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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

3575 Kaneff Crescent

Prepared for
Kaneff Developments

Project #: 20-632

1st Submission (Zoning) – May 2020

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1. INTRODUCTION

1.1. Background

Urbantech has been retained to prepare a Functional Servicing Report / Stormwater Management Report in support of an official plan and zoning by-law amendment application for 3575 Kaneff Crescent (hereafter referred to as the "subject lands" or "site"). The site is located at southeast corner of Mississauga Valley Drive and Kaneff Crescent in the City of Mississauga. The legal description of this property is Blocks 8, 9 and 10 (Plan 43R-4627).

Refer to **Drawing 1** for the **Site Location Plan.**

This report reviews offsite servicing capacities and provides functional servicing design and stormwater management information for the proposed development. The proposed site grading, site servicing and stormwater management designs are in accordance with accepted engineering practices, as well as, both City of Mississauga and Region of Peel standards and specifications.

1.2. Subject Site

The site is approximately 0.27 ha in size and is currently occupied by an existing parking lot space. The site is bounded by Mississauga Valley Boulevard to the north, Obelisk Way to the south, Kaneff Crescent to the east and Elm Drive to the west. The site is in the jurisdiction of the Credit Valley Conservation Authority and is within the Cooksville Creek watershed.

1.3. Proposed Development

The proposed works include redeveloping the subject lands with a 29 storey, 282 unit residential development with underground parking areas and associated water, storm and sanitary servicing. Vehicle access to the building, loading bay and underground parking is proposed as a way one access from Obelisk Way to Kaneff Crescent.

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2. GRADING

The future grades required to service the site will generally be influenced by boundary conditions and matching existing grades on the north, south, east and west sides of the site. In addition, the site grading design will take into consideration the following requirements and constraints:

- Conform to City of Mississauga's design criteria.
- Provide overland flow conveyance for major storm conditions.
- Reduce or eliminate the need for retaining walls.
- Provide suitable cover on proposed servicing.
- Achieve stormwater management and environmental objectives required for the site.

A geotechnical investigation was not available at this time. Geotechnical recommendations will be added once the report is available.

Swales are proposed around the perimeter of the site to ensure the first 5mm of rainfall is captured on-site. The site and swale grading have been designed to match the existing perimeter grades to minimize disturbance to the existing boundaries. Please refer to **Drawing 2** for **Grading Plan**.

3. STORM SERVICING AND STORMWATER MANAGEMENT

3.1. Existing Storm Servicing

City of Mississauga storm sewers are sized for the 10-year storm event. Underground services on Elm Drive consist of a trunk storm sewer (2550mm) which conveys flow east to Cooksville Creek. Flows within the site are captured at one internal low point via a double catch basin inlet. Flows are then conveyed to a 300mm diameter storm sewer that connects to a 375mm storm sewer service connection within the ROW before finally connecting to the Elm Drive Trunk Sewer. Existing landscaped area around site perimeter currently runs off uncontrolled to the street.

The existing 25-year and 100-year storm design sheets are included in **Appendix A.** The sheet was provided by the City of Mississauga along with the image of GIS storm sewer information. Based on the storm sewer information this site is a part of a large drainage area that discharges to what is referred to as the Square One Storm Trunk drainage area to Cooksville Creek. Refer to **Drawing 4** for the **Pre- Development Drainage Plan** for the existing site drainage area details.

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Table 1: Existing Area Breakdown and Runoff Coefficients

	Drainage Area (m^2)	Runoff Coefficient C	Outlet Location
Parking Lot Paved Area	1348	0.90	Ex STM Sewer Connection
Grass	552	0.25	Ex STM Sewer Connection
Overall Parking Lot Site	**1900**	**0.70**	Ex STM Sewer Connection
Grassed area to ROW	800	0.25	Uncontrolled Runoff to ROW
Total	**2700**		

3.2. Proposed Storm Servicing

The storm drainage concept for the site has been designed to maintain flows and contributing drainage areas to the existing outlets on the site as described in Section 3.1. The release rate to the municipal storm system from the existing development is based on the 2-year peak flow rate, applying the existing conditions' runoff coefficient for the area draining to the minor system. This was found to be 40 L/s. Under proposed conditions, flows from the subject lands will be captured at low points within the site and conveyed to the stormwater holding tank within underground parking level 1, then through the underground parking lot into EX. MH11. The existing structures within the site will be removed.

A weighted runoff coefficient of 0.77 was used to calculate proposed flows. Refer to **Drawing 5 Post - Development Drainage Plan** for the proposed site for drainage area details.

Table 2: Proposed Area breakdown and runoff coefficient

	Drainage Area (m^2)	Runoff Coefficient C	Outlet Location
Impervious Rooftop	1518	0.90	Ex STM Sewer Connection
Swales Area	383	0.25	Ex STM Sewer Connection
Impervious Surfaces (includes hard landscaping area)	741	0.90	Ex STM Sewer Connection
Overall Site	**2600**	**0.77**	Ex STM Sewer Connection
Walkways	82	0.90	Uncontrolled Runoff to Street

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The existing condition and post-development flows from the subject site are shown in Table 3.

Table 3: Existing and Proposed Conditions flows

Outlet Point	Drainage Area (ha)	Runoff Coefficient	Description	Existing Condition Flows L/s	
				Return Period (Years)	
				2	100*
Existing Condition	0.19	0.70	Conveyed to existing STM network via CB's	**40** (target for post-development conditions)	110
Existing Condition	0.08	0.25	Drains to street uncontrolled	10	50
Post Development	0.26	0.69	Drains to low points within the site and outlets into EX. MH 49	60	160
Post Development	0.008	0.9	Drains to street uncontrolled	2	6

* Per City of Mississauga guidelines, a 1.25 adjustment factor is incorporated in calculating the 100-year flow

As mentioned in **Section 1.2** the site is located within the Cooksville Creek and City of Mississauga has standards in place where the post-development flow has to be controlled to the 2-year pre-development rates. Therefore, a PC SWMM model was developed to determine the flows for the existing and proposed site conditions. The 2-year and 100-year design storm event flows were calculated by running the Chicago 4-hour storm, using the rainfall intensity equation: $I\ (mm / hr) = A / (T+B)^C$, where T is the Time of Concentration in minutes. The values for the A, B and C for the storms were obtained from the latest Engineering Design Criteria from the City of Mississauga.

Under existing conditions, the 375mm diameter storm sewer downstream of EX. MH11 with a slope of 0.67% has been modelled in PC SWMM and from the model the pipe has capacity to convey the uncontrolled 100-year storm from the site. Controls will be however put in place by having a stormwater tank that will control flows to pre-development 2-year flow of 40 L/s.

The PC SWMM model plan for existing and proposed site development is provided in **Appendix B**. **Drawing 1** - **Site Servicing Plan** shows details on proposed service connections.

3.3. Storm Water Management

3.3.1. Water balance and LID Measures

In order to meet the design criteria described in the T&W Developments Requirements Manual, the first 5 mm of runoff should be retained on-site. The required volume was established to determine the runoff and infiltration volume under post-development conditions with mitigation measures.

To determine the volume of rainfall that is to be retained on-site to achieve water balance targets, proposed site area was taken and multiplied by the 5mm rainfall depth across the total area.

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Table 4: Site Water Balance Calculations

Site Drainage Area (m^2)	Rainfall Depth (mm)	Rainfall Volume (m^3)
2600	5	13

Therefore, to achieve site water balance 13m^3 of rainfall needs to be retained on-site. There are swales around the perimeter of the site which have sufficient capacity to retain and infiltrate the target 5mm retention volume. Swale details can be seen in **Drawing 2 - Site Grading**.

Table 5: Swale Details

Swale Number	Swale Length (m)	Swale Area (m^2)	Volume Retained (m^3)
1	15.5	0.14	2.2
2	32	0.14	4.6
3	14	0.14	2.0
4	14.3	0.14	2.0
5	7.5	0.14	1.1
6	2.1	0.14	0.3
7	2.3	0.14	0.3
8	5.9	0.14	0.8
9	11.4	0.14	1.6
Total Volume			**15.0**

Due to grading constraints, the swales have varying slopes from 1.4% to 5%. In order to retain and hold water, berms or check dams will be provided along the length of the swale. In order to calculate the volume of water that would be retained, area of the berm is multiplied by the length of each swale. Details are provided in **Table 5**. The total volume of rainfall retained in swales can achieve the site water balance. Where possible, clean drainage from the site (e.g. roofs, landscaped areas) should be directed to the swales. Refer to **Drawing 5** – **Post-Development Drainage Plan** for the proposed site drainage area details.

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3.3.2. Quantity and Quality Control

Post-development flows from the roof areas, loading bay and other impervious surfaces will be directed to capture points / area drains and will be conveyed through the underground parking lot and will outlet into EX. MH11. The site post-development flow will be controlled to 2-year pre-development flow.

To size the stormwater tank, the post-development PC SWMM model was used. Details on the storage are provided in **Table 6** and details on sizing in **Appendix C.**

Table 6: Stormwater Tank Storage Calculations

Existing Condition Flow (existing 2-year) (m^3/s)	Proposed Condition Flow (100-year) (m^3/s)	Total Storage Needed (m^3)
0.04	0.16	77.1

Because the post-development flows mainly consist of "clean" rooftop water and landscape (soft and hard) areas with marginal flows conveyed through the loading bay, no quality control measures are proposed. The swales surrounding the site can also be considered to achieve a portion (approximately 17m^3) of the quantity control at detailed design and efforts should be made to discharge the clean roof runoff to the swales to meet the 5mm retention target and water quality "polishing". Otherwise, a sump will have to be provided in the underground tank to retain the balance of the 5mm volume that cannot be directed to the swales.

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4. Sanitary Servicing

4.1. Wastewater Servicing Design Criteria

Wastewater infrastructure will be designed in accordance with the latest Region of Peel Sanitary Sewer Design standards and specifications:

Wastewater Design Criteria

- Type of Development: 1 Bedroom Apartment – 1.68 person/unit; 2+Bedroom Apartment – 2.54 person/unit
- Unit Sewage Flow: 302.8 L/person/day
- Infiltration & Inflow: 0.2 L/s/ha
- Peaking Factor: $Pf = 1+ [14 / (4+p^{0.5})]$

The estimated population is 622 people (Refer to **Drawing 6** for **Sanitary Drainage Plan**). The total wastewater flow is 13 L/s (based on the minimum flow for populations less than 1000 people) + 0.052 L/s of I/I flow.

4.2. Existing Wastewater Infrastructure

The existing 600 mm wastewater sewer along Elm Drive is the designated gravity outlet for wastewater servicing of the subject lands. A 250mm sanitary sewer connection and control MH 8A are available at the southwest corner of Mississauga Valley and Elm Drive.

4.3. Proposed Wastewater Servicing

Sanitary drainage will be captured from the site and conveyed to the existing Sanitary MH. 8A and 250 mm sanitary sewer that connects into the existing 600 mm wastewater sewer along Elm Drive. **Drawing 1** illustrates the location of the existing services. Wastewater servicing design within the proposed building will be provided by the mechanical engineer at detailed design.

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5. Water Distribution

A 400mm CPP watermain along the south side of Mississauga Valley Boulevard and a 400 mm CPP watermain within the east side of the Elm Drive pavement surround the subject site. To calculate the domestic and fire flow water demands for the proposed development, the design criteria outlined in the Region of Peel "Watermain Design Criteria, 2010" will be used during the detailed design stage. The following **Table 7** summarizes the residential population densities that will be used to calculate the domestic water demands.

Table 7: Equivalent Population Density

Type of Development	Equivalent Population Density
Townhouse (Row Dwellings)	3.5 People/unit
Apartment (1 Bedroom)	1.68 People/unit
Apartment (2 or more bedrooms)	2.54 People/unit

The equivalent population for the site was calculated to be 622 people. **Table 8** summarizes the average daily demand and peaking factors that will be used in the future water distribution analysis. **Table 9** provides the Fire Underwriters Survey fire flow requirements.

Table 8: Water Design Factors

Type of Development	Average Daily Demand	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Residential	280 L/capita/day	2.0	3.0

Table 9: Fire Flow Requirements

Type of Development	Fire Flow (L/s)
Townhouses (Row)	267
Townhouses (Stacked)	217
Mid-rise Apartments	117

A hydrant test and hydraulic analysis will be completed to confirm the proposed water distribution strategy including fire flow and pressures. All criteria and design flows are to be confirmed by the appropriate designer as the building details are confirmed.

As shown on **Drawing 1**, the proposed development will be serviced via a service connection to the 400mm watermain on Mississauga Valley Boulevard to avoid the encroachment / disturbance to the Elm Street ROW that would result from providing a service connection across the entire ROW.

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6. Erosion and Sediment Control

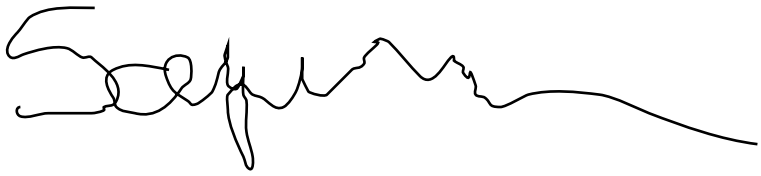
The erosion and sediment control plan for the site will be designed in conformance with the City of Mississauga and Credit Valley Conservation Authority guidelines. The existing site access will be used for construction access. Preliminary details are provided in **Drawing 3 – Demolition and ESC Plan**.

7. Conclusion

The proposed residential development at 3575 Kaneff Crescent can be serviced via the existing storm and sanitary sewers on Elm Drive and existing watermain on Mississauga Valley Boulevard. The development does not adversely impact any of the surrounding infrastructure or residential development, and the proposed stormwater management strategy will improve downstream conditions by limiting the release rates from the site to the existing, 2-year flow.

Report Prepared by:

Urbantech® Consulting



Sanja Ivanovic, P. Eng. M.E.P.P
Senior Water Resource Engineer

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Appendix A:

Background Drawings and Information

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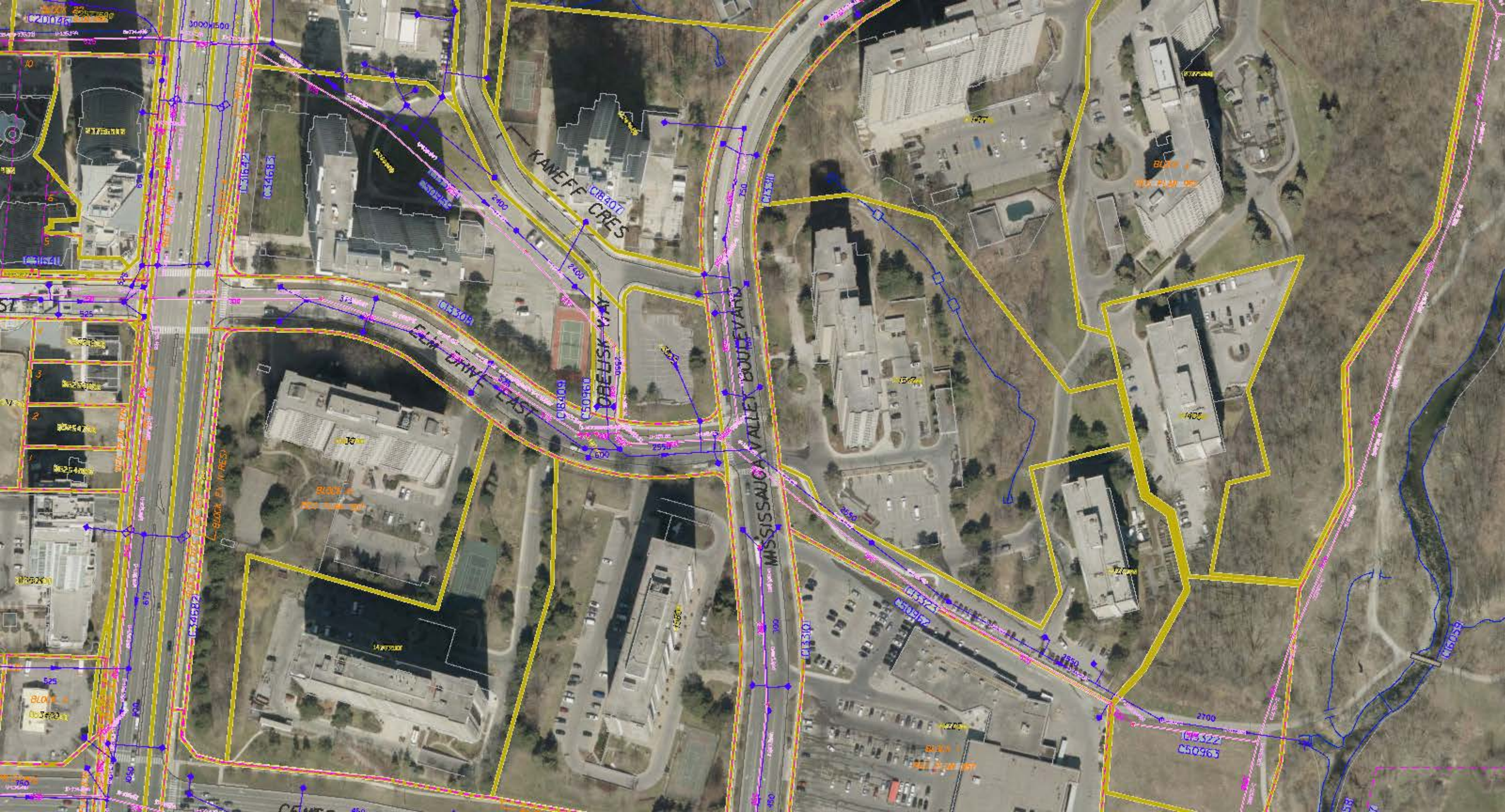
KANEFF CRES
ECHO DRIVE EAST
DREUSKY WAY
MISSISSAUGA VALLEY BOULEVARD

DEVELOPMENT STORM TRUNK REPLACEMENT

CONSULTANT GRECK AND ASSOCIATES LTD

MAJOR DRAINAGE AREA

MISSISSAUGA *Transportation and Works*

STORM DRAINAGE DESIGN CHART

FOR CIRCULAR DRAINS FLOWING FULL

SHEET NO. 1 OF 2 DATE 3/24/2015

DESIGNED BY Brian Greck. P.Eng.

CHECKED BY

100 years storm note: Design sheet used to present flow calculations prepared using PCSWMM Software

LOCATION OF SITE	FROM UPSTREAM	TO DOWNSTREAM	ADJACENT CONTRIBUTORY AREA	RUNOFF COEFFICIENT	AREA TIMES RUNOFF COEFFICIENT	ACCUMULATED AREA DRAINED BY SECTION	ACCUMULATED AREA TIMES RUNOFF COEFFICIENT FOR SECTION	FLOW TIME TO SECTION FROM EXTREME UPSTREAM INLET	INITIAL TIME OF CONCENTRATION AT EXTREME UPSTREAM INL.	TIME OF CONCENTRATION UPSTREAM END OF SECTION	INTENSITY OF RAINFALL	QUANTITY OF FLOW TO BE ACCOMMODATED IN SECTION	TYPE OF PIPE	MANNING'S ROUGHNESS COEFFICIENT	SLOPE	DIAMETER	LENGTH OF SECTION	VELOCITY OF FLOW WITH PIPE FLOWING FULL	CAPACITY OF PIPE FLOWING FULL	PIPE INVERT AT UPSTREAM M.H.	PIPE INVERT AT DOWNSTREAM M.H.	TIME OF FLOW IN SECTION
HURONTARIO	MH#	MH#	ha			ha		min	min	min	mm/hr	m^3/Sec		n	%	mm	m	m/Sec	m^3/Sec	m	m	min
	ST3	1	135.1	0.92	NA	135.1	NA	NA	NA	NA	NA	19.50	CONC.	0.013	1.1	2438	36.9	5.97	25.33	134.01	133.60	NA
	1	2	1.34	0.93	NA	136.4	NA	NA	NA	NA	NA	19.51	CONC.	0.013	1.4	2438	39.7	6.47	27.87	132.60	132.19	NA
	2	3	0	NA	NA	136.4	NA	NA	NA	NA	NA	19.87	CONC.	0.013	1.0	2438	74.6	5.62	23.37	131.34	130.50	NA
	3	4	0.77	0.93	NA	137.2	NA	NA	NA	NA	NA	19.87	CONC.	0.013	1.2	2438	57.9	6.20	26.50	129.50	128.80	NA
	4	5	0	NA	NA	137.2	NA	NA	NA	NA	NA	20.08	CONC.	0.013	1.5	2591	62.0	5.77	27.89	127.80	126.90	NA
	5	6	0	NA	NA	137.2	NA	NA	NA	NA	NA	20.08	CONC.	0.013	3.3	2591	12.2	5.87	28.69	126.80	126.40	NA
	6	7	5.22	0.93	NA	142.4	NA	NA	NA	NA	NA	20.08	CONC.	0.013	1.6	2591	60.7	5.95	29.10	126.30	125.35	NA
	7	8	0	NA	NA	142.4	NA	NA	NA	NA	NA	21.49	CONC.	0.013	1.0	2591	73.3	5.78	27.55	124.50	123.80	NA
	8	9	2.55	0.87	NA	145	NA	NA	NA	NA	NA	21.50	CONC.	0.013	1.3	2591	45.9	6.46	31.61	123.10	122.52	NA
	9	10	6.87	0.75	NA	151.9	NA	NA	NA	NA	NA	22.08	CONC.	0.013	0.8	2591	122	5.50	25.67	121.52	120.50	NA
COOKSVILLE CREEK	10	OUTFALL	0.89	0.57	NA	152.7	NA	NA	NA	NA	NA	23.41	CONC.	0.013	1.4	2743	68.4	4.23	39.67	119.50	118.49	NA

DEVELOPMENT STORM TRUNK REPLACEMENT
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MISSISSAUGA *Transportation and Works*

STORM DRAINAGE DESIGN CHART
FOR CIRCULAR DRAINS FLOWING FULL

SHEET NO. 2 OF 2 DATE 3/24/2015
DESIGNED BY Brian Greck. P.Eng.
CHECKED BY

25 years storm note: Design sheet used to present flow calculations prepared using PCSWMM Software

LOCATION OF SITE	FROM UPSTREAM	TO DOWNSTREAM	ADJACENT CONTRIBUTORY AREA	RUNOFF COEFFICIENT	AREA TIMES RUNOFF COEFFICIENT	ACCUMULATED AREA DRAINED BY SECTION	ACCUMULATED AREA TIMES RUNOFF COEFFICIENT FOR SECTION	FLOW TIME TO SECTION FROM EXTREME UPSTREAM INLET	INITIAL TIME OF CONCENTRATION AT EXTREME UPSTREAM INL.	TIME OF CONCENTRATION UPSTREAM END OF SECTION	INTENSITY OF RAINFALL	QUANTITY OF FLOW TO BE ACCOMMODATED IN SECTION	TYPE OF PIPE	MANNING'S ROUGHNESS COEFFICIENT	SLOPE	DIAMETER	LENGTH OF SECTION	VELOCITY OF FLOW WITH PIPE FLOWING FULL	CAPACITY OF PIPE FLOWING FULL	PIPE INVERT AT UPSTREAM M.H.	PIPE INVERT AT DOWNSTREAM M.H.	TIME OF FLOW IN SECTION
HURONTARIO	MH#	MH#	ha			ha		min	min	min	mm/hr	m^3/Sec		n	%	mm	m	m/Sec	m^3/Sec	m	m	min
	ST3	1	135.1	0.92	NA	135.1	NA	NA	NA	NA	NA	14.13	CONC.	0.013	1.1	2438	36.9	5.56	25.24	134.01	133.60	NA
	1	2	1.34	0.93	NA	136.4	NA	NA	NA	NA	NA	14.14	CONC.	0.013	1.4	2438	39.7	6.01	27.72	132.60	132.19	NA
	2	3	0	NA	NA	136.4	NA	NA	NA	NA	NA	14.41	CONC.	0.013	1.0	2438	74.6	5.27	23.24	131.34	130.50	NA
	3	4	0.77	0.93	NA	137.2	NA	NA	NA	NA	NA	14.41	CONC.	0.013	1.2	2438	57.9	5.77	26.21	129.50	128.80	NA
	4	5	0	NA	NA	137.2	NA	NA	NA	NA	NA	14.56	CONC.	0.013	1.5	2591	62.0	5.36	28.00	127.80	126.90	NA
	5	6	0	NA	NA	137.2	NA	NA	NA	NA	NA	14.56	CONC.	0.013	3.3	2591	12.2	5.45	28.55	126.80	126.40	NA
	6	7	5.22	0.93	NA	142.4	NA	NA	NA	NA	NA	14.56	CONC.	0.013	1.6	2591	60.7	5.51	29.13	126.30	125.35	NA
	7	8	0	NA	NA	142.4	NA	NA	NA	NA	NA	15.62	CONC.	0.013	1.0	2591	73.3	5.39	27.41	124.50	123.80	NA
	8	9	2.55	0.87	NA	145	NA	NA	NA	NA	NA	15.63	CONC.	0.013	1.3	2591	45.9	5.99	31.90	123.10	122.52	NA
	9	10	6.87	0.75	NA	151.9	NA	NA	NA	NA	NA	16.07	CONC.	0.013	0.8	2591	122	5.16	25.92	121.52	120.50	NA
COOKSVILLE CREEK	10	OUTFALL	0.89	0.57	NA	152.7	NA	NA	NA	NA	NA	17.07	CONC.	0.013	1.4	2743	68.4	3.53	39.69	119.50	118.49	NA

PCSWMM RESULTS: 25 YEAR STORM

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

CITY OF MISSISSAUGA
Square One Storm Trunk Sewer Assessement - Hydraulic Capacity Review
Prepared by: Greck and Associates Limited September 2014

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Starting Date SEP-23-2014 00:00:00
Ending Date SEP-24-2014 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec

WARNING 01: wet weather time step reduced to recording interval for Rain Gage Chicago_3hr_25yr

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 8
Number of nodes 13
Number of links 12
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3hr_25yr	Chicago_3hr_25yr	INTENSITY	1 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	0.89	80.00	25.00	0.5000	Chicago_3hr_25yr	HDW
S2	6.87	162.00	60.00	0.5000	Chicago_3hr_25yr	MH10
S3	2.55	50.00	80.00	0.5000	Chicago_3hr_25yr	MH9
S4	77.67	350.00	90.00	0.5000	Chicago_3hr_25yr	J6
S5	57.45	550.00	90.00	0.5000	Chicago_3hr_25yr	ST-3
S6	5.22	140.00	90.00	0.5000	Chicago_3hr_25yr	MH7
S7	0.77	85.00	90.00	0.5000	Chicago_3hr_25yr	MH4
S8	1.34	100.00	90.00	0.5000	Chicago_3hr_25yr	MH2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J6	JUNCTION	135.20	1.82	0.0	
MH1	JUNCTION	132.60	6.65	0.0	
MH10	JUNCTION	119.50	5.00	0.0	
MH2	JUNCTION	131.21	8.25	0.0	
MH3	JUNCTION	129.50	7.20	0.0	
MH4	JUNCTION	127.80	6.90	0.0	
MH5	JUNCTION	126.80	5.72	0.0	
MH6	JUNCTION	126.30	6.00	0.0	
MH7	JUNCTION	124.50	5.81	0.0	
MH8	JUNCTION	123.10	6.00	0.0	
MH9	JUNCTION	121.52	6.06	0.0	
ST-3	JUNCTION	134.01	5.38	0.0	
HDW	OUTFALL	118.50	2.74	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	MH10	HDW	CONDUIT	68.4	1.4618	0.0140
C10	MH3	MH4	CONDUIT	57.9	1.2090	0.0140
C11	MH8	MH9	CONDUIT	45.9	1.2626	0.0140
C12	MH5	MH6	CONDUIT	12.2	3.2775	0.0250
C13	MH6	MH7	CONDUIT	60.7	1.5657	0.0170
C2	MH9	MH10	CONDUIT	122.0	0.8361	0.0140
C3	MH4	MH5	CONDUIT	62.0	1.4518	0.0170
C4	MH7	MH8	CONDUIT	73.3	0.9550	0.0140
C6	MH2	MH3	CONDUIT	74.6	0.9521	0.0140
C7	J6	ST-3	CONDUIT	12.2	5.6648	0.0160
C8	ST-3	MH1	CONDUIT	36.9	1.1106	0.0140
C9	MH1	MH2	CONDUIT	39.7	1.3603	0.0140

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	2.74	5.91	0.69	2.74	1	39.69
C10	CIRCULAR	2.44	4.67	0.61	2.44	1	26.36
C11	CIRCULAR	2.59	5.27	0.65	2.59	1	31.69
C12	CIRCULAR	2.59	5.27	0.65	2.59	1	28.59

C13	CIRCULAR	2.59	5.27	0.65	2.59	1	29.06
C2	CIRCULAR	2.59	5.27	0.65	2.59	1	25.79
C3	CIRCULAR	2.59	5.27	0.65	2.59	1	27.98
C4	CIRCULAR	2.59	5.27	0.65	2.59	1	27.56
C6	CIRCULAR	2.44	4.67	0.61	2.44	1	23.39
C7	RECT_CLOSED	1.82	5.53	0.57	3.04	1	56.54
C8	CIRCULAR	2.44	4.67	0.61	2.44	1	25.27
C9	CIRCULAR	2.44	4.67	0.61	2.44	1	27.96

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	9.064	59.339
Evaporation Loss	0.000	0.000
Infiltration Loss	0.645	4.225
Surface Runoff	8.149	53.344
Final Surface Storage	0.271	1.776
Continuity Error (%)	-0.011	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	8.149	81.487
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.390	3.903
External Outflow	8.512	85.121
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.019	0.191
Final Stored Volume	0.039	0.388
Continuity Error (%)	0.084	

****
Time-Step Critical Elements
****
Link C12 (32.87%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 1.06 sec
Average Time Step : 3.83 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Subcatchment Runoff Summary

****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff mm	Peak Runoff 10^6 ltr	Runoff Coeff CMS
S1	59.34	0.00	0.00	25.24	32.80	0.29	0.14	0.553
S2	59.34	0.00	0.00	14.35	43.58	2.99	1.26	0.734
S3	59.34	0.00	0.00	6.84	51.01	1.30	0.50	0.860
S4	59.34	0.00	0.00	3.69	53.70	41.71	6.48	0.905
S5	59.34	0.00	0.00	3.43	54.28	31.18	7.83	0.915
S6	59.34	0.00	0.00	3.19	54.65	2.85	1.26	0.921
S7	59.34	0.00	0.00	3.03	54.86	0.42	0.33	0.925
S8	59.34	0.00	0.00	3.07	54.82	0.74	0.50	0.924

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J6	JUNCTION	0.09	0.39	135.59	0 01:15
MH1	JUNCTION	0.32	1.23	133.83	0 01:13
MH10	JUNCTION	1.60	2.44	121.94	0 00:00
MH2	JUNCTION	0.35	1.38	132.59	0 01:12
MH3	JUNCTION	0.33	1.29	130.79	0 01:13
MH4	JUNCTION	0.34	1.33	129.13	0 01:12
MH5	JUNCTION	0.34	1.31	128.11	0 01:13
MH6	JUNCTION	0.34	1.30	127.60	0 01:12
MH7	JUNCTION	0.35	1.40	125.90	0 01:12
MH8	JUNCTION	0.33	1.29	124.39	0 01:12
MH9	JUNCTION	0.37	1.48	123.00	0 01:12
ST-3	JUNCTION	0.34	1.30	135.31	0 01:13
HDW	OUTFALL	2.62	2.62	121.12	0 00:00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J6	JUNCTION	6.482	6.482	0 01:17	41.705	41.706
MH1	JUNCTION	0.000	14.134	0 01:13	0.000	72.887
MH10	JUNCTION	1.259	17.065	0 01:12	2.994	85.120
MH2	JUNCTION	0.496	14.409	0 01:12	0.737	73.624
MH3	JUNCTION	0.000	14.410	0 01:12	0.000	73.623
MH4	JUNCTION	0.328	14.561	0 01:13	0.423	74.045
MH5	JUNCTION	0.000	14.560	0 01:13	0.000	74.045
MH6	JUNCTION	0.000	14.560	0 01:13	0.000	74.045
MH7	JUNCTION	1.258	15.618	0 01:12	2.853	76.897
MH8	JUNCTION	0.000	15.623	0 01:12	0.000	76.897
MH9	JUNCTION	0.496	16.073	0 01:12	1.301	78.211

ST-3	JUNCTION	7.827	14.131	0 01:13	31.184	72.889
HDW	OUTFALL	0.141	17.125	0 01:11	0.292	89.024

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
HDW	99.99	2.618	17.125	89.024
System	99.99	2.618	17.125	89.024

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	17.067	0 01:11	3.53	0.43	0.92
C10	CONDUIT	14.414	0 01:13	5.77	0.55	0.53
C11	CONDUIT	15.630	0 01:12	5.99	0.49	0.50
C12	CONDUIT	14.560	0 01:13	5.45	0.51	0.51
C13	CONDUIT	14.564	0 01:13	5.51	0.50	0.50
C2	CONDUIT	16.072	0 01:12	5.16	0.62	0.57
C3	CONDUIT	14.560	0 01:13	5.36	0.52	0.51
C4	CONDUIT	15.623	0 01:12	5.39	0.57	0.54
C6	CONDUIT	14.410	0 01:12	5.27	0.62	0.57
C7	CONDUIT	6.483	0 01:17	4.63	0.11	0.33
C8	CONDUIT	14.134	0 01:13	5.56	0.56	0.53
C9	CONDUIT	14.139	0 01:13	6.01	0.51	0.50

****
Flow Classification Summary
****

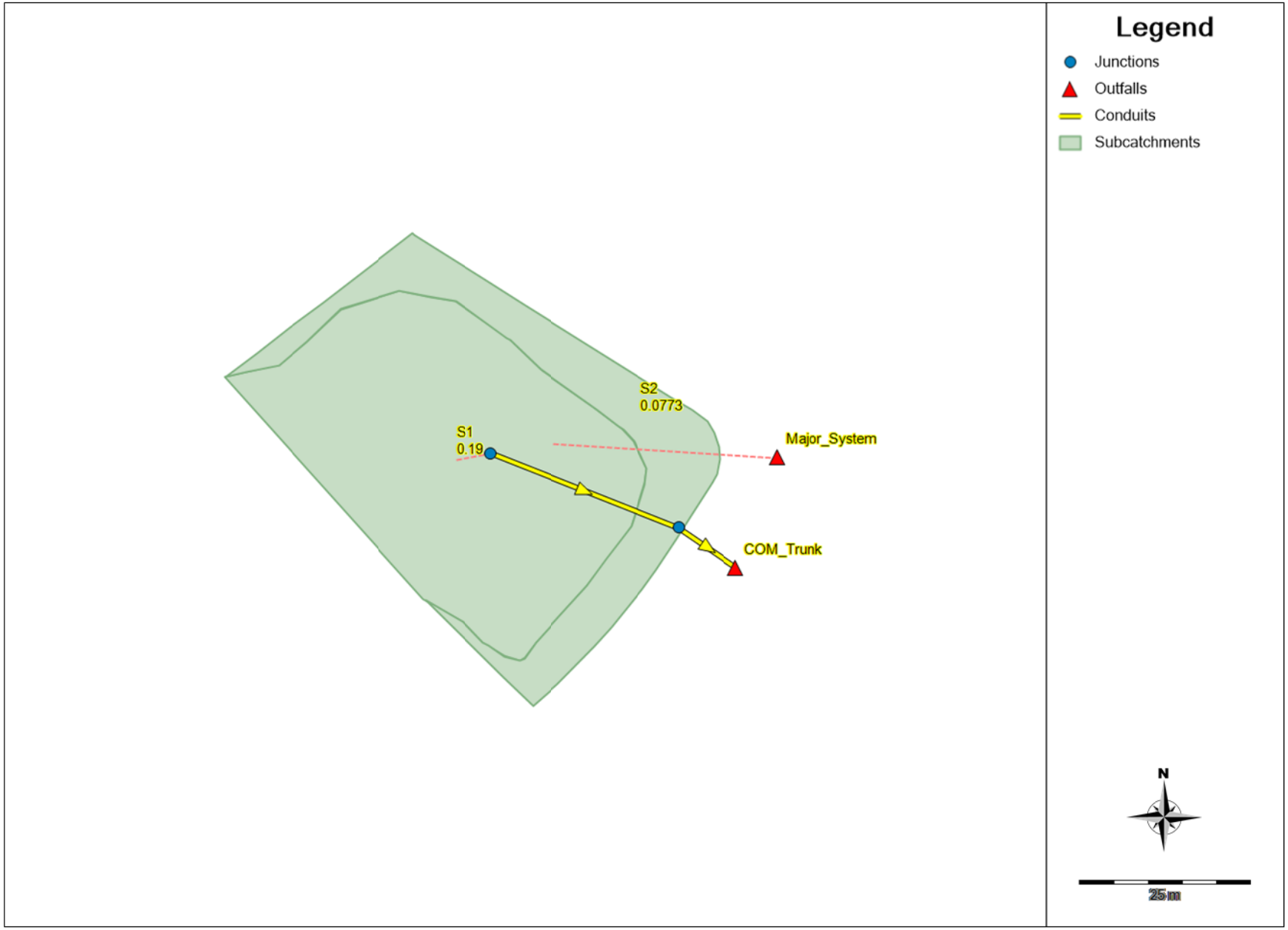
	Adjusted /Actual	--- Fraction of Time in Flow Class ---- Up	Down	Sub	Sup	Up	Down	Avg. Froude	Avg. Flow

Appendix B:

Storm and SWM calculations and PC SWMM Output

Urbantech®, A Division of Leighton-Zec Ltd.
3760 14th Avenue, Unit 301 Markham, Ontario L3R 3T7
TEL: 905.946.9461
www.urbantech.com

Existing Schematic



EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
Element Count
****
Number of rain gages 4
Number of subcatchments ... 2
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100yr-_COM	Chicago_3h_100yr-_COM	INTENSITY	5 min.
Chicago_3h_2yr	Chicago_3h	INTENSITY	5 min.
Chicago_4h_100yr_com	Chicago_4h_100yr_com	INTENSITY	5 min.
Chicago_4h_2yr_com	Chicago_4h_2yr_com	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	0.19	86.36	68.00	0.5000	Chicago_4h_2yr_com	2CB
S2	0.08	70.27	0.00	14.0000	Chicago_4h_2yr_com	Major_System

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
2CB	JUNCTION	128.13	4.03	0.0	
MH11	JUNCTION	127.80	3.16	0.0	
COM_Trunk	OUTFALL	127.71	0.38	0.0	

Major_System OUTFALL 130.79 0.00 0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	2CB	MH11	CONDUIT	29.4	1.1216	0.0130
C2	MH11	COM_Trunk	CONDUIT	10.1	0.8869	0.0100

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.30	0.07	0.07	0.30	1	0.10
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... MODIFIED_GREEN_AMPT
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 03/22/2020 00:00:00
Ending Date 03/23/2020 00:00:00

```
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:30
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.009	33.450
Evaporation Loss	0.000	0.000
Infiltration Loss	0.003	12.328
Surface Runoff	0.005	20.429
Final Storage	0.000	0.725
Continuity Error (%)	-0.098	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.005	0.055
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.005	0.055
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

```
**************************
Time-Step Critical Elements
**************************
Link C2 (1.70%)

*******************************
```

Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 2.61 sec
Average Time Step : 4.98 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	33.45	0.00	0.00	7.74	21.75	2.97	24.72	0.05	0.04	0.739
S2	33.45	0.00	0.00	23.60	0.00	9.88	9.88	0.01	0.01	0.295

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
2CB	JUNCTION	0.01	0.14	128.27	0 01:25	0.13
MH11	JUNCTION	0.01	0.12	127.92	0 01:25	0.12
COM_Trunk	OUTFALL	0.00	0.11	127.82	0 01:25	0.11
Major_System	OUTFALL	0.00	0.00	130.79	0 00:00	0.00

****
Node Inflow Summary

****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
2CB	JUNCTION	0.039	0.039	0 01:25	0.047	0.047	-0.007
MH11	JUNCTION	0.000	0.039	0 01:25	0	0.047	0.007
COM_Trunk	OUTFALL	0.000	0.039	0 01:25	0	0.047	0.000
Major_System	OUTFALL	0.008	0.008	0 01:30	0.00765	0.00765	0.000

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
COM_Trunk	19.07	0.003	0.039	0.047
Major_System	4.59	0.002	0.008	0.008
System	11.83	0.005	0.008	0.055

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.039	0	01:25	1.32	0.38	0.43
C2	CONDUIT	0.039	0	01:25	1.33	0.18	0.31

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.81	0.19	0.00	0.00	0.61	0.00
C2	1.00	0.00	0.00	0.00	0.81	0.18	0.00	0.00	0.82	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Apr 10 13:55:40 2020
Analysis ended on: Fri Apr 10 13:55:41 2020
Total elapsed time: 00:00:01

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
Element Count
****
Number of rain gages 4
Number of subcatchments ... 2
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100yr-_COM	Chicago_3h_100yr-_COM	INTENSITY	5 min.
Chicago_3h_2yr	Chicago_3h	INTENSITY	5 min.
Chicago_4h_100yr_com	Chicago_4h_100yr_com	INTENSITY	5 min.
Chicago_4h_2yr_com	Chicago_4h_2yr_com	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	0.19	86.36	68.00	0.5000	Chicago_4h_100yr_com	2CB
S2	0.08	70.27	0.00	14.0000	Chicago_4h_100yr_com	Major_System

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
2CB	JUNCTION	128.13	4.03	0.0	
MH11	JUNCTION	127.80	3.16	0.0	
COM_Trunk	OUTFALL	127.71	0.38	0.0	

Major_System OUTFALL 130.79 0.00 0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	2CB	MH11	CONDUIT	29.4	1.1216	0.0130
C2	MH11	COM_Trunk	CONDUIT	10.1	0.8869	0.0100

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.30	0.07	0.07	0.30	1	0.10
C2	CIRCULAR	0.38	0.11	0.09	0.38	1	0.21

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... MODIFIED_GREEN_AMPT
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 03/22/2020 00:00:00
Ending Date 03/23/2020 00:00:00

```
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:30
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.021	79.436
Evaporation Loss	0.000	0.000
Infiltration Loss	0.004	14.738
Surface Runoff	0.017	64.075
Final Storage	0.000	0.725
Continuity Error (%)	-0.129	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.017	0.171
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.017	0.171
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

```
**************************
Time-Step Critical Elements
**************************
Link C2 (4.38%)

*******************************
```

Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step   :   2.25 sec
Average Time Step   :   4.95 sec
Maximum Time Step   :   5.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00
Percent Not Converging   :   0.01

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	79.44	0.00	0.00	9.23	53.08	16.20	69.28	0.13	0.11	0.872
S2	79.44	0.00	0.00	28.27	0.00	51.28	51.28	0.04	0.05	0.646

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
2CB	JUNCTION	0.01	0.41	128.54	0 01:24	0.40
MH11	JUNCTION	0.01	0.24	128.04	0 01:25	0.24
COM_Trunk	OUTFALL	0.01	0.19	127.90	0 01:25	0.19
Major_System	OUTFALL	0.00	0.00	130.79	0 00:00	0.00

****
Node Inflow Summary

****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
2CB	JUNCTION	0.111	0.111	0 01:25	0.132	0.132	-0.001
MH11	JUNCTION	0.000	0.111	0 01:25	0	0.132	-0.001
COM_Trunk	OUTFALL	0.000	0.110	0 01:25	0	0.132	0.000
Major_System	OUTFALL	0.047	0.047	0 01:25	0.0396	0.0396	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
2CB	JUNCTION	0.02	0.113	3.617

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
COM_Trunk	20.12	0.010	0.110	0.132
Major_System	12.54	0.005	0.047	0.040

System	16.33	0.016	0.047	0.171

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.111	0 01:25	1.66	1.08	0.89
C2	CONDUIT	0.110	0 01:25	1.71	0.51	0.57

****
Flow Classification Summary
****

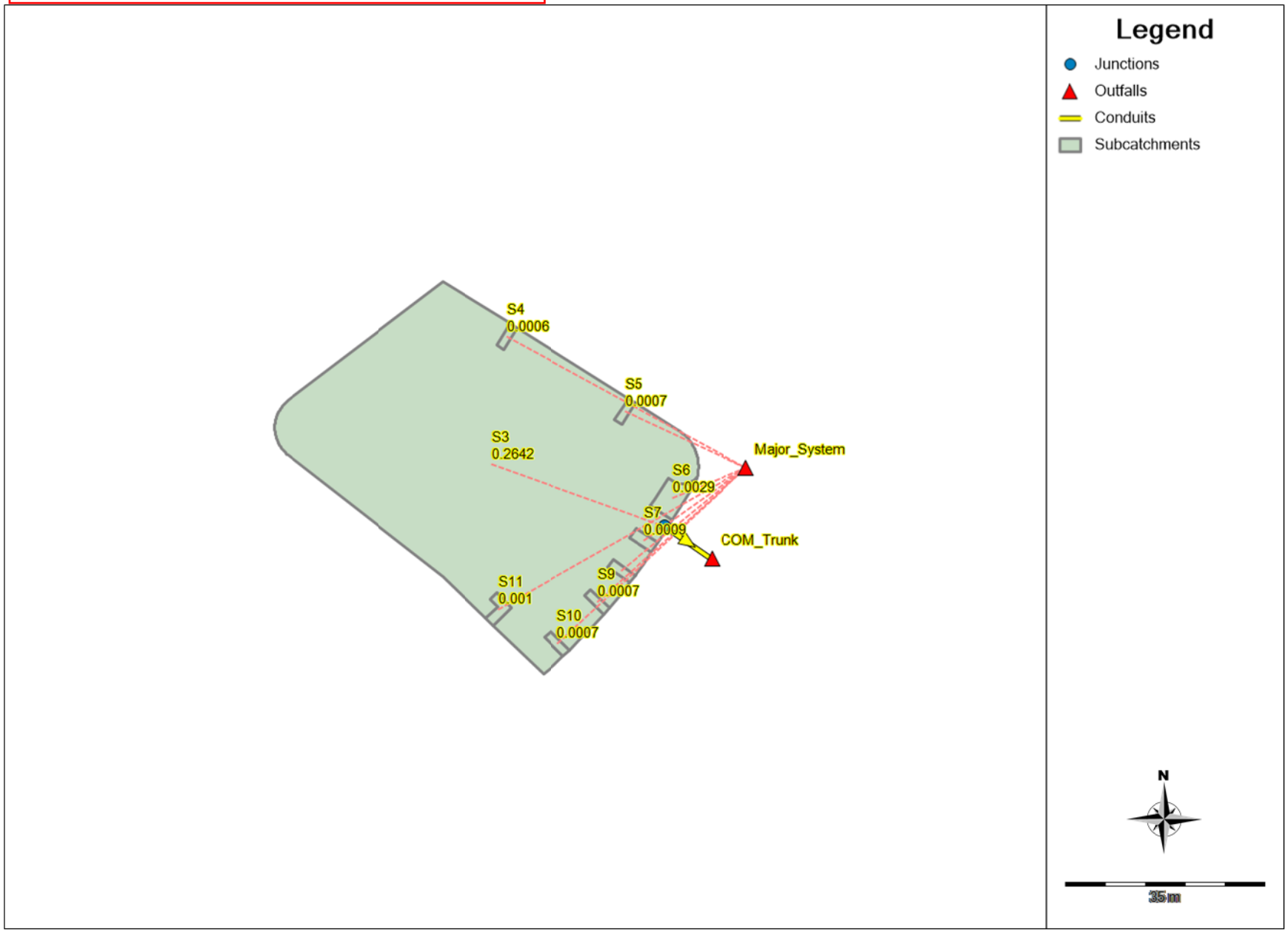
Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.61	0.00
C2	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.82	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.02	0.01	0.02	0.01

Analysis begun on: Thu May 21 16:07:26 2020
Analysis ended on: Thu May 21 16:07:26 2020
Total elapsed time: < 1 sec

Proposed Schematic



EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
Element Count
****
Number of rain gages 4
Number of subcatchments ... 9
Number of nodes 3
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100year	Chicago_3h_100year	INTENSITY	5 min.
Chicago_3h_2yr	Chicago_3h	INTENSITY	5 min.
Chicago_4h_100yr_com	Chicago_4h_100yr_com	INTENSITY	5 min.
Chicago_4h_2yr_com	Chicago_4h_2yr_com	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S10	0.00	1.40	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S11	0.00	2.00	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S3	0.26	52.84	83.30	0.5000	Chicago_4h_2yr_com	MH11
S4	0.00	1.20	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S5	0.00	1.40	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S6	0.00	5.80	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S7	0.00	1.80	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S8	0.00	1.40	100.00	0.5000	Chicago_4h_2yr_com	Major_System
S9	0.00	1.40	100.00	0.5000	Chicago_4h_2yr_com	Major_System

****
Node Summary

```
************
                                          Invert      Max.     Ponded    External
Name                 Type                  Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
MH11                 JUNCTION            127.80      3.16       0.0
COM_Trunk            OUTFALL             127.71      0.38       0.0
Major_System         OUTFALL             130.79      0.00       0.0


************
Link Summary
************
Name             From Node        To Node          Type             Length    %Slope Roughness
-------------------------------------------------------------------------------------------------
C2               MH11             COM_Trunk        CONDUIT            13.7    0.6569    0.0130


*********************
Cross Section Summary
*********************
                                        Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                 Depth     Area     Rad.    Width  Barrels     Flow
-------------------------------------------------------------------------------------------
C2               CIRCULAR               0.38     0.11     0.09     0.38        1     0.14


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... MODIFIED_GREEN_AMPT
```

```
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/22/2020 00:00:00
Ending Date .............. 03/23/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:30
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.009	33.450
Evaporation Loss	0.000	0.000
Infiltration Loss	0.001	3.941
Surface Runoff	0.008	28.274
Final Storage	0.000	1.258
Continuity Error (%)	-0.070	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.008	0.077
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.008	0.077
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Time-Step Critical Elements

None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 2.88 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S10	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S11	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S3	33.45	0.00	0.00	4.06	26.63	1.52	28.16	0.07	0.06	0.842
S4	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S5	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S6	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S7	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S8	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957
S9	33.45	0.00	0.00	0.00	32.01	0.00	32.01	0.00	0.00	0.957

****
Node Depth Summary
****

	Average	Maximum	Maximum	Time of Max	Reported

Node	Type	Depth Meters	Depth Meters	HGL Meters	Occurrence days hr:min	Max Depth Meters
MH11	JUNCTION	0.01	0.18	127.98	0 01:25	0.18
COM_Trunk	OUTFALL	0.01	0.17	127.88	0 01:25	0.17
Major_System	OUTFALL	0.00	0.00	130.79	0 00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH11	JUNCTION	0.058	0.058	0 01:25	0.0744	0.0744	-0.001
COM_Trunk	OUTFALL	0.000	0.058	0 01:25	0	0.0744	0.000
Major_System	OUTFALL	0.002	0.002	0 01:25	0.00262	0.00262	0.000

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr

COM_Trunk	22.34	0.004	0.058	0.074
Major_System	13.58	0.000	0.002	0.003
System	17.96	0.004	0.002	0.077

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C2	CONDUIT	0.058	0 01:25	1.15	0.41	0.47

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C2	1.00	0.00	0.00	0.00	0.93	0.07	0.00	0.00	0.80	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu May 21 16:11:36 2020
Analysis ended on: Thu May 21 16:11:36 2020
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)

****
Element Count
****
Number of rain gages 4
Number of subcatchments ... 9
Number of nodes 3
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100year	Chicago_3h_100year	INTENSITY	5 min.
Chicago_3h_2yr	Chicago_3h	INTENSITY	5 min.
Chicago_4h_100yr_com	Chicago_4h_100yr_com	INTENSITY	5 min.
Chicago_4h_2yr_com	Chicago_4h_2yr_com	INTENSITY	5 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S10	0.00	1.40	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S11	0.00	2.00	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S3	0.26	52.84	83.30	0.5000	Chicago_4h_100yr_com	MH11
S4	0.00	1.20	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S5	0.00	1.40	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S6	0.00	5.80	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S7	0.00	1.80	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S8	0.00	1.40	100.00	0.5000	Chicago_4h_100yr_com	Major_System
S9	0.00	1.40	100.00	0.5000	Chicago_4h_100yr_com	Major_System

****
Node Summary

```
************
                                          Invert      Max.     Ponded    External
Name                 Type                  Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
MH11                 JUNCTION            127.80      3.16       0.0
COM_Trunk            OUTFALL             127.71      0.38       0.0
Major_System         OUTFALL             130.79      0.00       0.0


************
Link Summary
************
Name             From Node        To Node          Type             Length    %Slope Roughness
-------------------------------------------------------------------------------------------------
C2               MH11             COM_Trunk        CONDUIT            13.7    0.6569    0.0130


*********************
Cross Section Summary
*********************
                                        Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                 Depth     Area     Rad.    Width  Barrels     Flow
-------------------------------------------------------------------------------------------
C2               CIRCULAR               0.38     0.11     0.09     0.38        1     0.14


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... MODIFIED_GREEN_AMPT
```

```
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 03/22/2020 00:00:00
Ending Date .............. 03/23/2020 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:30
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.022	79.436
Evaporation Loss	0.000	0.000
Infiltration Loss	0.001	4.695
Surface Runoff	0.020	73.555
Final Storage	0.000	1.258
Continuity Error (%)	-0.091	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.020	0.200
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.020	0.200
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

```
**************************
Time-Step Critical Elements
**************************
```

Link C2 (1.34%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 2.83 sec
Average Time Step : 4.99 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.01

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S10	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S11	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S3	79.44	0.00	0.00	4.84	64.98	8.43	73.41	0.19	0.16	0.924
S4	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S5	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S6	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S7	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S8	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983
S9	79.44	0.00	0.00	0.00	78.08	0.00	78.08	0.00	0.00	0.983

****
Node Depth Summary
****

	Average	Maximum	Maximum	Time of Max	Reported

Node	Type	Depth Meters	Depth Meters	HGL Meters	Occurrence days hr:min	Max Depth Meters
MH11	JUNCTION	0.01	0.46	128.26	0 01:25	0.46
COM_Trunk	OUTFALL	0.01	0.38	128.08	0 01:23	0.38
Major_System	OUTFALL	0.00	0.00	130.79	0 00:00	0.00

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH11	JUNCTION	0.158	0.158	0 01:25	0.194	0.194	0.002
COM_Trunk	OUTFALL	0.000	0.158	0 01:25	0	0.194	0.000
Major_System	OUTFALL	0.006	0.006	0 01:25	0.0064	0.0064	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
MH11	JUNCTION	0.03	0.086	2.699

****
Node Flooding Summary
****

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
COM_Trunk	23.19	0.011	0.158	0.194
Major_System	16.43	0.001	0.006	0.006
System	19.81	0.011	0.006	0.200

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C2	CONDUIT	0.158	0 01:25	1.43	1.11	1.00

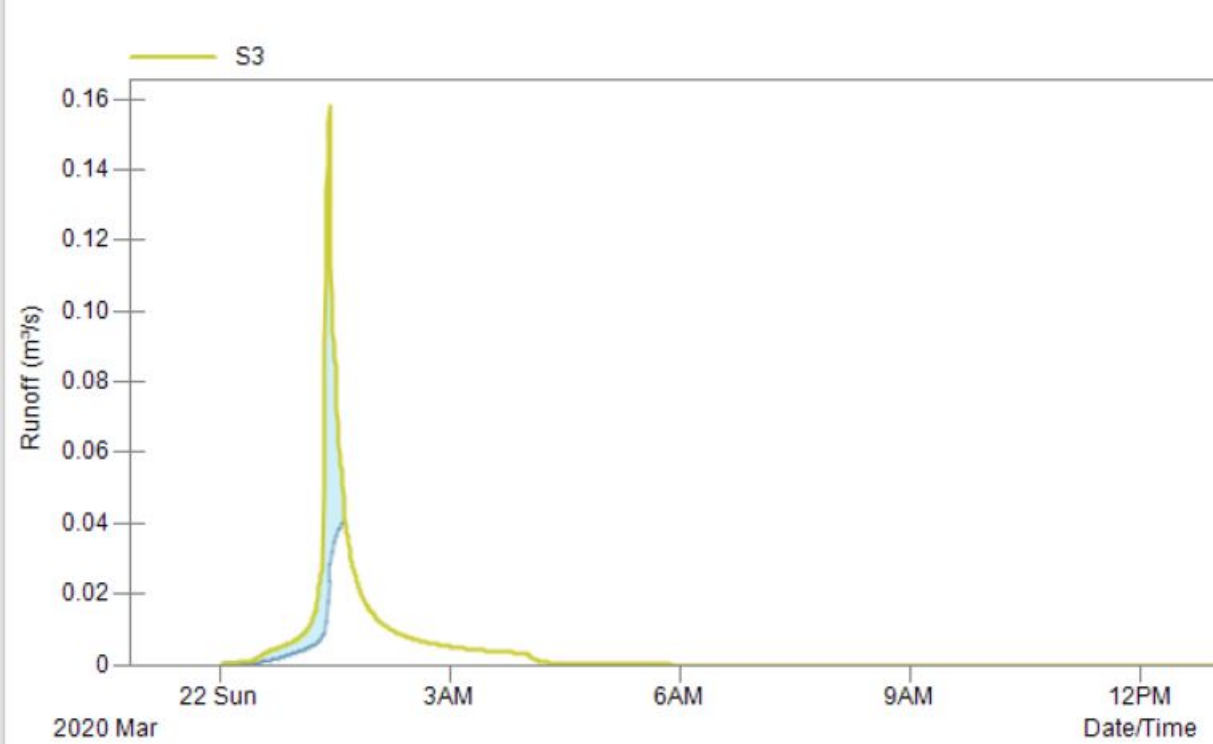
****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C2	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.79	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C2	0.03	0.03	0.03	0.03	0.03

```
Analysis begun on:  Mon Apr 13 11:00:36 2020
Analysis ended on:  Mon Apr 13 11:00:36 2020
Total elapsed time: < 1 sec
```



Data | Objectives | Error | Storage | Patterns | Edit | Derive | Audit | Events | Scatter | Duration | IDF

Storage required for S3 Runoff (m³/s)

From 3/21/2020 10:48:31 PM to 3/23/2020 1:11:58 AM (26.39 hours)

Available storage before outflow: 0 m³

Maximum design outflow: 0.04 m³/s

Storage volume required to obtain a peak flow of 0.04 m³/s at location S3 is 77.2 m³.

Drawings

Drawing 1 - Site Servicing Plan
Drawing 2 – Site Grading Plan
Drawing 3 – Demolition and ESC Plan
Drawing 4 – Pre-Development Drainage Plan
Drawing 5 – Post- Development Drainage Plan
Drawing 6 – Sanitary Drainage Plan

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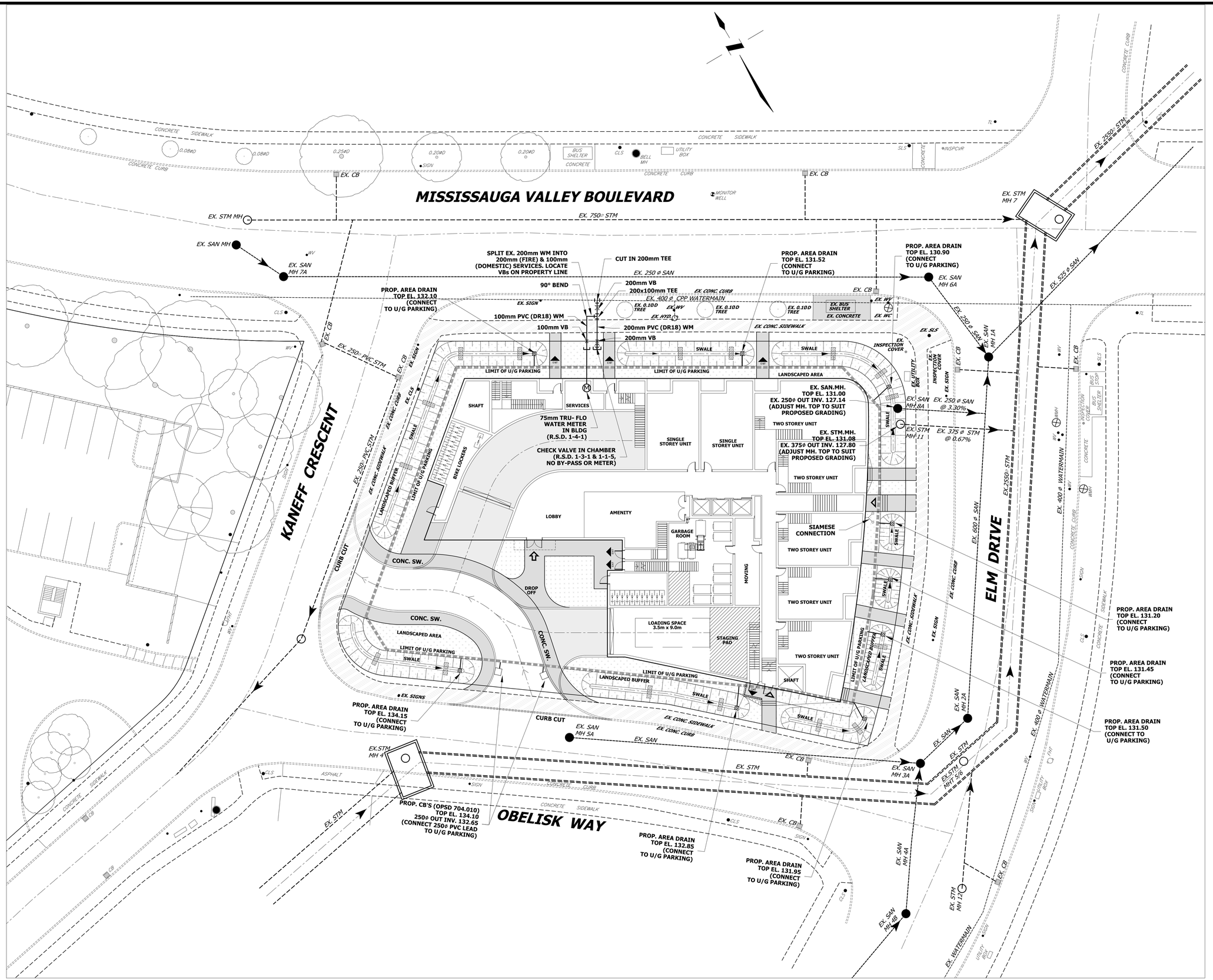
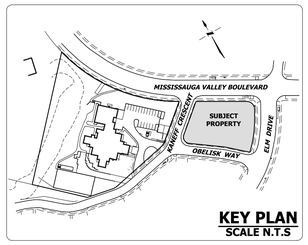
www.urbantech.com





KEY PLAN
SCALE N.T.S

GENERAL NOTES

STORM SEWERS:

1. ALL CONCRETE PIPE SMALLER THAN 450mm DIAMETER SHALL BE C-14, CLASS 2, CONCRETE PIPE 450mm DIAMETER AND LARGER SHALL BE C-76, CLASS 65-D, UNLESS OTHERWISE NOTED.
2. ALL POLYVINYL CHLORIDE (PVC.) PIPE SHALL MEET THE C.S.A. REQUIREMENTS AS NOTED WITHIN OPSS, 1841. THE PIPE MATERIAL SHALL HAVE A CELL CLASSIFICATION OF 12454-B OR 12454-C OR ASTM, STD. D-3034 & OPSS. 1841.
3. ALL CONCRETE SEWER PIPES SHALL HAVE RUBBER GASKET JOINTS.
4. CLASS "B" BEDDING IS TO BE USED AS PER CITY STANDARD 2112.08 SEWER BEDDING AND COVER MATERIAL SHALL CONFIRM WITH CITY STANDARDS 2112.09 AND 2112.10. IF WATER IS PRESENT IN THE TRENCH EXCAVATION THEN 19mm. CLEAR STONE IS TO BE USED FOR BEDDING IN ACCORDANCE WITH CITY STANDARD 2112.11 AND 2112.14 RESPECTIVELY, WHERE WET OR SOFT TRENCH SUBGRADE CONDITIONS ARE ENCOUNTERED, FURTHER ON-SITE GEOTECHNICAL ASSESSMENT MAY BE REQUIRED TO DETERMINE THE APPROPRIATE BEDDING IN ORDER TO STABILIZE THE SUBGRADE FOR SEWER CONSTRUCTION.
5. MANHOLE STEPS SHALL BE AS PER OPSD. 405.010.
6. MANHOLE COVERS AND FRAMES SHALL BE AS PER OPSD, 401.010.
7. SINGLE CATCHBASINS WITHIN ROAD ALLOWANCES SHALL BE AS PER OPSD. 705.010, WITH A 250mm DIAMETER LEAD, DOUBLE CATCHBASINS WITHIN ROAD ALLOWANCES SHALL BE AS PER OPSD. 705.020, WITH A 300mm DIAMETER LEAD.
8. ALL CATCHBASIN FRAME AND GRATES SHALL BE AS PER OPSD. 400.020,
9. THE TRENCH WIDTH AT THE TOP OF PIPE SHALL BE AS PER STD. 2112.08. IF THE MAXIMUM TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING EXTRA BEDDING AND/OR STRONGER PIPE AS REQUIRED.
10. ALL STORM SEWER AND APPURTENANCES SHALL BE CONSTRUCTED IN ACCORDANCE WITH CURRENT CITY OF MISSISSAUGA STANDARDS AND SPECIFICATIONS.
11. STORM SERVICE CONNECTION IS TO BE ON THE LEFT OF SANITARY SERVICE FACING THE HOUSE. (EXCEPT AS NOTED)
12. SERVICE CONNECTION AT THE STREET LINE IS TO BE HIGHER THAN THE SANITARY CONNECTION AT THAT POINT.
13. ALL CATCHBASINS ARE TO BE PLACED ON GRANULAR BEDDING (MINIMUM DEPTH 150mm).
14. TRENCH BACKFILLING ON PROPOSED ROADS SHALL WITH CITY'S ENGINEERING POLICY STATEMENT AS PROVIDED IN THE "DEVELOPMENT REQUIREMENTS MANUAL" (SECTION 4.02.06-TRENCH BACKFILLING ON ROADS), TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% S.P.D. WITHIN 2.0% OF THE OPTIMUM CONTENT.
15. SAND BACKFILLING IS REQUIRED ADJACENT TO MANHOLES, CATCHBASINS AND SERVICE CROSSING.

GENERAL:

1. ANY RELOCATION OF EXISTING UTILITIES REQUIRED BY THE DEVELOPMENT OF THE SUBJECT LANDS, IS TO BE UNDERTAKEN AT DEVELOPER'S EXPENSE.
2. ALL UNDERGROUND SERVICE CONNECTIONS WITHIN PAVED PORTION OF ANY EXISTING ROAD TO BE BACKFILLED WITH UNSHRINKABLE FILL TO THE LATEST CITY OF MISSISSAUGA OR REGION OF PEEL SPECIFICATIONS.
3. SNOW FENCE AND SEDIMENT TRAP CONTROL FENCE ARE TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE CONSTRUCTION AND SHALL REMAIN IN PLACE AND IN GOOD REPAIR THROUGHOUT THE CONSTRUCTION AND GRADING PHASES.
4. PRIOR TO THE START OF CONSTRUCTION, SNOW FENCING IS TO BE ERECTED ALONG THE PROPERTY BOUNDARIES ADJACENT TO ALL EXISTING RESIDENTIAL LOTS, PARKS AND ALL EXISTING SCHOOL BLOCKS.
5. THE LOCATION AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE RESTORATION TO THE REPAIR OF EXISTING UTILITIES DISTURBED DURING CONSTRUCTION.
6. ALL AREAS BEYOND THE PLAN OF SUBDIVISION WHICH ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
7. ALL CONSTRUCTION SIGNING MUST CONFORM TO THE M.T.O. MANUAL OF "UNIFORM TRAFFIC CONTROL DEVICES".
8. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.

ROADWORKS:

1. ALL FILL WITHIN ROAD ALLOWANCE TO BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY. THE SUITABILITY AND COMPACTION OF ALL FILL MATERIALS ARE TO BE CONFIRMED BY A RECOGNIZED SOIL CONSULTANT TO THE CITY ENGINEER PRIOR TO THE INSTALLATION OF ANY ROAD BASE MATERIALS.
2. ALL CONNECTIONS WITHIN PAVED PORTION OF ANY EXISTING ROAD TO BE BACKFILLED WITH GRANULAR MATERIAL AND/OR UNSHRINKABLE FILL AS PER THE LATEST OF CITY OF MISSISSAUGA STANDARDS AND SPECIFICATIONS.
3.
   a. TRENCH BACKFILLING ON PROPOSED ROADS SHALL COMPLY WITH THE CITY'S ENGINEERING POLICY STATEMENTS PROVIDED IN THE "DEVELOPMENT REQUIREMENTS MANUAL" (SECTION 4.02.06 - TRENCH BACKFILLING ON ROADS).
   b. ALL BACKFILL FOR SEWERS, WATERMAINS AND UTILITIES WITHIN ROAD ALLOWANCE SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT.
   c. THE TOP 1000mm OF THE SUB-GRADE IS TO BE COMPACTED TO A MINIMUM 98% STANDARD PROCTOR DENSITY WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT.
4. ALL ROADWORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF MISSISSAUGA STANDARDS AND SPECIFICATIONS.
5. ALL INTERSECTING ROADS SHALL BE PROVIDED WITH AN ADDITIONAL 150mm THICKNESS OF OPSS. GRANULAR "B". THIS EXTRA DEPTH SHALL EXTEND FOR A MINIMUM OF 15m BEYOND PROPERTY LINE OF INTERSECTING STREET , AS NOTED.
6. SUB-DRAINS ARE TO BE INSTALLED AS PER CITY STANDARD 2220.04 ALONG THE ENTIRE LENGTH OF THE ROAD.
7. PAVEMENT THICKNESS AND COMPOSITION TO BE AS SHOWN ON INDIVIDUAL PLAN AND PROFILE DRAWINGS.
8. CONCRETE CURB & GUTTER OPSD. 600.070.
9. SAND BACKFILL IS TO BE USED ADJACENT TO MANHOLES, CATCHBASINS AND SERVICE CROSSINGS.

REGION OF PEEL NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS MUST CORRESPOND TO THE CURRENT PEEL PUBLIC WORKS STANDARDS AND SPECIFICATIONS.
2. WATERMAIN AND / OR WATER SERVICE MATERIALS 100 mm (4") AND LARGER MUST BE PVC DR18 PIPE MANUFACTURED TO AWWA SPEC C900-16 COMPLETE WITH TRACER WIRE. SIZE 50 mm (2") AND SMALLER MUST BE TYPE 'K' SOFT COPPER PIPE PER ASTM B88-99 SPECIFICATION.
3. WATERMAINS AND / OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7 m (5'6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2 m (4'-0") FROM THEMSELVES AND ALL OTHER UTILITIES.
4. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50 mm (2") OUTLET ON 100 mm (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100 mm (4") DIAMETER MINIMUM ON A HYDRANT.
5. ALL CURB STOPS TO BE 3.0 m (10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
6. HYDRANT AND VALVE SET TO REGION STANDARD 1 - 6 - I DIMENSION A AND B, 0.7 m (2') AND 0.9 m (3') AND TO HAVE PUMPER NOZZLE.
7. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN, COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
8. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.3 m (12") OVER / 0.5 m (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
9. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
10. ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
11. LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
12. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
13. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO THE UTILITIES PRIOR TO CROSSING SUCH UTILITIES, FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
14. ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR, 1-7-5.
15. ALL UNITS TO BE EQUIPPED WITH 25mm WATER SERVICE (REGION STD. 1-7-1).
16. SANITARY MAINLINE SEWERS SHALL BE PVC SDR26.

BENCHMARK NOTE:

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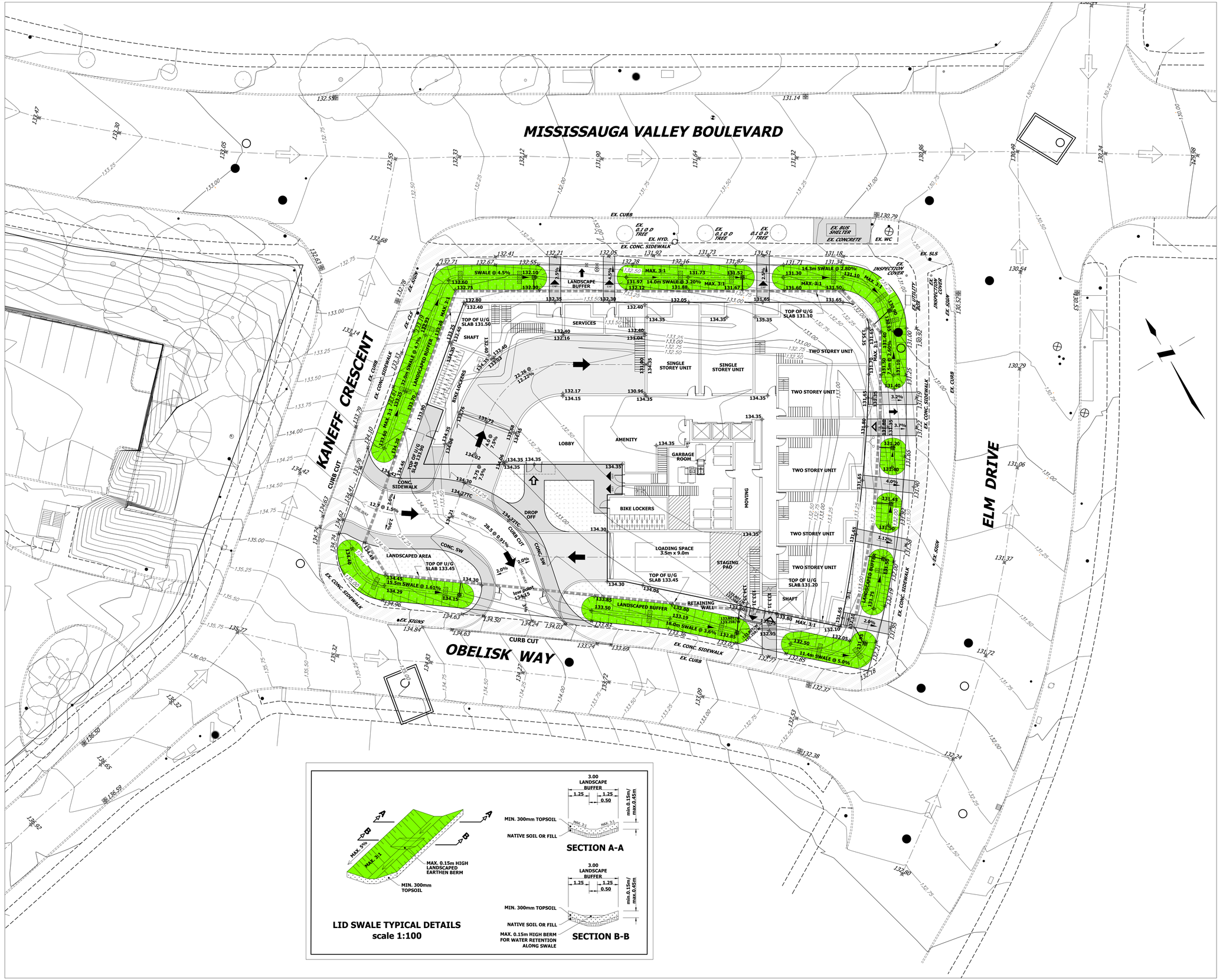
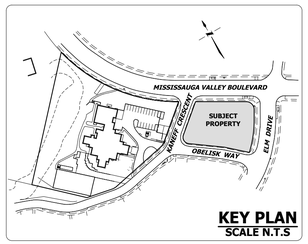
MISSISSAUGA

SITE SERVICING

PROJECT No.	DATE	SCALE	DWG No.
20-632	MAY 2020	1:200	1





KEY PLAN
SCALE N.T.S

LEGEND:

- 130.52 — EXISTING ELEVATION
- 130.52 — EXISTING CONTOUR
- EXISTING OVERLAND FLOW DIRECTION
- 131.00 — PROPOSED ELEVATION
- PROPOSED OVERLAND FLOW DIRECTION
- EX. STORM MANHOLE
- EX. SANITARY MANHOLE
- EX. HYDRANT
- PROPOSED WATER VALVE
- PROPOSED CATCH BASIN
- PROPOSED AREA DRAIN
- PROPOSED LID SWALE (SEE DETAILS THIS DWG.)

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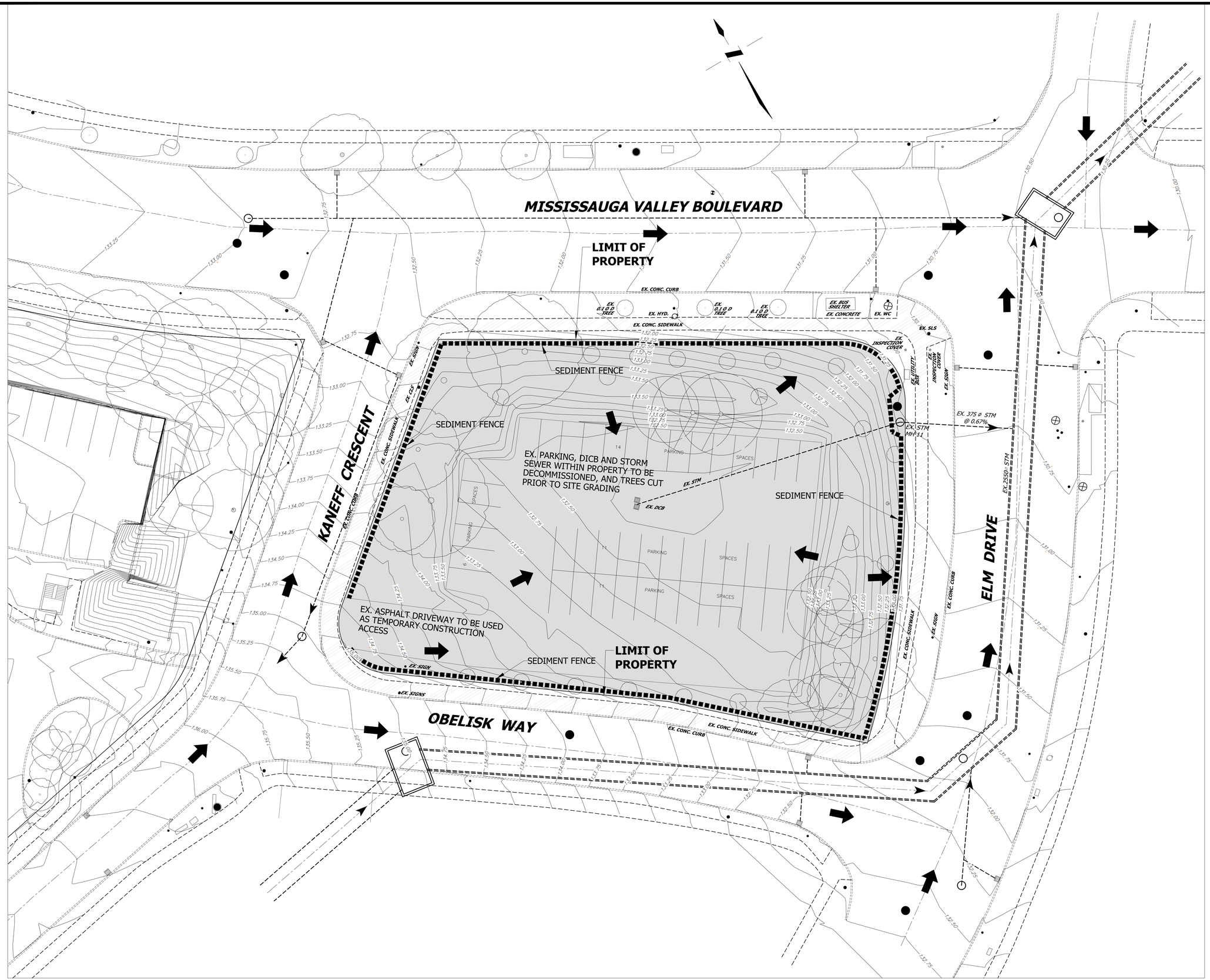
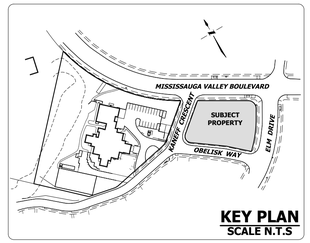
SITE GRADING

PROJECT No.	DATE	SCALE	DWG No.
20-632	MAY 2020	1:200	2





KEY PLAN
SCALE N.T.S

LEGEND:

- 130.50 — EXISTING CONTOUR
- EXISTING OVERLAND FLOW DIRECTION
- SEDIMENT FENCE

EROSION & SEDIMENT CONTROL NOTES:

1. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (i.e. SILT FENCE, STRAW BALES, CLEAR STONES...ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
2. EROSION AND SEDIMENT CONTROLS METHODS ARE TO BE CONTINUOUSLY EVALUATED; AND UPGRADES ARE TO BE IMPLEMENTED, WHEN NECESSARY.
3. ALL TOPSOIL STOCKPILE CONTAINING MORE THAN 100m³ OF MATERIAL SHALL BE LOCATED A MINIMUM OF 10m AWAY FROM A ROADWAY, DRAINAGE CHANNEL OR AN OCCUPIED RESIDENTIAL LOT. THE MAXIMUM SIDE SLOPES FOR TOPSOIL STOCKPILES SHALL BE 1.5 HORIZONTAL TO 1.0 VERTICAL.
4. RUNOFF FROM ALL TOPSOIL STOCKPILES SHALL BE CONTROLLED BY A SEDIMENT CONTROL FENCE OR OTHER APPROVED DEVICES. IF REMAINING FOR MORE THAN 30 DAYS, TOPSOIL STOCKPILES SHALL BE STABILIZED BY VEGETATIVE COVER, OR OTHER MEANS.
5. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR CONTROLLING SEDIMENT & EROSION WITHIN THE CONSTRUCTION SITE FOR THE TOTAL PERIOD OF THE CONSTRUCTION.
6. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES.

BENCHMARK NOTE:

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DEMOLITION AND ESC MEASURES

PROJECT No.	DATE	SCALE	DWG No.
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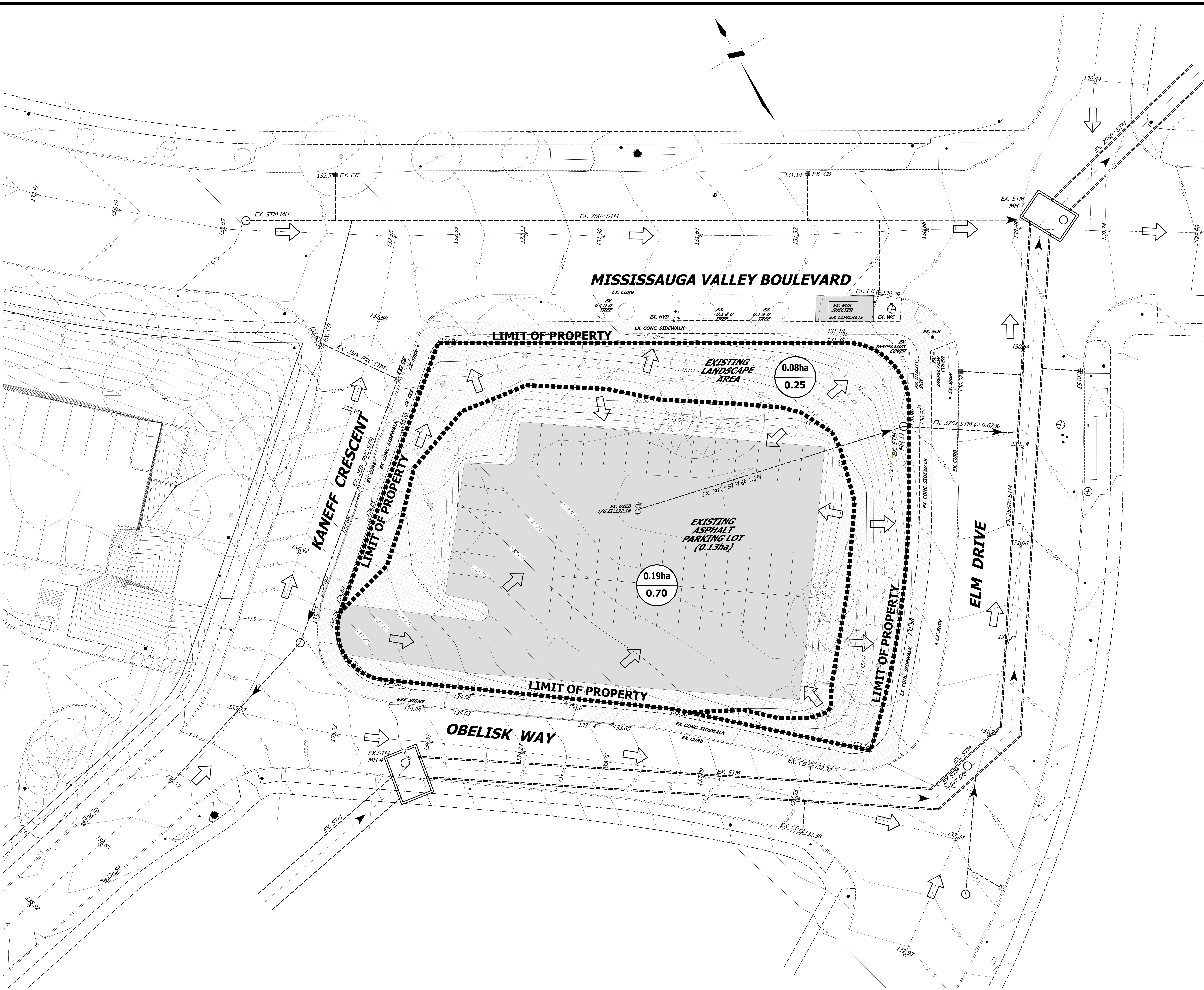

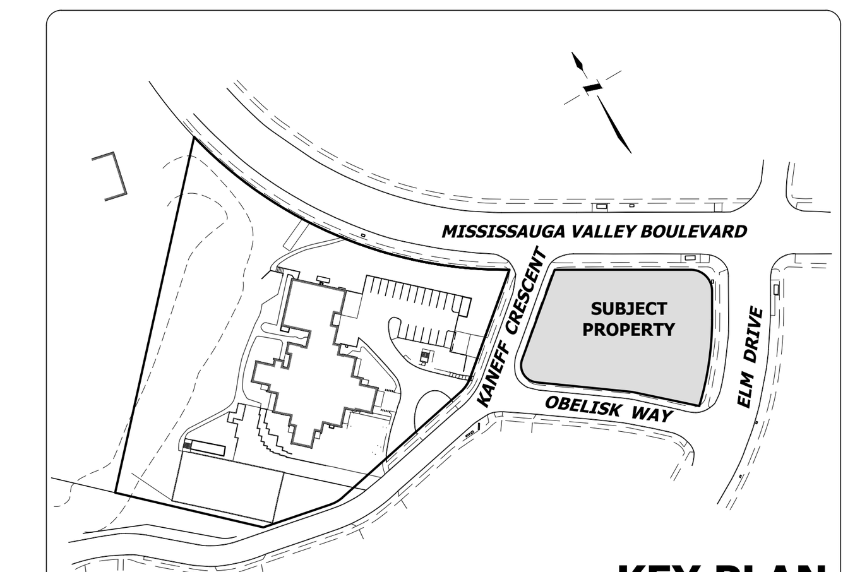

KEY PLAN
SCALE N.T.S

LEGEND

130.52	EXISTING ELEVATION
130.52	EXISTING CONTOUR
	EXISTING OVERLAND FLOW DIRECTION
	EXISTING SITE HARD SURFACE
	EXISTING LANDSCAPE SURFACE
	EXISTING DRAINAGE BOUNDARY
0.19ha / 0.70	EXISTING DRAINAGE AREA / EXISTING AVERAGE RUN-OFF COEFFICIENT

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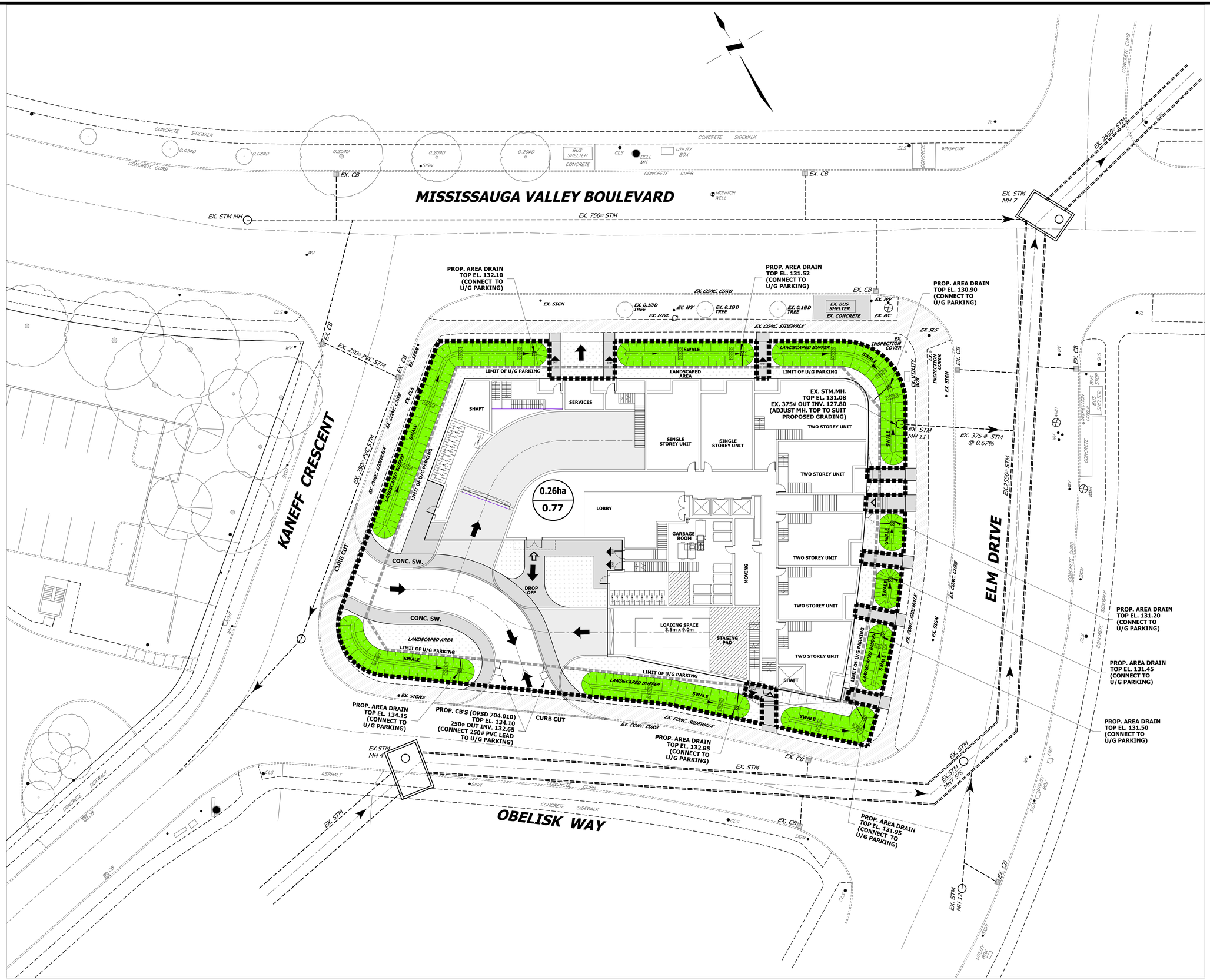
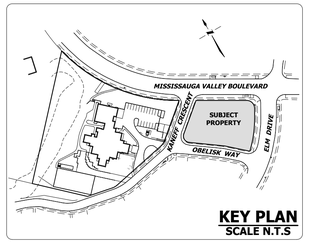
PRE-DEVELOPMENT DRAINAGE PLAN

PROJECT No.	DATE	SCALE	DWG No.
20-632	APR. 2020	1:200	4





KEY PLAN
SCALE N.T.S

LEGEND:

- PROPOSED HARD SURFACE
- PROPOSED LANDSCAPE SURFACE
- PROPOSED BOUNDARY FOR DRAINAGE AREA DIRECTED TO UNDERGROUND STORM TANK
- 0.26ha / 0.77 — DRAINAGE AREA IN ha (CONTROLLED DRAINAGE DISCHARGE); AVERAGE RUN-OFF COEFFICIENT
- PROPOSED OVERLAND FLOW DIRECTION
- EX. STORM MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED AREA DRAIN
- PROPOSED LID SWALE
- 0.02ha / 0.77 — DRAINAGE AREA IN ha (UNCONTROLLED DRAINAGE DISCHARGE); AVERAGE RUN-OFF COEFFICIENT

SITE STATISTIC:

* BUILDING / HARD SURFACE AREA 1,925 sq.m.
* LANDSCAPE AREA 815 sq.m.
* TOTAL SITE AREA 2,740 sq.m.

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POST-DEVELOPMENT DRAINAGE PLAN

PROJECT No.	DATE	SCALE	DWG No.
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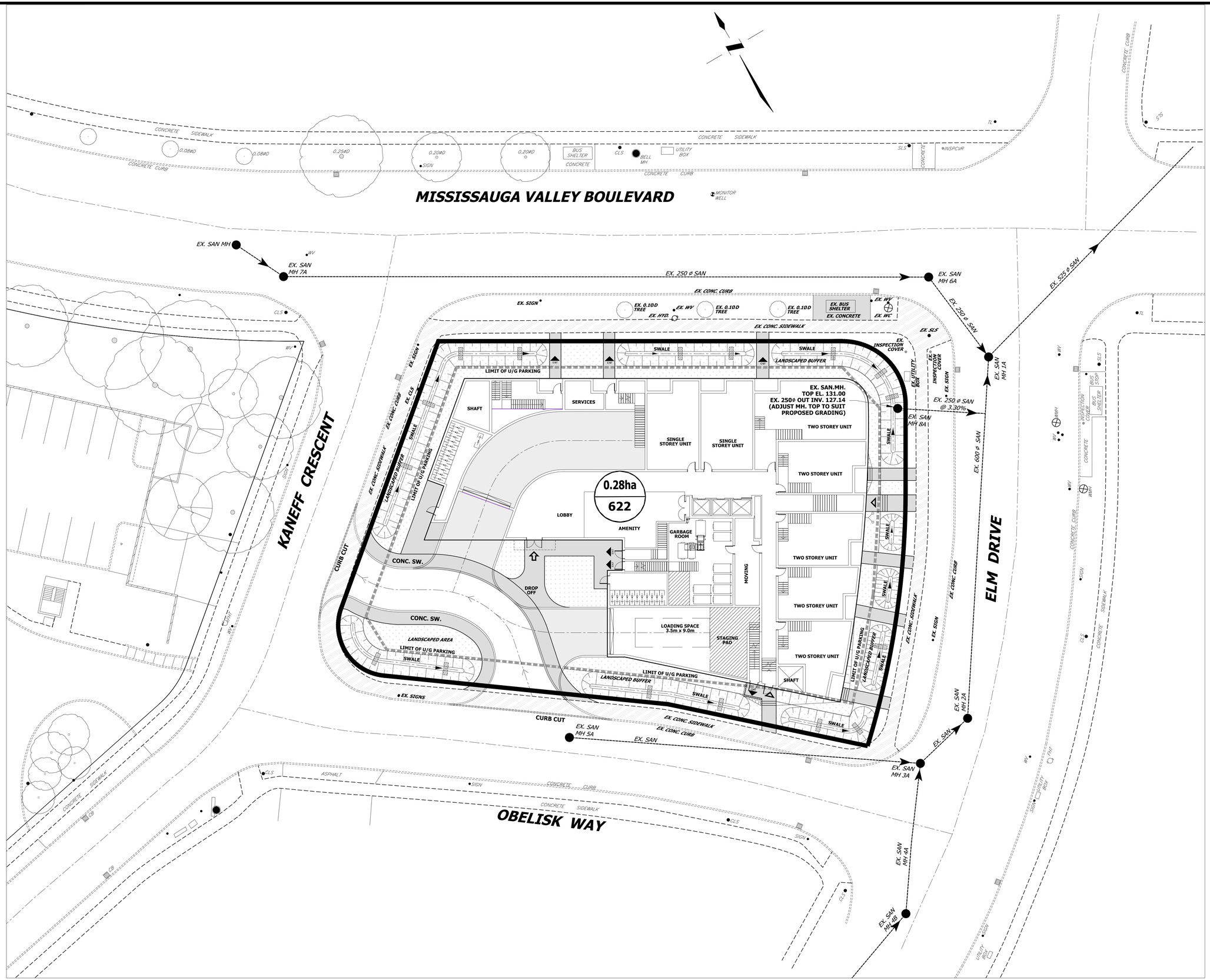

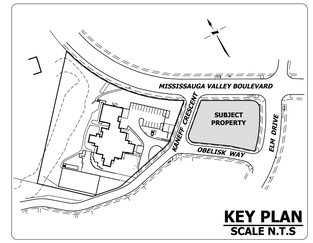

KEY PLAN
SCALE N.T.S

LEGEND:

DRAINAGE AREA BOUNDARY

DEVELOPMENT STATISTIC:

* 29 STOREY RESIDENTIAL BUILDING
* 5 STORY PODIUM
* TOTAL NUMBER OF UNITS: 282

DENSITY
1 BEDROOM: 110 UNITS x 1.68P/U = 185 P
2 & 3 BEDROOMS: 172 UNITS x 2.54P/U = 437 P

0.28ha
622

DRAINAGE AREA IN HECTARES

ESTIMATED POPULATION

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SANITARY DRAINAGE PLAN

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