12,831	12,831

Per 310 CMR 15.203, daily flow per 1,000 square feet of supermarket floor area = 97 gal/day

Per 310 CMR 15.203, daily flow per 1,000 square feet of retail floor area = 50 gal/day

$WW_{Existing} = 3{,}314\ GPD$

Proposed Conditions:

Type of Establishment	Building A	Building B	Total
Studio	0	24	24
1 Bedroom	34	102	136
2 Bedroom	57	42	99
3 Bedroom	24	5	29
Total Bedrooms	220	225	445
Retail (SF)	5,277	8,366	13,643

Per 310 CMR 15.203, daily flow per bedroom in multiple family dwelling = 110 gal/day

$WW_{Proposed} = 49{,}633\ GPD$

Calculation for Wastewater Flow:

$WW_{Flow} = WW_{Proposed} - WW_{Existing}$

$WW_{Proposed} = 49{,}633\ GPD$

$WW_{Existing} = 3{,}314\ GPD$

$\boldsymbol{WW_{Flow} = 46{,}319\ GPD}$