APPENDIX E:

ADDITIONAL STUDIES

Carmina • Wood • Morris DPC

487 Main Street Suite 500 Buffalo, New York 14203 P: 716.842.3165 F: 716.842.0263 W: cwm-ae.com

Architecture Engineering Interior Design

ENGINEER'S REPORT
for
Elmwood Crossing
451 Elmwood Avenue
City of Buffalo, New York

GENERAL

This project proposes the construction of a 5-story building which is a mix of residential, office space and retail space. The 5-story new build is approximately 13,303 sf of office space, 14,521 sf of retail space, two 1-bedroom apartments, sixteen 2-bedroom apartments and five 3-bedroom apartments. The location of the site is at the northeast corner of Elmwood Avenue and Bryant Street in the City of Buffalo. The site is currently a parking lot. There is an existing building at 451 Elmwood Avenue that is to remain and be incorporated into the project. Approximately 0.4 acres of the site will be disturbed during construction.

EXISTING CONDITIONS

Storm Sewer
The existing parking lot which occupies the site slopes west towards Elmwood Avenue where an existing trench drain picks up the runoff and conveys it to the sewer on Elmwood Avenue. The storm discharge for the building at 451 Elmwood Avenue is to remain.

Sanitary Sewer
The existing sewer lateral for the building at 451 Elmwood is to remain.

Water System
The existing 1" domestic and 4" fire service for the building at 451 Elmwood are to remain.

PROPOSED FACILITIES

Storm Sewer
The proposed 5-story building will have roof drains which collect the roof runoff and convey the water to the combined 36" sewer on Bryant Street with an 8" SDR-35 PVC lateral @ 2.0% min. slope.

Requirements set forth by the Buffalo Sewer Authority regarding stormwater discharges will apply for sites where the disturbance exceeds 0.25 acres. This includes attenuation of the 25-year proposed storm event to the 2-year existing conditions using volume storage and an engineered outlet structure. As discussed with the Buffalo Sewer Authority, given that the proposed building takes up the entire parcel, an area for storm water management is not available. It was agreed that since there is common ownership between this project and the other Elmwood Crossing

projects and the sewer system is interconnected, additional storm water detention will be provided on one of the other projects to compensate for the required detention requirement for this project.

Design Criteria
Storm pipes: 2-year storm

RUNOFF SUMMARY

EVENT	EX. RUNOFF (CFS)	PRO. RUNOFF (CFS)	RESULT (CFS)
1-year	1.19	1.24	+0.05
2-year	1.45	1.50	+0.05
5-year	1.83	1.88	+0.05
10-year	2.15	2.20	+0.05
25-year	2.40	2.45	+0.05
50-year	2.72	2.77	+0.05
100-year	2.97	3.02	+0.05

See attached storm calculations.

Sanitary Sewer

The 5-story building will have an 8" SDR-35 PVC sanitary lateral 2.0% minimum slope. This sewer will tie into the existing 36" City of Buffalo sanitary sewer located on Bryant Street.

Design Parameters

Office Space:	0.1 gal/day/sf x 14,251 sf = 1,330 gpd
Retail Space:	0.1 gal/day/sf x 13,303 sf = 1,452 gpd
1-bdrm apt:	110 gal/day/unit x 2 units = 220 gpd
2-bdrm apt:	220 gal/day/unit x 16 units = 3,520 gpd
3-bdrm apt:	330 gal/day/unit x 5 units = 1,650 gpd
Total:	8,172 gpd

The hydraulic loading rate is per "Design Standards for Wastewater Treatment Works" 1988, NYSDEC.

See downstream sewer capacity analysis. It is to be noted the attached downstream capacity report encompasses the entire Elmwood Crossing project.

Water System

A 4" class 52 DI domestic water service will service the 5-story building which will tap the existing 12" Bryant Street water main. A separate 6" Class 52 DI fire service will tap the existing 12" Bryant Street water main. A meter and RPZ will be installed on the domestic service inside the building. A double check valve detector assembly will be installed on the fire service also inside the building. Heat and light will be provided in the area of these devices and the RPZ will have a drain to the exterior for testing and failure purposes. The fire system will be designed by others.

Domestic Summary:

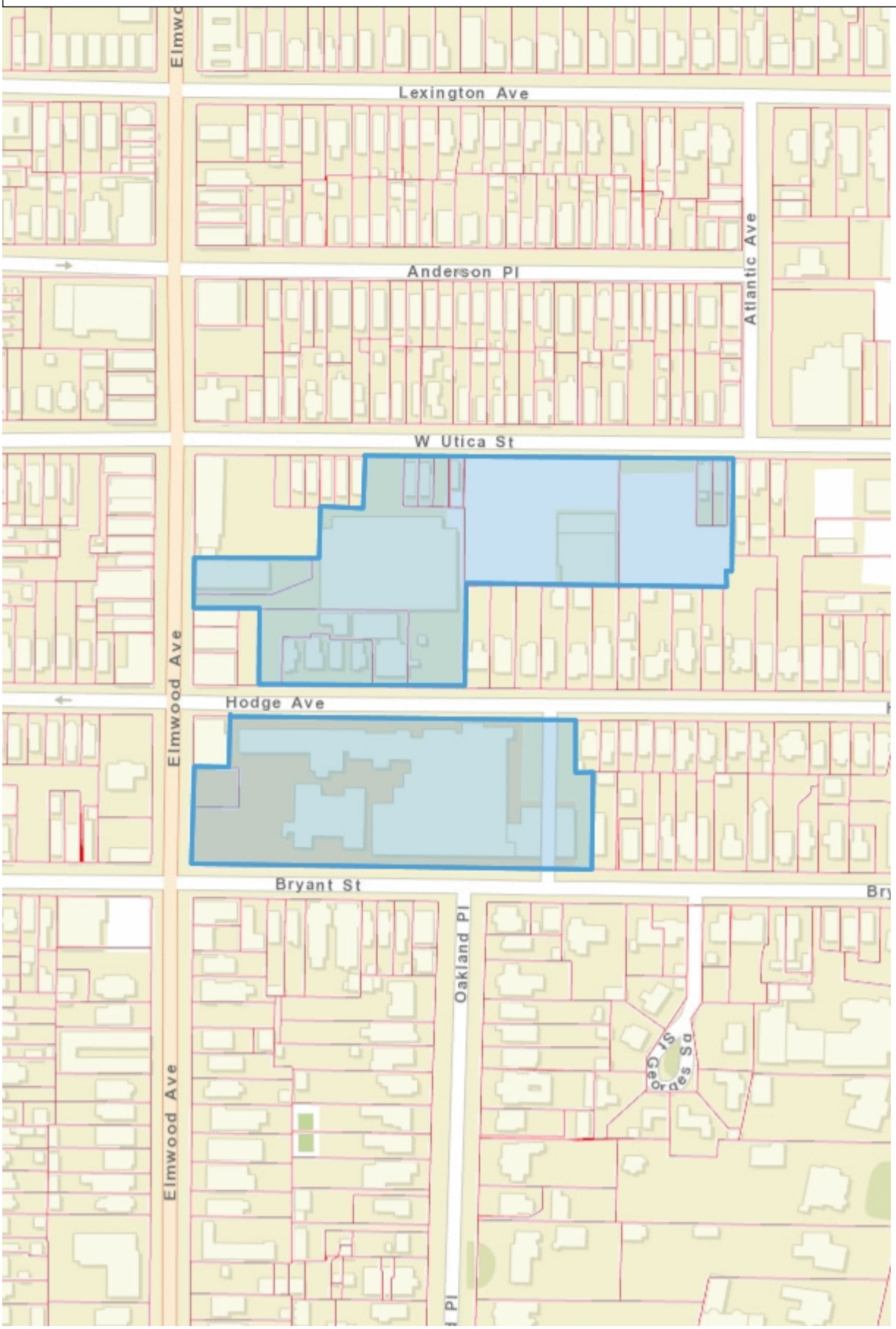
Peak Operating Demand:	22.47 gpm
Water Main:	12” on Bryant Street
Static Pressure:	51 psi (provided by City of Buffalo)
Friction Loss:	0.0 psi
Loss through meter/RPZ:	13.0 psi
Elevation Loss:	0.0 psi
Pressure after RPZ & Meter:	38.0 psi
@ Top floor	
Elevation Loss (to top floor):	25.98 psi
Pressure @ top floor:	12.0 psi (@ top floor)

Repairs to all devices will be made during off hours, dual backflow preventers are not required. The proposed building and existing church building are not located in a 100-year flood plain.

Disinfection of the water service following installation will be continuous feed, according to AWWA C-651, latest revision.

Location Map

Elmwood Crossing



Legend

- Council Districts
- Erie County Municipal Bounda
- Parcels
- World Street Map

Notes

1: 4,513

0.1 0 0.04 0.1 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere
MIS Department, City of Buffalo

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Sanitary Demand Calculations

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Project No.: 18.003 Date: 8/28/2018
Project Name: Elmwood Crossing
Project Address: 451 Elmwood Ave Buffalo, NY
Subject: Sanitary Sewer & Water Demand Calcs
Sheet: 1 of 1

Sanitary Sewage Demand Calculations:

451 Elmwood

Housing	110	gal/d/bdrm	x	2	unit	=	220	gpd		*use 110 gallons per day per 1 bedroom unit
	220	gal/d/bdrm	x	16	unit	=	3,520	gpd		*use 220 gallons per day per 2 bedroom unit
	330	gal/d/bdrm	x	5	unit	=	1,650	gpd		*use 330 gallons per day per 3 bedroom unit
Retail	0.1	gal/d/sf	x	13,303	sf	=	1,330	gpd		*use 0.1 gallons per day per square foot
Office	0.1	gal/d/sf	x	14,521	sf	=	1,452	gpd		*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 8,172 gpd

Find Peak Sanitary Demand:

Peaking Factor based on Population:
Total demand: 8,172 gpd / 100 gpcd = 82 per capita

Population (P) = 82 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.27

Peak Sanitary Demand = 8,172 X 4.27 = 34,868 gpd
= 0.035 MGD
= 0.054 cfs

451 Elmwood

8,172 gpd x 1.1 = 8,990 gpd *use 110% of sewage demand

*use 1.8 peaking factor and assume a 12 hour day

8,990 gpm x 1day/12hr x 1hr/60min = 12.49 gpm

12.49 gpm x 1.8 = 22.47 gpm Q_{peak}

Headlosses:

Q_{peak} = 22.47 gpm
Pipe = 4.00 inch Ductile Iron C = 140
Length = 25 LF (approx. distance from tap to RPZ inside bldg)

$$H_L = \frac{10.44\ L\ Q^{1.85}}{C^{1.85}\ D^{4.866}} = \frac{10.44(25)(26.62)^{1.85}}{(150)^{1.85}\ (4)^{4.866}} = 0.01 \text{ ft} = 0.00 \text{ psi}$$

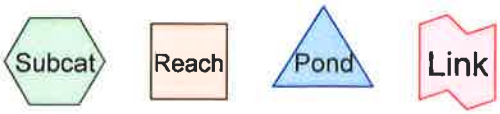
Δ elev = 0 ft = 0.00 psi
Loss through meter = 1 psi
Loss through RPZ = 12 psi
Total Losses = 13.0 psi
Static Pressure = 51 psi (per City of Buffalo)
Residual Pressure Following RPZ = 51 - 13.0 = 38.0 psi (available after rpz & meter)

Residual Pressure 30" above 5th Floor
Δ elev = 60 ft = 25.98 psi
Residual Pressure 30" above 5th Floor = 12.0 psi

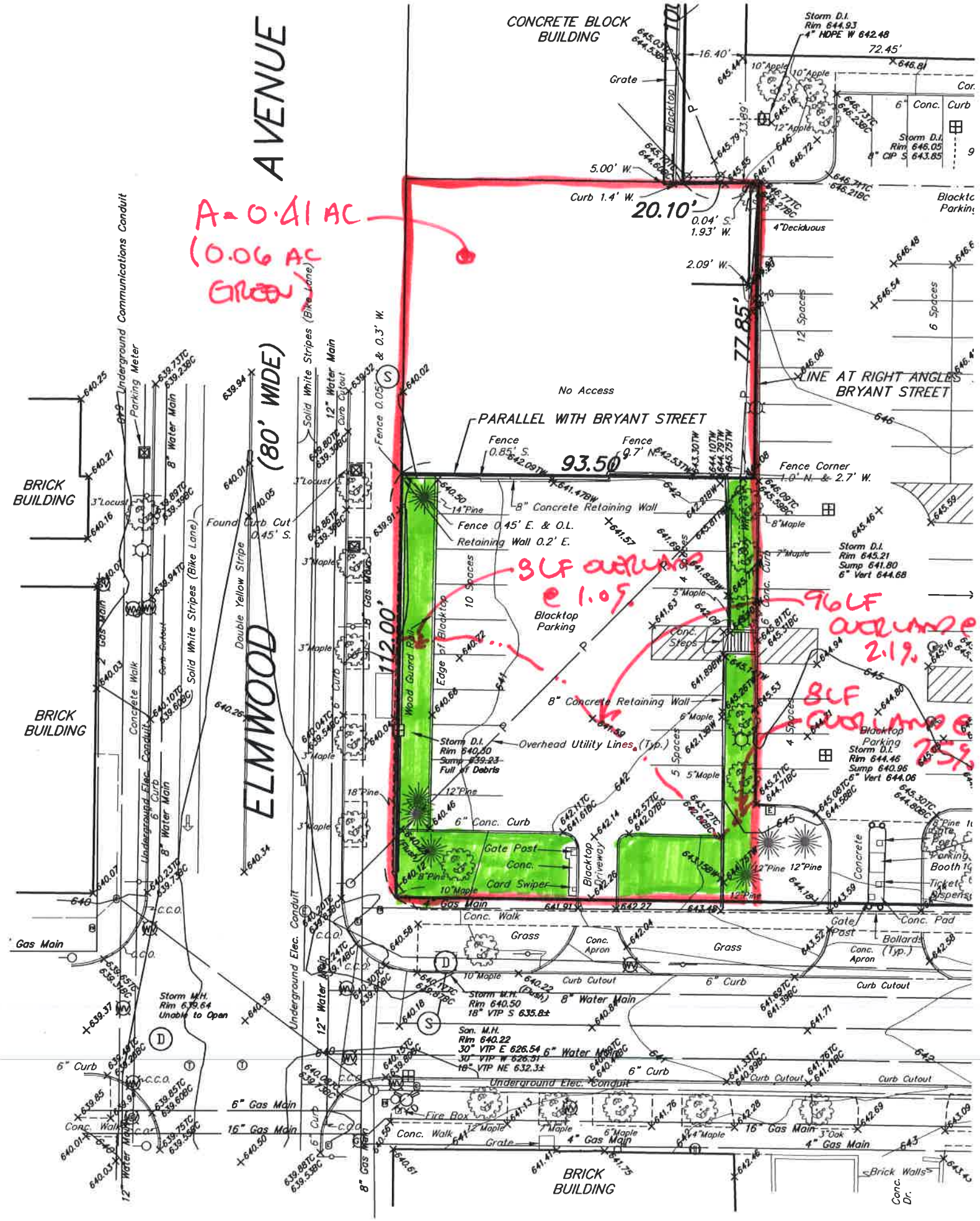
Storm Sewer System Drainage Calculations

Existing Runoff

Existing



Routing Diagram for Elmwood-Bryant
Prepared by Hewlett-Packard Company, Printed 3/19/2018
HydroCAD® 10.00-18 s/n 05019 © 2016 HydroCAD Software Solutions LLC


A = 0.41 AC
(0.06 AC GREEN)
ELMWOOD AVENUE
(80' WIDE)
CONCRETE BLOCK BUILDING
BRICK BUILDING
BRICK BUILDING
BRICK BUILDING
PARALLEL WITH BRYANT STREET
LINE AT RIGHT ANGLES BRYANT STREET
No Access
93.50'
112.00'
77.85'
20.10'
8LF overhang @ 1.0%
96LF overhang 2.1%
8LF overhang 25%
Blacktop Parking
8" Concrete Retaining Wall
Overhead Utility Lines (Typ.)
Storm D.I. Rim 640.50 Sump 639.23 Full of Debris
Storm D.I. Rim 645.21 Sump 641.80 6" Vert 644.68
Storm D.I. Rim 644.46 Sump 640.96 6" Vert 644.06
Storm D.I. Rim 644.93 4" HDPE W 642.48
Storm D.I. Rim 646.05 8" CIP S 643.85
Storm M.H. Rim 639.64 Unable to Open
Storm M.H. Rim 640.50 18" VTP S 635.8±
San. M.H. Rim 640.22 30" VTP E 626.54 30" VTP W 626.51 18" VTP NE 632.3±
Underground Elec. Conduit
Underground Communications Conduit
Solid White Stripes (Bike Lane)
Double Yellow Stripe
Found Curb Cut 0.45' S.
Fence Corner 1.0' N. & 2.7' W.
Gate Post
Card Swiper
Conc. Walk
Grass
Conc. Apron
Curb Cutout
6" Curb
Conc. Pad
Bollards (Typ.)
Fire Box
Grate
Brick Walls
Conc. Dr.
Gas Main
8" Water Main
12" Water Main
6" Gas Main
16" Gas Main
4" Gas Main

Events for Subcatchment 1S: Existing

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	1.19	0.057	1.67
2-Year	1.45	0.070	2.06
5-Year	1.83	0.091	2.65
10-Year	2.15	0.107	3.14
25-Year	2.40	0.121	3.54
50-Year	2.72	0.138	4.04
100-Year	**2.97**	**0.151**	**4.43**

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.060	84	50-75% Grass cover, Fair, HSG D (1S)
0.350	98	Paved parking, HSG D (1S)
0.410	**96**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.410	HSG D	1S
0.000	Other	
0.410		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.060	0.000	0.060	50-75% Grass cover, Fair	1S
0.000	0.000	0.000	0.350	0.000	0.350	Paved parking	1S
0.000	**0.000**	**0.000**	**0.410**	**0.000**	**0.410**	**TOTAL AREA**	

Summary for Subcatchment 1S: Existing

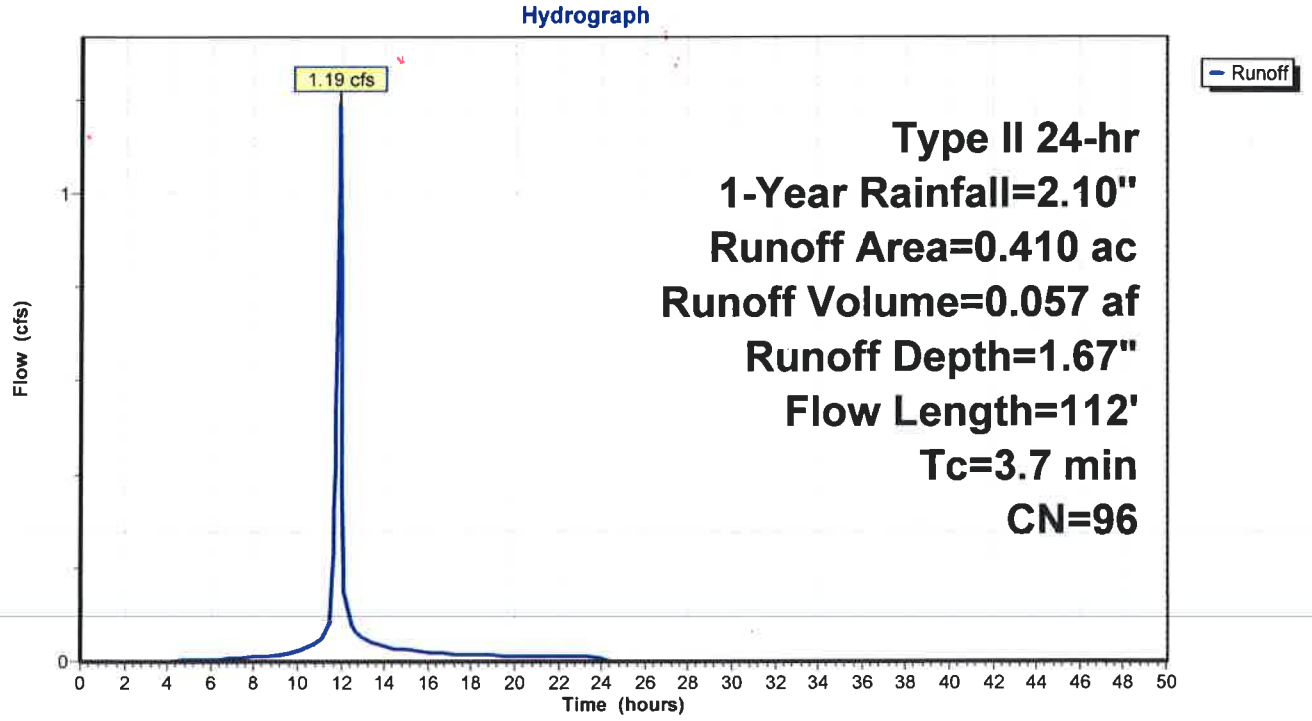
Runoff = 1.19 cfs @ 11.94 hrs, Volume= 0.057 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

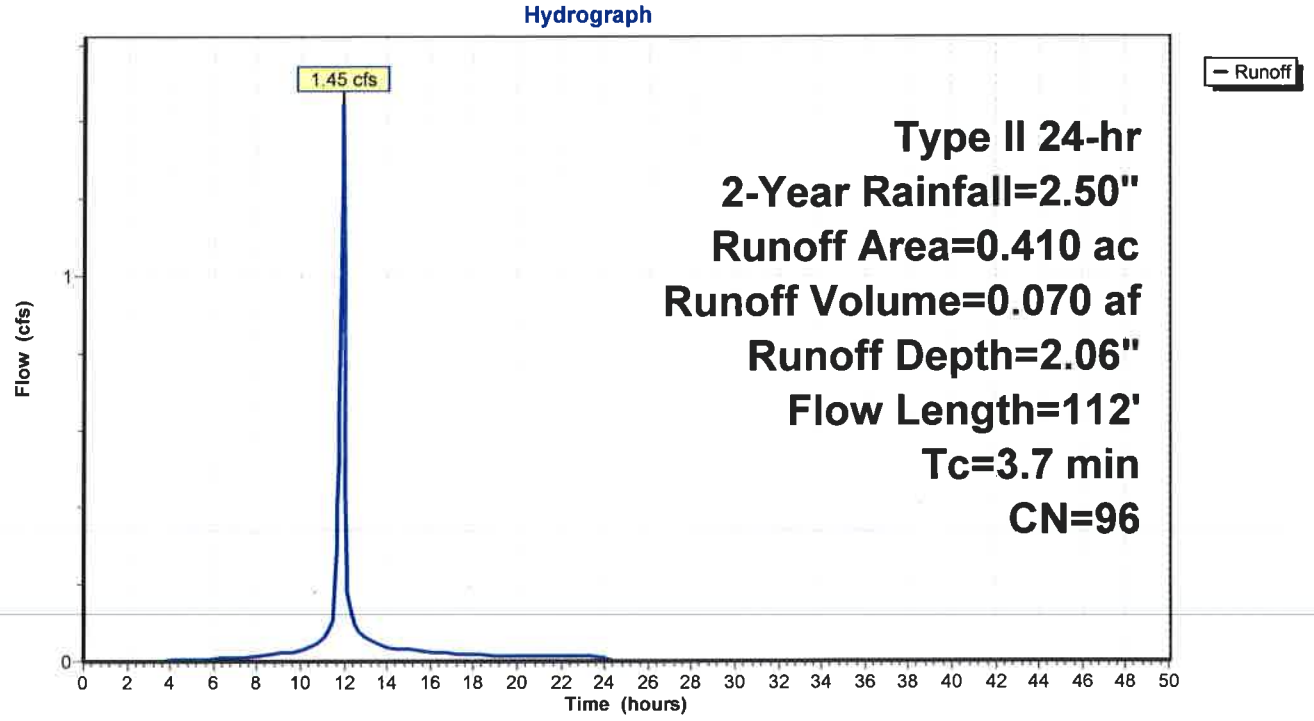
Runoff = 1.45 cfs @ 11.94 hrs, Volume= 0.070 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.50"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

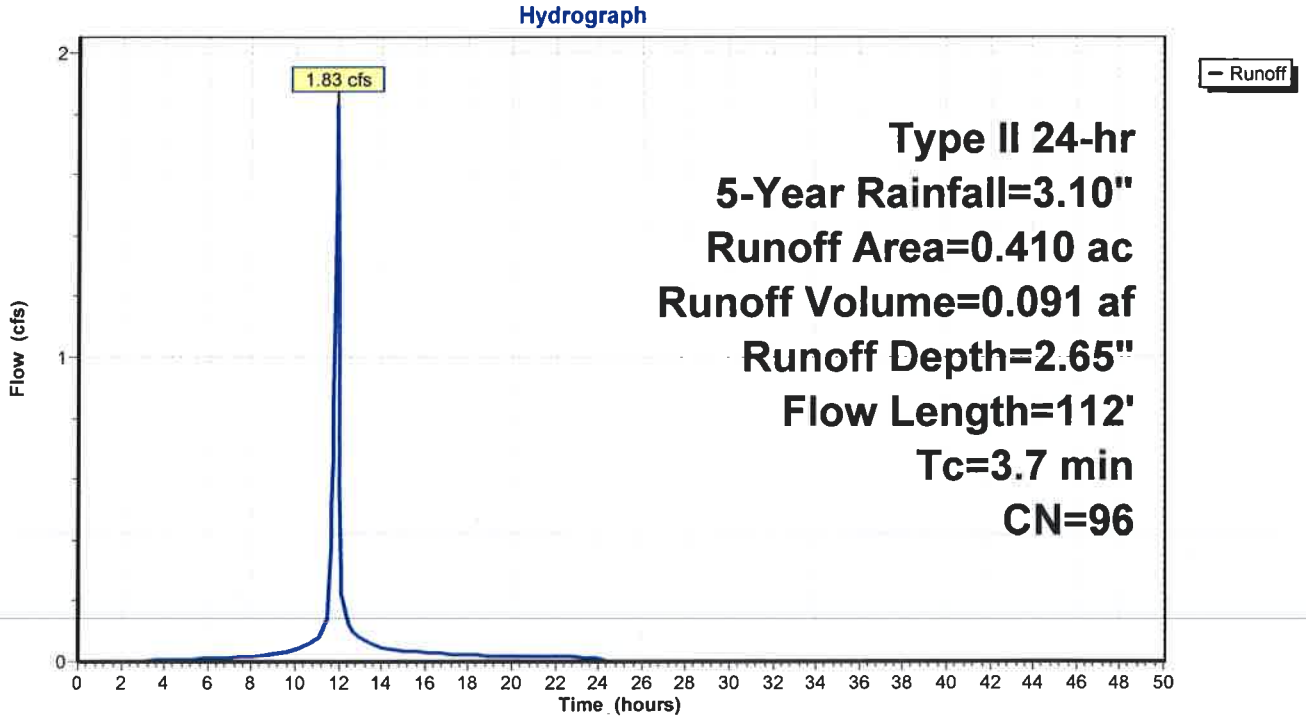
Runoff = 1.83 cfs @ 11.94 hrs, Volume= 0.091 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

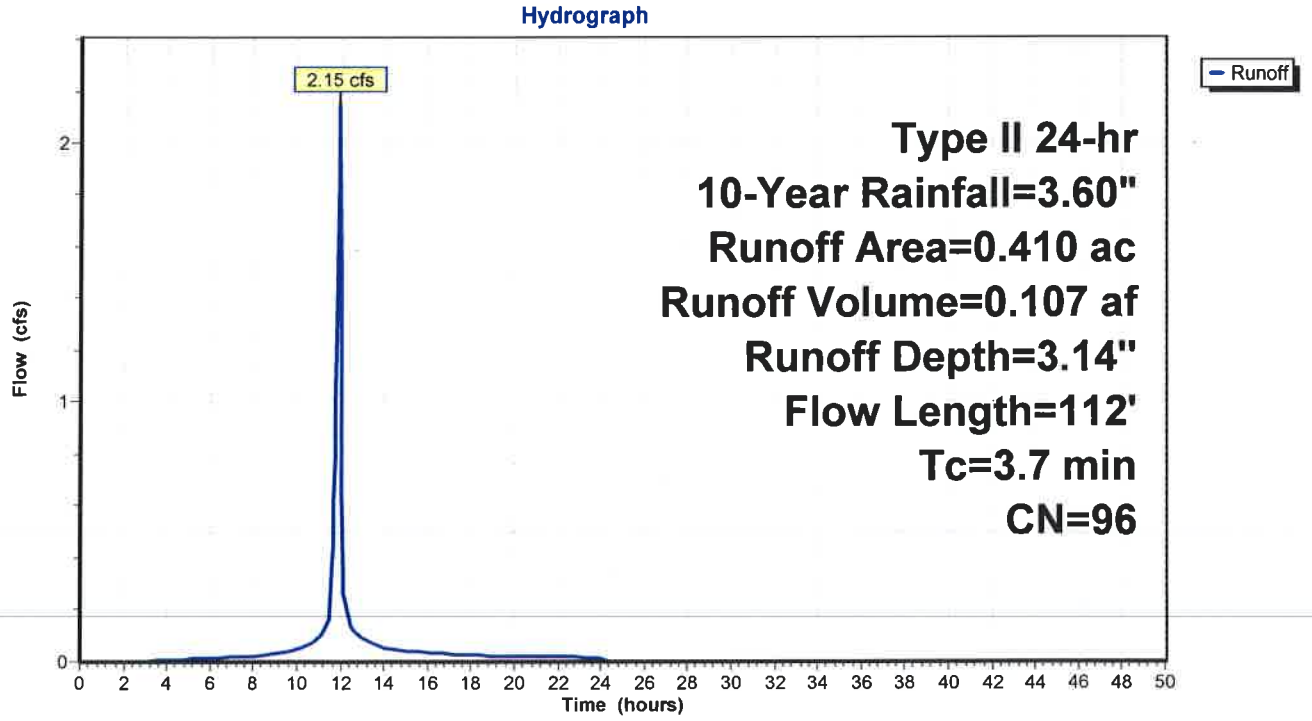
Runoff = 2.15 cfs @ 11.94 hrs, Volume= 0.107 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

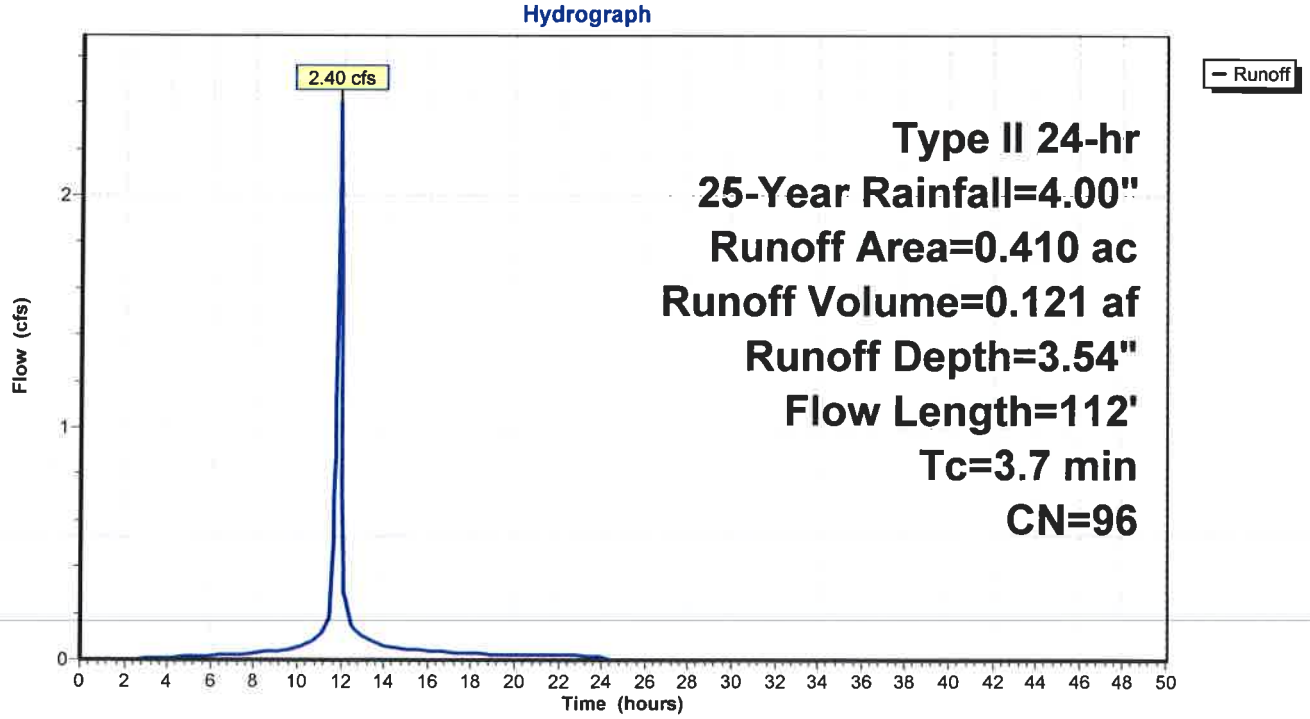
Runoff = 2.40 cfs @ 11.94 hrs, Volume= 0.121 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.00"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

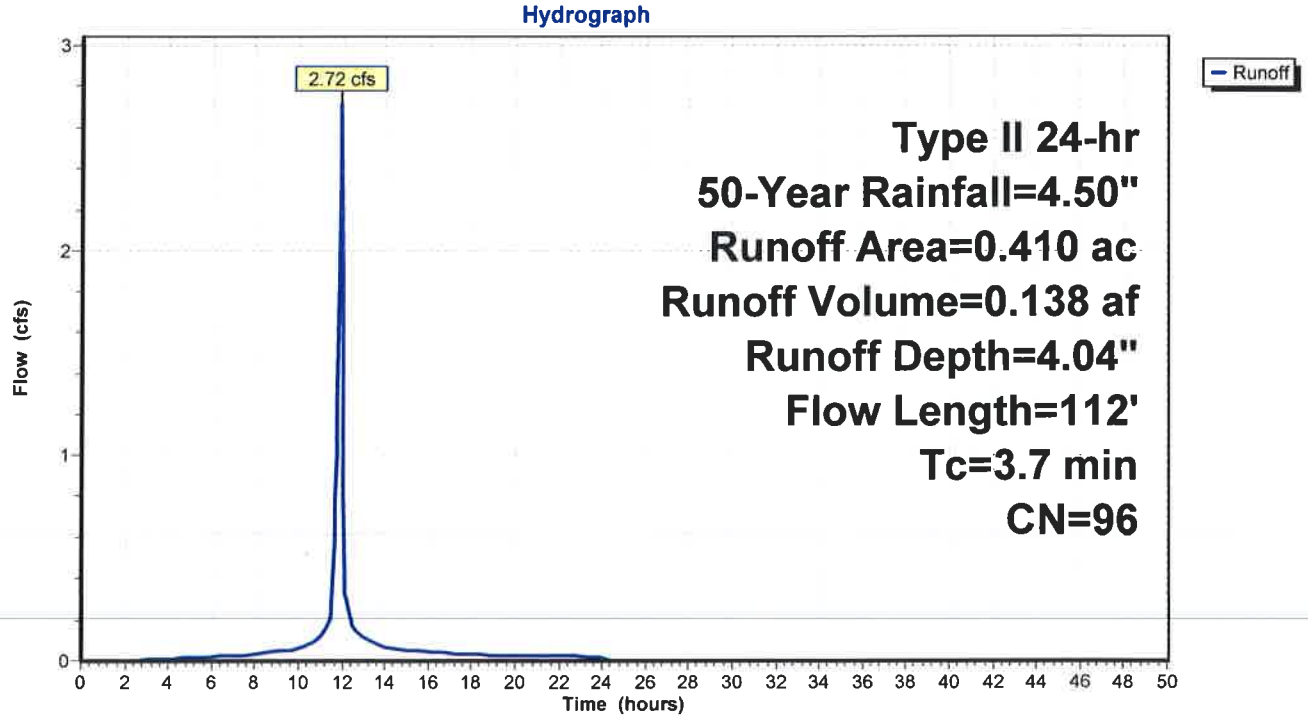
Runoff = 2.72 cfs @ 11.94 hrs, Volume= 0.138 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.50"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing



Summary for Subcatchment 1S: Existing

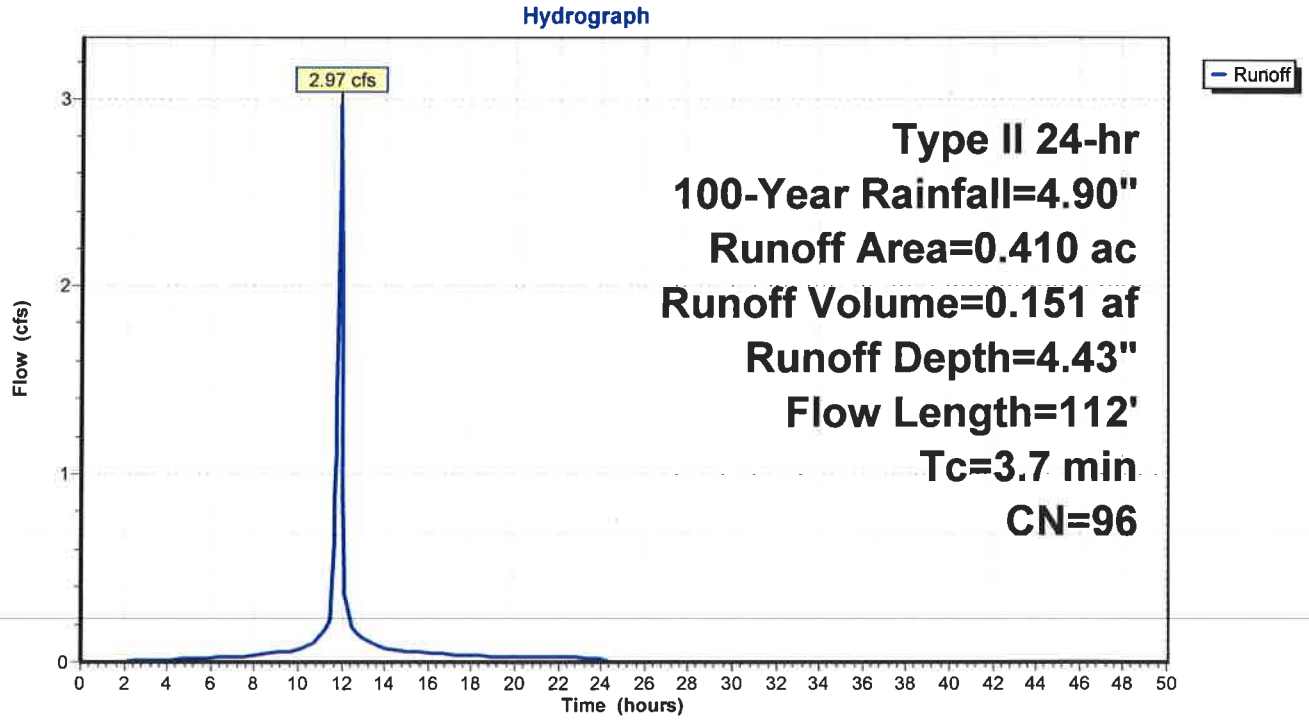
Runoff = 2.97 cfs @ 11.94 hrs, Volume= 0.151 af, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.90"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.060	84	50-75% Grass cover, Fair, HSG D
0.410	96	Weighted Average
0.060		14.63% Pervious Area
0.350		85.37% Impervious Area

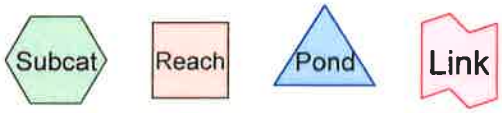
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	8	0.2500	0.25		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
1.3	96	0.0210	1.23		**Sheet Flow, overland-pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.9	8	0.0100	0.07		**Sheet Flow, overland-grass** Grass: Short n= 0.150 P2= 2.50"
3.7	112	Total			

Subcatchment 1S: Existing

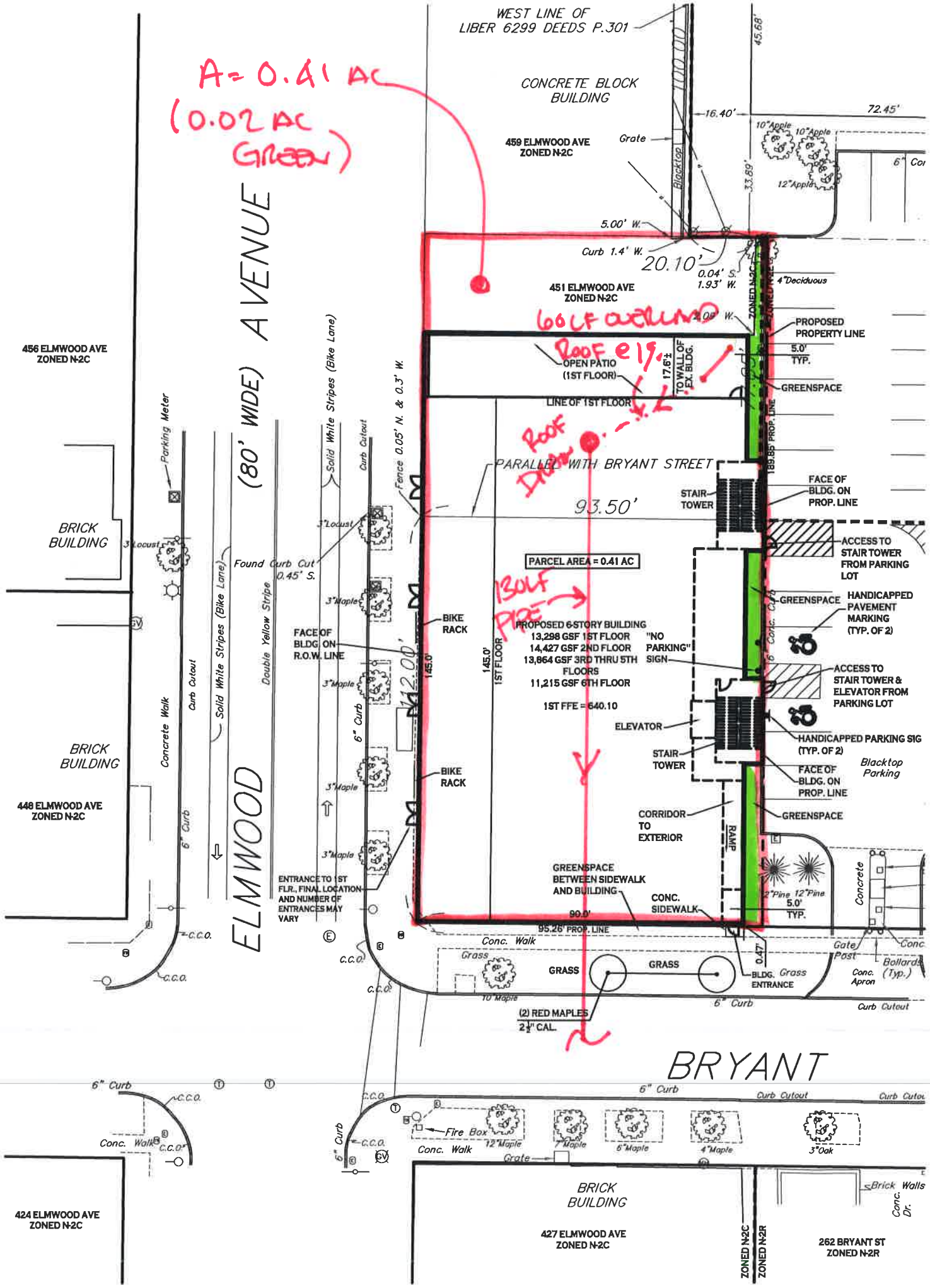


Proposed Runoff

Proposed



Routing Diagram for Elmwood-Bryant
Prepared by Hewlett-Packard Company, Printed 3/19/2018
HydroCAD® 10.00-18 s/n 05019 © 2016 HydroCAD Software Solutions LLC


A= 0.41 AC
(0.02 AC GREEN)
WEST LINE OF LIBER 6299 DEEDS P.301
CONCRETE BLOCK BUILDING
459 ELMWOOD AVE ZONED N-2C
451 ELMWOOD AVE ZONED N-2C
456 ELMWOOD AVE ZONED N-2C
448 ELMWOOD AVE ZONED N-2C
424 ELMWOOD AVE ZONED N-2C
427 ELMWOOD AVE ZONED N-2C
262 BRYANT ST ZONED N-2R
ELMWOOD AVENUE (80' WIDE)
BRYANT
BRICK BUILDING
60 LF OVERHAND
ROOF ELV.
ROOF DRAIN
13 OLF PIPE
PARALLEL WITH BRYANT STREET
93.50'
112.00'
PARCEL AREA = 0.41 AC
PROPOSED 6-STORY BUILDING
13,298 GSF 1ST FLOOR
14,427 GSF 2ND FLOOR
13,864 GSF 3RD THRU 5TH FLOORS
11,215 GSF 6TH FLOOR
1ST FFE = 640.10
PROPOSED PROPERTY LINE
GREENSPACE
FACE OF BLDG. ON PROP. LINE
STAIR TOWER
ELEVATOR
ACCESS TO STAIR TOWER FROM PARKING LOT
ACCESS TO STAIR TOWER & ELEVATOR FROM PARKING LOT
HANDICAPPED PAVEMENT MARKING (TYP. OF 2)
HANDICAPPED PARKING SIG (TYP. OF 2)
"NO PARKING" SIGN
BIKE RACK
FACE OF BLDG. ON R.O.W. LINE
ENTRANCE TO 1ST FLR., FINAL LOCATION AND NUMBER OF ENTRANCES MAY VARY
CORRIDOR TO EXTERIOR
RAMP
GREENSPACE BETWEEN SIDEWALK AND BUILDING
CONC. SIDEWALK
BLDG. ENTRANCE
(2) RED MAPLES 2½" CAL.
Blacktop Parking
Found Curb Cut 0.45' S.
Solid White Stripes (Bike Lane)
Double Yellow Stripe
Concrete Walk
Curb Cutout
Parking Meter
Fence 0.05' N. & 0.3' W.
Conc. Walk
Grass
Fire Box
Grate
Brick Walls
Conc. Dr.
Gate Post
Bollards (Typ.)
Conc. Apron
Concrete
ZONED N-2C
ZONED N-2R

Events for Subcatchment 2S: Proposed

Event	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	1.24	0.060	1.77
2-Year	1.50	0.074	2.16
5-Year	1.88	0.094	2.76
10-Year	2.20	0.111	3.25
25-Year	2.45	0.125	3.65
50-Year	2.77	0.142	4.15
100-Year	**3.02**	**0.155**	**4.55**

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.020	80	>75% Grass cover, Good, HSG D (2S)
0.390	98	Paved parking, HSG D (2S)

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.410	HSG D	2S
0.000	Other	

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.020	0.000	0.020	>75% Grass cover, Good	2S
0.000	0.000	0.000	0.390	0.000	0.390	Paved parking	2S

Summary for Subcatchment 2S: Proposed

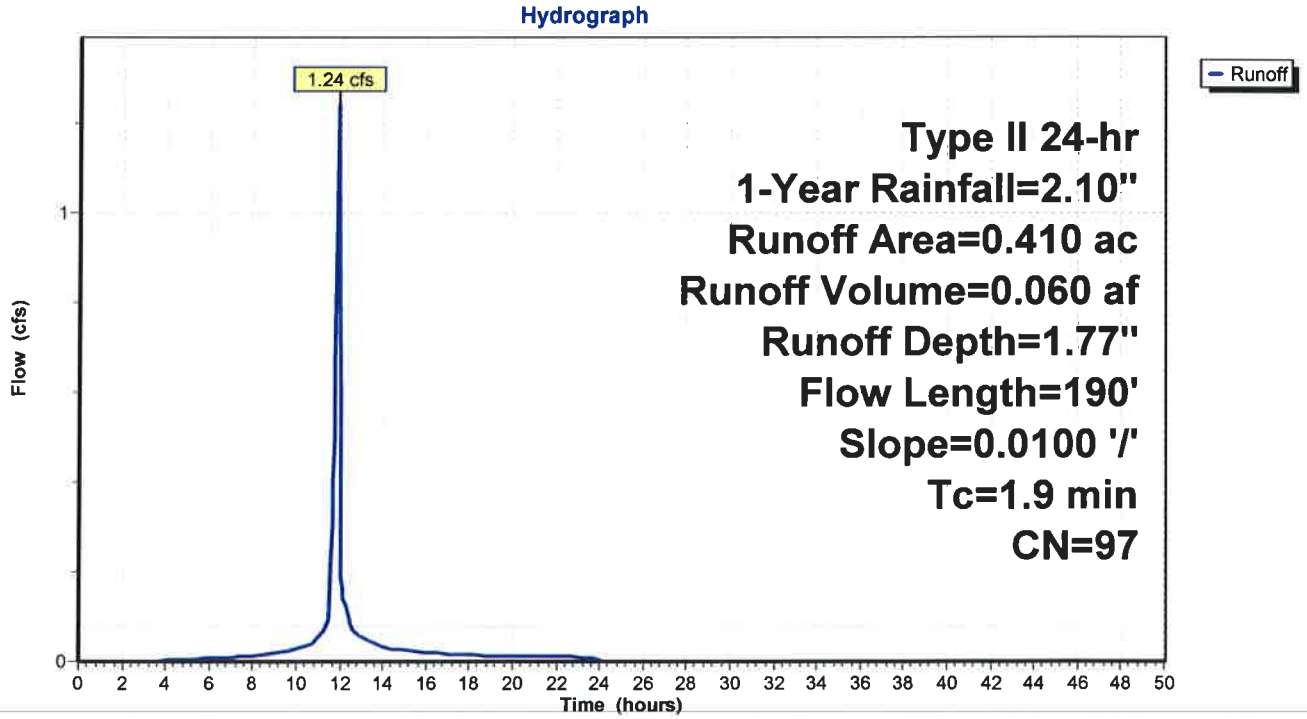
Runoff = 1.24 cfs @ 11.91 hrs, Volume= 0.060 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.10"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

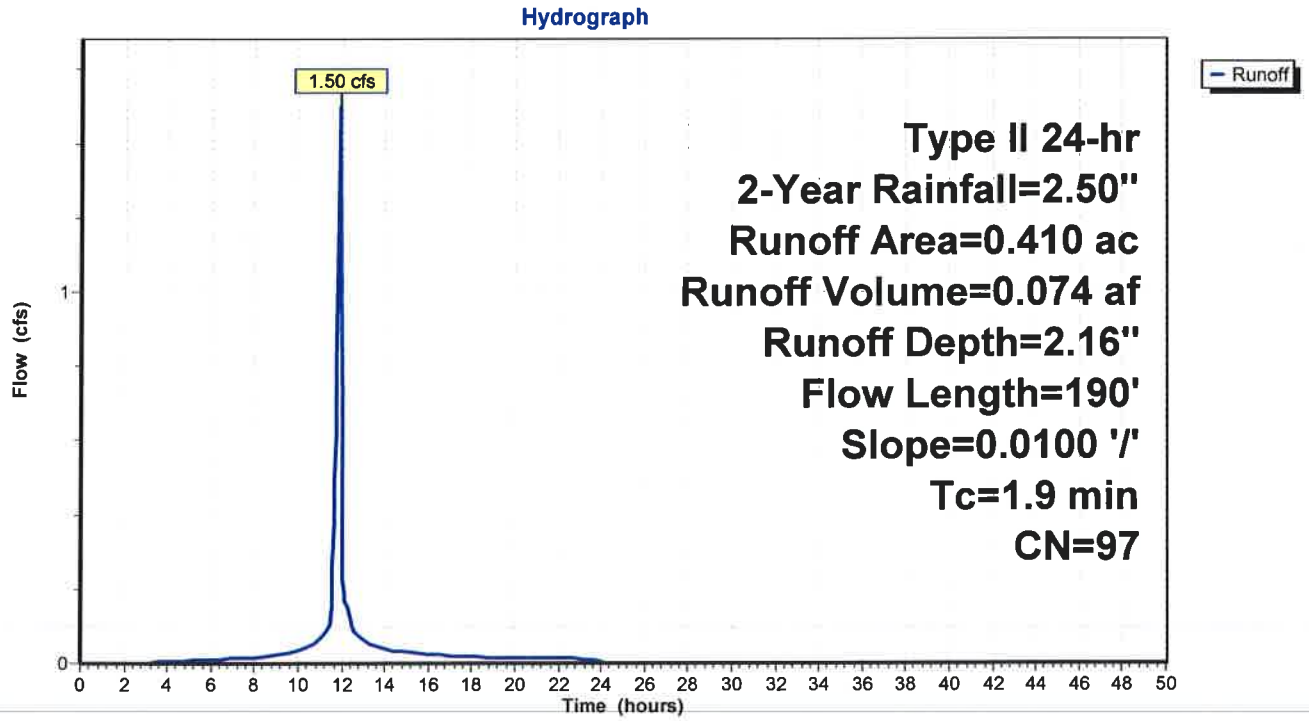
Runoff = 1.50 cfs @ 11.91 hrs, Volume= 0.074 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.50"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

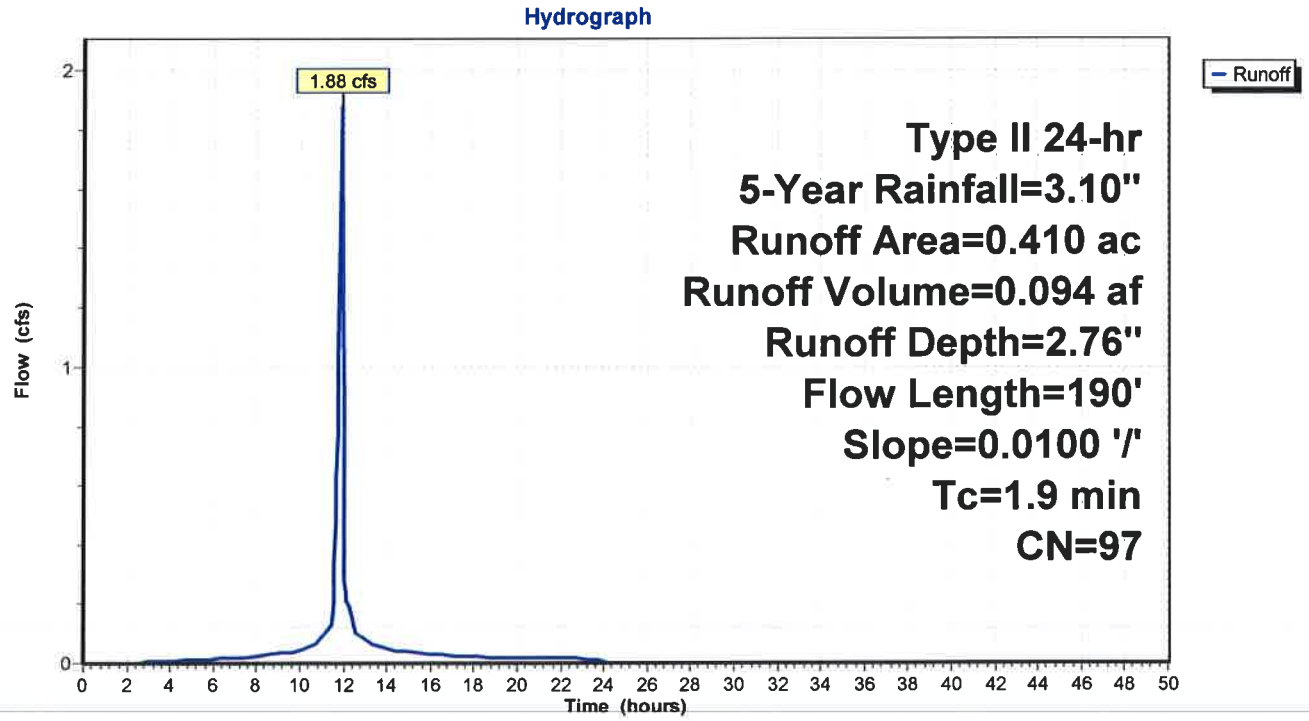
Runoff = 1.88 cfs @ 11.91 hrs, Volume= 0.094 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-Year Rainfall=3.10"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

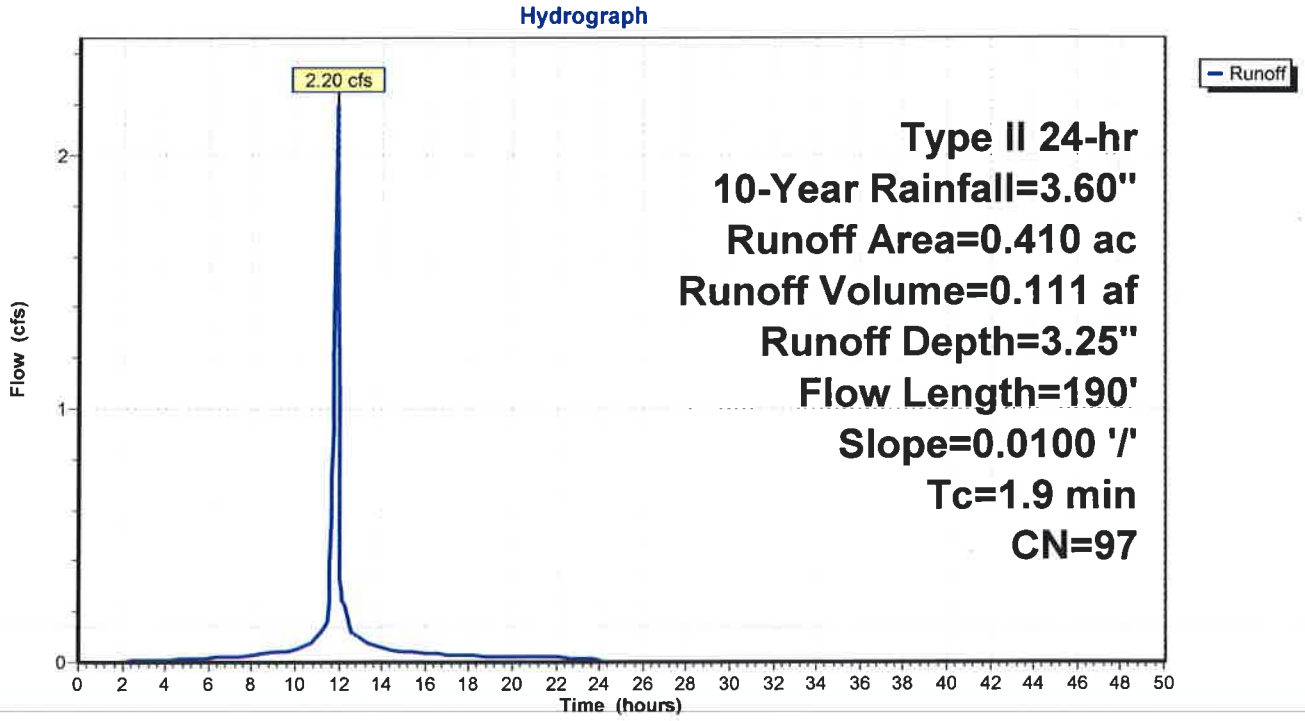
Runoff = 2.20 cfs @ 11.91 hrs, Volume= 0.111 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.60"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

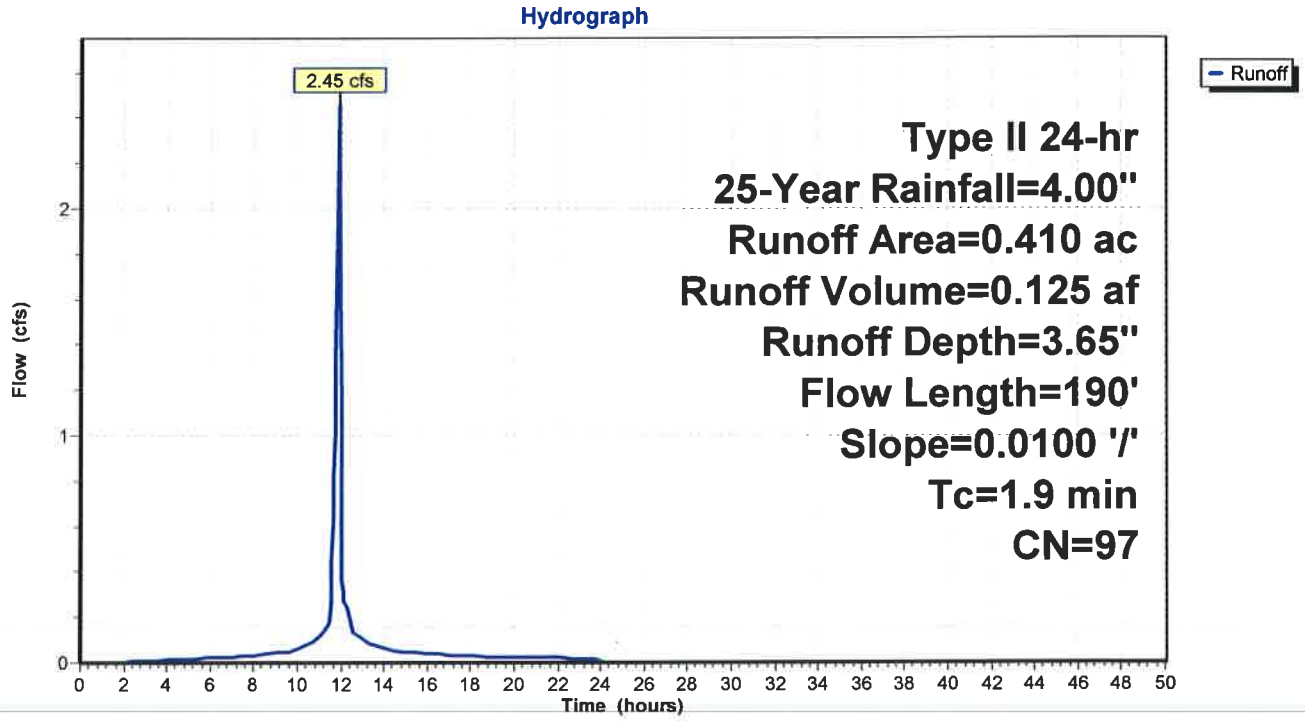
Runoff = 2.45 cfs @ 11.91 hrs, Volume= 0.125 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=4.00"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

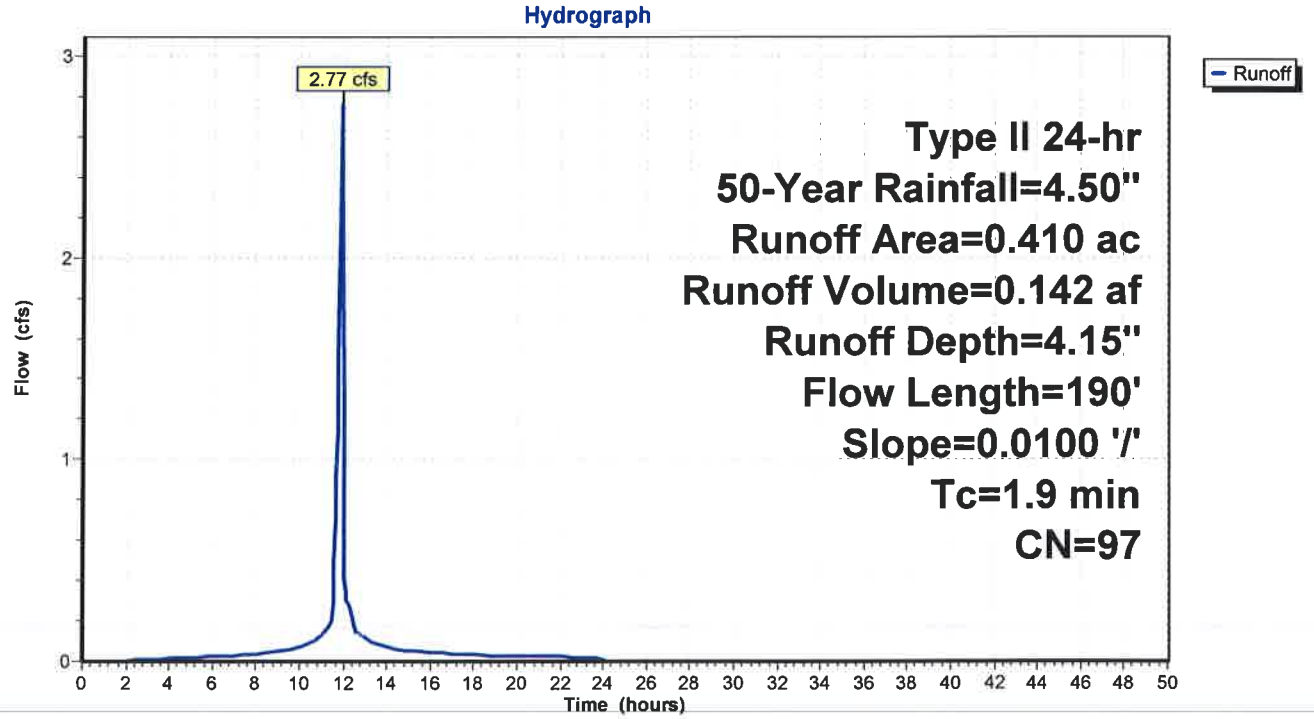
Runoff = 2.77 cfs @ 11.91 hrs, Volume= 0.142 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-Year Rainfall=4.50"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Summary for Subcatchment 2S: Proposed

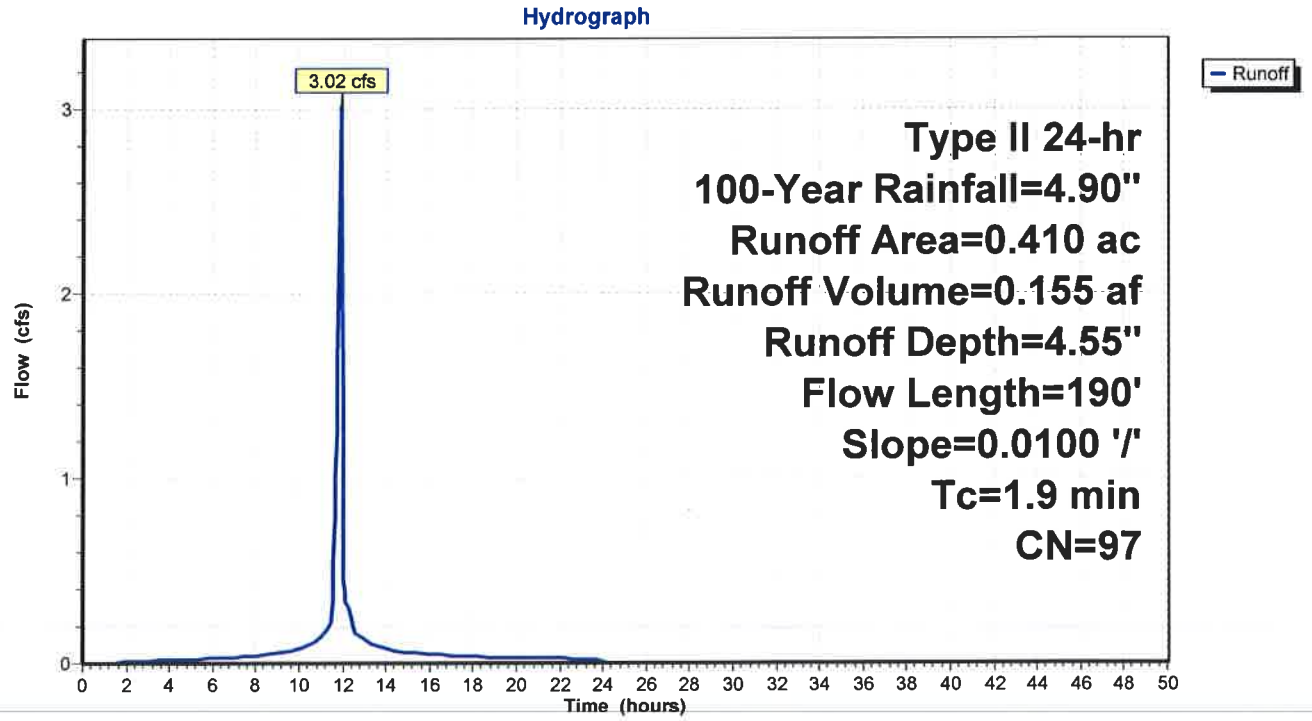
Runoff = 3.02 cfs @ 11.91 hrs, Volume= 0.155 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=4.90"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.410	97	Weighted Average
0.020		4.88% Pervious Area
0.390		95.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	60	0.0100	0.83		**Sheet Flow, overland-roof** Smooth surfaces n= 0.011 P2= 2.50"
0.7	130		3.00		**Direct Entry, pipe flow**
1.9	190	Total			

Subcatchment 2S: Proposed



Downstream Sanitary Sewer Capacity Analysis

Carmina • Wood • Morris DPC

487 Main Street Suite 500 Buffalo, New York 14203 P: 716.842.3165 F: 716.842.0263 W: cwm-ae.com

Architecture Engineering Interior Design

STATE OF NEW YORK
CHRISTOPHER WOOD
076394
LICENSED PROFESSIONAL ENGINEER

SANITARY SEWER ENGINEER'S REPORT
FOR
ELMWOOD CROSSING
Elmwood Ave, Bryant St, Hodge St, Utica Ave
Buffalo, New York

GENERAL

This project consists of the redevelopment of the existing Children's Hospital site off of Elmwood Avenue between Bryant Street, Hodge Street and West Utica Avenue in the City of Buffalo. Proposed for the entire redevelopment is 322 residential units, a 94 room hotel, a 15,217 sf health and wellness center, a 132 capacity day care facility, 61,225 sf of office space, 46,227 sf of retail space and a 36,000 sf grocery store. The redevelopment will be a combination of new building construction, building additions and rehabilitated existing buildings. Each building will have a 6 inch SDR-35 PVC sanitary sewer lateral connection to any of the existing sewers located on the streets listed above. This report analyzes the downstream sewer capacity as a whole of the proposed redevelopment described above.

EXISTING CONDITIONS

Sanitary Sewer

Existing buildings to be redeveloped will re-use existing sanitary sewer laterals connections. These buildings include the Annex Building, Variety Tower, Alfiero Building, MH Building, D building and 125 Hodge Ave. The proposed daycare facility will be a building addition onto 125 Hodge Ave and the sanitary will be connected internally to the existing building so no new sanitary lateral will be required.

PROPOSED FACILITIES

Sanitary Sewer

All standalone new buildings (451 Elmwood, 188 W. Utica & 204 W. Utica) constructed as part of this project will require new sanitary sewer laterals. Proposed for the new building at 451 Elmwood will be an 8" SDR-35 PVC sanitary lateral connection at 2.0% min. Proposed for the two parcels along West Utica will require 8" SDR-35 PVC sanitary laterals at 2.0% min.

Design Parameters @ 451 Elmwood:

(2)	1-bdrm apartment @ 110 gpd/room	= 220 gpd
(16)	2-bdrm apartment @ 220 gpd/room	= 3,520 gpd
(5)	3-bdrm apartment @ 330 gpd/person	= 1,650 gpd
(13,303)	retail space @ 0.1 gpd/square foot	= 1,330 gpd
(14,521)	office space @ 0.1 gpd/square foot	= 1,542 gpd

Total Sanitary Demand:	8,172 gpd
Peak Sanitary Demand (4.27 peaking factor):	34,814 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 34,814 gpd	=	0.054 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.176 cfs

Design Parameters @ 188 W. Utica:

(20)	2-bdrm townhouse @ 220 gpd/room	= 4,400 gpd

Total Sanitary Demand:	4,400 gpd
Peak Sanitary Demand (4.33 peaking factor):	19,008 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 19,008 gpd	=	0.029 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.201 cfs

Design Parameters @ 204 W. Utica:

(12)	1-bdrm apartment @ 110 gpd/room	= 1,320 gpd
(40)	2-bdrm apartment @ 220 gpd/room	= 8,800 gpd
(6)	3-bdrm apartment @ 330 gpd/person	= 1,980 gpd
(12,424)	retail space @ 0.1 gpd/square foot	= 1,242 gpd
(36,000)	grocery store @ 0.1 gpd/square foot	= 3,600 gpd

Total Sanitary Demand:	16,942 gpd
Peak Sanitary Demand (4.17 peaking factor):	70,650 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 70,650 gpd	=	0.109 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.121 cfs

The hydraulic loading rate is per "New York State Design Standards for Intermediate Wastewater Treatment Systems" March 5, 2014, NYSDEC.

Below is an analysis of the monitored flow rates at four downstream sanitary nodes chosen by the Buffalo Sewer Authority. It is to be noted that the entire proposed peak flow does not flow through all nodes until Node 3. Each node has been analyzed to account for only the portion of the project that will flow through it. See attached sanitary sewer demand calculations for how the proposed flow at each node was broken down.

Downstream Sewer Capacity Analysis Summary:

Node 1 – 310 West Utica (24"):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.294 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.430 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.334 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.470 cfs

Capacity of existing 24" brick @ 0.63% = 15.549 cfs (n=0.015)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 24" combined sewer. The Elmwood Crossing Peak Flow value at Node 1 consists of the sanitary demand from the proposed developments at 188 W. Utica and 204 W. Utica only.

Node 2 – 390 West Utica (34”x25”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.000 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.136 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.000 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.136 cfs

Capacity of existing 37.5”x25” egg shaped brick @ 0.30% = 21.95 cfs (n=0.015)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 37.5”x25” egg shaped combined sewer. The Elmwood Crossing Peak Flow value at Node 2 consists of the sanitary demand from the proposed developments at 188 W. Utica and 204 W. Utica only.

Node 3 – West Utica & Rhode Island (54”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.429 cfs *
Elmwood Crossing Peak Flow	=	0.551 cfs **
Proposed Peak Flow	=	0.980 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.528 cfs *
Elmwood Crossing Peak Flow	=	0.551 cfs **
Proposed Peak Flow	=	1.079 cfs

Capacity of existing 54” RCP @ 0.25% = 106.427 cfs (n=0.012)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 54” storm relief sewer. The Elmwood Crossing Peak Flow value at Node 3 consists of the entire Elmwood Crossing development.

Node 4 – 353 Bryant (42”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.314 cfs *
Elmwood Crossing Peak Flow	=	0.433 cfs **
Proposed Peak Flow	=	0.747 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.282 cfs *
Elmwood Crossing Peak Flow	=	0.433 cfs **
Proposed Peak Flow	=	0.715 cfs

Capacity of existing 42” RCP @ 0.96% = 106.702 cfs (n=0.012)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 42” storm relief sewer. The Elmwood Crossing Peak Flow value at Node 4 consists of the sanitary demand from the 451 Elmwood and daycare proposed developments in addition to the existing buildings to be rehabilitated named Annex Building, Variety Tower, Tanner Building, Alfiero Building and Buildings ‘MH’ and ‘D’.

Notes:

Pipe slopes and materials provided by BSA
Pipe sizes field verified by TECSmith
1 MGD = 1.547 cfs
* Converted from measurements in TECSmith report dated 3/19/2018
** Avg Sanitary Flow = 93,520 gpd = 0.145 cfs
Using a Peaking factor of 3.82; Elmwood Crossing Peak Flow = 0.551 cfs

SPP296 Analysis:

The existing weir located at SPP296 has a wall height of 24”, existing flow depths were not provided at this SPP. Interpolated flow from Node 3 indicated a flow depth of between 3.4” and 3.6” including the proposed Elmwood Crossing project peak flow demand. There will still be approximately 20” of freeboard at the weir wall located at SPP296 with the addition of the proposed peak demand into the existing sewer system. Refer to the sanitary demand calculations.

Sanitary Demand Calculations

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

451 Elmwood

Housing	110	gal/d/bdrm	x	2	bdrm	=	220	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	16	bdrm	=	3,520	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	5	bdrm	=	1,650	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	13,303	sf	=	1,330	gpd		*use 0.1 gallons per day per square foot
Office	0.1	gal/d/sf	x	14,521	sf	=	1,452	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	8,172	gpd	Average	

Annex Building

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	35	bdrm	=	7,700	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	3	bdrm	=	990	gpd		*use 330 gallons per day per 3 bedroom un
Total Site Sanitary Demand:						=	10,010	gpd	Average	

Variety Tower

Housing	110	gal/d/bdrm	x	3	bdrm	=	330	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	25	bdrm	=	5,500	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	9	bdrm	=	2,970	gpd		*use 330 gallons per day per 3 bedroom un
Office	0.1	gal/d/sf	x	21,704	sf	=	2,170	gpd		*use 0.1 gallons per day per square foot
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd		*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd		*use 20 gallons per day per person
Total Site Sanitary Demand:						=	21,610	gpd	Average	

Alfiero Building

Office	0.1	gal/d/sf	x	25,000	sf	=	2,500	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	2,500	gpd	Average	

MH Building

Housing	110	gal/d/bdrm	x	19	bdrm	=	2,090	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	15	bdrm	=	3,300	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	8	bdrm	=	2,640	gpd		*use 330 gallons per day per 3 bedroom un
Total Site Sanitary Demand:						=	8,030	gpd	Average	

D Building

Housing	110	gal/d/bdrm	x	15	bdrm	=	1,650	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	17	bdrm	=	3,740	gpd		*use 220 gallons per day per 2 bedroom un
Total Site Sanitary Demand:						=	5,390	gpd	Average	

* The hydraulic loading rate is per “Design Standards for Intermediate Sized Wastewater Treatment Systems” 2014, NYSDEC.

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Tanner Building

Housing	110	gal/d/bdrm	x	20	bdrm	=	2,200	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	31	bdrm	=	6,820	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	8	bdrm	=	2,640	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	20,550	sf	=	2,055	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	13,715	gpd	Average	

125 Hodge - Daycare Building

Housing	110	gal/d/bdrm	x	1	bdrm	=	110	gpd		*use 110 gallons per day per 1 bedroom un
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd		*use 20 gallons per day per child
Total Site Sanitary Demand:						=	2,750	gpd	Average	

188 W. Utica

Housing	220	gal/d/bdrm	x	20	bdrm	=	4,400	gpd		*use 220 gallons per day per 2 bedroom un
Total Site Sanitary Demand:						=	4,400	gpd	Average	

204 W. Utica

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	40	bdrm	=	8,800	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	16,942	gpd	Average	

* The hydraulic loading rate is per “Design Standards for Intermediate Sized Wastewater Treatment Systems” 2014, NYSDEC.

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

451 Elmwood

Housing	110	gal/d/bdrm	x	2	bdrm	=	220	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	16	bdrm	=	3,520	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	5	bdrm	=	1,650	gpd	*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	13,303	sf	=	1,330	gpd	*use 0.1 gallons per day per square foot
Office	0.1	gal/d/sf	x	14,521	sf	=	1,452	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 8,172 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:
Total demand: 8,172 gpd / 100 gpcd = 82 per capita

Population (P) = 82 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.27

Peak Sanitary Demand = 8,172 X 4.26 = 34,814 gpd
= 0.035 MGD
= 0.054 cfs

188 W. Utica

Housing	220	gal/d/bdrm	x	20	bdrm	=	4,400	gpd	*use 220 gallons per day per 2 bedroom un

Total Site Sanitary Demand: = 4,400 gpd Average

Find Peak Sanitary Demand:

Peaking Factor based on Population:
Total demand: 4,400 gpd / 100 gpcd = 44 per capita

Population (P) = 44 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.33

Peak Sanitary Demand = 4,400 X 4.32 = 19,008 gpd
= 0.019 MGD
= 0.029 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

204 W. Utica

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	40	bdrm	=	8,800	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	16,942	gpd	Average	

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 16,942 gpd / 100 gpcd = 169 per capita

Population (P) = 169 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.17

Peak Sanitary Demand = 16,942 X 4.17 = 70,650 gpd
= 0.071 MGD
= 0.109 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 1 & 2

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	60	bdrm	=	13,200	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	21,342	gpd	Average	

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 21,342 gpd / 100 gpcd = 213 per capita

Population (P) = 213 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.14

Peak Sanitary Demand = 21,342 X 4.13 = 88,144 gpd
= 0.088 MGD
= 0.136 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 3

Housing	110	gal/d/bdrm	x	84	bdrm	=	9,240	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	199	bdrm	=	43,780	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	39	bdrm	=	12,870	gpd	*use 330 gallons per day per 3 bedroom un
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd	*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd	*use 20 gallons per day per person
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd	*use 20 gallons per day per child
Office	0.1	gal/d/sf	x	61,225	sf	=	6,123	gpd	*use 0.1 gallons per day per square foot
Retail	0.1	gal/d/sf	x	46,277	sf	=	4,628	gpd	*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 93,520 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 93,520 gpd / 100 gpcd = 935 per capita

Population (P) = 935 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 3.82

Peak Sanitary Demand = 93,520 X 3.81 = 356,312 gpd
= 0.356 MGD
= 0.551 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 4

Housing	110	gal/d/bdrm	x	72	bdrm	=	7,920	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	139	bdrm	=	30,580	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	33	bdrm	=	10,890	gpd	*use 330 gallons per day per 3 bedroom un
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd	*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd	*use 20 gallons per day per person
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd	*use 20 gallons per day per child
Office	0.1	gal/d/sf	x	61,225	sf	=	6,123	gpd	*use 0.1 gallons per day per square foot
Retail	0.1	gal/d/sf	x	33,853	sf	=	3,385	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 72,178 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 72,178 gpd / 100 gpcd = 722 per capita

Population (P) = 722 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 3.89

Peak Sanitary Demand = 72,178 X 3.88 = 280,050 gpd
= 0.280 MGD
= 0.433 cfs

NOTES:
1. NOT TO SCALE.
2. AREA AND PERIMETER DETERMINED BY MODELING THE SHAPE IN AUTOCAD.

$R = \frac{A}{P} = \frac{5.485\ ft^2}{8.689\ ft} = 0.631\ ft$

$n = 0.015$

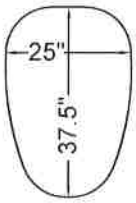
$Q = \frac{1.49}{n}(A)(R)^{2/3}(S)^{1/2}$

$Q = \left(\frac{1.49}{0.015}\right)(5.485\ ft^2)((0.631\ ft)^{2/3})((0.003)^{1/2})$

$Q = 21.95\ ft^3/sec$ (* capacity flowing full)

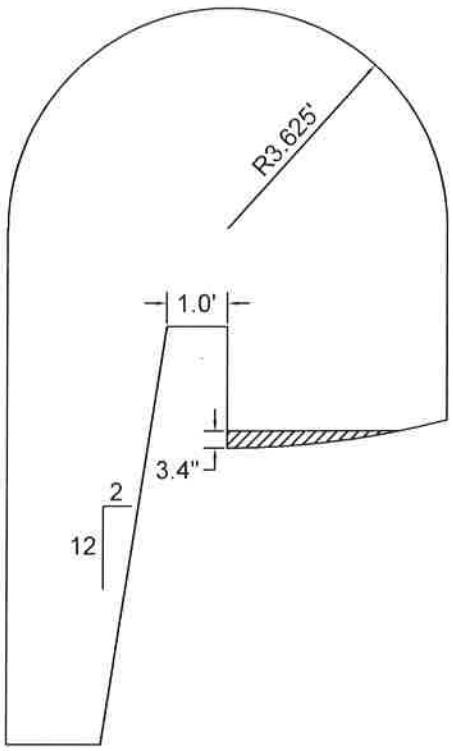
@ NODE 2

A= 5.485 ft^2 +/-
P= 8.689 ft +/-
S= 0.30%



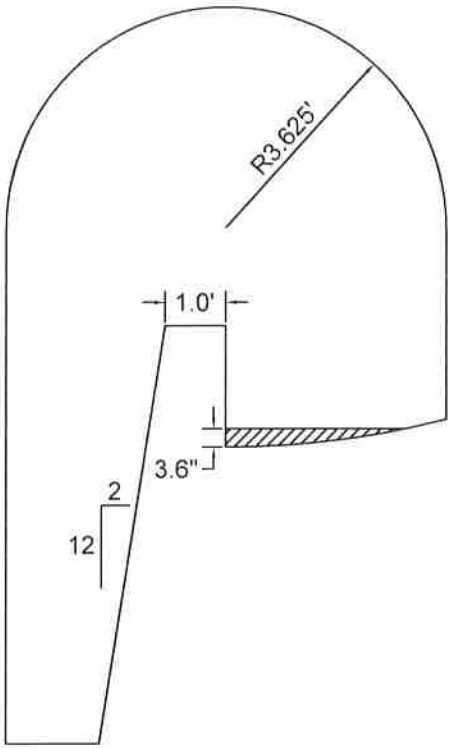
@ SPP 296

A= 0.525 ft^2 +/-
P= 3.137 ft +/-
S= 0.23%
Q= 0.980 ft^3/sec
D= 3.4 in +/-
FB= 20.6 in +/-



WEEKDAY - DOWNSTREAM

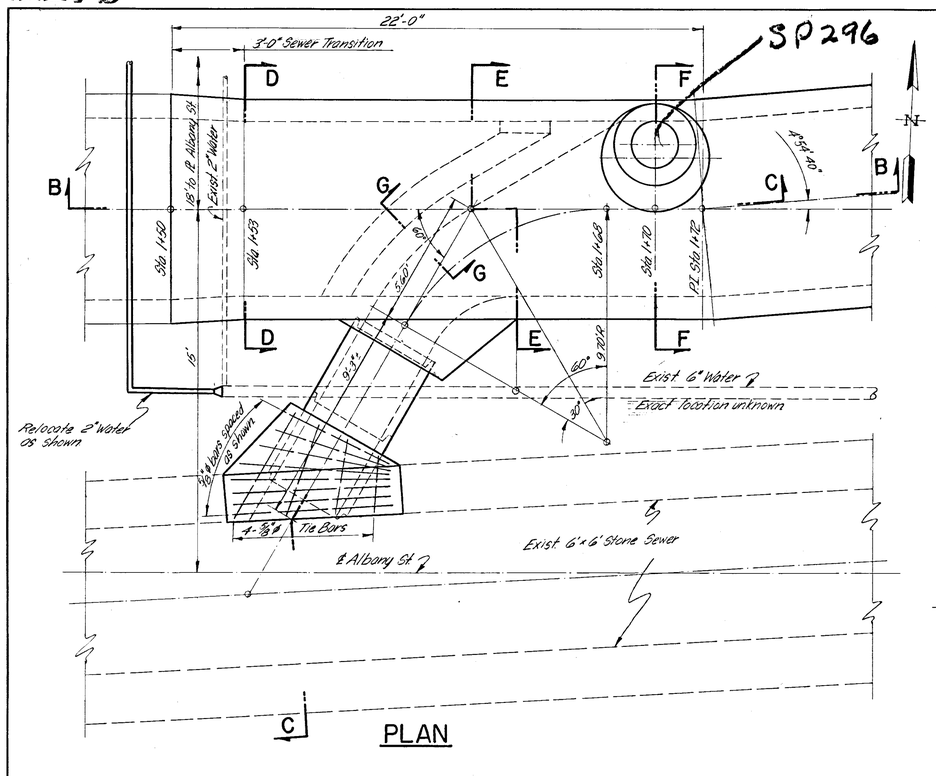
@ SPP 296



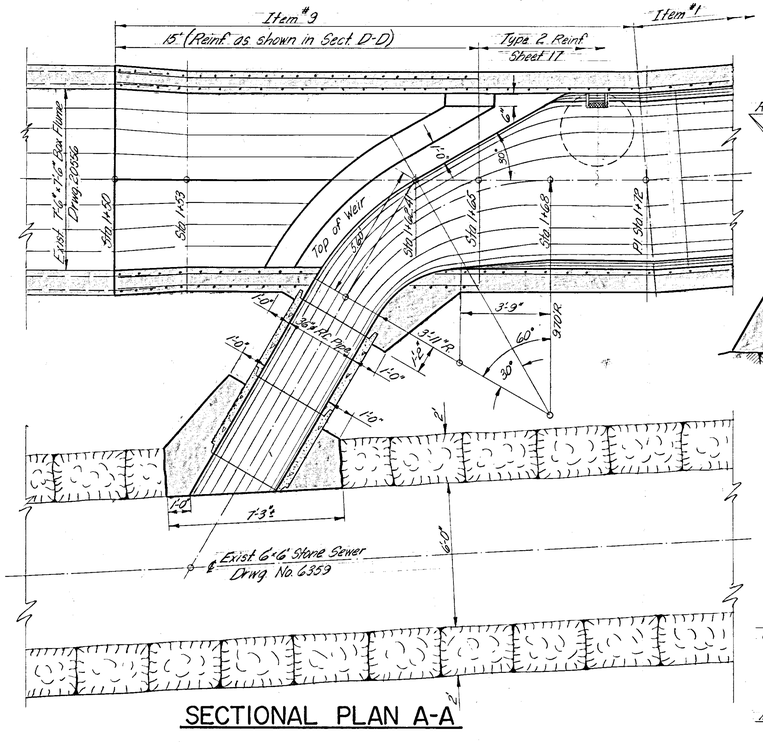
A= 0.583 ft^2 +/-
P= 3.357 ft +/-
S= 0.23%
Q= 1.079 ft^3/sec
D= 3.6 in +/-
FB= 20.4 in +/-

WEEKEND - DOWNSTREAM

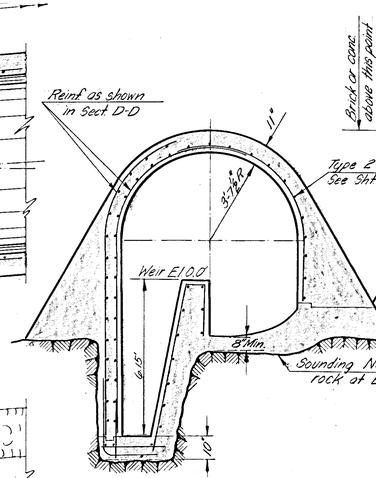
A= AREA OF WATER FLOW
P= WETTED PERIMETER
S= SLOPE
Q= FLOW OBSERVED (OBSERVED @ NODE 3)
D= DEPTH OF FLOW
FB= FREEBOARD DEPTH BETWEEN WATER LEVEL AND WEIR WALL



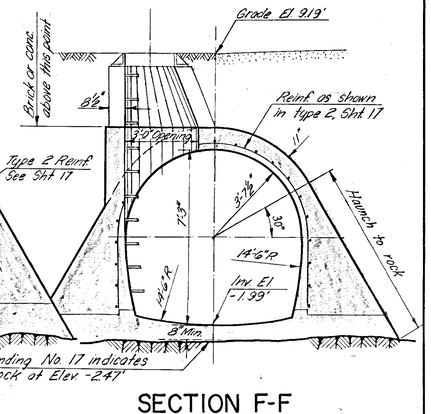
PLAN



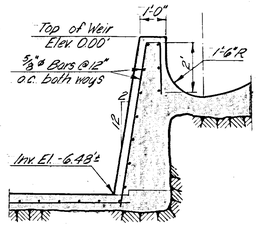
SECTIONAL PLAN A-A



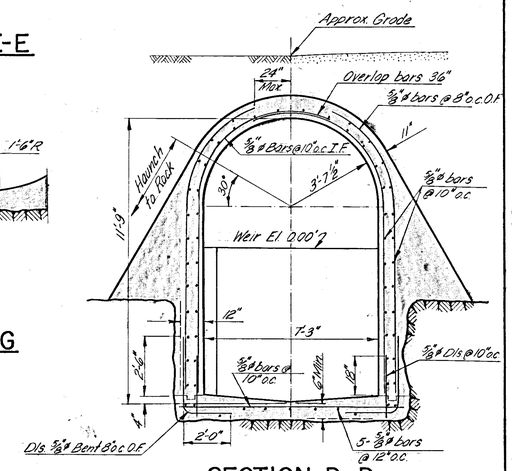
SECTION E-E



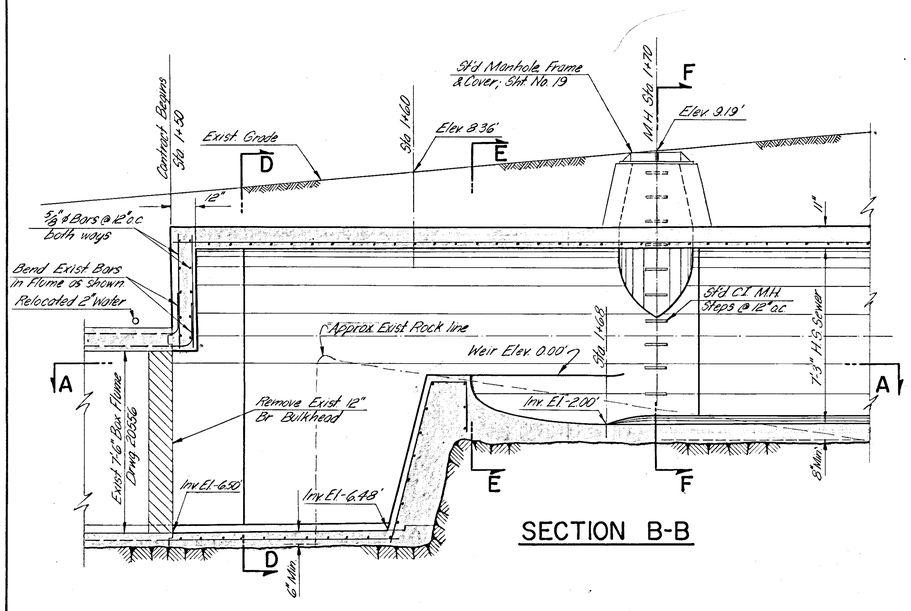
SECTION F-F



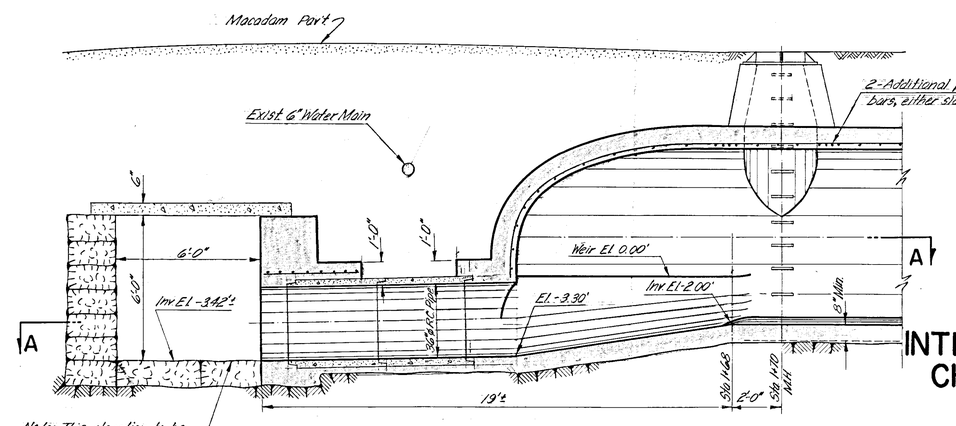
SECTION G-G



SECTION D-D



SECTION B-B



Note: This elevation to be verified prior to construction of D.W.F. Channel

SECTION C-C

ALBANY ST. SEWER DISTRICT

TRUNK RELIEF SEWER

IN

ALBANY ST., FARGO AVE., MASSACHUSETTS AVE. & W. UTICA ST. BETWEEN BLACK ROCK HARBOR & NORWOOD AVE.

INTERCEPTING AND OVERFLOW CHAMBER IN ALBANY ST.

ENGINEERING DIVISION

BUFFALO SEWER AUTHORITY — BUFFALO, N.Y.

SCALE: 1" — MAY 1956

SHEET 7 OF ~~23~~ SHEETS

TECSmith Monitoring Report

Date	Node 1			Node 2			Node 3			Node 4			Rain[2]
	310 West Utica (24")			390 West Utica (34"Hx25"W)			West Utica & Rhode Island (54")			353 Bryant (42")			
	FLOW (GAL x 1,000)	PEAK FLOW (MGD)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	(inches)
2/16/2018	99.320	0.282	4.577	0.000	0.000	14.046	179.727	0.445	4.058	66.314	0.187	2.217	***0.04***
2/17/2018	141.843	0.206	3.619	0.000	0.000	13.894	259.281	0.341	2.071	105.044	0.153	1.942	***0***
2/18/2018	127.741	0.183	3.392	0.000	0.000	13.726	178.007	0.244	1.832	93.557	0.154	1.997	***0***
2/19/2018	485.040	3.370	13.339	0.000	0.000	15.173	641.926	3.641	7.455	664.423	4.920	7.593	***0.82***
2/20/2018	409.581	2.225	11.079	0.000	0.000	14.722	960.499	3.040	6.463	734.193	3.056	5.794	***0.59***
2/21/2018	152.156	0.305	4.801	23.056	2.213	14.006	276.229	0.441	2.376	193.593	0.579	3.402	***0.07***
2/22/2018	113.213	0.149	3.157	0.000	0.000	13.721	200.185	0.277	1.884	116.950	0.203	2.086	***0***
2/23/2018	153.748	3.021	13.245	0.000	0.000	14.666	265.683	2.422	5.887	258.951	4.036	6.842	***0.24***
2/24/2018	119.564	0.180	3.438	0.000	0.000	13.708	203.512	0.261	1.800	112.294	0.161	1.931	***0***
2/25/2018	168.884	0.760	7.533	0.000	0.000	13.934	250.689	0.826	3.147	212.708	1.316	4.484	***0.13***
2/26/2018	111.971	0.150	3.378	0.000	0.000	13.611	181.254	0.243	1.762	101.675	0.193	2.035	***0***
2/27/2018	107.089	0.146	3.204	0.000	0.000	13.613	133.014	0.178	1.574	93.336	0.145	1.888	***0***
2/28/2018	100.645	0.133	3.229	-13.698	0.000	13.645	130.554	0.196	1.603	95.592	0.142	1.876	***0.03***
3/1/2018	70.591	0.144	3.262	0.000	0.000	13.602	139.073	0.211	1.778	90.068	0.161	1.916	***0.43***
3/2/2018	115.401	0.232	3.932	0.000	0.000	13.821	212.020	0.344	2.122	163.513	0.330	2.664	***0.83***
3/3/2018	106.417	0.216	3.787	0.000	0.000	13.765	207.304	0.291	1.878	122.808	0.179	2.066	***0***
3/4/2018	73.587	0.175	3.716	0.000	0.000	13.821	204.971	0.324	2.016	109.253	0.182	2.076	***0***
3/5/2018	75.323	0.173	3.442	0.000	0.000	13.708	182.400	0.245	1.774	99.306	0.153	2.044	***0***
3/6/2018	82.481	0.152	3.160	0.000	0.000	13.708	161.794	0.197	1.672	99.836	0.139	2.037	***0.01***
3/7/2018	111.700	0.244	4.015	0.000	0.000	13.708	170.326	0.214	1.725	99.367	0.166	2.058	***0.01***
3/8/2018	94.636	0.143	3.205	0.000	0.000	13.708	180.691	0.225	1.778	95.665	0.150	1.943	***0***
3/9/2018	112.398	0.191	3.504	0.000	0.000	13.727	168.611	0.233	1.785	96.341	0.168	2.059	***0.02***
3/10/2018	126.029	0.201	3.454	0.000	0.000	13.669	172.016	0.222	1.818	97.064	0.160	2.054	***0***
3/11/2018	120.810	0.182	3.229	0.000	0.000	13.666	167.799	0.249	1.857	88.043	0.139	1.986	***0***
3/12/2018	109.783	0.190	3.287	0.000	0.000	13.821	164.092	0.239	1.851	90.140	0.130	1.976	***0***
3/13/2018	116.789	0.177	3.112	0.000	0.000	13.666	158.541	0.213	1.781	94.016	0.143	1.981	***0.13***
3/14/2018	125.835	0.210	3.512	0.000	0.000	13.990	179.481	0.276	2.070	117.461	0.251	2.629	***0.2***
3/15/2018	121.091	0.202	3.185	0.000	0.000	13.934	183.248	0.277	2.023	114.452	0.184	2.158	***0.13***
3/16/2018	38.296	0.122	2.600	0.000	0.000	13.765	70.597	0.219	1.814	38.927	0.132	1.877	***0.01***
---	---	---	---	---	---	---	---	---	---	---	---	---	***0.01***

Yellow Highlights are Dry Weather Week Days

Blue Highlights are Dry Weather Weekend Days

TECsmith

TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

Date: March 19, 2018

COMBINED SYSTEM DRY WEATHER FLOW CAPACITY STUDY – Summary Review

Prepared For: Former Children's Hospital - DS Capacity Analysis

Christopher Wood
487 Main Street, Suite 600
Buffalo, New York 14203
P: (716) 842-3165
F: (716) 842-0263

Project Name: Former Children's Hospital - DS Capacity Analysis

Flow Monitoring Period: February 16, 2018 to March 16, 2018

Dry Week days Monitored: February 22, February 26-27, March 5, March 8, March 12

Dry Weekend days Monitored: February 17-18, February 24, March 3-4, March 10-11

Number of Monitoring Nodes: Four (4) downstream manholes

Node Locations and Descriptions:

- Node 1 310 West Utica (24")
- Node 2 390 West Utica (34"Hx25"W)
- Node 3 West Utica & Rhode Island (54")
- Node 4 353 Bryant (42")

Summary Conclusion:

Based on the data presented in this report, specifically the flow depth measurements recorded (see graphs below):

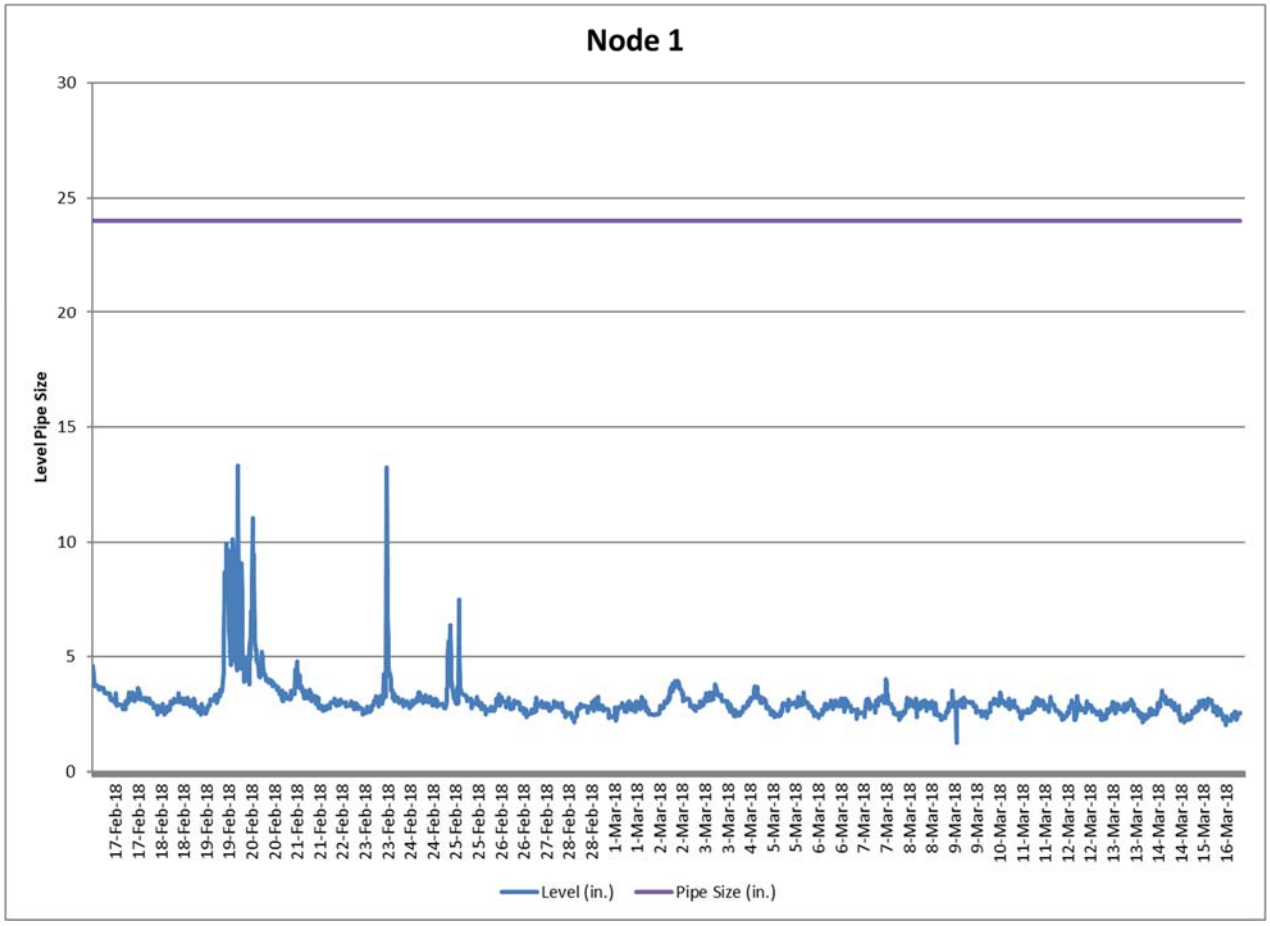
- At no time did the flow depth exceed pipe diameter at any of the downstream monitoring points during the dry vents monitored.
- At no time during the monitoring period did the flow at any point slow or stall which would have caused a backup or flooding at the manhole.

TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

Depth of Flow Capacity Summary:

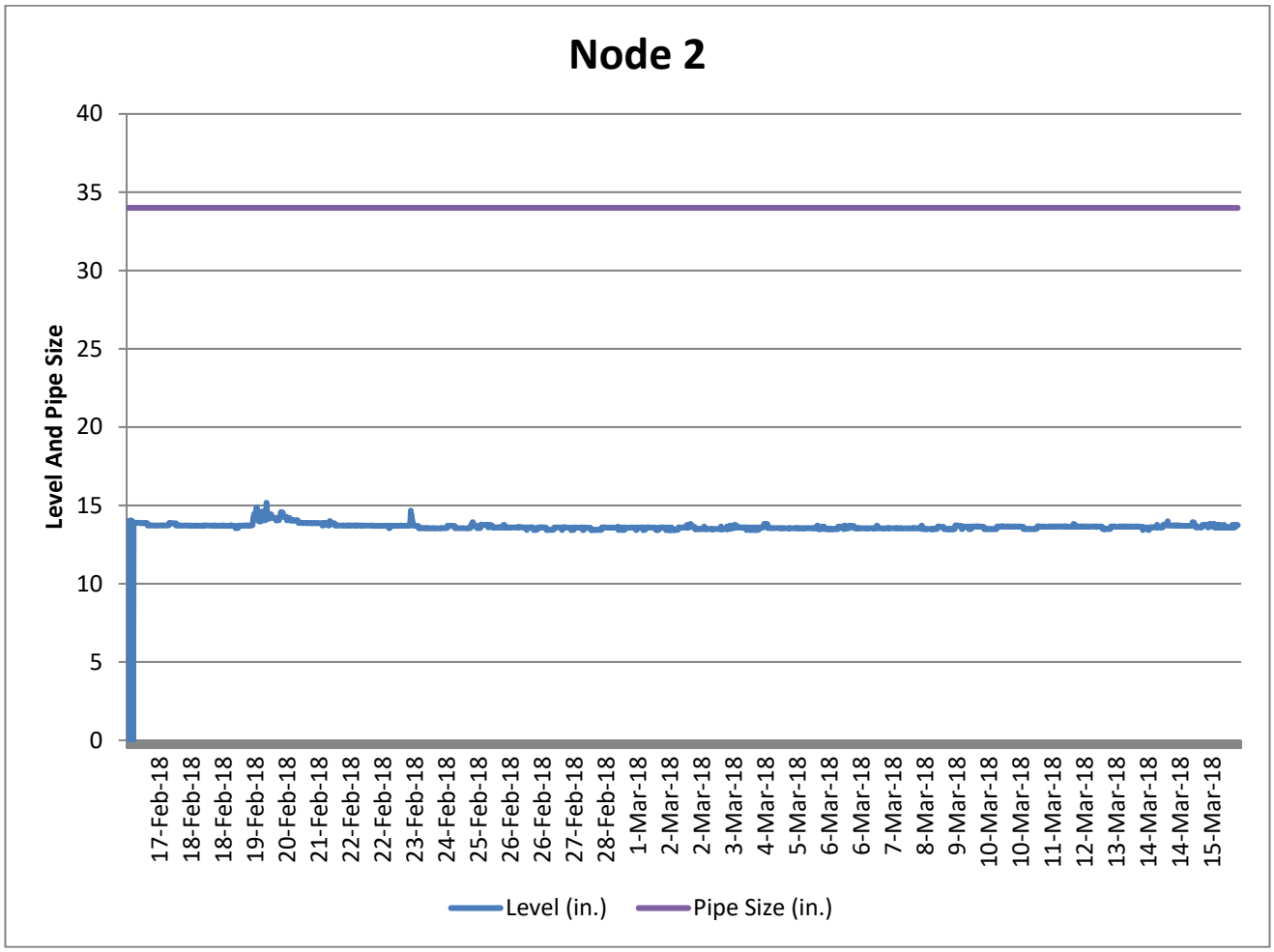
Depth of flow capacity is based on diameter of pipe. See graphs below.

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 1.



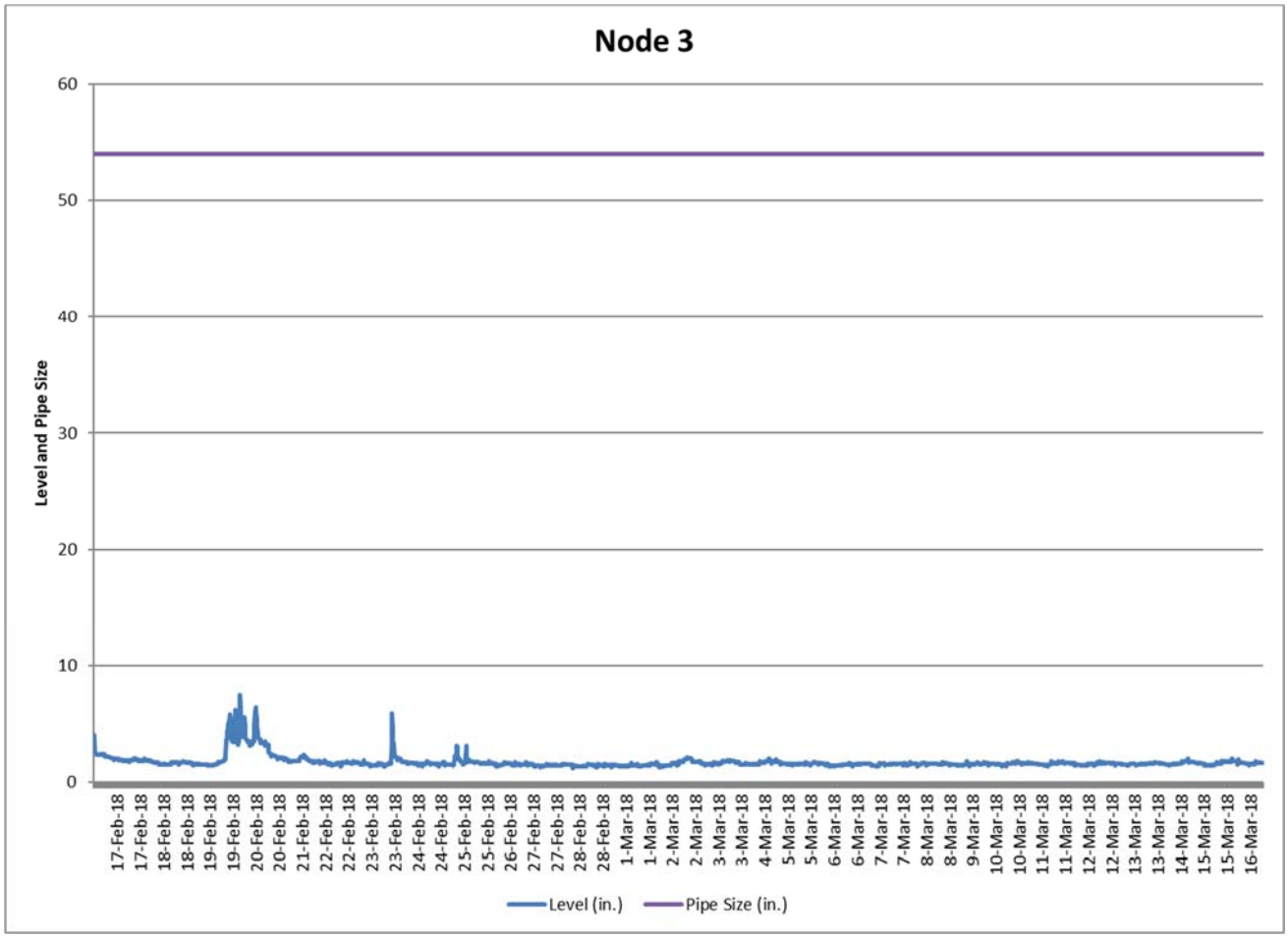
TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 2.



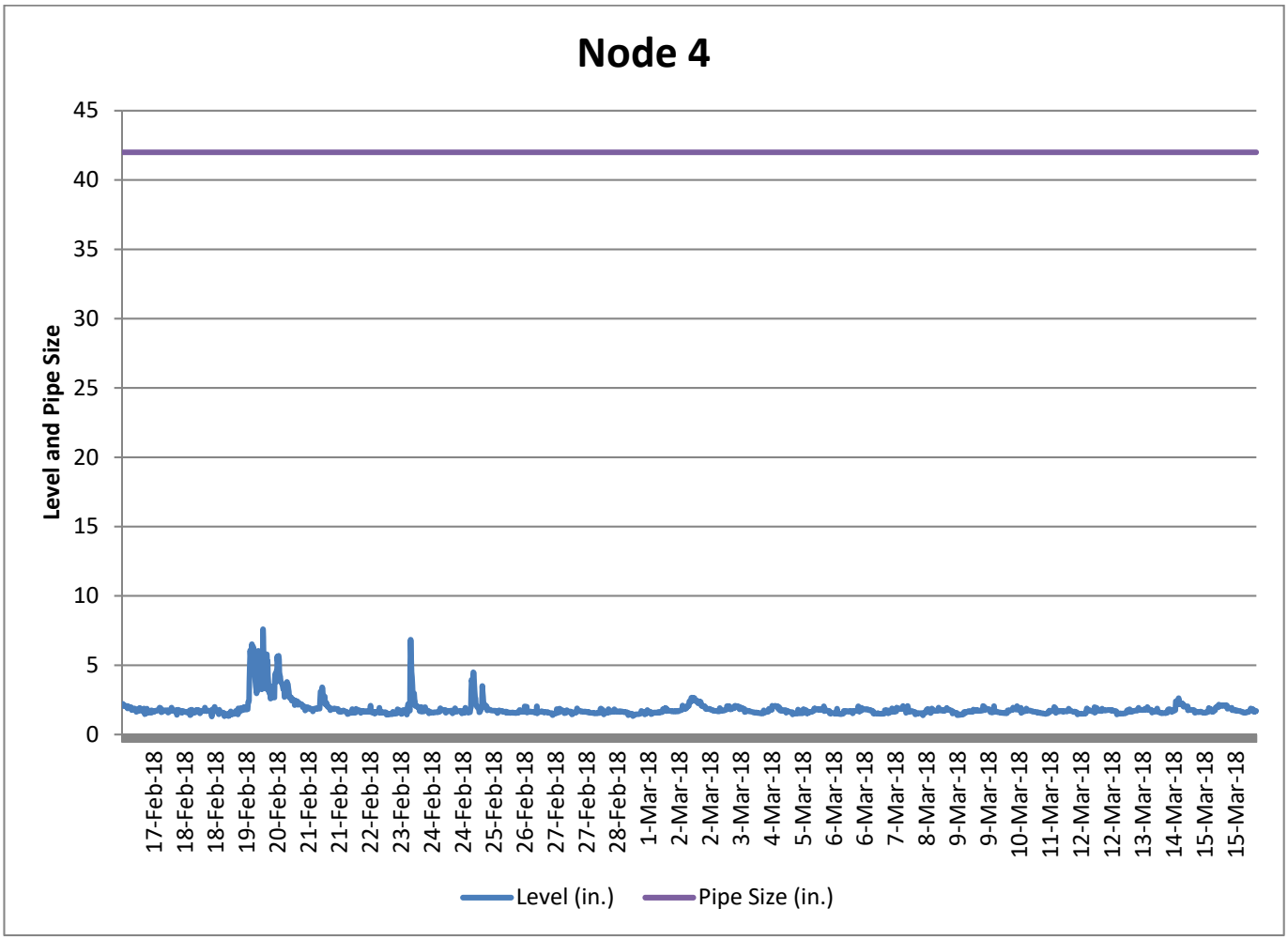
TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 3.

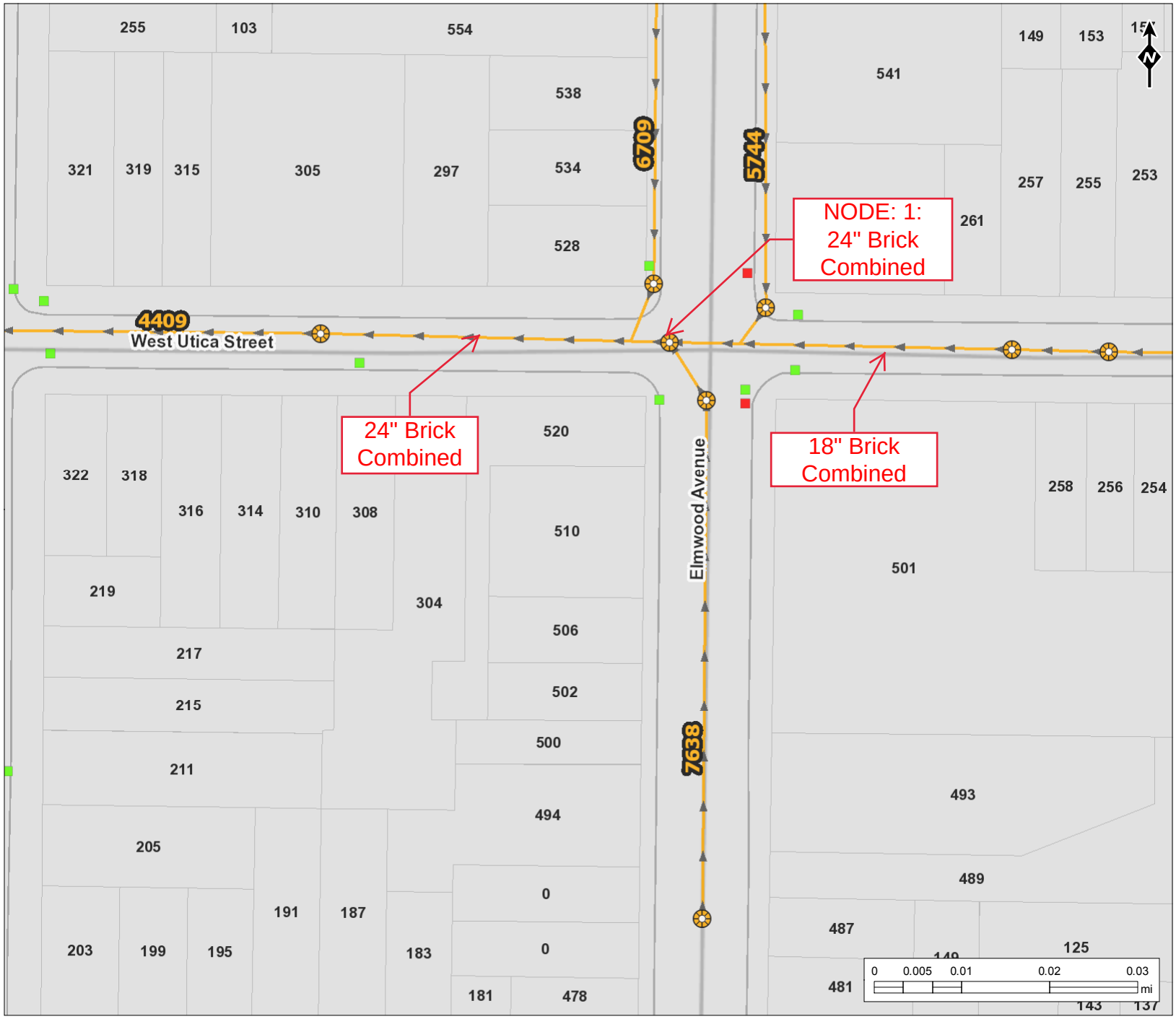


TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 4.



Former Children's Hospital Node 1

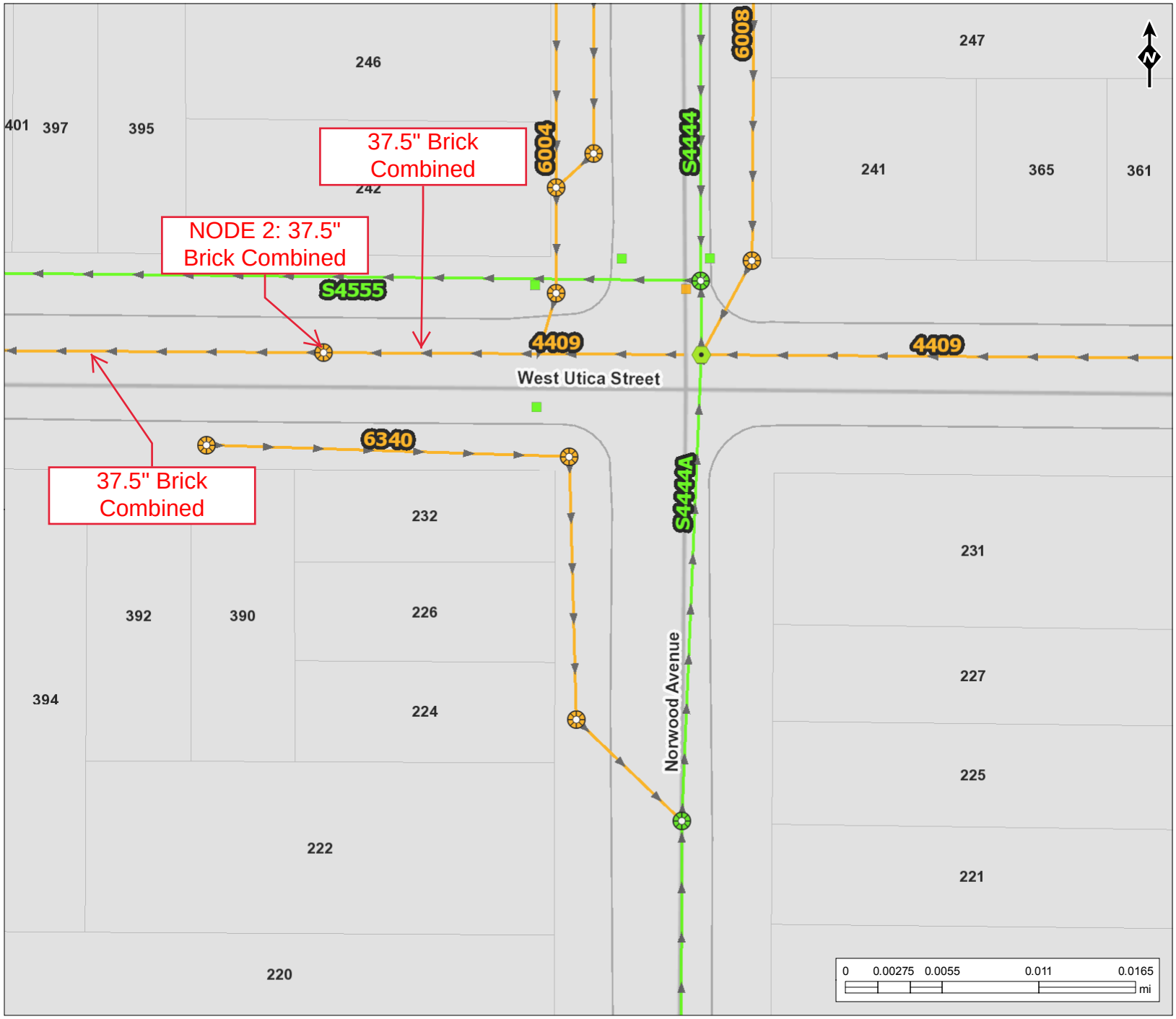


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By BUFFALO SEWER AUTHORITY

Former Children's Hospital Node 2

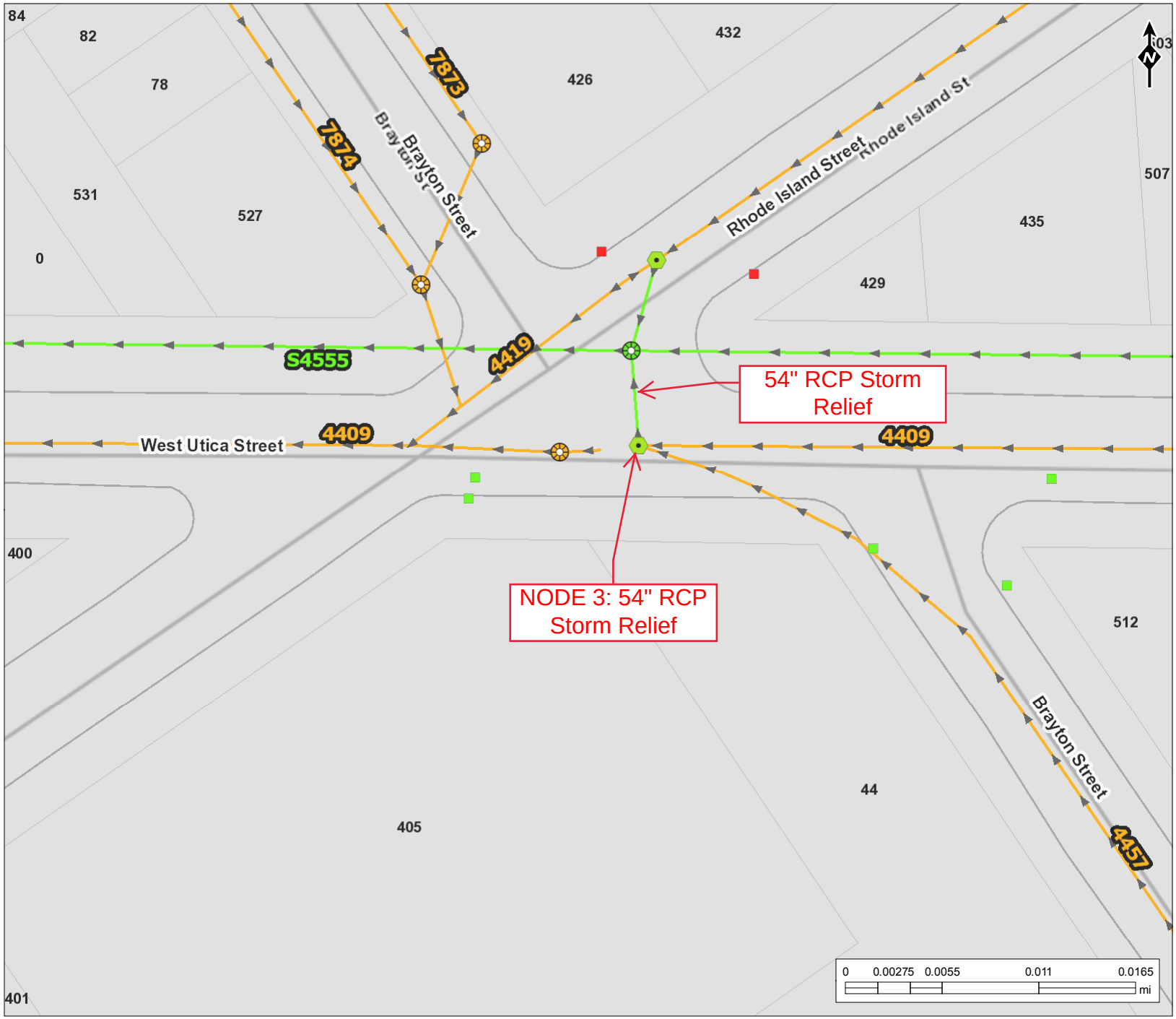


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Former Children's Hospital Node 3

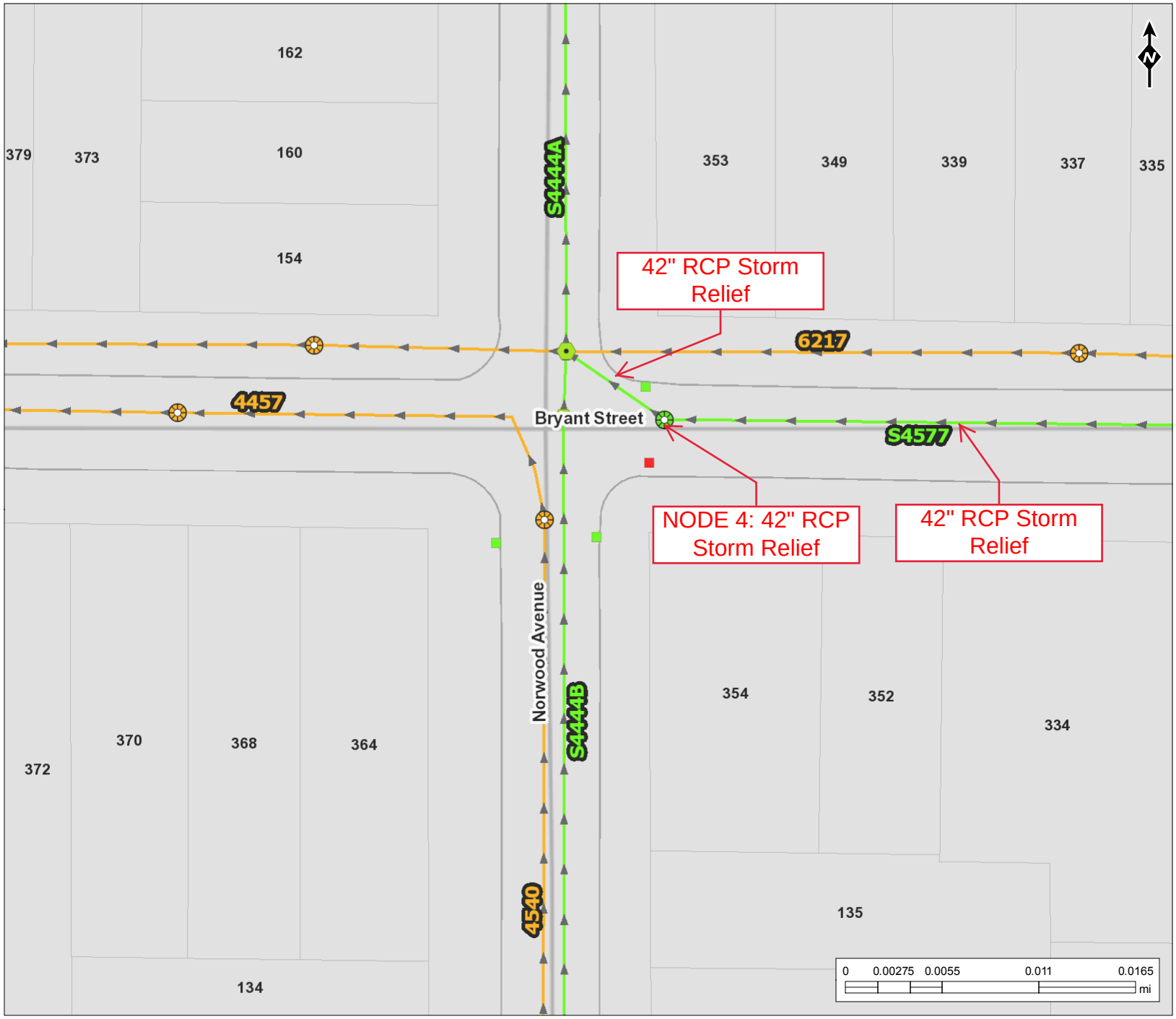


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Former Children's Hospital Node 4



LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Carmina • Wood • Morris DPC

487 Main Street Suite 500 Buffalo, New York 14203 P: 716.842.3165 F: 716.842.0263 W: cwm-ae.com

Architecture Engineering Interior Design

STATE OF NEW YORK
CHRISTOPHER WOOD
076394
LICENSED PROFESSIONAL ENGINEER

SANITARY SEWER ENGINEER'S REPORT
FOR
ELMWOOD CROSSING
Elmwood Ave, Bryant St, Hodge St, Utica Ave
Buffalo, New York

GENERAL

This project consists of the redevelopment of the existing Children's Hospital site off of Elmwood Avenue between Bryant Street, Hodge Street and West Utica Avenue in the City of Buffalo. Proposed for the entire redevelopment is 322 residential units, a 94 room hotel, a 15,217 sf health and wellness center, a 132 capacity day care facility, 61,225 sf of office space, 46,227 sf of retail space and a 36,000 sf grocery store. The redevelopment will be a combination of new building construction, building additions and rehabilitated existing buildings. Each building will have a 6 inch SDR-35 PVC sanitary sewer lateral connection to any of the existing sewers located on the streets listed above. This report analyzes the downstream sewer capacity as a whole of the proposed redevelopment described above.

EXISTING CONDITIONS

Sanitary Sewer

Existing buildings to be redeveloped will re-use existing sanitary sewer laterals connections. These buildings include the Annex Building, Variety Tower, Alfiero Building, MH Building, D building and 125 Hodge Ave. The proposed daycare facility will be a building addition onto 125 Hodge Ave and the sanitary will be connected internally to the existing building so no new sanitary lateral will be required.

PROPOSED FACILITIES

Sanitary Sewer

All standalone new buildings (451 Elmwood, 188 W. Utica & 204 W. Utica) constructed as part of this project will require new sanitary sewer laterals. Proposed for the new building at 451 Elmwood will be an 8" SDR-35 PVC sanitary lateral connection at 2.0% min. Proposed for the two parcels along West Utica will require 8" SDR-35 PVC sanitary laterals at 2.0% min.

Design Parameters @ 451 Elmwood:

(2)	1-bdrm apartment @ 110 gpd/room	= 220 gpd
(16)	2-bdrm apartment @ 220 gpd/room	= 3,520 gpd
(5)	3-bdrm apartment @ 330 gpd/person	= 1,650 gpd
(13,303)	retail space @ 0.1 gpd/square foot	= 1,330 gpd
(14,521)	office space @ 0.1 gpd/square foot	= 1,542 gpd

Total Sanitary Demand:	8,172 gpd
Peak Sanitary Demand (4.27 peaking factor):	34,814 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 34,814 gpd	=	0.054 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.176 cfs

Design Parameters @ 188 W. Utica:

(20)	2-bdrm townhouse @ 220 gpd/room	= 4,400 gpd

Total Sanitary Demand:	4,400 gpd
Peak Sanitary Demand (4.33 peaking factor):	19,008 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 19,008 gpd	=	0.029 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.201 cfs

Design Parameters @ 204 W. Utica:

(12)	1-bdrm apartment @ 110 gpd/room	= 1,320 gpd
(40)	2-bdrm apartment @ 220 gpd/room	= 8,800 gpd
(6)	3-bdrm apartment @ 330 gpd/person	= 1,980 gpd
(12,424)	retail space @ 0.1 gpd/square foot	= 1,242 gpd
(36,000)	grocery store @ 0.1 gpd/square foot	= 3,600 gpd

Total Sanitary Demand:	16,942 gpd
Peak Sanitary Demand (4.17 peaking factor):	70,650 gpd

Using the peak sanitary demand and Manning's Equation for flow within circular pipes, it has been determined that an 8" SDR-35 PVC sanitary lateral will be adequate.

Capacity of 8" PVC @ 2.0%	=	2.230 cfs
Peak Sanitary Demand of 70,650 gpd	=	0.109 cfs
Excess capacity within 8" PVC @ 2.0%	=	2.121 cfs

The hydraulic loading rate is per "New York State Design Standards for Intermediate Wastewater Treatment Systems" March 5, 2014, NYSDEC.

Below is an analysis of the monitored flow rates at four downstream sanitary nodes chosen by the Buffalo Sewer Authority. It is to be noted that the entire proposed peak flow does not flow through all nodes until Node 3. Each node has been analyzed to account for only the portion of the project that will flow through it. See attached sanitary sewer demand calculations for how the proposed flow at each node was broken down.

Downstream Sewer Capacity Analysis Summary:

Node 1 – 310 West Utica (24"):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.294 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.430 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.334 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.470 cfs

Capacity of existing 24" brick @ 0.63% = 15.549 cfs (n=0.015)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 24" combined sewer. The Elmwood Crossing Peak Flow value at Node 1 consists of the sanitary demand from the proposed developments at 188 W. Utica and 204 W. Utica only.

Node 2 – 390 West Utica (34”x25”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.000 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.136 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.000 cfs *
Elmwood Crossing Peak Flow	=	0.136 cfs **
Proposed Peak Flow	=	0.136 cfs

Capacity of existing 37.5”x25” egg shaped brick @ 0.30% = 21.95 cfs (n=0.015)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 37.5”x25” egg shaped combined sewer. The Elmwood Crossing Peak Flow value at Node 2 consists of the sanitary demand from the proposed developments at 188 W. Utica and 204 W. Utica only.

Node 3 – West Utica & Rhode Island (54”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.429 cfs *
Elmwood Crossing Peak Flow	=	0.551 cfs **
Proposed Peak Flow	=	0.980 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.528 cfs *
Elmwood Crossing Peak Flow	=	0.551 cfs **
Proposed Peak Flow	=	1.079 cfs

Capacity of existing 54” RCP @ 0.25% = 106.427 cfs (n=0.012)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 54” storm relief sewer. The Elmwood Crossing Peak Flow value at Node 3 consists of the entire Elmwood Crossing development.

Node 4 – 353 Bryant (42”):

Weekday Peak Dry Weather:

Existing Peak Flow measured	=	0.314 cfs *
Elmwood Crossing Peak Flow	=	0.433 cfs **
Proposed Peak Flow	=	0.747 cfs

Weekend Peak Dry Weather:

Existing Peak Flow measured	=	0.282 cfs *
Elmwood Crossing Peak Flow	=	0.433 cfs **
Proposed Peak Flow	=	0.715 cfs

Capacity of existing 42” RCP @ 0.96% = 106.702 cfs (n=0.012)

Conclusion: The addition of the proposed sewage flow will not exceed the capacity of the existing 42” storm relief sewer. The Elmwood Crossing Peak Flow value at Node 4 consists of the sanitary demand from the 451 Elmwood and daycare proposed developments in addition to the existing buildings to be rehabilitated named Annex Building, Variety Tower, Tanner Building, Alfiero Building and Buildings ‘MH’ and ‘D’.

Notes:

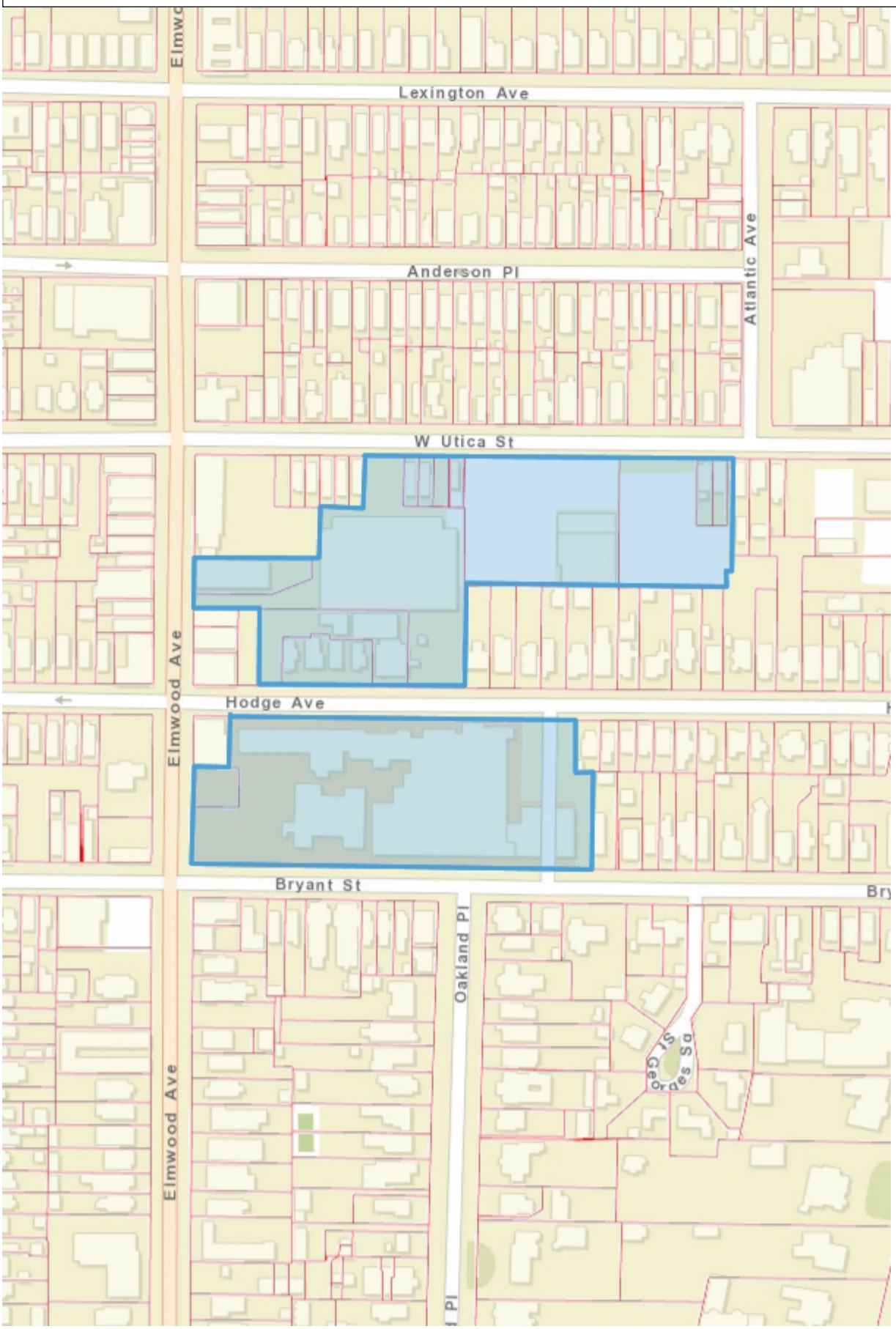
Pipe slopes and materials provided by BSA
Pipe sizes field verified by TECSmith
1 MGD = 1.547 cfs
* Converted from measurements in TECSmith report dated 3/19/2018
** Avg Sanitary Flow = 93,520 gpd = 0.145 cfs
Using a Peaking factor of 3.82; Elmwood Crossing Peak Flow = 0.551 cfs

SPP296 Analysis:

The existing weir located at SPP296 has a wall height of 24”, existing flow depths were not provided at this SPP. Interpolated flow from Node 3 indicated a flow depth of between 3.4” and 3.6” including the proposed Elmwood Crossing project peak flow demand. There will still be approximately 20” of freeboard at the weir wall located at SPP296 with the addition of the proposed peak demand into the existing sewer system. Refer to the sanitary demand calculations.

Location Map

Elmwood Crossing



Legend

- Council Districts
- Erie County Municipal Bounda
- Parcels
- World Street Map

Notes

1: 4,513

0.1 0 0.04 0.1 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere
MIS Department, City of Buffalo

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Sanitary Demand Calculations

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

451 Elmwood

Housing	110	gal/d/bdrm	x	2	bdrm	=	220	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	16	bdrm	=	3,520	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	5	bdrm	=	1,650	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	13,303	sf	=	1,330	gpd		*use 0.1 gallons per day per square foot
Office	0.1	gal/d/sf	x	14,521	sf	=	1,452	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	8,172	gpd	Average	

Annex Building

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	35	bdrm	=	7,700	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	3	bdrm	=	990	gpd		*use 330 gallons per day per 3 bedroom un
Total Site Sanitary Demand:						=	10,010	gpd	Average	

Variety Tower

Housing	110	gal/d/bdrm	x	3	bdrm	=	330	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	25	bdrm	=	5,500	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	9	bdrm	=	2,970	gpd		*use 330 gallons per day per 3 bedroom un
Office	0.1	gal/d/sf	x	21,704	sf	=	2,170	gpd		*use 0.1 gallons per day per square foot
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd		*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd		*use 20 gallons per day per person
Total Site Sanitary Demand:						=	21,610	gpd	Average	

Alfiero Building

Office	0.1	gal/d/sf	x	25,000	sf	=	2,500	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	2,500	gpd	Average	

MH Building

Housing	110	gal/d/bdrm	x	19	bdrm	=	2,090	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	15	bdrm	=	3,300	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	8	bdrm	=	2,640	gpd		*use 330 gallons per day per 3 bedroom un
Total Site Sanitary Demand:						=	8,030	gpd	Average	

D Building

Housing	110	gal/d/bdrm	x	15	bdrm	=	1,650	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	17	bdrm	=	3,740	gpd		*use 220 gallons per day per 2 bedroom un
Total Site Sanitary Demand:						=	5,390	gpd	Average	

* The hydraulic loading rate is per “Design Standards for Intermediate Sized Wastewater Treatment Systems” 2014, NYSDEC.

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Tanner Building

Housing	110	gal/d/bdrm	x	20	bdrm	=	2,200	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	31	bdrm	=	6,820	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	8	bdrm	=	2,640	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	20,550	sf	=	2,055	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	13,715	gpd	Average	

125 Hodge - Daycare Building

Housing	110	gal/d/bdrm	x	1	bdrm	=	110	gpd		*use 110 gallons per day per 1 bedroom un
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd		*use 20 gallons per day per child
Total Site Sanitary Demand:						=	2,750	gpd	Average	

188 W. Utica

Housing	220	gal/d/bdrm	x	20	bdrm	=	4,400	gpd		*use 220 gallons per day per 2 bedroom un
Total Site Sanitary Demand:						=	4,400	gpd	Average	

204 W. Utica

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	40	bdrm	=	8,800	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	16,942	gpd	Average	

* The hydraulic loading rate is per “Design Standards for Intermediate Sized Wastewater Treatment Systems” 2014, NYSDEC.

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

451 Elmwood

Housing	110	gal/d/bdrm	x	2	bdrm	=	220	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	16	bdrm	=	3,520	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	5	bdrm	=	1,650	gpd	*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	13,303	sf	=	1,330	gpd	*use 0.1 gallons per day per square foot
Office	0.1	gal/d/sf	x	14,521	sf	=	1,452	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 8,172 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:
Total demand: 8,172 gpd / 100 gpcd = 82 per capita

Population (P) = 82 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.27

Peak Sanitary Demand = 8,172 X 4.26 = 34,814 gpd
= 0.035 MGD
= 0.054 cfs

188 W. Utica

Housing	220	gal/d/bdrm	x	20	bdrm	=	4,400	gpd	*use 220 gallons per day per 2 bedroom un

Total Site Sanitary Demand: = 4,400 gpd Average

Find Peak Sanitary Demand:

Peaking Factor based on Population:
Total demand: 4,400 gpd / 100 gpcd = 44 per capita

Population (P) = 44 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.33

Peak Sanitary Demand = 4,400 X 4.32 = 19,008 gpd
= 0.019 MGD
= 0.029 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

204 W. Utica

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	40	bdrm	=	8,800	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	16,942	gpd	Average	

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 16,942 gpd / 100 gpcd = 169 per capita

Population (P) = 169 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.17

Peak Sanitary Demand = 16,942 X 4.17 = 70,650 gpd
= 0.071 MGD
= 0.109 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 1 & 2

Housing	110	gal/d/bdrm	x	12	bdrm	=	1,320	gpd		*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	60	bdrm	=	13,200	gpd		*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	6	bdrm	=	1,980	gpd		*use 330 gallons per day per 3 bedroom un
Retail	0.1	gal/d/sf	x	12,424	sf	=	1,242	gpd		*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd		*use 0.1 gallons per day per square foot
Total Site Sanitary Demand:						=	21,342	gpd	Average	

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 21,342 gpd / 100 gpcd = 213 per capita

Population (P) = 213 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 4.14

Peak Sanitary Demand = 21,342 X 4.13 = 88,144 gpd
= 0.088 MGD
= 0.136 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 3

Housing	110	gal/d/bdrm	x	84	bdrm	=	9,240	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	199	bdrm	=	43,780	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	39	bdrm	=	12,870	gpd	*use 330 gallons per day per 3 bedroom un
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd	*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd	*use 20 gallons per day per person
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd	*use 20 gallons per day per child
Office	0.1	gal/d/sf	x	61,225	sf	=	6,123	gpd	*use 0.1 gallons per day per square foot
Retail	0.1	gal/d/sf	x	46,277	sf	=	4,628	gpd	*use 0.1 gallons per day per square foot
Grocery	0.1	gal/d/sf	x	36,000	sf	=	3,600	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 93,520 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 93,520 gpd / 100 gpcd = 935 per capita

Population (P) = 935 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 3.82

Peak Sanitary Demand = 93,520 X 3.81 = 356,312 gpd
= 0.356 MGD
= 0.551 cfs

CARMINA WOOD MORRIS, D.P.C.
487 MAIN STREET, SUITE 500
BUFFALO, NEW YORK, 14203
(716) 842-3165
FAX (716) 842-0263

Sanitary Sewage Demand Calculations:

Elmwood Crossing @ Node 4

Housing	110	gal/d/bdrm	x	72	bdrm	=	7,920	gpd	*use 110 gallons per day per 1 bedroom un
	220	gal/d/bdrm	x	139	bdrm	=	30,580	gpd	*use 220 gallons per day per 2 bedroom un
	330	gal/d/bdrm	x	33	bdrm	=	10,890	gpd	*use 330 gallons per day per 3 bedroom un
Hotel	110	gal/d/room	x	94	room	=	10,340	gpd	*use 110 gallons per day per hotel room
Health	20	gal/d/per	x	15	per	=	300	gpd	*use 20 gallons per day per person
Day Care	20	gal/d/child	x	132	child	=	2,640	gpd	*use 20 gallons per day per child
Office	0.1	gal/d/sf	x	61,225	sf	=	6,123	gpd	*use 0.1 gallons per day per square foot
Retail	0.1	gal/d/sf	x	33,853	sf	=	3,385	gpd	*use 0.1 gallons per day per square foot

Total Site Sanitary Demand: = 72,178 gpd Average

* The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 72,178 gpd / 100 gpcd = 722 per capita

Population (P) = 722 people

Peaking Factor : $(18 + \sqrt{P}) / (4 + \sqrt{P})$ where P is in thousands

Peaking Factor = 3.89

Peak Sanitary Demand = 72,178 X 3.88 = 280,050 gpd
= 0.280 MGD
= 0.433 cfs

NOTES:
1. NOT TO SCALE.
2. AREA AND PERIMETER DETERMINED BY MODELING THE SHAPE IN AUTOCAD.

$R = \frac{A}{P} = \frac{5.485\ ft^2}{8.689\ ft} = 0.631\ ft$

$n = 0.015$

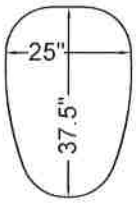
$Q = \frac{1.49}{n}(A)(R)^{2/3}(S)^{1/2}$

$Q = \left(\frac{1.49}{0.015}\right)(5.485\ ft^2)((0.631\ ft)^{2/3})((0.003)^{1/2})$

$Q = 21.95\ ft^3/sec$ (* capacity flowing full)

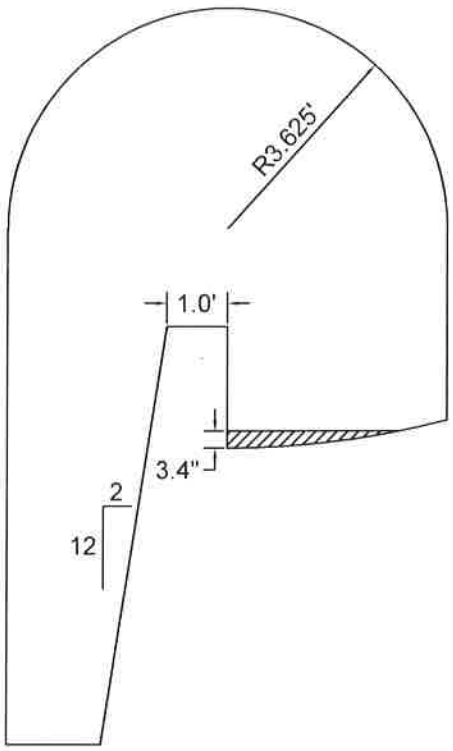
@ NODE 2

A= 5.485 ft^2 +/-
P= 8.689 ft +/-
S= 0.30%



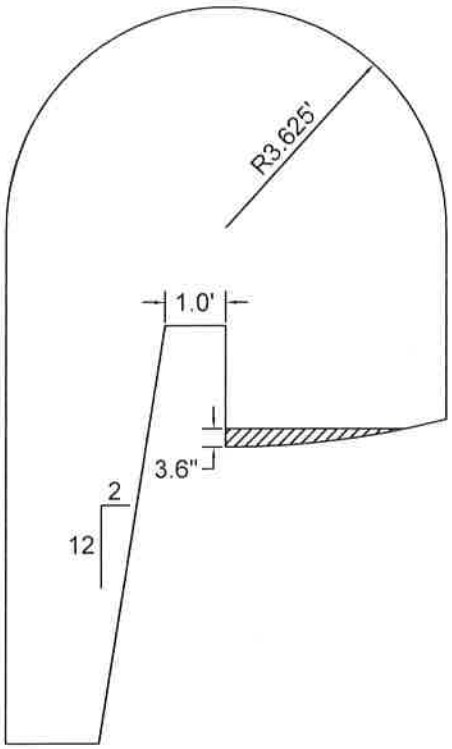
@ SPP 296

A= 0.525 ft^2 +/-
P= 3.137 ft +/-
S= 0.23%
Q= 0.980 ft^3/sec
D= 3.4 in +/-
FB= 20.6 in +/-



WEEKDAY - DOWNSTREAM

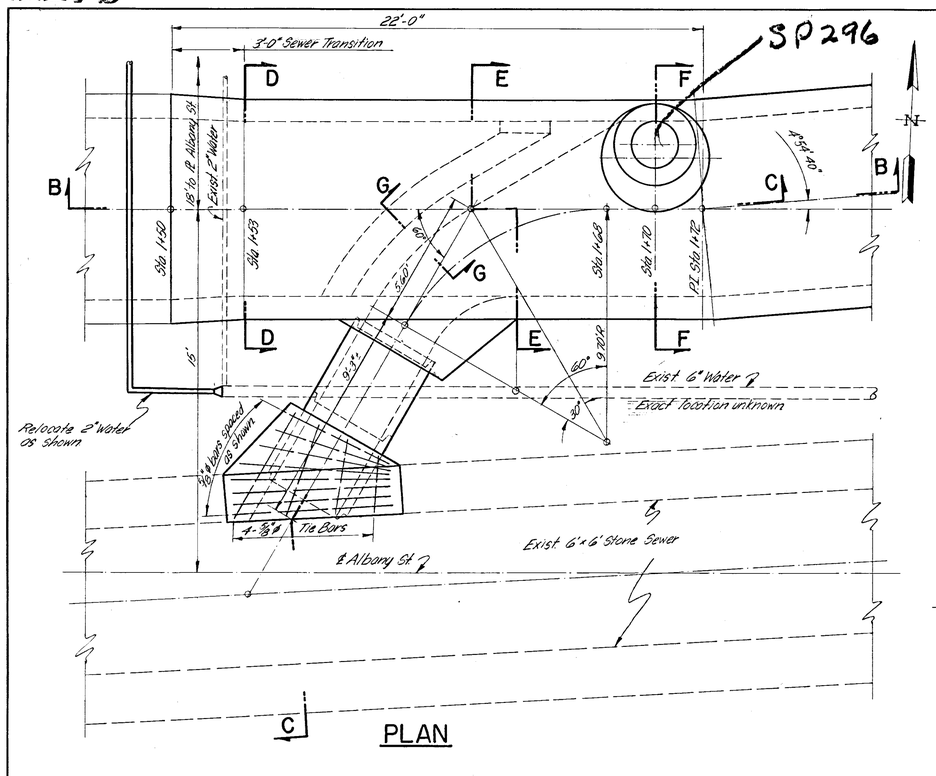
@ SPP 296



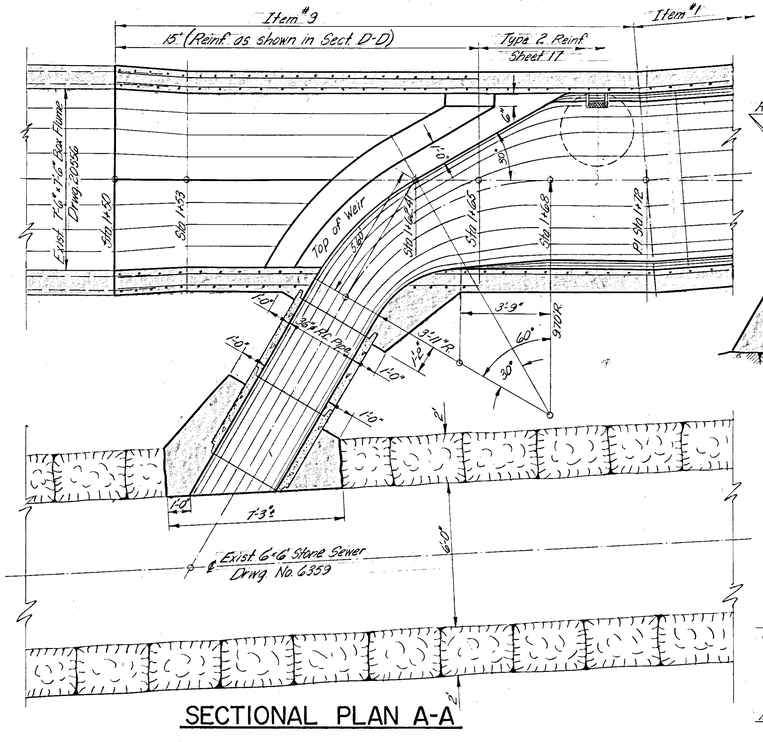
A= 0.583 ft^2 +/-
P= 3.357 ft +/-
S= 0.23%
Q= 1.079 ft^3/sec
D= 3.6 in +/-
FB= 20.4 in +/-

WEEKEND - DOWNSTREAM

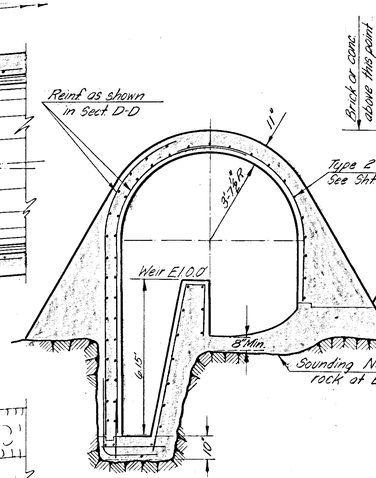
A= AREA OF WATER FLOW
P= WETTED PERIMETER
S= SLOPE
Q= FLOW OBSERVED (OBSERVED @ NODE 3)
D= DEPTH OF FLOW
FB= FREEBOARD DEPTH BETWEEN WATER LEVEL AND WEIR WALL



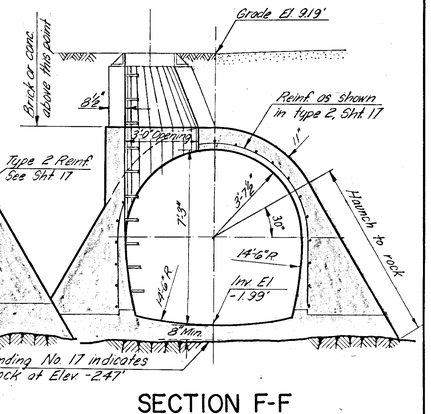
PLAN



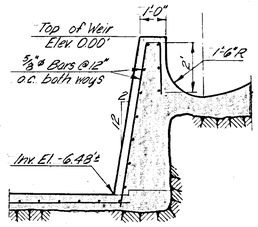
SECTIONAL PLAN A-A



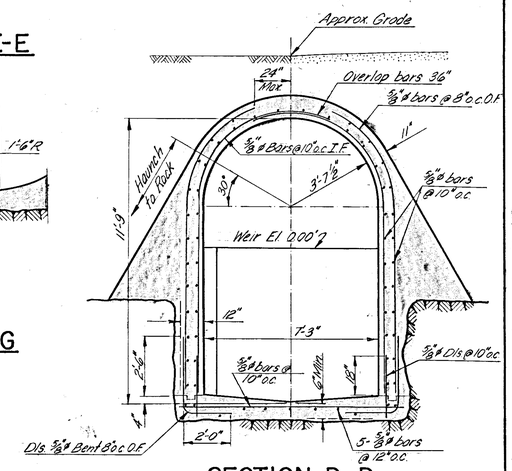
SECTION E-E



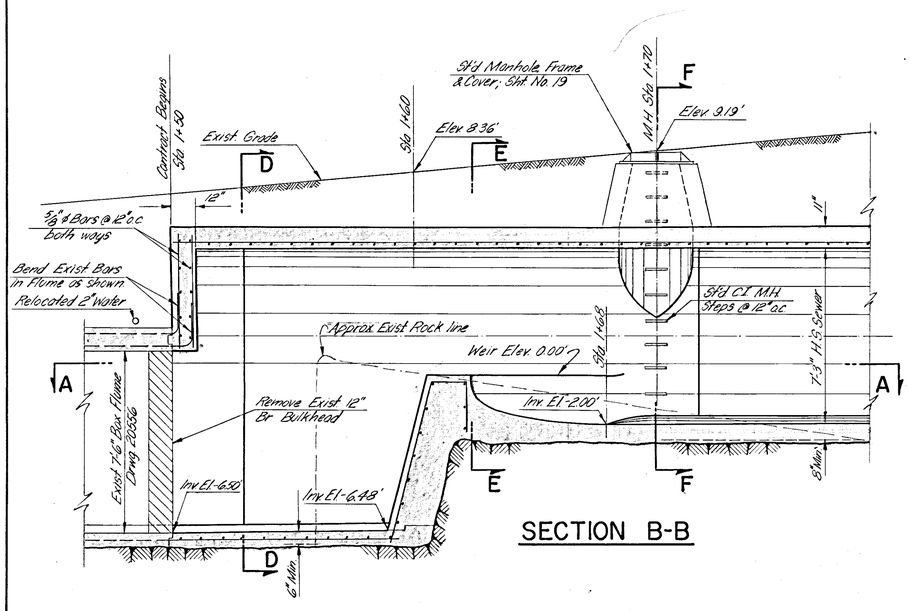
SECTION F-F



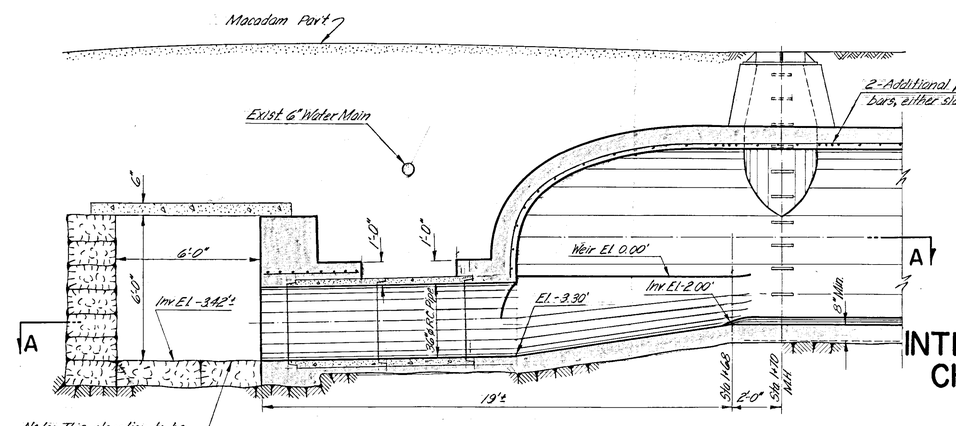
SECTION G-G



SECTION D-D



SECTION B-B



Note: This elevation to be verified prior to construction of D.W.F. Channel

SECTION C-C

ALBANY ST. SEWER DISTRICT

TRUNK RELIEF SEWER

IN

ALBANY ST., FARGO AVE., MASSACHUSETTS AVE. & W. UTICA ST. BETWEEN BLACK ROCK HARBOR & NORWOOD AVE.

INTERCEPTING AND OVERFLOW CHAMBER IN ALBANY ST.

ENGINEERING DIVISION

BUFFALO SEWER AUTHORITY — BUFFALO, N.Y.

SCALE: 1" — MAY 1956

SHEET 7 OF ~~23~~ SHEETS

Sanitary Sewer Capacity Analysis

Date	Node 1			Node 2			Node 3			Node 4			Rain[2]
	310 West Utica (24")			390 West Utica (34"Hx25"W)			West Utica & Rhode Island (54")			353 Bryant (42")			
	FLOW (GAL x 1,000)	PEAK FLOW (MGD)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	FLOW (GAL x 1,000)	PEAK FLOW (MDG)	PEAK LEVEL (IN)	(inches)
2/16/2018	99.320	0.282	4.577	0.000	0.000	14.046	179.727	0.445	4.058	66.314	0.187	2.217	***0.04***
2/17/2018	141.843	0.206	3.619	0.000	0.000	13.894	259.281	0.341	2.071	105.044	0.153	1.942	***0***
2/18/2018	127.741	0.183	3.392	0.000	0.000	13.726	178.007	0.244	1.832	93.557	0.154	1.997	***0***
2/19/2018	485.040	3.370	13.339	0.000	0.000	15.173	641.926	3.641	7.455	664.423	4.920	7.593	***0.82***
2/20/2018	409.581	2.225	11.079	0.000	0.000	14.722	960.499	3.040	6.463	734.193	3.056	5.794	***0.59***
2/21/2018	152.156	0.305	4.801	23.056	2.213	14.006	276.229	0.441	2.376	193.593	0.579	3.402	***0.07***
2/22/2018	113.213	0.149	3.157	0.000	0.000	13.721	200.185	0.277	1.884	116.950	0.203	2.086	***0***
2/23/2018	153.748	3.021	13.245	0.000	0.000	14.666	265.683	2.422	5.887	258.951	4.036	6.842	***0.24***
2/24/2018	119.564	0.180	3.438	0.000	0.000	13.708	203.512	0.261	1.800	112.294	0.161	1.931	***0***
2/25/2018	168.884	0.760	7.533	0.000	0.000	13.934	250.689	0.826	3.147	212.708	1.316	4.484	***0.13***
2/26/2018	111.971	0.150	3.378	0.000	0.000	13.611	181.254	0.243	1.762	101.675	0.193	2.035	***0***
2/27/2018	107.089	0.146	3.204	0.000	0.000	13.613	133.014	0.178	1.574	93.336	0.145	1.888	***0***
2/28/2018	100.645	0.133	3.229	-13.698	0.000	13.645	130.554	0.196	1.603	95.592	0.142	1.876	***0.03***
3/1/2018	70.591	0.144	3.262	0.000	0.000	13.602	139.073	0.211	1.778	90.068	0.161	1.916	***0.43***
3/2/2018	115.401	0.232	3.932	0.000	0.000	13.821	212.020	0.344	2.122	163.513	0.330	2.664	***0.83***
3/3/2018	106.417	0.216	3.787	0.000	0.000	13.765	207.304	0.291	1.878	122.808	0.179	2.066	***0***
3/4/2018	73.587	0.175	3.716	0.000	0.000	13.821	204.971	0.324	2.016	109.253	0.182	2.076	***0***
3/5/2018	75.323	0.173	3.442	0.000	0.000	13.708	182.400	0.245	1.774	99.306	0.153	2.044	***0***
3/6/2018	82.481	0.152	3.160	0.000	0.000	13.708	161.794	0.197	1.672	99.836	0.139	2.037	***0.01***
3/7/2018	111.700	0.244	4.015	0.000	0.000	13.708	170.326	0.214	1.725	99.367	0.166	2.058	***0.01***
3/8/2018	94.636	0.143	3.205	0.000	0.000	13.708	180.691	0.225	1.778	95.665	0.150	1.943	***0***
3/9/2018	112.398	0.191	3.504	0.000	0.000	13.727	168.611	0.233	1.785	96.341	0.168	2.059	***0.02***
3/10/2018	126.029	0.201	3.454	0.000	0.000	13.669	172.016	0.222	1.818	97.064	0.160	2.054	***0***
3/11/2018	120.810	0.182	3.229	0.000	0.000	13.666	167.799	0.249	1.857	88.043	0.139	1.986	***0***
3/12/2018	109.783	0.190	3.287	0.000	0.000	13.821	164.092	0.239	1.851	90.140	0.130	1.976	***0***
3/13/2018	116.789	0.177	3.112	0.000	0.000	13.666	158.541	0.213	1.781	94.016	0.143	1.981	***0.13***
3/14/2018	125.835	0.210	3.512	0.000	0.000	13.990	179.481	0.276	2.070	117.461	0.251	2.629	***0.2***
3/15/2018	121.091	0.202	3.185	0.000	0.000	13.934	183.248	0.277	2.023	114.452	0.184	2.158	***0.13***
3/16/2018	38.296	0.122	2.600	0.000	0.000	13.765	70.597	0.219	1.814	38.927	0.132	1.877	***0.01***
---	---	---	---	---	---	---	---	---	---	---	---	---	***0.01***

Yellow Highlights are Dry Weather Week Days

Blue Highlights are Dry Weather Weekend Days

TECsmith

TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

Date: March 19, 2018

COMBINED SYSTEM DRY WEATHER FLOW CAPACITY STUDY – Summary Review

Prepared For: Former Children's Hospital - DS Capacity Analysis

Christopher Wood
487 Main Street, Suite 600
Buffalo, New York 14203
P: (716) 842-3165
F: (716) 842-0263

Project Name: Former Children's Hospital - DS Capacity Analysis

Flow Monitoring Period: February 16, 2018 to March 16, 2018

Dry Week days Monitored: February 22, February 26-27, March 5, March 8, March 12

Dry Weekend days Monitored: February 17-18, February 24, March 3-4, March 10-11

Number of Monitoring Nodes: Four (4) downstream manholes

Node Locations and Descriptions:

- Node 1 310 West Utica (24")
- Node 2 390 West Utica (34"Hx25"W)
- Node 3 West Utica & Rhode Island (54")
- Node 4 353 Bryant (42")

Summary Conclusion:

Based on the data presented in this report, specifically the flow depth measurements recorded (see graphs below):

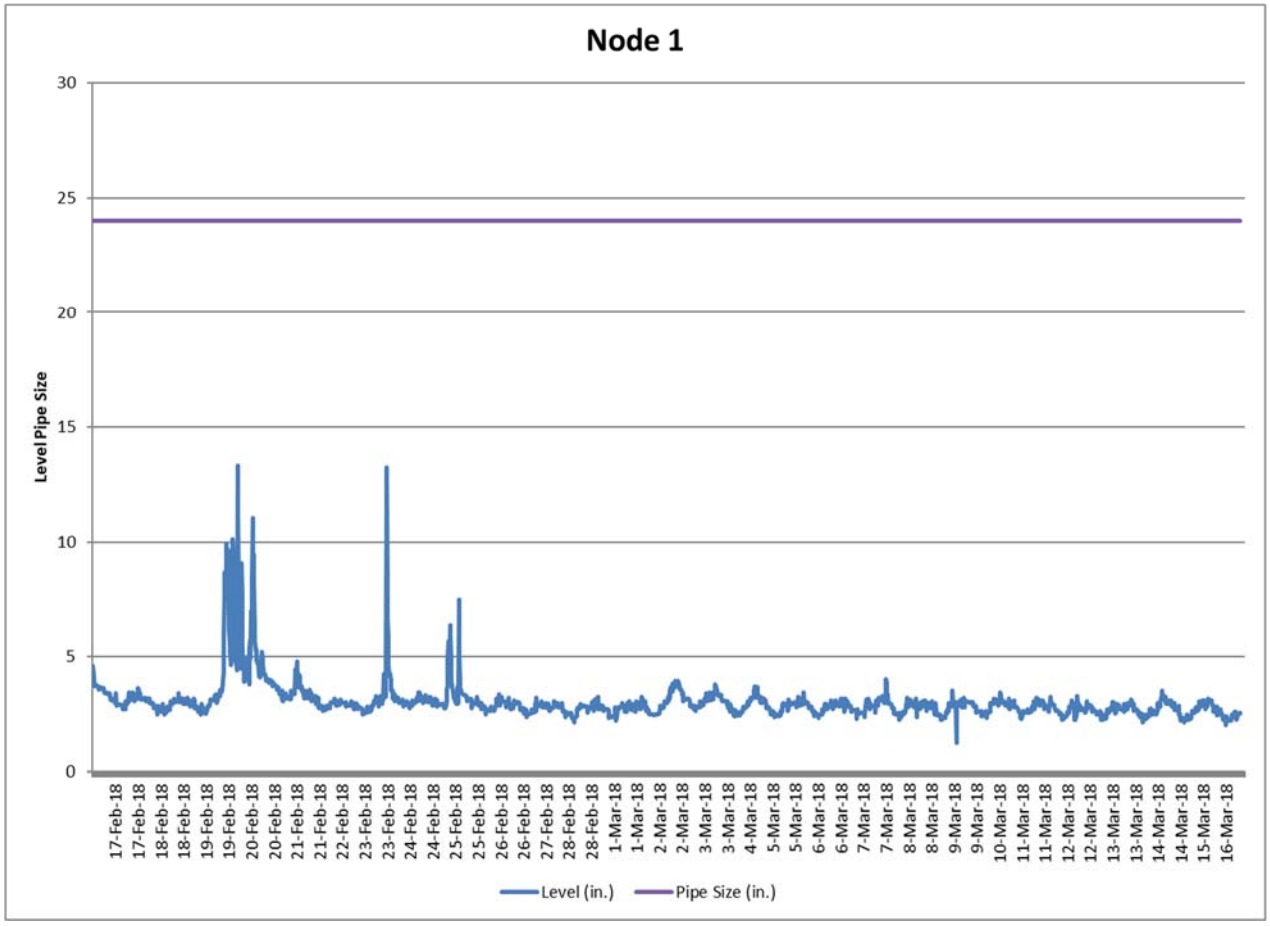
- At no time did the flow depth exceed pipe diameter at any of the downstream monitoring points during the dry vents monitored.
- At no time during the monitoring period did the flow at any point slow or stall which would have caused a backup or flooding at the manhole.

TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

Depth of Flow Capacity Summary:

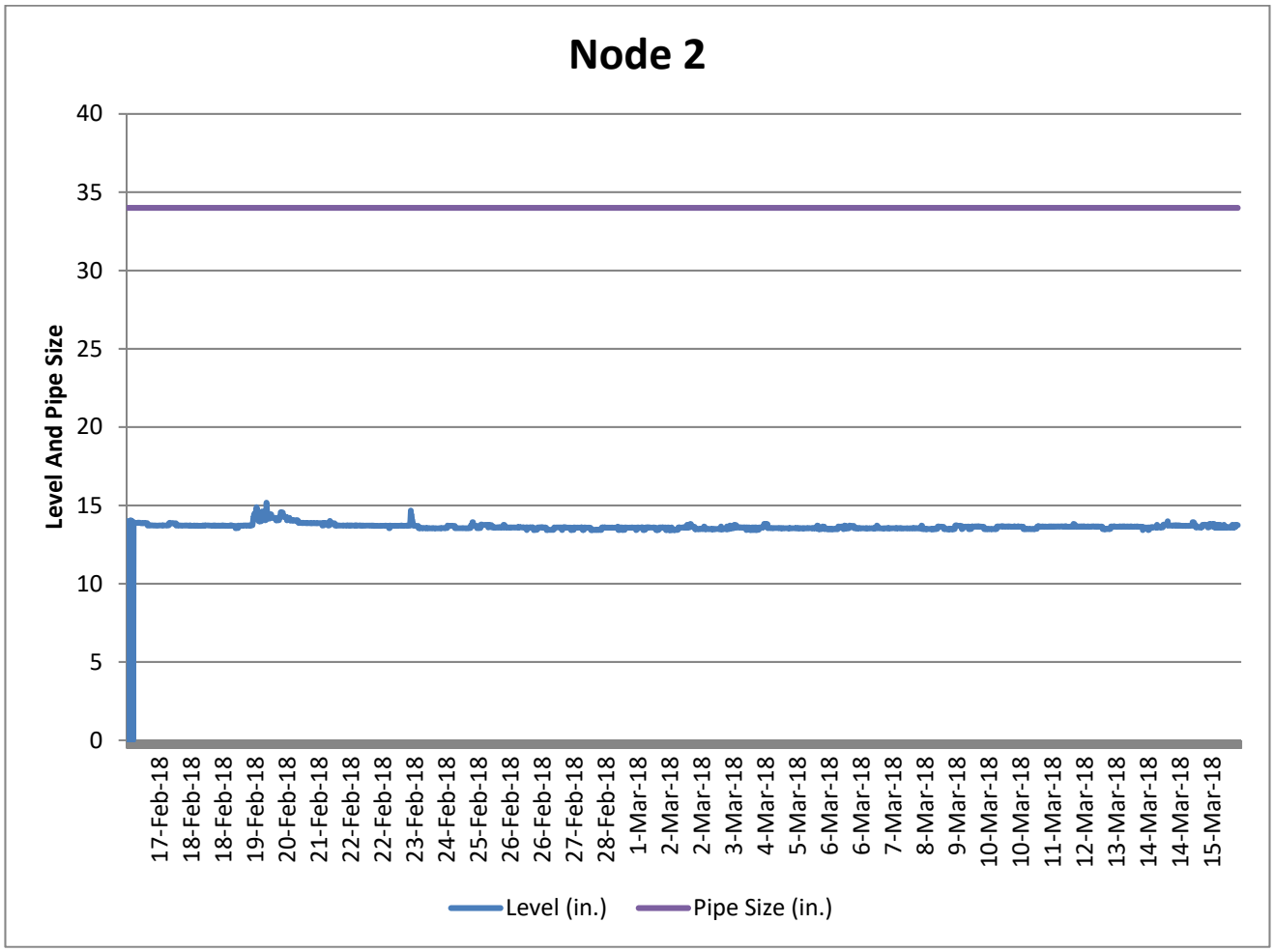
Depth of flow capacity is based on diameter of pipe. See graphs below.

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 1.



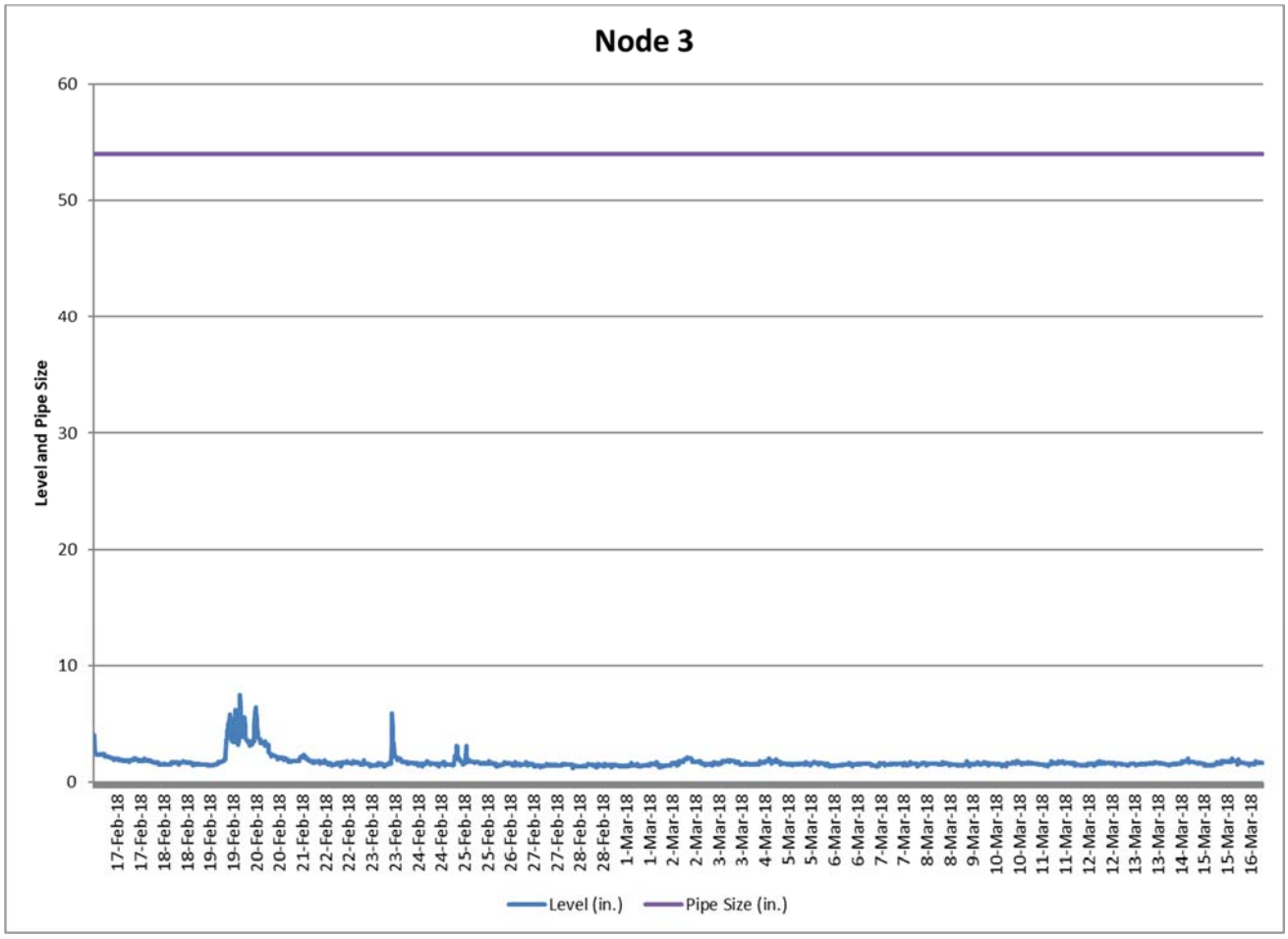
TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 2.



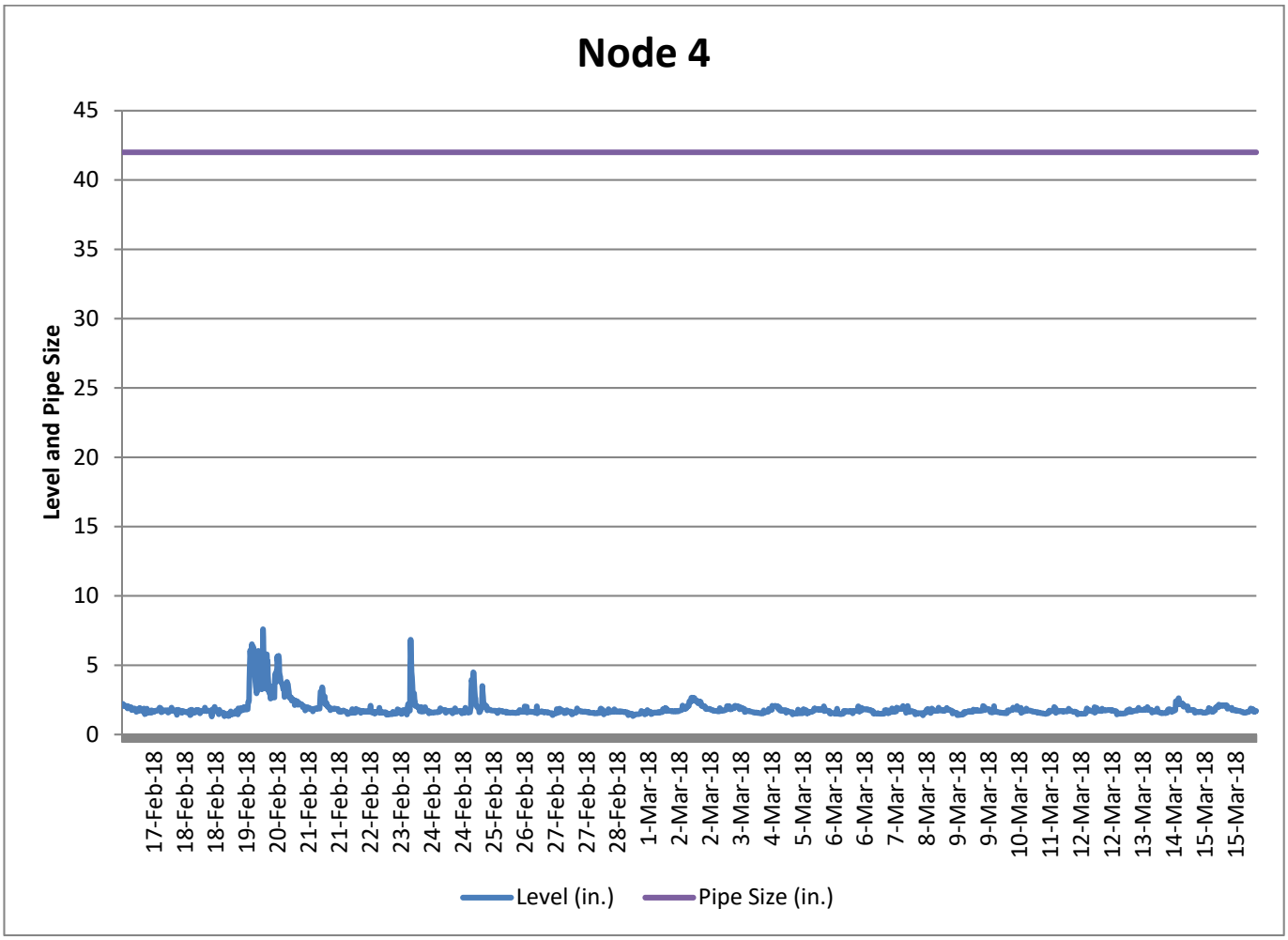
TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 3.

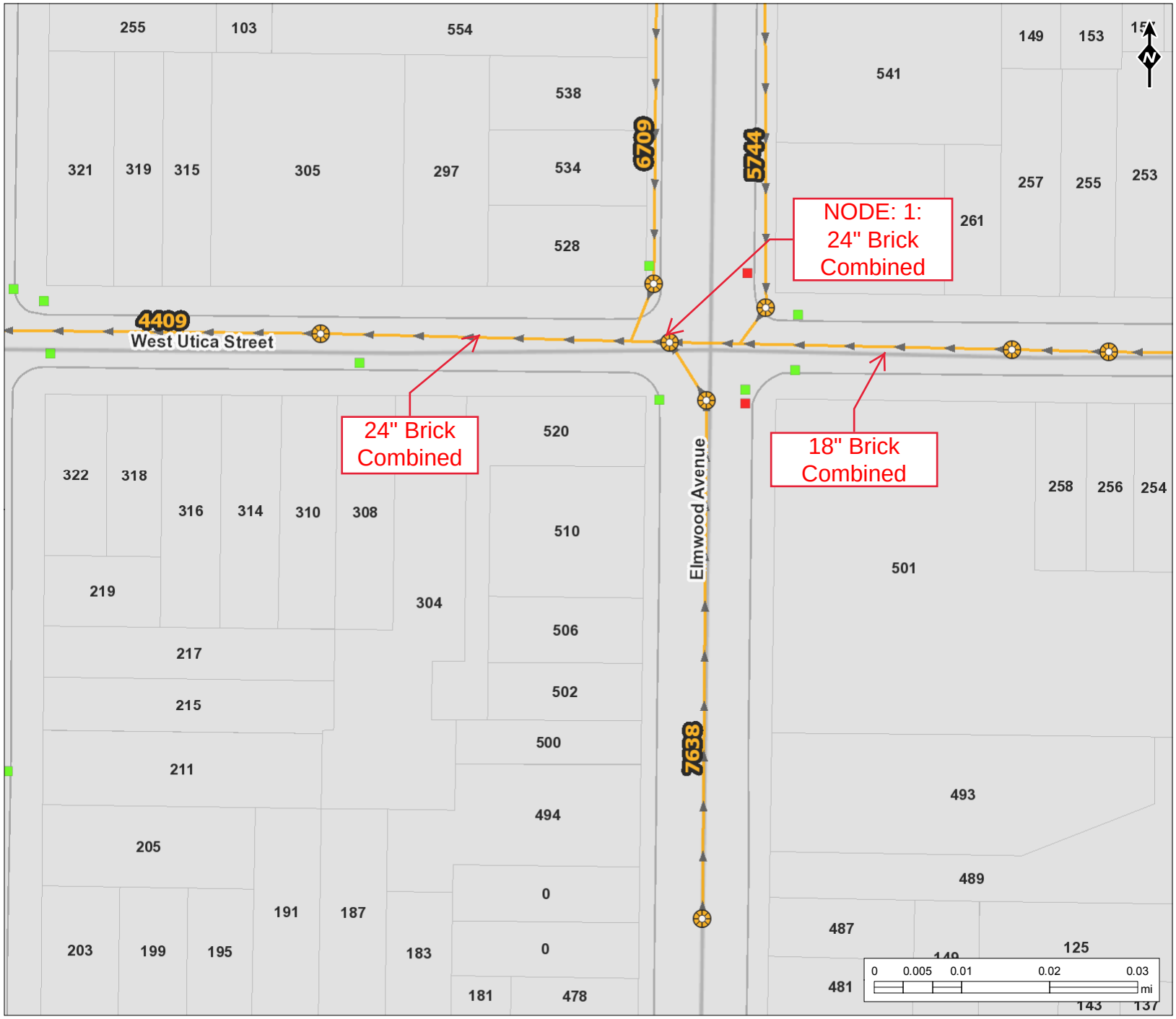


TECSMITH, Inc.
PO Box 383
Elma, New York 14059-0383
Tel: 716-687-1418
Fax: 716-655-3369

- At no time during the monitoring period did depth of flow exceed pipe diameter at Node 4.



Former Children's Hospital Node 1

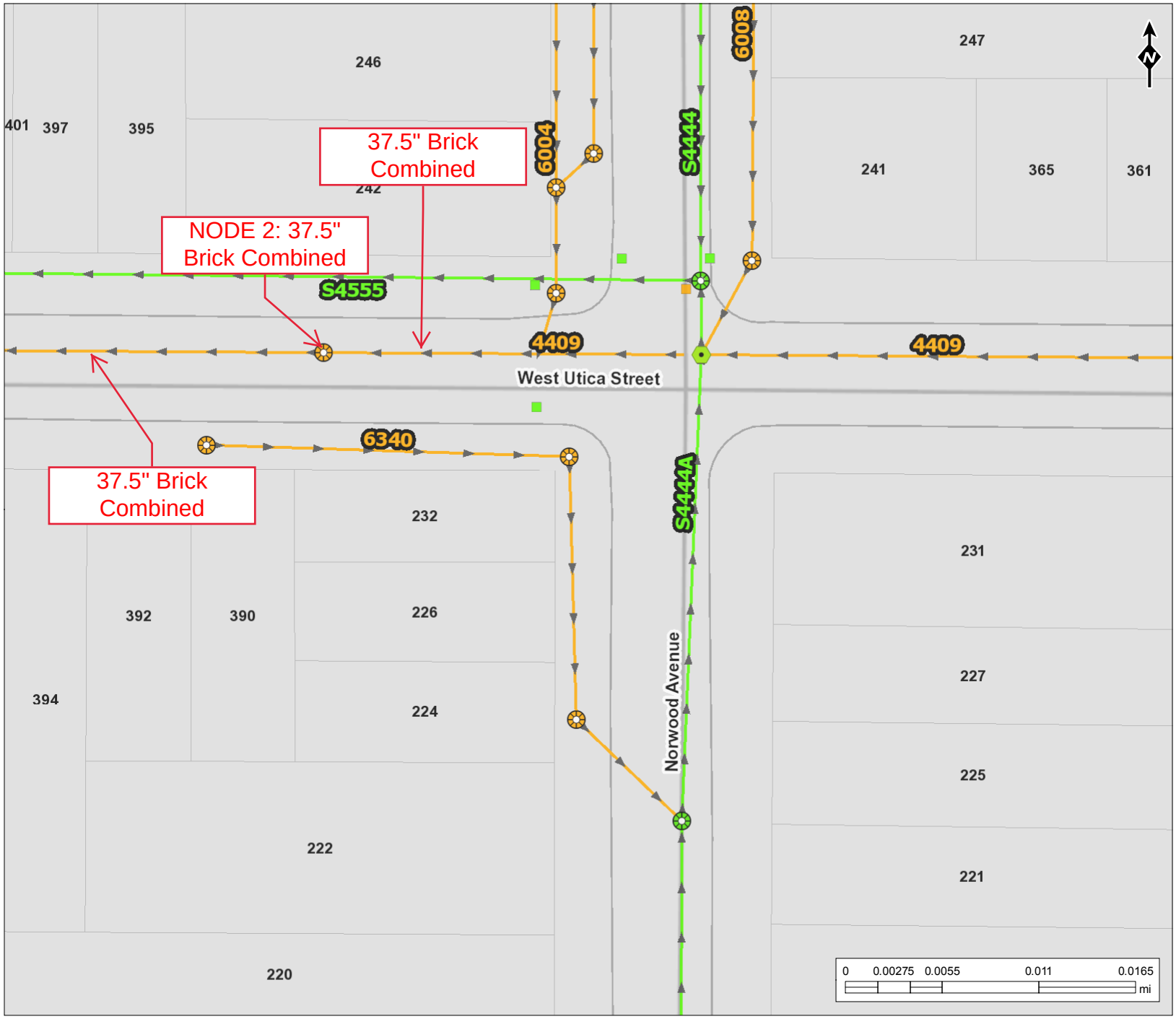


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By BUFFALO SEWER AUTHORITY

Former Children's Hospital Node 2

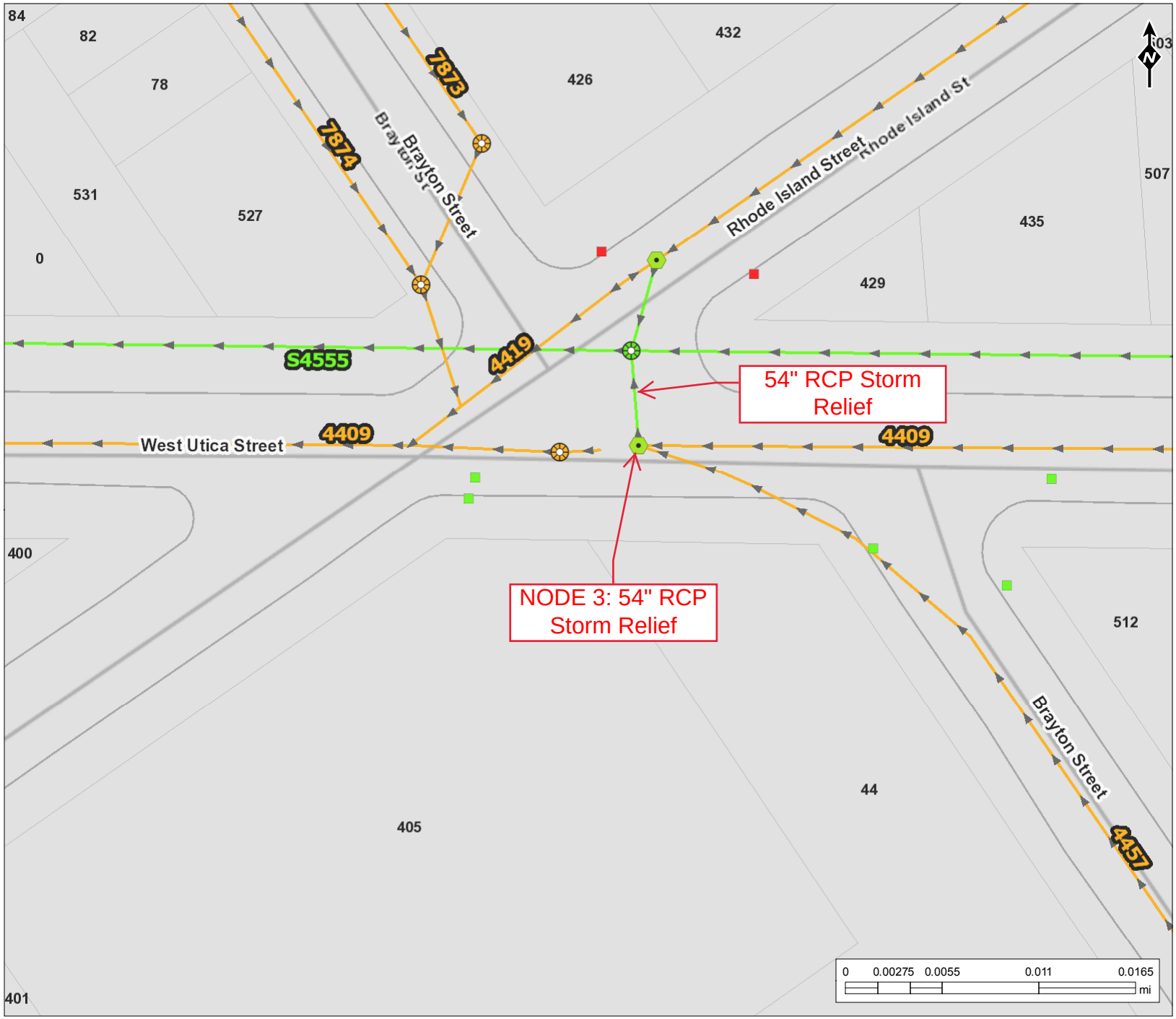


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Former Children's Hospital Node 3

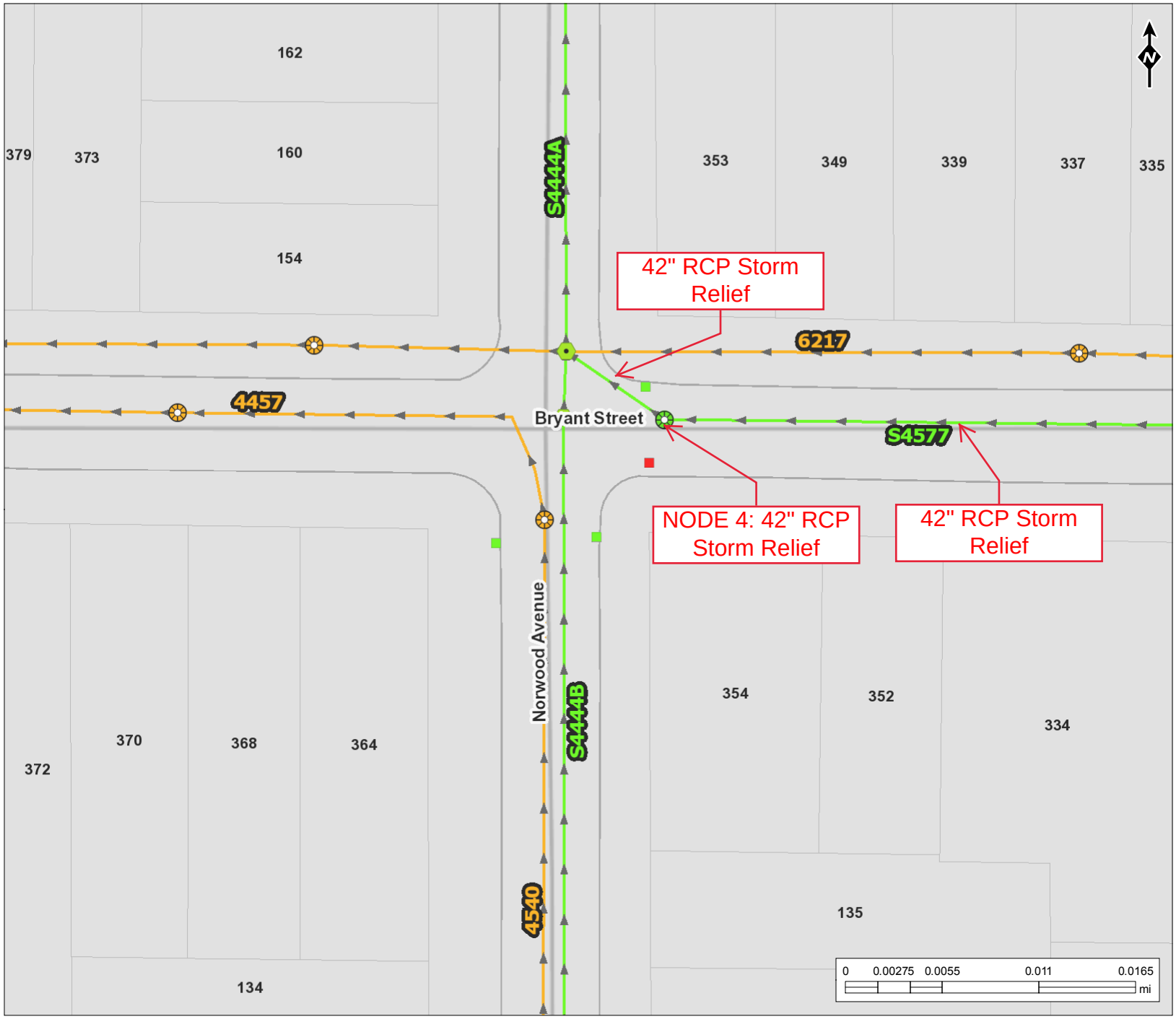


LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Former Children's Hospital Node 4



LEGEND

- Permit Issued
- Sewer Patrol Points
- 2x2 Catch Basin
- 4x4 Catch Basin
- Steel Receiver
- Other
- NA
- CSO
- Treatment Plant Outfall

Prepared By Buffalo Sewer Authority

Please check the following as a follow-up to your request:

For more information, please call Fouad Arab (UFPO Mark-outs) at (716) 851-4747x124 or send an e-mail to farab@city-buffalo.com.

4
6
8
10
12
14
16

18
20
24
30
36
48
60

PIPE INFORMATION:

ID	Location	Street From	Street To	Date installed	Diameter	Location Description
P_14456	Elmwood Ave	W.S., S side of Bryant St.	N side of Bryant St.	1/1/1939	8	7½ ft W to 3 ft E of W curb
P_15679	Bryant St	120 ft W of W curb Elmwood Ave	Elmwood Ave.	1/1/1997	8	5 ft to 4 ft S of N curb
P_16198	Elmwood Ave	W.S., N side of Bryant St.	S side of Hodge Ave.	01/01/1893	6	3 ft E of W curb
P_16544	Elmwood Ave	W.S., S side of Bryant St.	N side of Bryant St.	1/1/1939	8	7½ ft W to 3 ft E of W curb

VALVE INFORMATION:

ID	X coord (ft)	Y coord (ft)	Status	VB Location
V_23831_S	1069565.85	1060127.17	PRIVATE	4"SP combo supply for #448, 94'N 6"E N/W cor Bryant
V_23832_S	1069556.41	1060127.09	PRIVATE	4" Fire Supply for #448, 4'6" S of N
V_23833_S	1069556.52	1060121.23	PRIVATE	2" Dom. Supply for #448, 6'6" N of S curb.

BUFFALO DIVISION OF WATER
FLOW TEST
HYDRANT MAINTENANCE CHECK LIST

Flow Test By: BRIAN D. LACKIE (JASON & M-228) Date: 8/21/2014

Hydrant No. 1A - 1ST HYDRANT NORTH OF HODGE STREET
1B - 1ST HYDRANT WEST OF ELMWOOD ON ANDERSON

Location: ELMWOOD AVE - WEST MAIN - BRYANT - TO - LAFAYETTE

CHECK OFF & COMMENT ON ITEMS BELOW

FLOW TEST:

MAIN SIZE 6"

SUPPLY SIZE 6"

NOZZLE SIZE 2.5"

HOW LONG 15 MIN

STATIC PRESSURE 44 psi @ hyd # 1A

RESIDUAL PRESSURE 37 psi @ hyd # 1A

PITOMETER PRESSURE 22 psi @ hyd # 1B

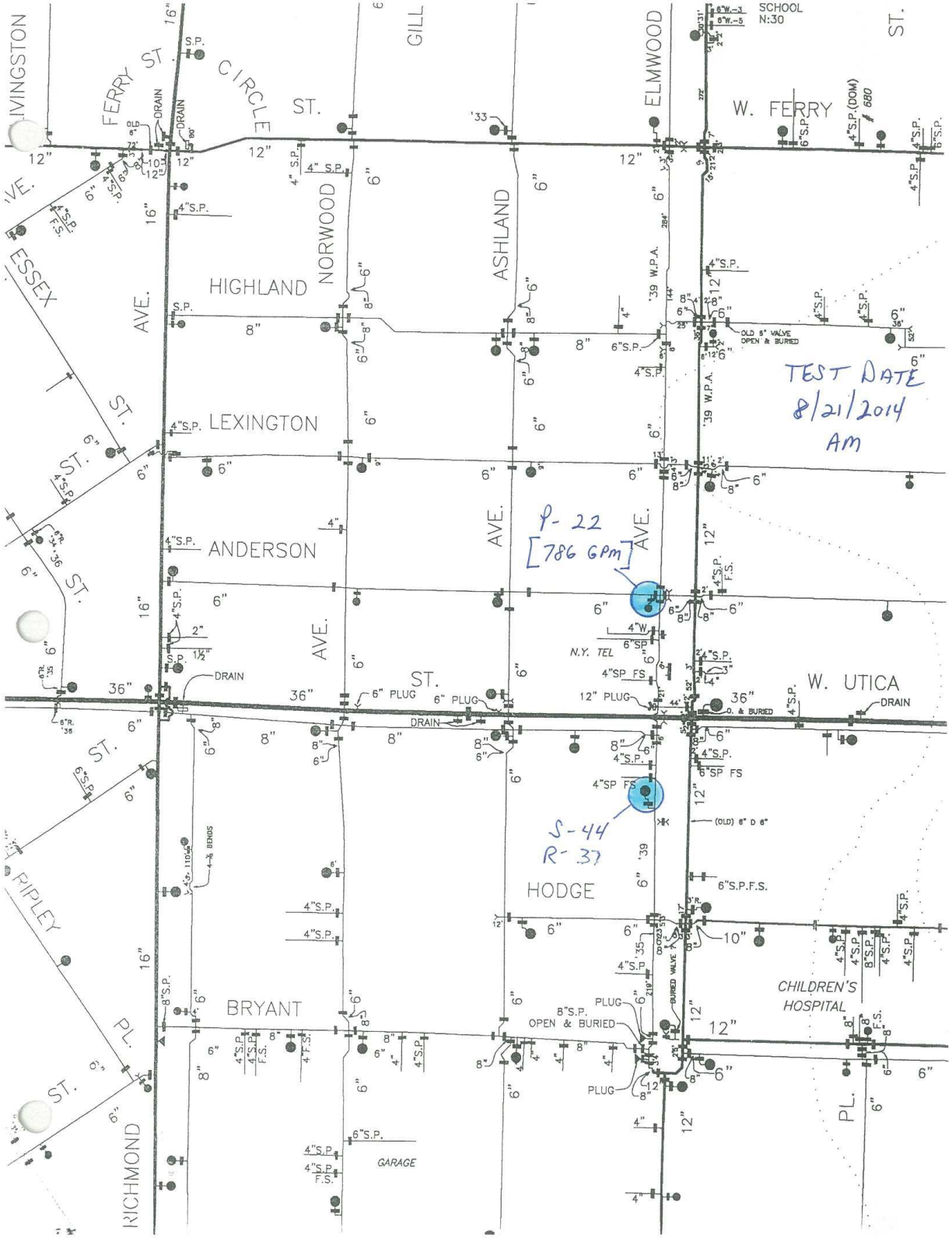
FLOW IN GPM 786 @ hyd # 1B

TIME OF TEST AM

DATE OF TEST 8/21/2014

FLUSHED HYDRANT: YES ✓ NO

COMMENTS


TEST DATE
8/21/2014
AM
P- 22
[786 GPM]
S-44
R-37
W. FERRY
W. UTICA
HIGHLAND
LEXINGTON
ANDERSON
HODGE
BRYANT
ESSEX
RICHMOND
RIPLEY
FERRY ST.
CIRCLE ST.
GILL
NORWOOD
ASHLAND
ELMWOOD
SCHOOL
N:30
CHILDREN'S HOSPITAL
GARAGE
N.Y. TEL
OLD 8" VALVE OPEN & BURIED
6" PLUG
12" PLUG
DRAIN

BUFFALO DIVISION OF WATER
FLOW TEST
HYDRANT MAINTENANCE CHECK LIST

Flow Test By: BRIAN D. LACKIE Date: 5/23/14

Hydrant No. 1A - 1ST HYDRANT EAST OF ASHLAND ON BRYANT
1B - 1ST HYDRANT EAST OF NORWOOD ON BRYANT

Location: BRYANT ST. - ELMWOOD AVE -TO- RICHMOND AVE

CHECK OFF & COMMENT ON ITEMS BELOW

FLOW TEST:

MAIN SIZE 8"

SUPPLY SIZE 6"

NOZZLE SIZE 2.5"

HOW LONG 15 min

STATIC PRESSURE 51 psi @ hyd # 1A

RESIDUAL PRESSURE 49 psi @ hyd # 1A

PITOMETER PRESSURE 43 psi @ hyd # 1B

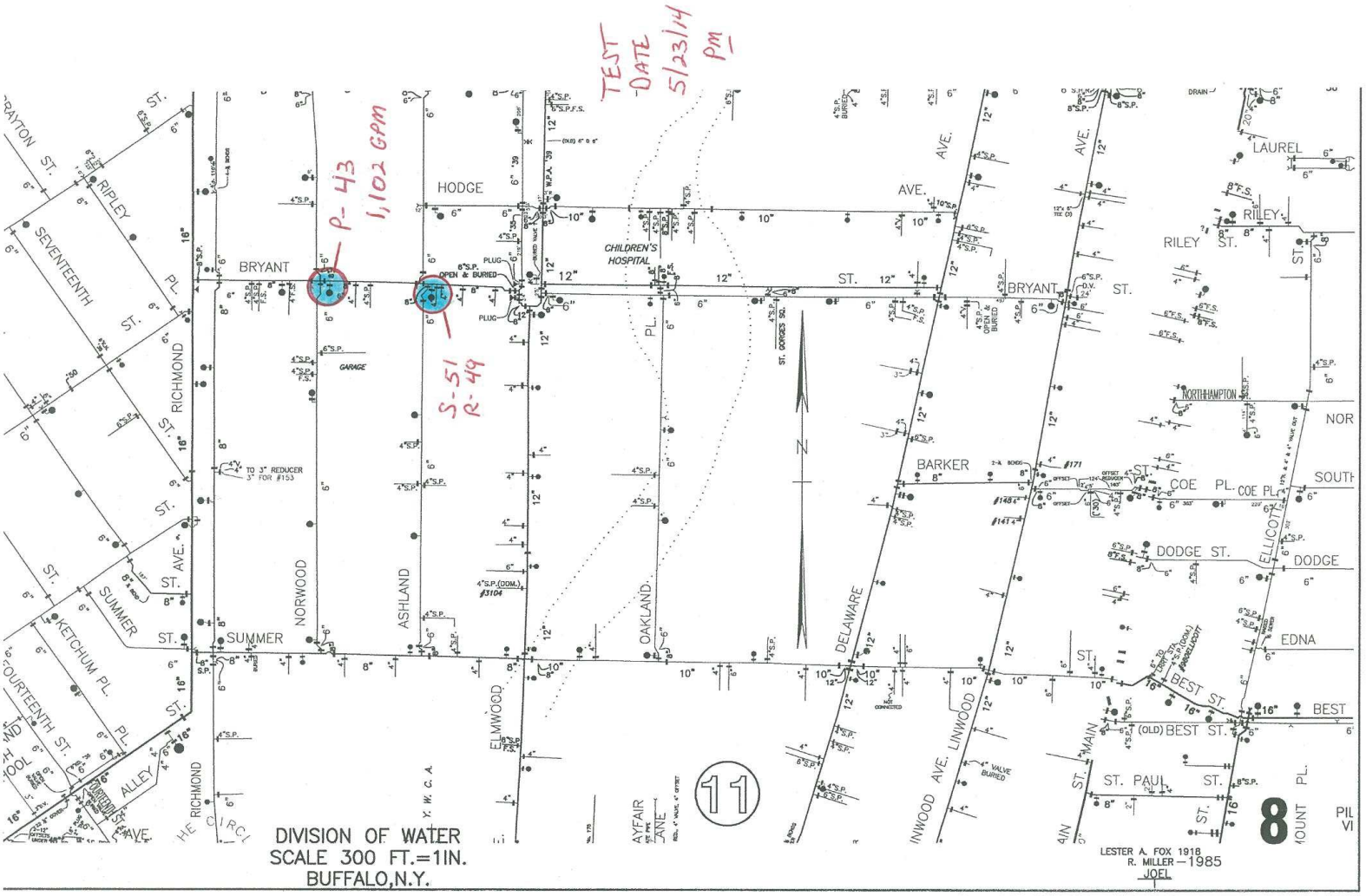
FLOW IN GPM 1,102 @ hyd # 1B

TIME OF TEST Pm

DATE OF TEST 5/23/2014

FLUSHED HYDRANT: YES ✓ NO

COMMENTS


TEST
DATE
5/23/14
PM
P- 43
1,102 GPM
S-51
R-49
BRYANT
HODGE
CHILDREN'S HOSPITAL
RICHMOND
NORWOOD
ASHLAND
ELMWOOD
OAKLAND
DELAWARE
LINWOOD
MAIN
ELLICOTT
SUMMER
BARKER
COE PL.
DODGE ST.
EDNA
BEST ST.
(OLD) BEST ST.
ST. PAUL ST.
LAUREL
RILEY
NORTHAMPTON
SEVENTEENTH ST.
RIPLEY
KETCHUM PL.
COURTEENTH ST.
ALLEY
AYFAIR PLACE
GARAGE
PLUG
OPEN & BURIED
TO 3" REDUCER 3" FOR #153
ST. GORGES SQ.
11
8
DIVISION OF WATER
SCALE 300 FT.=1IN.
BUFFALO,N.Y.
LESTER A. FOX 1918
R. MILLER—1985
JOEL

APPENDIX E:

ADDITIONAL STUDIES

(DOE Portfolio Manager Reference Data)

ENERGY STAR®
PortfolioManager® Technical Reference

U.S. Energy Use Intensity by Property Type

OVERVIEW

This reference table is designed to help you to compare your property's energy use to the national median (or mid-point) energy use of similar properties.

Benchmarking your Property

When benchmarking in Portfolio Manager, we recommend that you focus on the primary function (or, main activity) in your building(s). Begin by selecting your primary function from the table below and then enter as few additional use types as possible. Benchmarking your building using a single use type will most closely approximate how your building would have been recorded in the reference data survey, and therefore yield the most accurate comparisons to median performance. In some cases, buildings may have multiple distinctly different uses. For example, an office and a hotel that share a common building. In these mixed-use settings, it is appropriate to enter multiple use types. Definitions of all property types are available at: www.energystar.gov/PMGlossary.

Using Median Site and Source Energy Use Intensity (EUI)

The ***national median source EUI*** is a recommended benchmark metric for all buildings. The median value is the middle of the national population – half of buildings use more energy, half use less. The median works better than the mean (arithmetic average) for comparing relative energy performance, because it more accurately reflects the mid-point of energy use for most property types.

The table presents the median in both ***site EUI*** and ***source EUI***. Site EUI is what you may be familiar with from your utility bills. Site EUI contains a mixture of what is called primary energy (i.e., a raw fuel like natural gas) and secondary energy (i.e., a converted product like electricity or district steam). Source energy provides the most equitable way to combine primary and secondary energy types into a single common unit, ensuring that no building receives either a credit or a penalty based on its energy source or utility. You can learn more about source energy and the way it is computed at www.energystar.gov/SourceEnergy. We strongly encourage you to use source EUI.

While almost all commercial building types have a national Median Source EUI, some (***presented in cyan***) will also have a 1-100 ENERGY STAR Score. The score evaluates a building relative to its peers, similar to the median energy use values, and also adjusts for climate and business activity. You can learn more about the score at: www.energystar.gov/ENERGYSTARScore.

Understanding Reference Data

The right-most column in the table indicates the reference data source we use to determine the median performance of buildings in your peer group. To compute the national median, we always rely on nationally representative data. For the majority of property types, the reference data is from the Commercial Building Energy Consumption Survey (CBECS). This is a national survey conducted by the U.S. Department of Energy's Energy Information Administration (for more information visit: http://www.eia.gov/consumption/commercial/). Three additional surveys are referenced for data centers, wastewater treatment plants, and multifamily housing. Additional information on these surveys can be found in the technical reference document for each property type.

U.S. National Median Reference Values for All Portfolio Manager Property Types

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Banking/Financial Services	**Bank Branch ***		209.9	88.3	CBECS - Bank/Financial
	Financial Office*		116.4	52.9	CBECS - Office & Bank/Financial
Education	Adult Education		110.4	52.4	CBECS - Education
	College/University		180.6	84.3	CBECS - College/University
	K-12 School*		104.4	48.5	CBECS - Elementary/Middle & High School
	Pre-school/Daycare		131.5	64.8	CBECS - Preschool
	Vocational School		110.4	52.4	CBECS - Education
	Other - Education				
Entertainment/Public Assembly	Convention Center		109.6	56.1	CBECS - Social/Meeting
	Movie Theater		112.0	56.2	CBECS - Public Assembly
	Museum				
	Performing Arts				
	Recreation	Bowling Alley	112.0	50.8	CBECS - Recreation
		Fitness Center/Health Club/Gym			
		Ice/Curling Rink			
		Roller Rink			
		Swimming Pool			
		Other - Recreation			
	Social/Meeting Hall		109.6	56.1	CBECS - Social/Meeting

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Entertainment/Public Assembly	Stadium	Indoor Arena	112.0	56.2	CBECS - Public Assembly
		Race Track			
		Stadium (Closed)			
		Stadium (Open)			
		Other - Stadium			
	Other	Aquarium			
		Casino			
		Zoo			
		Other - Entertainment/Public Assembly			
		Bar/Nightclub	297.0	130.7	CBECS - Bar/Pub/Lounge
Food Sales & Service	Convenience Store	Convenience Store with Gas Station	592.6	231.4	CBECS - Food Sales
		Convenience Store without Gas Station			
	Restaurant/Bar	Bar/Nightclub	297.0	130.7	CBECS - Bar/Pub/Lounge
		Fast Food Restaurant	886.4	402.7	CBECS - Fast Food
		Restaurant	573.7	325.6	CBECS - Restaurant/Cafeteria
		Other - Restaurant/Bar			
	Supermarket/Grocery Store*		444.0	196.0	CBECS - Grocery Store/Food Market
	Wholesale Club/Supercenter*		120.0	51.4	CBECS - Retail Store
	Other	Food Sales	592.6	231.4	CBECS - Food Sales
		Food Service	527.7	270.3	CBECS - Food Service

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Healthcare	Ambulatory Surgical Center		138.3	62.0	CBECS - Outpatient Healthcare
	Hospital	**Hospital (General Medical & Surgical)***	426.9	234.3	Industry Survey
		Other/Specialty Hospital	433.9	206.7	CBECS - Inpatient Healthcare
	Medical Office*		121.7	51.2	CBECS - Medical Office
	Outpatient Rehabilitation/Physical Therapy		138.3	62.0	CBECS - Outpatient Healthcare
	Residential Care Facility		213.2	99.0	Industry Survey
	Senior Care Community*		213.2	99.0	Industry Survey
	Urgent Care/Clinic/Other Outpatient		145.8	64.5	CBECS - Clinic/Outpatient
Lodging/Residential	**Barracks***		107.5	57.9	CBECS - Dormitory
	Hotel*		146.7	63.0	CBECS - Hotel & Motel/Inn
	Multifamily Housing*		118.1	59.6	Fannie Mae Industry Survey
	Prison/Incarceration		156.4	69.9	CBECS - Public Order and Safety
	Residence Hall/Dormitory*		107.5	57.9	CBECS - Dormitory
	Residential Care Facility		213.2	99.0	Industry Survey
	Senior Care Community*		213.2	99.0	Industry Survey
	Single Family Home		N/A	N/A	None Available
	Other - Lodging/Residential		143.6	63.6	CBECS - Lodging
Manufacturing/Industrial	Manufacturing/Industrial Plant		N/A	N/A	None Available
Mixed Use	Mixed Use Property		89.3	40.1	CBECS - Other
Office	**Medical Office***		121.7	51.2	CBECS - Medical Office
	Office*		116.4	52.9	CBECS - Office & Bank/Financial
	Veterinary Office		145.8	64.5	CBECS - Clinic/Outpatient
Parking	Parking		N/A	N/A	None Available

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Public Services	**Courthouse***		211.4	101.2	CBECS - Courthouse
	Drinking Water Treatment & Distribution *(Average EUI presented in Energy per Flow in gallons per day)*		5.90	2.27	AWWA - Water Treatment Plant
	Fire Station		124.9	63.5	CBECS - Fire Station/Police Station
	Library		143.6	71.6	CBECS - Library
	Mailing Center/Post Office		96.9	47.9	CBECS - Service
	Police Station		124.9	63.5	CBECS - Fire Station/Police Station
	Prison/Incarceration		156.4	69.9	CBECS - Public Order and Safety
	Social/Meeting Hall		109.6	56.1	CBECS - Social/Meeting
	Transportation Terminal/Station		112.0	56.2	CBECS - Public Assembly
	Wastewater Treatment Plant* *(Average EUI presented in Energy per Flow in gallons per day)*		7.51	2.89	AWWA - Wastewater Plant
	Other - Public Services		89.3	40.1	CBECS - Other
Religious Worship	**Worship Facility***		58.4	30.5	CBECS - Religious Worship
Retail	Automobile Dealership		124.1	55.0	CBECS - Retail other than Mall
	Convenience Store	Convenience Store with Gas Station	592.6	231.4	CBECS - Food Sales
		Convenience Store without Gas Station			
	Mall	Enclosed Mall	170.7	65.7	CBECS - Enclosed Mall
		Lifestyle Center	228.8	103.5	CBECS - Strip Shopping Mall
		Strip Mall			
		Other - Mall	225.3	101.6	CBECS - Enclosed Mall and Strip Shopping Mall
	Retail Store*		120.0	51.4	CBECS - Retail Store
	Supermarket/Grocery Store*		444.0	196.0	CBECS - Grocery Store/Food Market
	Wholesale Club/Supercenter*		120.0	51.4	CBECS - Retail Store

Broad Category	Primary Function	Further Breakdown (where needed)	Source EUI (kBtu/ft²)	Site EUI (kBtu/ft²)	Reference Data Source - Peer Group Comparison
Technology/Science	**Data Center*** *(Average PUE presented in place of EUI: PUE = Total Energy / IT Energy)*		1.82	1.82	EPA - Data Center
	Laboratory		318.2	115.3	CBECS - Laboratory
	Other – Technology/Science		89.3	40.1	CBECS - Other
Services	**Data Center*** *(Average PUE presented in place of EUI: PUE = Total Energy / IT Energy)*		1.82	1.82	EPA - Data Center
	Personal Services (Health/Beauty, Dry Cleaning, etc.)		96.9	47.9	CBECS - Service
	Repair Services (Vehicle, Shoe, Locksmith, etc.)				
	Other - Services				
Utility	Drinking Water Treatment & Distribution *(Average EUI presented in Energy per Flow in gallons per day)*		5.90	2.27	AWWA - Water Treatment Plant
	Energy/Power Station		89.3	40.1	CBECS - Other
	Wastewater Treatment Plant* *(Average EUI presented in Energy per Flow in gallons per day)*		7.51	2.89	AWWA - Wastewater Plant
	Other - Utility		89.3	40.1	CBECS - Other
Warehouse/Storage	Self-Storage Facility		47.8	20.2	CBECS – Non-refrigerated Warehouse
	Warehouse/Distribution Center	**Distribution Center***	52.9	22.7	CBECS – Non-refrigerated Warehouse & Distribution Center
		Non-Refrigerated Warehouse*			
		Refrigerated Warehouse*	235.6	84.1	CBECS – Refrigerated Warehouses
Other	Other		89.3	40.1	CBECS - Other