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FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

5150 NINTH LINE

CITY OF MISSISSAUGA

REGION OF PEEL

PREPARED FOR
MATTAMY HOMES

Urbantech File No.: 19-608

1ST SUBMISSION – OCTOBER 2019

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1 INTRODUCTION

1.1. BACKGROUND

This report provides functional servicing design and stormwater management information in support of the site plan application for the proposed residential development located at 5150 Ninth Line, hereafter referred to as the subject property.

The development concepts contained in this report are an extension of the information contained within the following reports:

- Ninth Line South Urban Design Study by NAK Design Strategies (2019)
- Ninth Line Lands Scoped Subwatershed Study by Wood (2018)
- Ninth Line Lands: Servicing Strategy Report by Region of Peel (2016)

This study presents the recommended stormwater management and municipal servicing scheme for the development of the subject property. This report is also applicable for any future revisions to the site plan, assuming the revisions are minor and in general conformance with the concepts outlined herein.

The information presented in this report conforms to the following guidelines:

- City of Mississauga T&W Development Requirements
- Region of Peel Public Works Design, Specifications & Procedures Manual
- Stormwater Management Planning and Design Manual by the Ministry of Environment (MOE)

1.2. SUBJECT PROPERTY

The subject property is approximately 4.33 ha in size including the 10m setback and MTO buffer, and 3.85 ha not including these features. The site currently consists mainly of agricultural land with a veterinary hospital and various residential properties. The site is bounded by an existing woodlot to the north, Ninth Line to the east, a holdout property to the south and Highway 407 ETR to the west.

1.3. DEVELOPMENT PHASING

It is proposed to construct the development in two phases. Prior to completion of the MTO Transitway Corridor Environmental Assessment and detailed design, it is proposed to construct Phase 1 of the subject property, up to an offset of 74m from the limit of the Highway 407 corridor. Phase 2 (shown conceptually on the engineering drawings) and the associated development limits will be confirmed through the EA process. The proposed land uses are as follows for the two phases, totalling to 164 proposed townhouse units:

Phase 1: 17 freehold towns, 63 condo towns, 15 dual frontage towns, 24 back-to-back towns
Phase 2: 5 condo towns, 40 back-to-back towns

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2 GRADING & ROADS

The site grading design considers the following objectives and constraints:

- Conform to City of Mississauga grading criteria
- Match existing boundary conditions
- Minimize cut and fill operations and work towards a balanced site
- Provide overland flow conveyance for major storm conditions
- Provide minimum cover on proposed servicing

A retaining wall is proposed along the south property limit of the adjacent holdout property, 5170 Ninth Line. This is unavoidable due to constraints with required grading of the public road and the maximum allowable grade difference across the proposed townhouse units in relation to the high existing ground on the adjacent property. In accordance with City standards, the wall will feature a fence on top.

An acoustic fence and berm are proposed for flanking units adjacent to Ninth Line, in accordance with recommendations prepared by YCA Engineering. Refer to the Acoustic Report for further information. A short section of the acoustic fence will be constructed on top of the retaining wall described above.

A public 20m right-of-way is proposed in accordance with City standard 2211.070 which will connect to Ninth Line. Prior to completion of the Ninth Line EA and road widening (estimated construction date of 2023), the public road will match into the existing pavement and curbs. The proposed public right-of-way will be extended south through the future developments west of Ninth Line.

Typical condo roads will feature 7m wide pavement and are sized sufficiently to accommodate proposed services and utilities, as well as to convey overland flow for major storm conditions. Where on street parking is required, wider pavement is proposed to accommodate two travel lanes in addition to a parking lane.

Refer to **Drawing 1**, "*Site Grading,*" and **Drawings 2** & **2A**, "*Grading Cross Sections*," for additional grading details.

Refer to **Drawing 4**, "*ROW Cross Sections*," for additional details regarding rights-of-way and typical cross sections.

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3 STORM SERVICING AND STORMWATER MANAGEMENT

3.1. EXISTING STORM DRAINAGE

The site is within the Credit Valley Conservation Authority jurisdiction, within the Sawmill Creek Subwatershed. There are no regulated features on the subject lands, although the woodlot and wetlands to the north of the property are regulated features.

Existing drainage patterns for the subject property are shown on **Drawing 5A**, "*Existing Storm Drainage*." The majority of the property, as well as the woodlot to the north of the site drains to the existing storm sewers on Ninth Line via several existing culverts, street catchbasins and ditch inlet catchbasins. The Ninth Line storm sewers appear to be adequately sized to convey the 10-year storm event from the contributing areas. The southwest portion of the subject property drains southwards overland to an existing storm sewer at Eglinton Avenue (total catchment area to Eglinton is approximately 8.5 ha).

A Visual OTTHYMO 5 model (VO5) was created to simulate the various return period event flows from the site including the external areas and Ninth Line ROW.Since Ninth Line is the outfall for the subject lands (including the 750mm storm sewer immediately south of the subject property), the model includes a minor, major and total combined flow location for comparison purposes.

Model parameters were based on available land use / soil information and measurements. It was assumed that the 10-year storm flows are captured into the minor system on Ninth Line and the remaining flow during larger events is discharged onto the Ninth Line ROW. Flow separation was modelled by simulating the 10-year storm and introducing a DuHYD command for each catchment to capture the 10-year flow. The following table provides the VO5 model input for the existing conditions simulation.

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Existing Conditions Model Parameters

Area Description	Model ID (command type)	Area [ha]	Surface slope [%]	Length [%]	Time to Peak (Upland Method) [hours]	Soil Group	Land Use	Curve Number	Initial Abstractions Pervious/ impervious [mm]
External "east" woodlot area and portion of 5170 Ninth Line	NHYD-7 (NASHYD)	2.51	1	300	0.73	C	20% Meadow / 80% Forest	74	5
External "west" woodlot and agricultural area on 5150 Ninth Line	NHYD-10 (NASHYD)	10.25	2.5	550	0.86	C	20% Meadow / 80% Forest	74	5
Existing drainage on 5150 and 5104 Ninth Line	NHYD-11 (NASHYD)	2.04	1.5	225	0.45	C	20% Meadow / 80% Forest	82	5
5170 Ninth Line frontage on Ninth Line	NHYD-8 (STANDHYD)	0.35	1.5	48	N/A	C	75% IMP	74	5 / 1
5150 Ninth Line frontage on Ninth Line	NHYD-9 (STANDHYD)	0.29	1.5	44	N/A	C	50% IMP	74	5 / 1
Ninth Line ROW to existing 750mm storm sewer	NHYD-6 (STANDHYD)	1.81	1.8	600	N/A	C	70% IMP	74	5 / 1

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Based on the existing conditions model, the following major, minor, and total system flows were estimated. Note that the "effective" area indicates what portion of the site drains to the various outlets based on the DuHYD / flow-splitting between the minor system (10-year) and major system (flows greater than 10-year).

Existing Major System Flows at Ninth Line, south of property line (NHYD 14)

Design Event	Effective Area [ha]	Peak Flow [m^3/s]
(1) 25mm	0	0
(2) 2yr 4hr 10min Chicago	0	0
(3) 5yr 4hr 10min Chicago	0	0
(4) 10yr 4hr 10min Chicago	0	0
(5) 25yr 4hr 10min Chicago	1.126	0.106
(6) 50yr 4hr 10min Chicago	2.434	0.195
(7) 100yr 4hr 10min Chicago	3.728	0.286

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Existing Minor System Flows at Ninth Line, south of property line (NHYD 15)

Design Event	Effective Area [ha]	Peak Flow [m^3/s]
(1) 25mm	17.25	0.165
(2) 2yr 4hr 10min Chicago	17.25	0.304
(3) 5yr 4hr 10min Chicago	17.25	0.436
(4) 10yr 4hr 10min Chicago	17.25	0.574
(5) 25yr 4hr 10min Chicago	16.124	0.59
(6) 50yr 4hr 10min Chicago	14.816	0.605
(7) 100yr 4hr 10min Chicago	13.522	0.676

Existing Total System Flows at Ninth Line, south of property line (NHYD 21)

Design Event	Effective Area [ha]	Peak Flow [m^3/s]
(1) 25mm	17.25	0.165
(2) 2yr 4hr 10min Chicago	17.25	0.304
(3) 5yr 4hr 10min Chicago	17.25	0.436
(4) 10yr 4hr 10min Chicago	17.25	0.575
(5) 25yr 4hr 10min Chicago	17.25	0.696
(6) 50yr 4hr 10min Chicago	17.25	0.8
(7) 100yr 4hr 10min Chicago	17.25	0.909

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The validity of the existing conditions model was assessed through comparison to the existing studies for the subject lands. The Ninth Line Lands Scoped Subwatershed Study by Wood (2018) established the following criteria for new pre-development flow targets in the Sawmill Creek watershed (for the overall Ninth Line study area between Ninth Line and Highway 407). Please refer to the excerpt from the SWS below:

Table 2.2.2 Stormwater Management Facility Sizing Criteria for Flood Control – Sixteen Mile Creek Watershed		
Quantity Component	**Cumulative Unitary Volume[1.] (m^3/impervious ha)**	**Unitary Discharge (m^3/s/ha)**
Sawmill Creek Subwatershed		
5 Year	500	0.015
100 Year	800	0.050

While the subwatershed study flows are generally calculated using continuous modelling and frequency analysis (and are typically lower than event-based modelling), it was found that the existing conditions unit rates calculated based on the existing VO5 model were relatively close to the subwatershed study results.

Total Existing 5 Year flow at NHYD 21 = 0.436 m^3/s
Total Area at NHYD 21 = 17.25 ha
5 Year Unitary Discharge (VO5) = **0.025 m^3/s/ha** (vs. 0.015 m^3/s/ha)

Total Existing 100 Year flow at NHYD 21 = 0.909 m^3/s
Total Area at NHYD 21 = 17.25 ha
5 Year Unitary Discharge (VO5) = **0.053 m^3/s/ha** (vs. 0.050 m^3/s/ha)

With respect to mitigation of downstream flooding impacts, the 100-year storm is the most critical and the VO5 model agrees with the subwatershed study targets in this respect.

To avoid impacts to the minor system on Ninth Line, the minor system flows calculated using the VO5 model will represent the targets for the subject lands.

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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 where possible and meet the existing targets established in the preceding section. Storm sewers for the subject lands have been sized according to the City of Mississauga sewer design criteria.

Under proposed conditions, flows from a portion of the woodlot area will be conveyed through the subject lands and combined with flows from the subject lands. A sub-surface tank is proposed to control the post-development flows (and pre-development woodlot drainage) to acceptable rates such that the existing minor system flows on Ninth Line are not exceeded.

A portion of the subject lands isolated by the public ROW at the south-east corner of the property is not able to drain to the proposed tank. This area will discharge flows directly into the minor and major system. The proposed tank servicing the large portion of the property will overcontrol to allow this area to drain uncontrolled. Quality control will be provided by an oil-grit separator. The tank outlet and the south-east area will drain via a 525mm storm sewer connection to Existing MH1 on Ninth Line

The proposed public ROW through the subject lands cannot be controlled by the proposed tank due to ownership issues; therefore, the public ROW will drain directly to the Ninth Line storm sewer / ROW. Water quality and quantity controls (oil-grit separator) will be provided independently from the site plan area for the public ROW.

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3.3. STORM WATER MANAGEMENT

The following section describes the SWM criteria applicable to the subject lands.

Water Balance / Recharge

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. An annual water balance was established to determine the runoff and infiltration volume under post development conditions with mitigation measures.

Based on the 4.33 ha site area, approximately 216m^3 of runoff should be infiltrated / retained on site. Due to the proposed storm servicing strategy and limited opportunities to direct drainage to pervious areas, it is proposed to infiltrate an equivalent volume from the clean drainage discharged from the woodlot area towards the subject lands. This will be infiltrated in a stone gallery at the south edge of the woodlot buffer. The clean woodlot drainage is a better source of recharge volume than the proposed site plan area.

The infiltration gallery is approximately 250m long. In order to provide storage / infiltration storage of 216m^3, the trench must be approximately 1.5m wide by 1.5m deep, assuming 40% porosity. The trench design will be revisited when detailed hydrogeological information / groundwater levels become available.

Note that rooftops within the site plan area will be discharged to pervious areas as well, which will enhance the overall water balance.

Erosion Control

The Ninth Line Lands Scoped Subwatershed Study by Wood (2018) established criteria for erosion control. However, it was confirmed with Wood staff that erosion control is not necessary for this particular site as the outlet is an extensive sewer system rather than a nearby watercourse.

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Quality Control

Stormwater quality control for the future development within the Ninth Line Lands is required to control runoff to an "Enhanced" standard of treatment.

Oil/grit separators are proposed to provide quality treatment for the subject lands. The optimal placement (i.e. multiple units upstream of the storage tank or one large unit downstream) must be determined with the oil/grit separator suppliers. Furthermore, the tank itself may have pre-treatment cells for ease of maintenance and additional TSS removal. However, assuming the entire private site plan area discharges to a single O/GS at MH 24 (approximately 10 ha including the woodlot), an STC-14000 or equivalent would be required.

For the public ROW area (0.54 ha), an STC-1000 or equivalent would be required.

Quantity Control

The Ninth Line Lands Scoped Subwatershed Study by Wood (2018) established the following quantity control criteria for stormwater management. However, these targets represent a "total" flow rate and don't take into consideration the capacity of the minor system on Ninth Line.

Table 2.2.2 Stormwater Management Facility Sizing Criteria for Flood Control – Sixteen Mile Creek Watershed

Quantity Component	Cumulative Unitary Volume[1.] (m^3/impervious ha)	Unitary Discharge (m^3/s/ha)
Sawmill Creek Subwatershed		
5 Year	500	0.015
100 Year	800	0.050

In lieu of matching the subwatershed study targets precisely, a post-to-pre-development flow control strategy is proposed based on the aforementioned existing conditions VO5 model (which correlated well with the subwatershed study flows).

The post-development model simulates the proposed drainage strategy including the storage tank, uncontrolled drainage areas, public ROW, and remaining woodlot / external drainage. The ultimate development (including Phase 2) has been considered in the model.

The following table describes the post-development model catchments.

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Proposed Conditions Model Parameters

Area Description	Model ID (command type)	Area [ha]	Surface slope [%]	Length [%]	Time to Peak (Upland Method) [hours]	Soil Group	Land Use	Curve Number	Initial Abstractions Pervious/ impervious [mm]
External “east” woodlot area and portion of 5170 Ninth Line	NHYD-7 (NASHYD)	2.51	1	300	0.73	C	20% Meadow / 80% Forest	74	5
External “west” woodlot area to Tank	NHYD-10 (NASHYD)	6.45	2.5	300	0.86	C	20% Meadow / 80% Forest	74	5
5170 Ninth Line frontage on Ninth Line	NHYD-8 (STANDHYD)	0.35	1.5	48	N/A	C	75% IMP	74	5 / 1
Site area to Tank	NHYD-67 (STANDHYD)	3.16	1.5	145	N/A	C	65% IMP	74	5 / 1
Public ROW	NHYD-71 (STANDHYD)	0.54	1.5	160	N/A	C	65% IMP	74	5 / 1
South-east site plan area to major / minor system	NHYD-73 (STANDHYD)	0.38	1.5	50	N/A	C	65% IMP	74	5 / 1
South-east site plan area to Ninth Line major system	NHYD-72 (STANDHYD)	0.07	1.5	22	N/A	C	65% IMP	74	5 / 1
Ninth Line ROW to existing 750mm storm sewer	NHYD-6 (STANDHYD)	1.81	1.8	600	N/A	C	70% IMP	74	5 / 1

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The following storage elements were simulated:

Swale surface storage above infiltration tank

Discharge [m^3/s]	Volume [m^3]
0	0
0	49
0.401 (max 100-year flow from woodlot)	50

Underground storage tank (discharged based on preliminary 220mm orifice size)

Discharge [m^3/s]	Volume [m^3]
00	0
0.053	329
0.075	658
0.106	1316
0.150	2632

Note that the target 100-year storage volume (based on the SWS targets of 800m^3/imp ha for 6.45 ha of woodlot and 3.54 ha of development at 65% imperviousness) is approximately 2,800m^3, which generally agrees with the VO5 model storage requirements.

Pipe Storage (public ROW) (discharge based on SWS target of 0.050m^3/s/ha)

Discharge [m^3/s]	Volume [m^3]
0	0
0.027	160

The public ROW storage can be provided via a super-pipe with orifice plate (approximately 1050mm diameter) subject to further consultation with the City. This is not currently shown on **Drawing 5**.

The proposed conditions model results for the minor, major and total system flows are presented in the following tables, in addition to the existing flows at these same locations.

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Proposed vs. Existing Major System Flows at Ninth Line (NHYD 14)

Design Event	Existing Effective Area [ha]	Existing Peak Flow [m^3/s]	Proposed Effective Area [ha]	Proposed Peak Flow [m^3/s]
(1) 25mm	0	0	0.07	0.006
(2) 2yr 4hr 10min Chicago	0	0	0.07	0.010
(3) 5yr 4hr 10min Chicago	0	0	0.07	0.013
(4) 10yr 4hr 10min Chicago	0	0	0.07	0.017
(5) 25yr 4hr 10min Chicago	1.126	0.106	0.334	0.150
(6) 50yr 4hr 10min Chicago	2.434	0.195	0.632	0.283
(7) 100yr 4hr 10min Chicago	3.728	0.286	0.919	0.403

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Proposed vs. Existing Minor System Flows at Ninth Line (NHYD 15)

Design Event	Existing Effective Area [ha]	Existing Peak Flow [m^3/s]	Proposed Effective Area [ha]	Proposed Peak Flow [m^3/s]
(1) 25mm	17.25	0.165	15.20	0.209
(2) 2yr 4hr 10min Chicago	17.25	0.304	15.20	0.364
(3) 5yr 4hr 10min Chicago	17.25	0.436	15.20	0.510
(4) 10yr 4hr 10min Chicago	17.25	0.574	15.20	0.650
(5) 25yr 4hr 10min Chicago	16.124	0.59	14.94	0.659
(6) 50yr 4hr 10min Chicago	14.816	0.605	14.64	0.668
(7) 100yr 4hr 10min Chicago	13.522	0.676	14.35	0.676

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Proposed vs. Existing Total System Flows at Ninth Line (NHYD 21)

Design Event	Existing Effective Area [ha]	Existing Peak Flow [m^3/s]	Proposed Effective Area [ha]	Proposed Peak Flow [m^3/s]
(1) 25mm	17.25	0.165	15.270	0.215
(2) 2yr 4hr 10min Chicago	17.25	0.304	15.270	0.374
(3) 5yr 4hr 10min Chicago	17.25	0.436	15.270	0.523
(4) 10yr 4hr 10min Chicago	17.25	0.575	15.270	0.667
(5) 25yr 4hr 10min Chicago	17.25	0.696	15.270	0.809
(6) 50yr 4hr 10min Chicago	17.25	0.8	15.270	0.950
(7) 100yr 4hr 10min Chicago	17.25	0.909	15.270	1.08

The proposed conditions results indicate that the minor system flows are not exceeded during the 100-year event. There are slight exceedances of the frequent storm events; however, it is expected that these can be eliminated through optimization of the storage tank / outlet structure at detailed design. Similarly, there are slight increases above the existing major system flows, but the total flow on the major system is well below the capacity of the ROW.

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4 SANITARY SERVICING

4.1. EXISTING SANITARY SERVICING

The subject lands fall within Erin Centre and Motorway Sewersheds of the West Trunk System which ultimately discharges to the Clarkson Water Pollution Control Plant. Existing wastewater infrastructure in and around the subject lands is outlined below:

- 825mm sanitary trunk sewer on Ninth Line from Erin Centre Boulevard north to Britannia Road West
- 825mm sanitary sewer on Erin Centre Boulevard
- No sanitary sewers on Ninth Line north of Saratoga Way or south of Erin Centre Boulevard
- Local sewers within subdivisions east of Ninth Line

As outlined in the Region's *Ninth Line Lands Servicing Strategy Report*, the Clarkson WPCP is anticipated to be expanded in the future and the existing 825mm trunk sewer on Erin Centre Boulevard is adequately sized to handle projected flows from the subject property. Therefore, it is assumed that there are no downstream sanitary capacity issues associated with the development of the subject property.

4.2. PROPOSED SANITARY SERVICING

A new sanitary sewer on Ninth Line is proposed to provide an outlet from the subject lands to the existing 825mm sanitary sewer at Erin Centre Boulevard. This sewer may also be extended farther south to accommodate future development of the properties along the west side of Ninth Line down to Eglinton Avenue.

Population densities of 3.24 people per unit for low-rise/townhouses and 1.84 people per unit for high-rise/apartments have been assumed based on marketing and demographic info for the area. Note these densities result in higher projected populations than the Region standard densities based on land area (175 people per hectare for townhouses and 475 people per hectare for apartments).

Refer to **Drawing 6**, "*Sanitary Drainage Plan*," for further details. Sanitary design calculations are included in **Appendix A**.

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5 WATER DISTRIBUTION

5.1. EXISTING WATER SERVICING

A 400mm trunk watermain exists within the east boulevard Ninth Line that will supply the proposed development through the construction of new water infrastructure. This watermain is within Pressure Zone 4W of the Region's water distribution system servicing elevations between 166.3m and 198.1m. Pressure Zone 4W is supplied by the Streetsville High-Lift Pumping Station and the Meadowvale North Low-Lift Pumping Station.

As outlined in the Region's Ninth Line Lands Servicing Strategy Report, the need to expand existing water distribution infrastructure in the area of Ninth Line is currently under review.

5.2. PROPOSED WATER SERVICING

A 300mm watermain is proposed within the new public road west of Ninth Line. This watermain will connect to the existing Pressure Zone 4W 400mm watermain on Ninth Line. Local, looped watermains (200mm or smaller) are proposed within the private condo roads to service the development. All proposed units will be provided with individual water service connections in accordance with Region design criteria.

Hydrant testing and water modelling will be conducted as part of the detailed engineering design to confirm adequate fire flow is available.

6 EROSION AND SEDIMENT CONTROL

The erosion and sediment control plan for the site will be designed in conformance with the City of Mississauga guidelines and Credit Valley Conservation Authority. The following erosion and sediment control measures will be installed and maintained during construction:

- A temporary sediment control fence will be placed prior to grading
- Temporary sediment traps will be provided at each outlet
- Gravel mud mats will be provided at construction vehicle access points to minimize off-site tracking of sediments
- All temporary erosion and sediment control measures will be routinely inspected and repaired during construction. Temporary controls will not be removed until the areas they serve are restored and stable.

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7 CONCLUSION

The proposed residential development at 5150 Ninth Line, which includes 164 townhouses divided over two phases, can be adequately serviced via the existing storm, sanitary and water distribution infrastructure and does not adversely impact any of the surrounding infrastructure or properties.

Stormwater quantity control is provided by an underground storage tank within the outdoor amenity space.

Water balance is provided via an infiltration gallery at the north end of the property near the woodlot. Water quality control is provided via 2 oil/grit separators treating the site plan area and public ROW.

Sanitary servicing is provided by a proposed trunk on Ninth Line to the existing 825mm trunk sewer on Erin Centre Boulevard, ultimately draining to the Clarkson Water Pollution Control Plant.

Water servicing is provided by the existing Pressure Zone 4W 400mm watermain on Ninth Line.

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APPENDIX A

DESIGN CALCULATIONS

- Storm Sewer Design Sheet (10-Year)
- SWM Design Calculations
- Sanitary Sewer Design Sheet

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STORM SEWER DESIGN SHEET

10 Year Storm

5150 & 5170 NINTH LINE

CITY OF MISSISSAUGA

PROJECT DETAILS

Project No: 19-608 FSR
Date: 23-Oct-19
Designed by: SR
Checked by: DZ

DESIGN CRITERIA

Min. Diameter =	300	mm	Rainfall Intensity =	A / (Tc+B)^c
Mannings 'n'=	0.013			
Starting Tc =	15	min	A =	1010
			B =	4.6
Factor of Safety =	15	%	c =	0.78

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
CONDO	1	2	0.12	0.65	0.08	0.08	99.2	0.021			0.021	60.1	0.50	300	0.068	0.97	15.00	1.04	16.04	31%
WOODLOT		2	6.45	0.25	1.61	1.61														
CONDO	2	3	0.32	0.65	0.21	1.90	95.3	0.502			0.502	37.7	0.50	675	0.594	1.66	16.04	0.38	16.41	85%
CONDO	3	4				1.90	93.9	0.495			0.495	12.2	0.50	675	0.594	1.66	16.41	0.12	16.54	83%
CONDO	4	5				1.90	93.5	0.493			0.493	55.6	0.50	675	0.594	1.66	16.54	0.56	17.09	83%
CONDO	5	6	0.35	0.65	0.23	2.13	91.6	0.541			0.541	50.1	1.00	675	0.841	2.35	17.09	0.36	17.45	64%
CONDO	6	7				2.13	90.5	0.534			0.534	58.0	1.00	675	0.841	2.35	17.45	0.41	17.86	64%
CONDO	8	9	0.61	0.65	0.40	0.40	99.2	0.109			0.109	61.6	1.00	375	0.175	1.59	15.00	0.65	15.65	62%
CONDO	9	10				0.40	96.7	0.106			0.106	90.0	1.00	375	0.175	1.59	15.65	0.94	16.59	61%
CONDO	10	7				0.40	93.3	0.103			0.103	38.8	0.50	375	0.124	1.12	16.59	0.58	17.17	83%
CONDO	7	11	0.15	0.65	0.10	2.62	89.2	0.649			0.649	23.8	0.50	750	0.787	1.78	17.86	0.22	18.08	82%
CONDO	11	13				2.62	88.5	0.644			0.644	13.2	0.50	750	0.787	1.78	18.08	0.12	18.21	82%
HOLDOUT		14	0.12	0.25	0.03	0.03														
CONDO	14	15	0.13	0.65	0.08	0.11	99.2	0.032			0.032	30.8	1.00	300	0.097	1.37	15.00	0.38	15.38	33%
CONDO	15	16	0.55	0.65	0.36	0.47	97.7	0.128			0.128	78.4	0.50	450	0.202	1.27	15.38	1.03	16.41	64%
CONDO	16	17				0.47	93.9	0.123			0.123	8.8	0.70	450	0.239	1.50	16.41	0.10	16.50	52%
CONDO	17	18	0.41	0.65	0.27	0.74	93.6	0.192			0.192	49.6	0.70	450	0.239	1.50	16.50	0.55	17.06	81%
CONDO	18	13				0.74	91.7	0.188			0.188	49.6	0.70	450	0.239	1.50	17.06	0.55	17.61	79%
CONDO	13	19				3.36	88.1	0.822			0.822	16.6	0.50	825	1.015	1.90	18.21	0.15	18.35	81%
CONDO	19	TANK-IN-1				3.36	87.7	0.818			0.818	7.6	0.50	825	1.015	1.90	18.35	0.07	18.42	81%
HOLDOUT		20	0.12	0.65	0.08	0.08														
REAR	20	21	0.28	0.65	0.18	0.26	99.2	0.072			0.072	34.9	0.50	375	0.124	1.12	15.00	0.52	15.52	58%
REAR	21	22				0.26	97.2	0.070			0.070	22.8	0.50	375	0.124	1.12	15.52	0.34	15.86	57%
REAR	22	TANK-IN-2				0.26	95.9	0.069			0.069	3.0	0.50	375	0.124	1.12	15.86	0.04	15.90	56%
									Release rate from tank, refer to FSR											
CONDO	TANK-OUT	23	0.38	0.65	0.25	0.25	99.2	0.068	0.150	0.150	0.218	82.4	0.40	525	0.272	1.26	15.00	1.09	16.09	80%
CONDO	23	24				0.25	95.1	0.065		0.150	0.215	25.9	0.40	525	0.272	1.26	16.09	0.34	16.44	79%
CONDO	24	25				0.25	93.8	0.064		0.150	0.214	26.2	0.40	525	0.272	1.26	16.44	0.35	16.78	79%
CONDO	25	26				0.25	92.7	0.064		0.150	0.214	14.2	0.40	525	0.272	1.26	16.78	0.19	16.97	79%

Urbantech Consulting, A Division of Leighton-Zec Ltd.
3760 14th Ave, Suite 301 Markham, Ontario L3R 3T7
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			B =	4.6
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NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
CONDO	26	EX. 1				0.25	92.0	0.063		0.150	0.213	10.9	0.40	525	0.272	1.26	16.97	0.14	17.12	78%
PUBLIC ROAD	27	28	0.54	0.65	0.35	0.35	99.2	0.097			0.097	9.3	0.50	375	0.124	1.12	15.00	0.14	15.14	78%
PUBLIC ROAD	28	29				0.35	98.6	0.096			0.096	97.8	0.50	375	0.124	1.12	15.14	1.45	16.59	78%
PUBLIC ROAD	29	30				0.35	93.3	0.091			0.091	20.9	0.50	375	0.124	1.12	16.59	0.31	16.90	73%
NINTH LINE		30	1.81	0.70	1.27	1.27														
NINTH LINE	30	EX. 1				1.62	92.3	0.415			0.415	52.0	1.60	525	0.544	2.51	16.90	0.34	17.25	76%
NINTH LINE	EX. 1	EX. 2				1.87	91.1	0.472		0.150	0.622	120.0	0.50	750	0.787	1.78	17.25	1.12	18.37	79%

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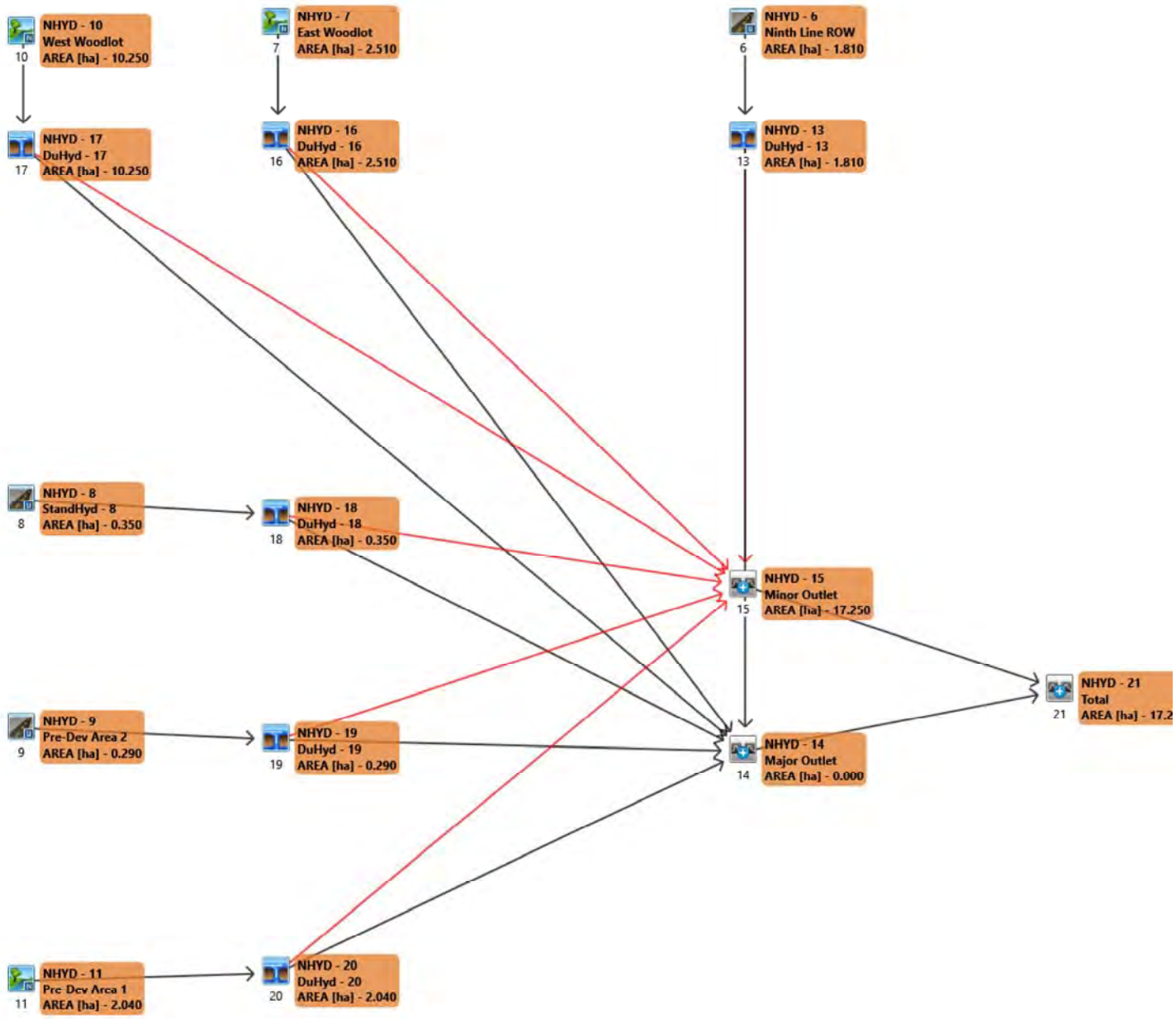
Existing VO5 Model Schematic



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      V    V   I    SSSSS  U   U    A    L            (v 5.2.2001)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.2\VO2\voin.dat
  Output  filename: C:\Users\afata\AppData\Local\Civica\VH5\5896d5f1-0392-4509-9a9a-a7ad7af225d7\cc953f25-47ce
  Summary filename: C:\Users\afata\AppData\Local\Civica\VH5\5896d5f1-0392-4509-9a9a-a7ad7af225d7\cc953f25-47ce


DATE: 10-30-2019                          TIME: 12:11:03

USER:



COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : (1) 25mm                    **
  **********************************************


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|                  |              ata\Local\Temp\
|                  |              734ead6f-7495-406d-a828-cff27744436f\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

-----------------------------------------------------------------------


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| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   2.51   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.73

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.131
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     PEAK FLOW       (cms)=   0.010 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=   3.660
     TOTAL RAINFALL   (mm)=  24.996
     RUNOFF COEFFICIENT   =   0.146

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0016)|
| Inlet Cap.= 0.060|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   2.51      0.01      2.58    3.66
     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   2.51      0.01      2.58    3.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              734ead6f-7495-406d-a828-cff27744436f\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

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--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=  10.25   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.86

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.455

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=   3.660
     TOTAL RAINFALL   (mm)=  24.996
     RUNOFF COEFFICIENT   =   0.146

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0017)|
| Inlet Cap.= 0.217|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):  10.25      0.04      2.83    3.66
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     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):  10.25      0.04      2.83    3.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              734ead6f-7495-406d-a828-cff27744436f\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

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| CALIB            |
| NASHYD   (  0011)|   Area    (ha)=   2.04   Curve Number   (CN)= 82.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.45

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.173

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=   5.277
     TOTAL RAINFALL   (mm)=  24.996
     RUNOFF COEFFICIENT   =   0.211

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0020)|
| Inlet Cap.= 0.091|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   2.04      0.02      2.08    5.28
     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   2.04      0.02      2.08    5.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              734ead6f-7495-406d-a828-cff27744436f\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

0.17	2.07	1.17	5.70	2.17	5.19	3.17	2.80
0.33	2.27	1.33	10.78	2.33	4.47	3.33	2.62
0.50	2.52	1.50	50.21	2.50	3.95	3.50	2.48
0.67	2.88	1.67	13.37	2.67	3.56	3.67	2.35
0.83	3.38	1.83	8.29	2.83	3.25	3.83	2.23
1.00	4.18	2.00	6.30	3.00	3.01	4.00	2.14

CALIB
STANDHYD (0006)
ID= 1 DT= 5.0 min

Area (ha)= 1.81
Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.27	0.54
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.80	1.80
Length	(m)=	600.00	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.17	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.29	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	3.11		
over (min)	10.00	40.00		
Storage Coeff. (min)=	8.27 (ii)	37.45 (ii)		
Unit Hyd. Tpeak (min)=	10.00	40.00		
Unit Hyd. peak (cms)=	0.13	0.03		
			TOTALS	
PEAK FLOW (cms)=	0.12	0.00	0.118 (iii)	
TIME TO PEAK (hrs)=	1.58	2.25	1.58	
RUNOFF VOLUME (mm)=	24.00	3.66	17.88	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.15	0.72	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0013)
Inlet Cap.= 0.393
#of Inlets= 1
Total(cms)= 0.4

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.81	0.12	1.58	17.88
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.81	0.12	1.58	17.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM
Ptotal= 25.00 mm

Filename: C:\Users\afata\AppData\Local\Temp\734ead6f-7495-406d-a828-cff27744436f\8c7882d0
Comments: 25MM4HRC_10min Edited 2012

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.07	1.17	5.70	2.17	5.19	3.17	2.80

0.33	2.27	1.33	10.78	2.33	4.47	3.33	2.62
0.50	2.52	1.50	50.21	2.50	3.95	3.50	2.48
0.67	2.88	1.67	13.37	2.67	3.56	3.67	2.35
0.83	3.38	1.83	8.29	2.83	3.25	3.83	2.23
1.00	4.18	2.00	6.30	3.00	3.01	4.00	2.14

CALIB
STANDHYD (0008)
ID= 1 DT= 5.0 min

Area (ha)= 0.35
Total Imp(%)= 75.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.26	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	48.30	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.17	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.29	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	48.59		
over (min)	5.00	15.00		
Storage Coeff. (min)=	2.17 (ii)	11.59 (ii)		
Unit Hyd. Tpeak (min)=	5.00	15.00		
Unit Hyd. peak (cms)=	0.31	0.09		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.01	0.028 (iii)	
TIME TO PEAK (hrs)=	1.50	1.67	1.50	
RUNOFF VOLUME (mm)=	24.00	12.60	18.28	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.50	0.73	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0018)
Inlet Cap.= 0.089
#of Inlets= 1
Total(cms)= 0.1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	0.35	0.03	1.50	18.28
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	0.35	0.03	1.50	18.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM
Ptotal= 25.00 mm

Filename: C:\Users\afata\AppData\Local\Temp\734ead6f-7495-406d-a828-cff27744436f\8c7882d0
Comments: 25MM4HRC_10min Edited 2012

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.07	1.17	5.70	2.17	5.19	3.17	2.80

0.33	2.27	1.33	10.78	2.33	4.47	3.33	2.62
0.50	2.52	1.50	50.21	2.50	3.95	3.50	2.48
0.67	2.88	1.67	13.37	2.67	3.56	3.67	2.35
0.83	3.38	1.83	8.29	2.83	3.25	3.83	2.23
1.00	4.18	2.00	6.30	3.00	3.01	4.00	2.14

CALIB
STANDHYD (0009)
ID= 1 DT= 5.0 min

Area (ha)= 0.29
Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.14
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.50	1.50
Length	(m)=	43.97	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.17	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.29	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	6.38		
over (min)	5.00	25.00		
Storage Coeff. (min)=	1.82 (ii)	24.95 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.32	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.01	0.00	0.014 (iii)	
TIME TO PEAK (hrs)=	1.50	1.92	1.50	
RUNOFF VOLUME (mm)=	24.00	4.98	11.59	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.20	0.46	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0019)
Inlet Cap.= 0.042
#of Inlets= 1
Total(cms)= 0.0

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	0.29	0.01	1.50	11.59
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	0.29	0.01	1.50	11.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0014)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

*** W A R N I N G : HYDROGRAPH 0013 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 0016 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0014 <ID= 3> IS ALSO DRY

```
--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0017 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0018 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0019 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0020 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     1.81   0.118     1.58    17.88
     + ID2= 2 (  0016):     2.51   0.010     2.58     3.66
       ================================================
       ID = 3 (  0015):     4.32   0.119     1.58     9.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0015):     4.32   0.119     1.58     9.62
     + ID2= 2 (  0017):    10.25   0.038     2.83     3.66
       ================================================
       ID = 1 (  0015):    14.57   0.123     1.58     5.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):    14.57   0.123     1.58     5.43
     + ID2= 2 (  0018):     0.35   0.028     1.50    18.28
       ================================================
       ID = 3 (  0015):    14.92   0.142     1.50     5.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0015):    14.92   0.142     1.50     5.73
     + ID2= 2 (  0019):     0.29   0.014     1.50    11.59
       ================================================
       ID = 1 (  0015):    15.21   0.157     1.50     5.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

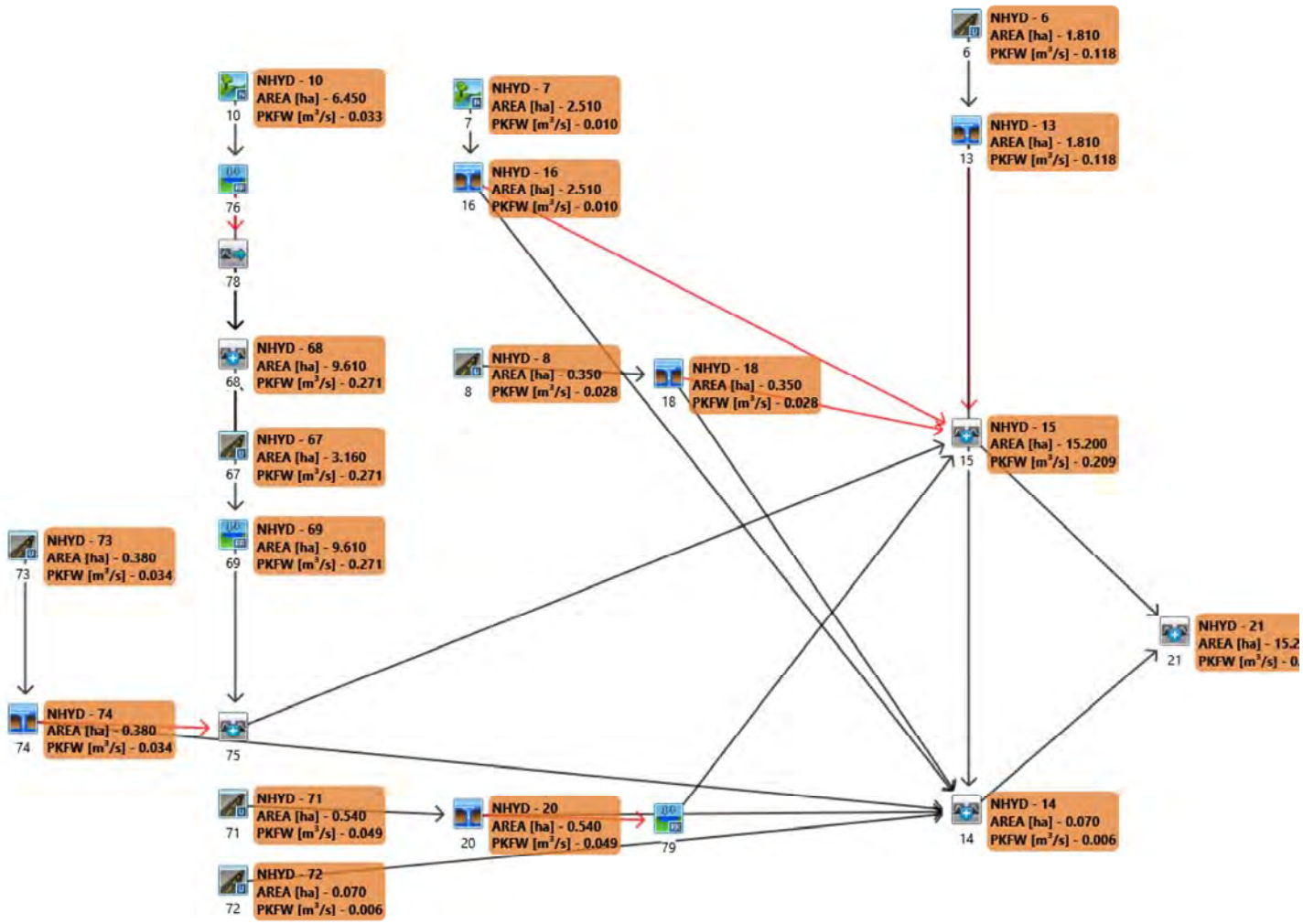
```
--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0015):    15.21   0.157     1.50     5.84
      + ID2= 2 (  0020):     2.04   0.016     2.08     5.28
        ==================================================
        ID = 3 (  0015):    17.25   0.159     1.50     5.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0021)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0021 = HYDROGRAPH 0015
        ID1= 1 (  0014):     0.00   0.000     0.00    11.59
      + ID2= 2 (  0015):    17.25   0.159     1.50     5.77
        ==================================================
        ID = 3 (  0021):    17.25   0.159     1.50     5.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

Proposed VO5 Model Schematic



```
================================================================================

      V    V   I    SSSSS  U   U    A    L             (v 5.2.2001)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 5.2\VO2\voin.dat
  Output  filename: C:\Users\afata\AppData\Local\Civica\VH5\5896d5f1-0392-4509-9a9a-a7ad7af225d7\a7234f63-e972
  Summary filename: C:\Users\afata\AppData\Local\Civica\VH5\5896d5f1-0392-4509-9a9a-a7ad7af225d7\a7234f63-e972


DATE: 10-30-2019                          TIME: 12:18:40

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : (1) 25mm                      **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.07	1.17	5.70	2.17	5.19	3.17	2.80
0.33	2.27	1.33	10.78	2.33	4.47	3.33	2.62
0.50	2.52	1.50	50.21	2.50	3.95	3.50	2.48
0.67	2.88	1.67	13.37	2.67	3.56	3.67	2.35
0.83	3.38	1.83	8.29	2.83	3.25	3.83	2.23
1.00	4.18	2.00	6.30	3.00	3.01	4.00	2.14

```
------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   2.51   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.73

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.17	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.29	3.000	3.01	4.00	2.14

```
    Unit Hyd Qpeak  (cms)=   0.131
```

```
     PEAK FLOW       (cms)=   0.010 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=   3.660
     TOTAL RAINFALL   (mm)=  24.996
     RUNOFF COEFFICIENT   =   0.146

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0016)|
| Inlet Cap.= 0.060|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   2.51      0.01      2.58    3.66
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   2.51      0.01      2.58    3.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.81
|ID= 1 DT= 5.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.27          0.54
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.80          1.80
     Length            (m)=     600.00         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         3.11
               over (min)        10.00        40.00
     Storage Coeff.  (min)=       8.27 (ii)   37.45 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.13         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.00          0.118 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.25           1.58
     RUNOFF VOLUME    (mm)=      24.00         3.66          17.88
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.15           0.72
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0013)|
| Inlet Cap.= 0.393|
| #of Inlets=     1|
| Total(cms)=   0.4|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.81      0.12      1.58   17.88
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.81      0.12      1.58   17.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0008)|   Area    (ha)=   0.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.26         0.09
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      48.30        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21        48.59
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.17 (ii)   11.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.01          0.028 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.67           1.50
     RUNOFF VOLUME    (mm)=      24.00        12.60          18.28
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.50           0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0018)|
| Inlet Cap.= 0.089|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.35      0.03      1.50   18.28
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   0.35      0.03      1.50   18.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0071)|   Area    (ha)=   0.54
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.35         0.19
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         1.50
     Length            (m)=      60.00        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         2.88
               over (min)         5.00        35.00
     Storage Coeff.  (min)=       2.19 (ii)   33.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=       0.31         0.03
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.049 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      24.00         3.66          16.84
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.15           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0020)|
| Inlet Cap.= 0.126|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   0.54      0.05      1.50   16.84
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   0.54      0.05      1.50   16.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0072)|   Area    (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.05         0.02
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         1.50
     Length            (m)=      21.60        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         2.88
               over (min)         5.00        35.00
     Storage Coeff.  (min)=       1.19 (ii)   32.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=       0.33         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00          0.006 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      24.00         3.66          16.65
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.15           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0073)|   Area    (ha)=   0.38
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.25         0.13
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         1.50
     Length            (m)=      50.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         2.88
                 over (min)        5.00        35.00
     Storage Coeff.  (min)=       1.97 (ii)   33.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=       0.31         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00        0.034 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17         1.50
     RUNOFF VOLUME    (mm)=      24.00         3.66        16.83
     TOTAL RAINFALL   (mm)=      25.00        25.00        25.00
     RUNOFF COEFFICIENT   =       0.96         0.15         0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0074)|
| Inlet Cap.= 0.089|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
```

```
     TOTAL HYD.(ID= 1):   0.38      0.03      1.50   16.83
     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   0.38      0.03      1.50   16.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0013 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0016 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0018 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0020 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0014 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0014 = HYDROGRAPH 0072
       ID1= 3 (  0014):     0.00   0.000     0.00    16.83
     + ID2= 2 (  0072):     0.07   0.006     1.50    16.65
       ================================================
       ID = 1 (  0014):     0.07   0.006     1.50    16.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0074 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0014):     0.07   0.006     1.50    16.65
     + ID2= 2 (  0074):     0.00   0.000     0.00     0.00
       ================================================
       ID = 3 (  0014):     0.07   0.006     1.50    16.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0010)|   Area    (ha)=   6.45   Curve Number   (CN)= 74.0
```

```
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.46

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
               0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
               0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
               0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
               0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
               0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
               0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
               0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
               0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
               0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
               0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
               1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.536

     PEAK FLOW       (cms)=   0.033 (i)
     TIME TO PEAK    (hrs)=   2.167
     RUNOFF VOLUME    (mm)=   3.660
     TOTAL RAINFALL   (mm)=  24.996
     RUNOFF COEFFICIENT   =   0.146

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0076)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4010      0.0050
                          0.0010     0.0040   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)      6.450      0.033      2.17       3.66
   OUTFLOW: ID= 1 (  0076)      6.450      0.040      2.08       3.50
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=121.29
                  TIME SHIFT OF PEAK FLOW         (min)= -5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0042

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------
--------------------
| SHIFT HYD(  0078)|
| IN= 2---> OUT= 1 |
| SHIFT= 20.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 2 (  0076):    0.00     0.00      0.00      0.00
    SHIFT ID= 1 (  0078):    0.00     0.00      0.33      0.00

--------------------------------------------------------------------------------

--------------------
|    READ STORM    |    Filename: C:\Users\afata\AppD
|                  |              ata\Local\Temp\
|                  |              4b8629c5-a565-44f7-84b5-805cd1f6758d\8c7882d0
| Ptotal= 25.00 mm |    Comments: 25MM4HRC_10min Edited 2012
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.07 |  1.17    5.70 |  2.17    5.19 |  3.17    2.80
                0.33    2.27 |  1.33   10.78 |  2.33    4.47 |  3.33    2.62
                0.50    2.52 |  1.50   50.21 |  2.50    3.95 |  3.50    2.48
                0.67    2.88 |  1.67   13.37 |  2.67    3.56 |  3.67    2.35
                0.83    3.38 |  1.83    8.29 |  2.83    3.25 |  3.83    2.23
                1.00    4.18 |  2.00    6.30 |  3.00    3.01 |  4.00    2.14

--------------------------------------------------------------------------------
```

```
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   3.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.05         1.11
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.50         1.50
     Length            (m)=     145.14        40.00
     Mannings n             =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.17 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21         2.88
               over (min)         5.00        40.00
     Storage Coeff.  (min)=       3.73 (ii)   35.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=       0.25         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.00          0.271 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      24.00         3.66          16.87
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.15           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0068)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     3.16   0.271     1.50    16.87
      + ID2= 2 (  0076):     6.45   0.040     2.08     3.50
        ==========================================
        ID = 3 (  0068):     9.61   0.271     1.50     7.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0068)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0078 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0068):     9.61   0.271     1.50     7.90
      + ID2= 2 (  0078):     0.00   0.000     0.33     0.00
        ==========================================
        ID = 1 (  0068):     9.61   0.271     1.50     7.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0069)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
```

```
                          0.0000     0.0000   |   0.1100      0.1316
                          0.0530     0.0329   |   0.1500      0.2632
                          0.0750     0.0658   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0068)      9.610      0.271      1.50       7.90
   OUTFLOW: ID= 1 (  0069)      9.610      0.048      2.75       7.88

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.72
                    TIME SHIFT OF PEAK FLOW         (min)= 75.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0299

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0075)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0069):     9.61   0.048     2.75     7.88
     + ID2= 2 (  0074):     0.38   0.034     1.50    16.83
       ================================================
       ID = 3 (  0075):     9.99   0.062     1.50     8.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0079)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0270      0.0160
                          0.0000     0.0000   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0020)      0.540      0.049      1.50       16.84
   OUTFLOW: ID= 1 (  0079)      0.540      0.008      1.92       16.57
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00        0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.42
                    TIME SHIFT OF PEAK FLOW         (min)= 25.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0045

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0013):     1.81   0.118     1.58    17.88
     + ID2= 2 (  0016):     2.51   0.010     2.58     3.66
       ================================================
       ID = 3 (  0015):     4.32   0.119     1.58     9.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0015):     4.32   0.119     1.58     9.62
     + ID2= 2 (  0018):     0.35   0.028     1.50    18.28
       ================================================
       ID = 1 (  0015):     4.67   0.141     1.50    10.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     4.67   0.141     1.50    10.27
     + ID2= 2 (  0075):     9.99   0.062     1.50     8.22
       ================================================
       ID = 3 (  0015):    14.66   0.203     1.50     8.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0015):    14.66   0.203     1.50     8.88
     + ID2= 2 (  0079):     0.54   0.008     1.92    16.57
       ================================================
       ID = 1 (  0015):    15.20   0.209     1.50     9.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0021)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0014):     0.07   0.006     1.50    16.65
     + ID2= 2 (  0015):    15.20   0.209     1.50     9.15
       ================================================
       ID = 3 (  0021):    15.27   0.215     1.50     9.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

Detailed Stormceptor Sizing Report – Woodlot + Site

Project Information & Location			
Project Name	19-608 OGS 3a	**Project Number**	19698
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	9/9/2019
Designer Information		**EOR Information (optional)**	
Name	Urbantech Water	**Name**	
Company	Urbantech	**Company**	
Phone #	905-946-9461	**Phone #**	
Email	Urbantech.water@gmail.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Woodlot + Site
Recommended Stormceptor Model	STC 14000
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	81
PSD	Fine Distribution
Rainfall Station	TORONTO PEARSON AP

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary		
Stormceptor Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**
STC 300	48	32
STC 750	57	46
STC 1000	58	46
STC 1500	58	46
STC 2000	63	57
STC 3000	64	57
STC 4000	69	68
STC 5000	69	68
STC 6000	72	75
STC 9000	77	81
STC 10000	77	81
STC 14000	81	87
StormceptorMAX	Custom	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4669
Rainfall Station Name	TORONTO PEARSON AP	**Total Rainfall (mm)**	24214.8
Station ID #	8733	**Average Annual Rainfall (mm)**	605.4
Coordinates	43°41'N, 79°38'W	**Total Evaporation (mm)**	744.6
Elevation (ft)	562	**Total Infiltration (mm)**	18021.3
Years of Rainfall Data	44	**Total Rainfall that is Runoff (mm)**	5448.9

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	10
Imperviousness %	25.00

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.263	0.165

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	0.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	165.00
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	525
Pipe Material	
Multiple Inlets (Y/N)	Yes
Grate Inlet (Y/N)	Yes

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	Woodlot + Site

Site Details

Drainage Area

Total Area (ha)	10
Imperviousness %	25.00

Surface Characteristics

Width (m)	632.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

Buildup/Wash-off Parameters

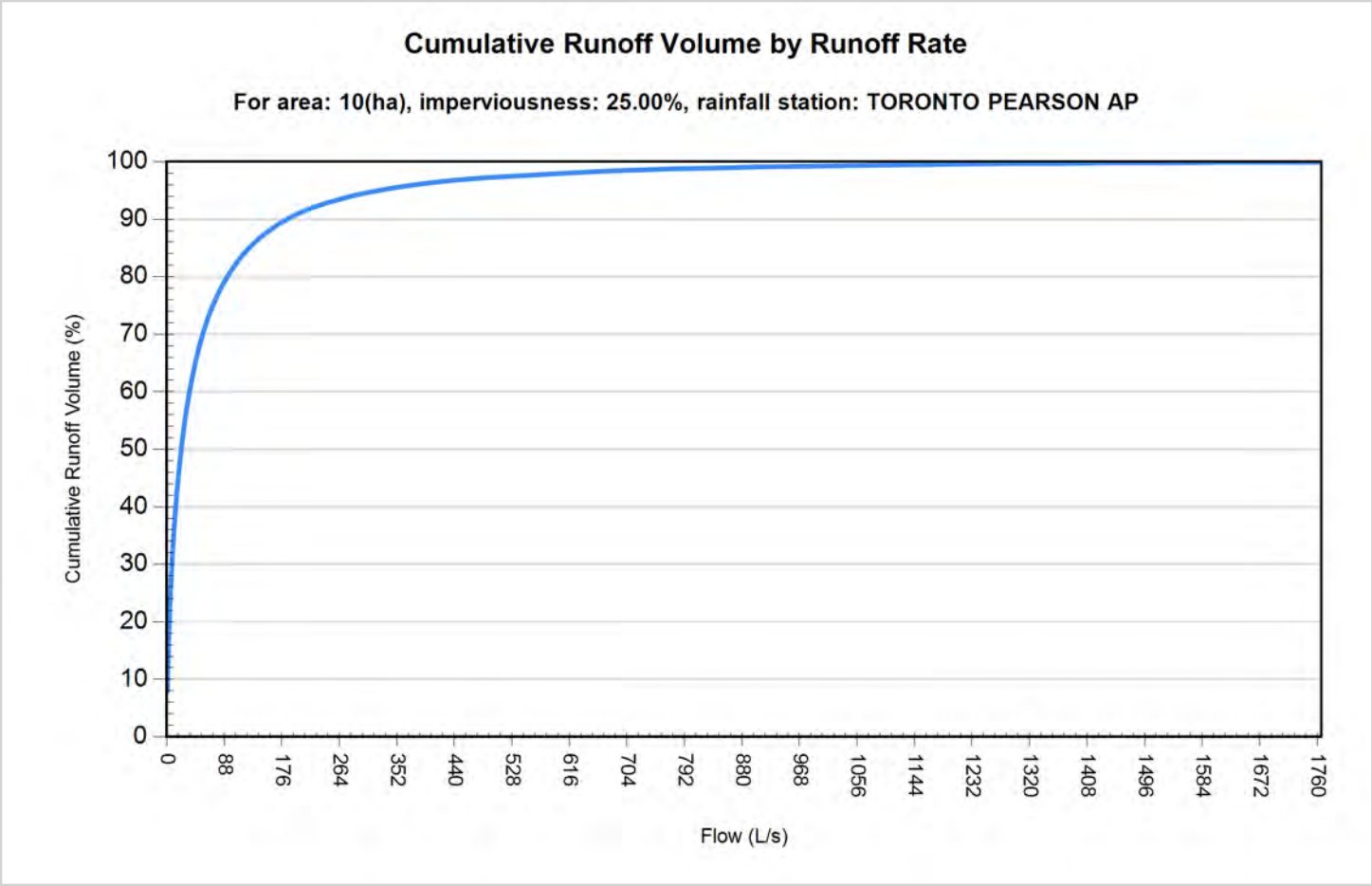
Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

TSS Availability Parameters

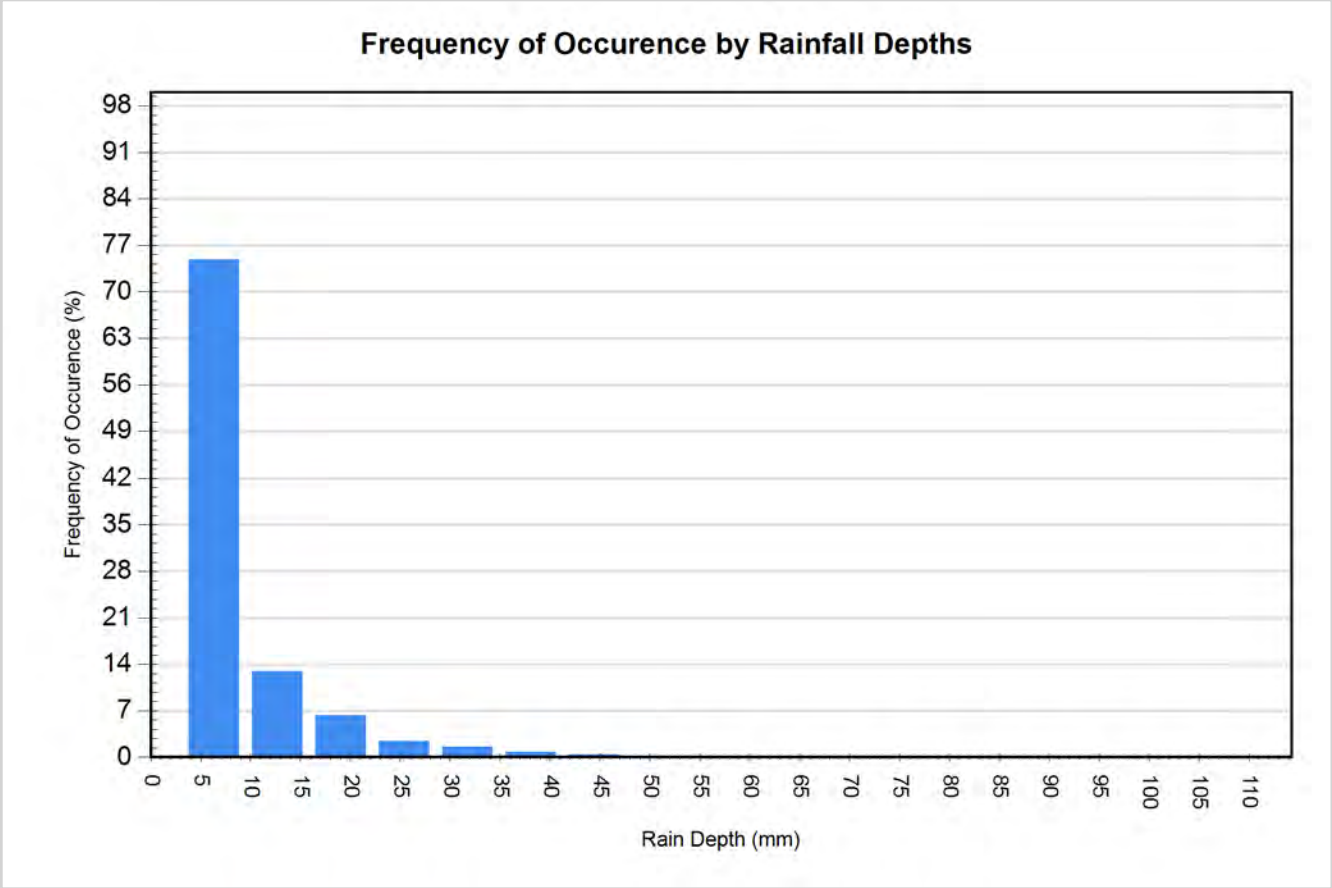
Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m^3)	Volume Over (m^3)	Cumulative Runoff Volume (%)
1	44082	516864	7.9
4	113738	447211	20.3
9	180727	380296	32.2
16	241509	319429	43.1
25	295083	265872	52.6
36	340659	220296	60.7
49	378724	182192	67.5
64	409803	151126	73.1
81	435220	125696	77.6
100	456056	104886	81.3
121	473374	87547	84.4
144	487634	73295	86.9
169	499238	61686	89.0
196	508821	52112	90.7
225	516629	44297	92.1
256	523041	37889	93.2
289	528512	32417	94.2
324	533044	27889	95.0
361	536842	24088	95.7
400	540077	20855	96.3
441	542784	18144	96.8
484	545074	15856	97.2
529	546970	13955	97.5
576	548723	12201	97.8
625	550306	10618	98.1
676	551680	9244	98.4
729	552906	8017	98.6
784	554020	6902	98.8
841	554967	5955	98.9
900	555770	5152	99.1
961	556497	4424	99.2
1024	557155	3767	99.3
1089	557736	3184	99.4
1156	558222	2699	99.5
1225	558664	2257	99.6
1296	559059	1861	99.7
1369	559379	1542	99.7

1444	559668	1253	99.8
1521	559911	1009	99.8
1600	560143	777	99.9
1681	560357	563	99.9
1764	560512	408	99.9



Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	3499	74.9	6076	25.1
12.70	606	13.0	5524	22.8
19.05	293	6.3	4579	18.9
25.40	119	2.5	2585	10.7
31.75	73	1.6	2068	8.5
38.10	37	0.8	1281	5.3
44.45	19	0.4	764	3.2
50.80	10	0.2	470	1.9
57.15	2	0.0	108	0.4
63.50	4	0.1	235	1.0
69.85	3	0.1	205	0.8
76.20	2	0.0	145	0.6
82.55	1	0.0	80	0.3
88.90	0	0.0	0	0.0
95.25	1	0.0	95	0.4
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

Detailed Stormceptor Sizing Report – Public ROW

Project Information & Location			
Project Name	19-608 OGS 3a	**Project Number**	19698
City	Mississauga	**State/ Province**	Ontario
Country	Canada	**Date**	9/9/2019
Designer Information		**EOR Information (optional)**	
Name	Urbantech Water	**Name**	
Company	Urbantech	**Company**	
Phone #	905-946-9461	**Phone #**	
Email	Urbantech.water@gmail.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Public ROW
Recommended Stormceptor Model	STC 1000
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	80
PSD	Fine Distribution
Rainfall Station	TORONTO PEARSON AP

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 300	71
STC 750	79
STC 1000	80
STC 1500	81
STC 2000	84
STC 3000	85
STC 4000	88
STC 5000	88
STC 6000	90
STC 9000	92
STC 10000	92
STC 14000	94
StormceptorMAX	Custom

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4669
Rainfall Station Name	TORONTO PEARSON AP	**Total Rainfall (mm)**	24214.8
Station ID #	8733	**Average Annual Rainfall (mm)**	605.4
Coordinates	43°41'N, 79°38'W	**Total Evaporation (mm)**	1847.6
Elevation (ft)	562	**Total Infiltration (mm)**	8331.9
Years of Rainfall Data	44	**Total Rainfall that is Runoff (mm)**	14035.3

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	0.54
Imperviousness %	65.00

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.020	0.027

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	Public ROW

Site Details

Drainage Area

Total Area (ha)	0.54
Imperviousness %	65.00

Surface Characteristics

Width (m)	147.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

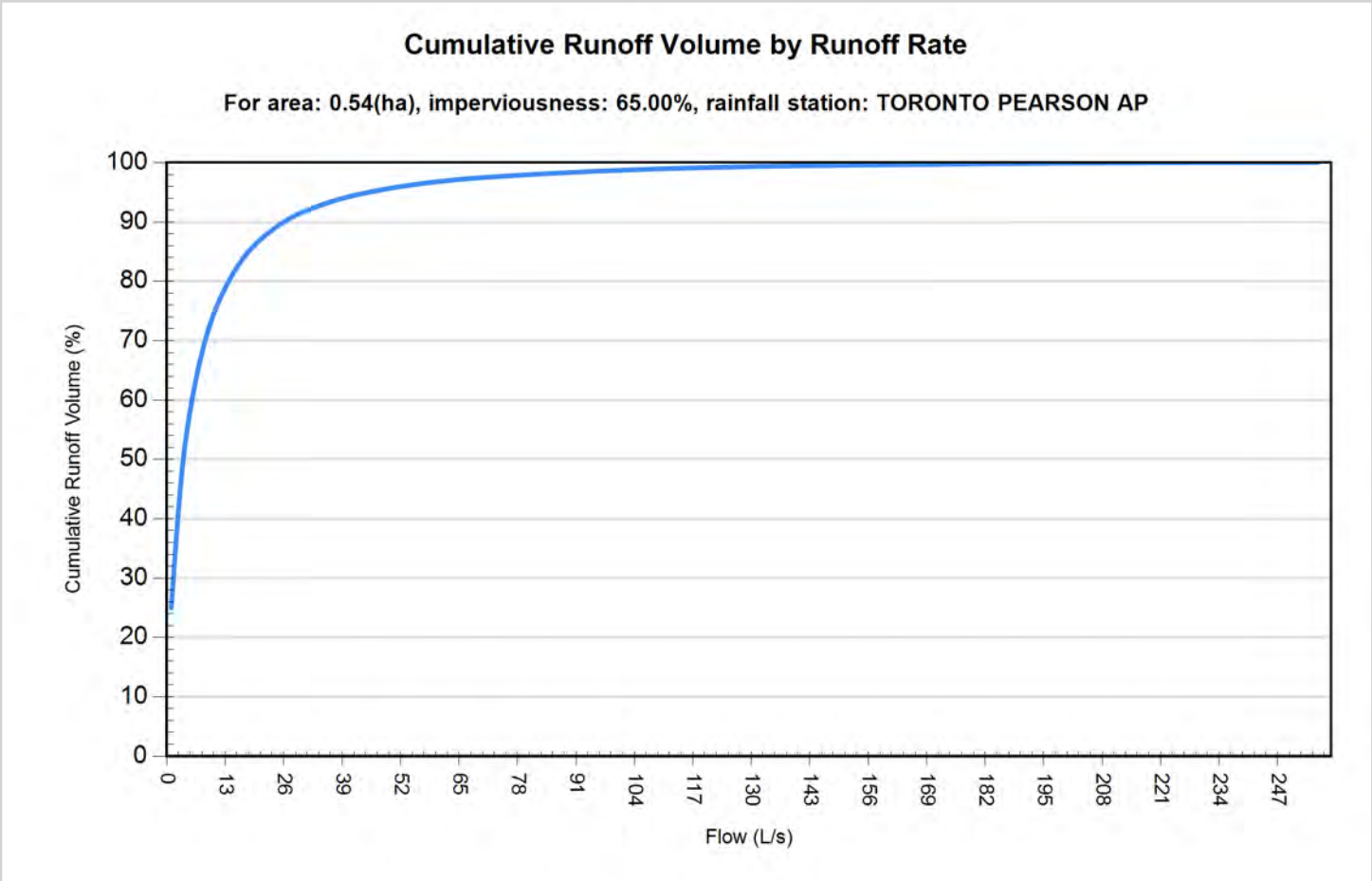
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	19625	58881	25.0
4	40804	37701	52.0
9	55878	22623	71.2
16	64957	13543	82.8
25	70251	8247	89.5
36	73244	5253	93.3
49	75063	3434	95.6
64	76193	2304	97.1
81	76916	1581	98.0
100	77456	1041	98.7
121	77843	653	99.2
144	78114	383	99.5
169	78299	198	99.7
196	78410	87	99.9
225	78472	25	100.0
256	78496	1	100.0



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101.60	0	0.0	0	0.0
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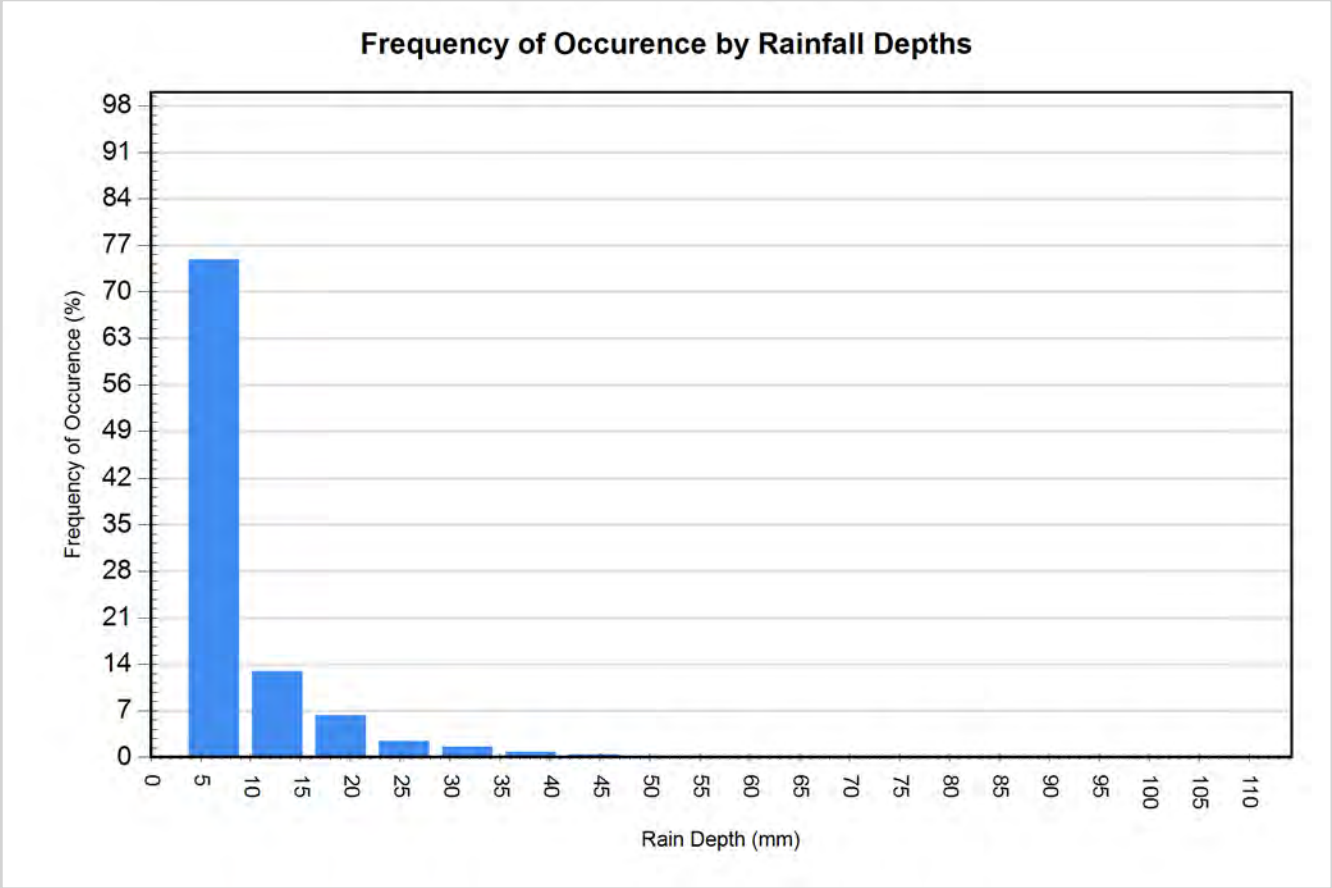

For Stormceptor Specifications and Drawings Please Visit:
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SANITARY SEWER DESIGN SHEET

5150 & 5170 NINTH LINE

CITY OF MISSISSAUGA, REGION OF PEEL

PROJECT DETAILS

Project No: 19-608
Date: 26-Oct-19
Designed by: SR
Checked by: DZ

DESIGN CRITERIA

Min. Flow =	13	l/s			
Min Diameter =	250	mm	Avg. Domestic Flow =	302.8	l/c/d
Mannings 'n'=	0.013		Infiltration =	0.200	l/s/ha
Min. Velocity =	0.75	m/s	Max. Peaking Factor =	4.00	
Max. Velocity =	3.50	m/s	Min. Peaking Factor=	1.50	
			Domestic Sewage flow for < 1000 ppl = 0.013m^3/s		
Factor of Safety =	15	%	(Region of Peel Std. 2-5-2)		

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	RESIDENTIAL							COMMERCIAL/INDUSTRIAL/INSTITUTIONAL						FLOW CALCULATIONS								PIPE DATA						
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENISTY (P/ha)	DENSITY (P/unit)	POP	ACCUM. RES. POP.	AREA (ha)	ACC. AREA (ha)	EQUIV. POP. (p/ha)	FLOW RATE (l/s/ha)	EQUIV. POP.	ACCUM. EQUIV. POP.	INFILTRATION (l/s)	TOTAL ACCUM. POP.	PEAKING FACTOR	RES. FLOW (l/s)	MIN. RES. FLOW (l/s)	COMM. FLOW (l/s)	ACCUM. COMM. FLOW (l/s)	TOTAL FLOW (l/s)	SLOPE (%)	PIPE DIAMETER (mm)	PIPE LENGTH (m)	FULL FLOW CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)	PERCENT FULL (%)
5034 NINTH LINE	1T	2T	0.72	0.72	209		1.84	385	385							0.1	385	4.00	5.4	13.0			13.1	0.40	250		37.6	0.77	0.69	35%
5054 NINTH LINE	2T	3T	1.03	1.75	298		1.84	548	933							0.4	933	3.82	12.5	13.0			13.4	0.40	250		37.6	0.77	0.69	35%
5080 NINTH LINE	3T	4T	2.86	4.61	835		1.84	1536	2469							0.9	2469	3.51	30.4	30.4			31.3	0.35	300		57.2	0.81	0.82	55%
5104 NINTH LINE	4T	5T	0.77	5.38	29		3.24	94	2563							1.1	2563	3.50	31.4	31.4			32.5	0.35	300		57.2	0.81	0.82	57%
NINTH LINE	5T	6T	2.22	7.60					2563							1.5	2563	3.50	31.4	31.4			33.0	0.35	300		57.2	0.81	0.82	58%
5150 NINTH LINE	6T	7T	3.99	11.59	164		3.24	532	3095							2.3	3095	3.43	37.2	37.2			39.5	0.35	300		57.2	0.81	0.85	69%
5170 NINTH LINE	7T	8T	0.73	12.32	27		3.24	89	3184							2.5	3184	3.42	38.2	38.2			40.6	0.35	300		57.2	0.81	0.87	71%
NINTH LINE	8T	9T		12.32					3184							2.5	3184	3.42	38.2	38.2			40.6	0.35	300		57.2	0.81	0.87	71%

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APPENDIX B

DRAWINGS

- Drawing 1 – Site Grading
- Drawing 2 – Grading Cross Sections
- Drawing 2A – Grading Cross Sections
- Drawing 3 – Site Servicing
- Drawing 4 – ROW Cross Sections
- Drawing 5A – Existing Storm Drainage
- Drawing 5 – Storm Drainage
- Drawing 6 – Sanitary Drainage

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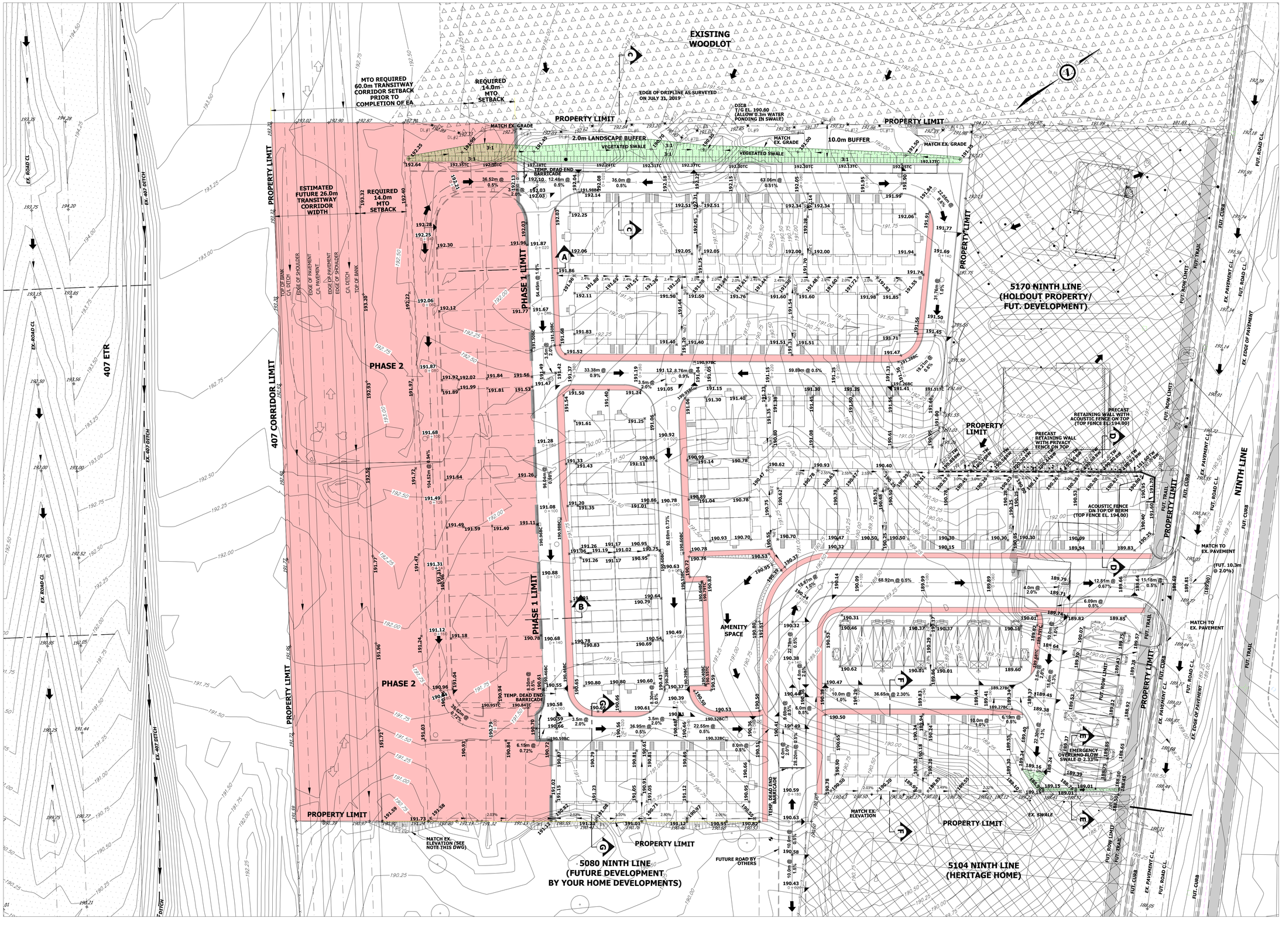

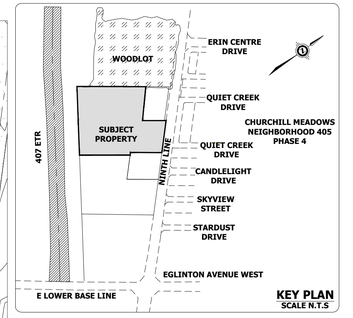

LEGEND

- 191.50 — ORIGINAL GROUND CONTOUR
- × 191.63 — EXISTING ELEVATION
- ×192.25 — PROPOSED ELEVATION
- OVERLAND FLOW DIRECTION
- PHASE 2 DEVELOPMENT (SUBJECT TO MTO TRANSITWAY CORRIDOR EA)
- PRIVACY FENCE
- ACOUSTIC FENCE (MAX HEIGHT 2.4m)

NOTES:

* PRIOR TO COMPLETION OF MTO TRANSITWAY CORRIDOR EA AND DETAIL DESIGN, PROPOSED DEVELOPMENT WILL BE PHASED UP TO 74.0m OFFSET FROM THE 407 CORRIDOR LIMIT.
* PHASE 2 DEVELOPMENT CONCEPT AND FUTURE TRANSITWAY CORRIDOR CONFIGURATION SHOWN ON THIS PLAN ARE CONCEPTUAL ONLY, AND THE DEVELOPMENT LIMITS WILL BE CONFIRMED THROUGH THE MTO EA PROCESS.
* REFER TO DRAWINGS 2 AND 2A FOR GRADING CROSS SECTIONS A-A to G-G.
* REFER TO DRAWING 4 FOR PROPOSED DEVELOPMENT ROWs AND FUTURE NINTH LINE ROAD CROSS SECTIONS.
* ENCROACHMENT PERMISSION TO BE OBTAINED FROM 5080 NINTH LINE FOR TEMPORARY GRADING ON THEIR PROPERTY

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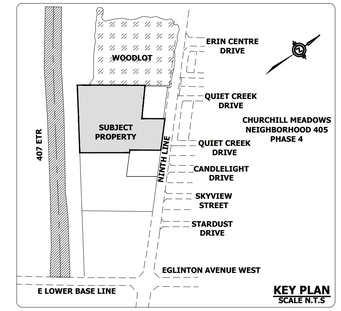
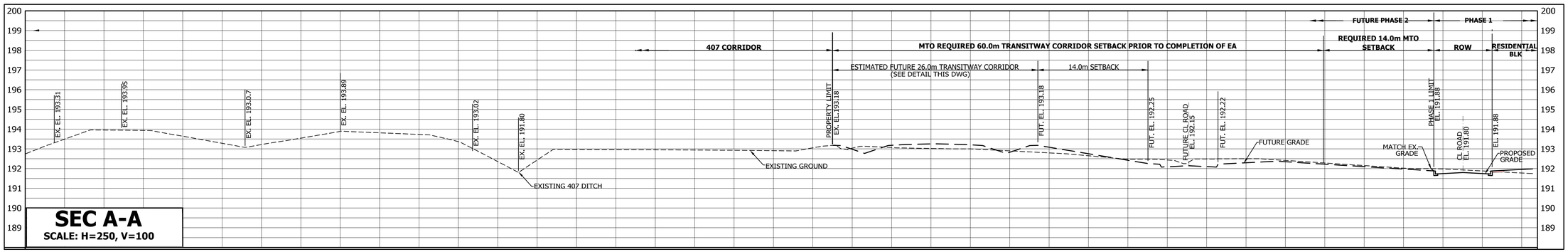
SITE GRADING

PROJECT No.	DATE	SCALE	DWG No.
19-608	OCT. 2019	1:500	1



KEY PLAN
SCALE N.T.S



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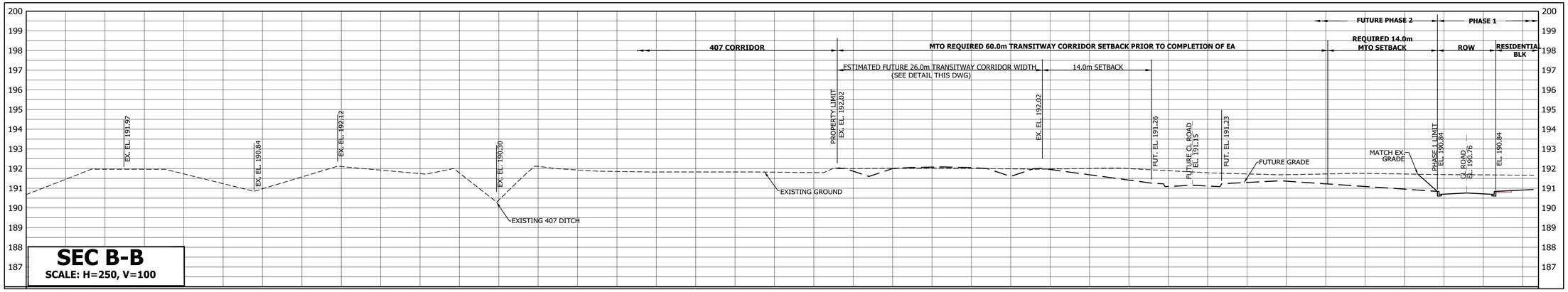

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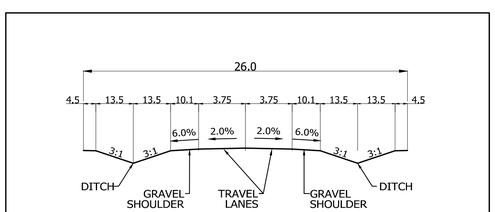

PRELIMINARY FUTURE TRANSITWAY CORRIDOR SECTION

NOTES:

* REFER TO DRAWING 1 FOR LOCATION OF CROSS SECTIONS
* PRIOR TO COMPLETION OF MTO TRANSITWAY CORRIDOR EA AND DETAIL DESIGN, PROPOSED DEVELOPMENT WILL BE PHASED UP TO 74.0m OFFSET FROM THE 407 CORRIDOR LIMIT
* FUTURE TRANSITWAY CORRIDOR CROSS SECTION DETAILS ARE CONCEPTUAL ONLY AND WILL BE CONFIRMED THROUGH THE EA PROCESS

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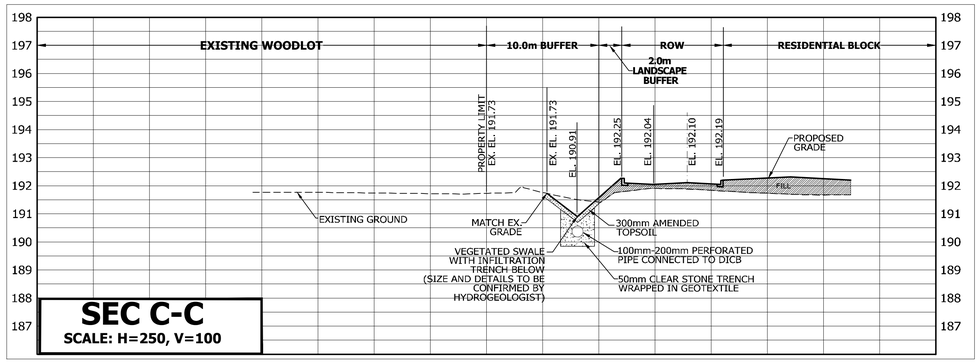
GRADING SECTIONS A-A AND B-B

PROJECT No.	DATE	SCALE	DWG No.
19-608	OCT. 2019	AS SHOWN	2

File: P:\Projects\19-608 5150 & 5170 Ninth Line Mattamy\Reports\FSR\Drawings & Figures\DWG 2_Grading Cross Sections.dwg – Revised by <<BLANUSA>> - Thu, Oct 24 2019 – 2:26pm



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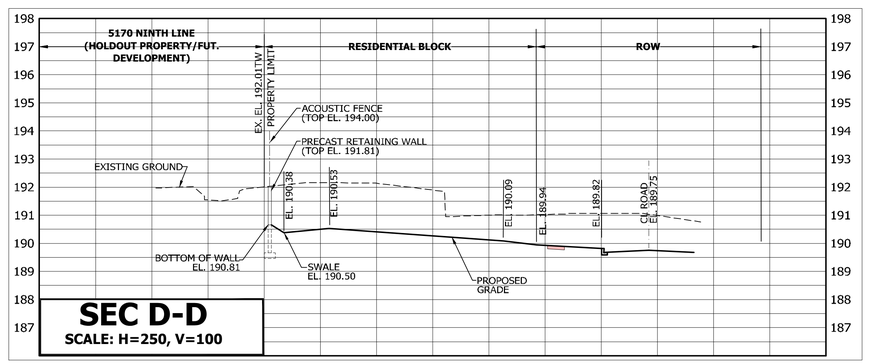

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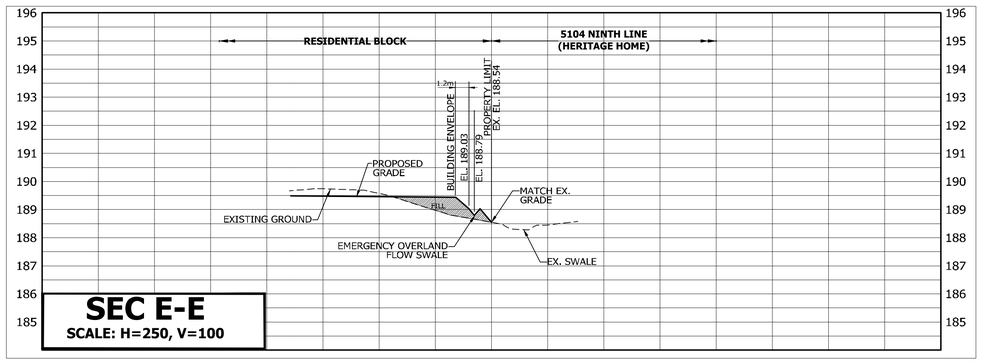

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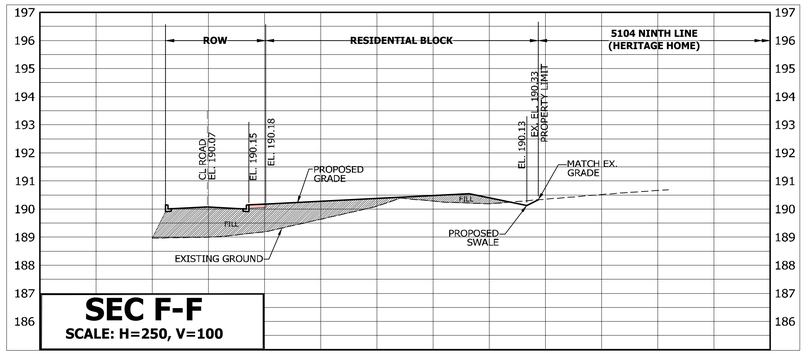

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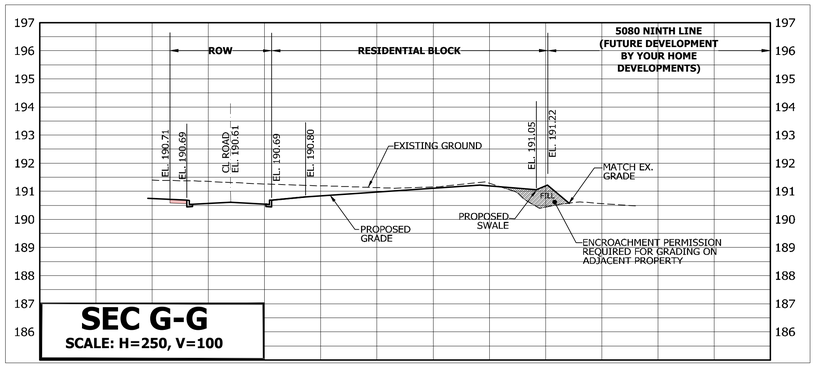

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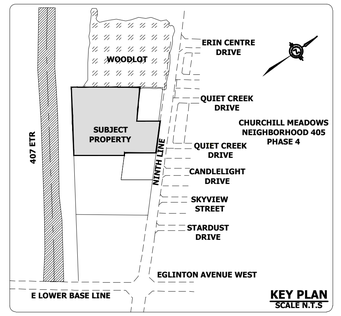

KEY PLAN
SCALE N.T.S

NOTES:

* REFER TO DRAWING 1 FOR LOCATIONS OF CROSS SECTIONS

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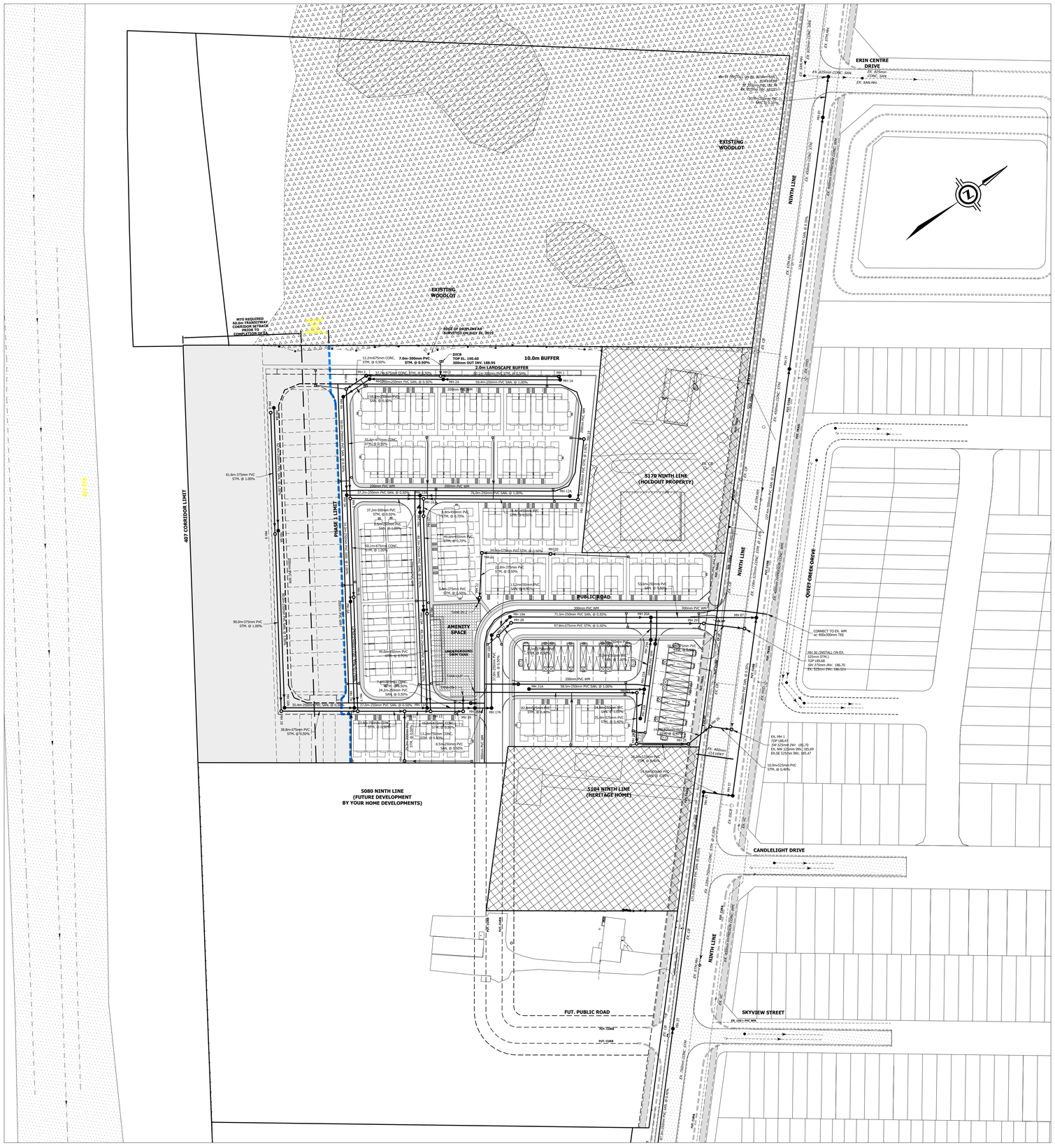
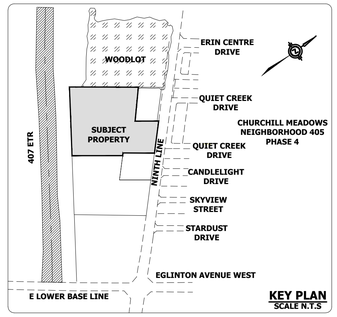
GRADING SECTIONS C-C TO G-G

PROJECT No.	DATE	SCALE	DWG No.
19-608	OCT. 2019	AS SHOWN	2A



SANITARY STRUCTURE TABLE		
MH	*T/G*	*INVERTS*
MH 0T	187.30	NW185.61
MH 1A	191.88	SW188.93
MH 1T	187.63	NW185.38 SE185.41
MH 2A	192.18	NE188.34 SW188.31
MH 2T	187.66	SE185.18 NW185.15
MH 3A	192.03	NE188.12 S188.09
MH 3T	0.00	SE184.81 NW184.76
MH 4A	191.98	N188.01 SE187.98
MH 4T	188.20	NE184.27 SE184.33
MH 5A	191.48	NW187.73 SE187.70 NE187.83
MH 5T	187.74	SW184.22 NW184.16
MH 6A	190.95	NW187.16 SE187.13
MH 6T	189.71	SW184.73 NW183.81 SE183.84
MH 7A	190.65	NW186.59 NE186.56 SW186.59
MH 7T	191.80	SE183.36 NW183.33
MH 8A	192.27	SE188.38
MH 8T	192.73	SE182.88 NW182.85
MH 9A	191.69	NW187.75 SE187.72
MH 9T	192.88	SE182.78
MH 10A	187.95	NW186.82 NE186.76
MH 11A	190.47	NW186.37 NE186.04 NW186.71
MH 12A	191.32	SW188.37
MH 13A	191.10	NE187.61 SE187.55 SW187.64
MH 14A	191.00	NW187.46 SE187.43
MH 15A	190.64	NW187.09 SE187.06
MH 16A	190.37	SW185.92 NE185.89
MH 17A	190.46	SW185.85 NW185.76
MH 18A	190.23	SE185.57 N185.51
MH 19A	190.10	S185.45 NE185.39
MH 20A	189.77	SW185.03 NE185.00 SE185.71
MH 21A	190.31	NE187.36
MH 22A	189.43	SE186.14 NW186.11 SW186.77
MH 23A	189.24	NW186.29
MH 24A	189.73	SE185.86 NW185.83

STORM STRUCTURE TABLE		
MH	*T/G*	*INVERTS*
EX. MH 1	188.47	SW185.70
MH 1	191.85	SW189.60
MH 2	192.15	NE189.30 SW188.92
MH 3	191.99	NE188.74 S188.71
MH 4	191.98	N188.64 SE186.61
MH 5	191.43	NW188.34 SE188.31 NE188.73
MH 6	190.94	NW187.81 SE187.78
MH 7	190.61	NW187.20 NE187.12 SW187.50
MH 8	192.22	SE189.32
MH 9	191.64	NW188.70 SE188.67
MH 10	187.90	NW187.77 NE187.69
MH 11	190.49	NW187.16 NE186.97 SE187.43
MH 12	190.71	NW187.55
MH 13	190.42	SW186.91 NE186.83 NW187.21
MH 14	191.61	SE188.93
MH 15	191.35	NW188.62 SW188.47
MH 16	191.05	SW188.54 SE188.02 NE188.08
MH 17	190.95	NW187.96 SE187.93
MH 18	190.59	NW187.58 SE187.55
MH 19	190.34	SW186.75 NW186.69
MH 20	190.25	SW187.39
MH 21	190.62	NE187.22 SE187.16
MH 22	190.55	NW187.04 SE187.01
MH 23	189.33	SW186.18 SE186.12
MH 24	189.15	NW186.02 NE185.96
MH 25	188.45	SW185.86 N185.83
MH 26	188.53	S185.77 NE185.74
MH 27	190.26	N187.40
MH 28	190.17	S187.35 NE187.32
MH 29	189.62	SW186.83 NE186.80
MH 30	189.68	SW186.70
TANK-IN-1	*N/A*	SE186.65
TANK-IN-2	*N/A*	NW187.00
TANK-OUT	*N/A*	NE186.51



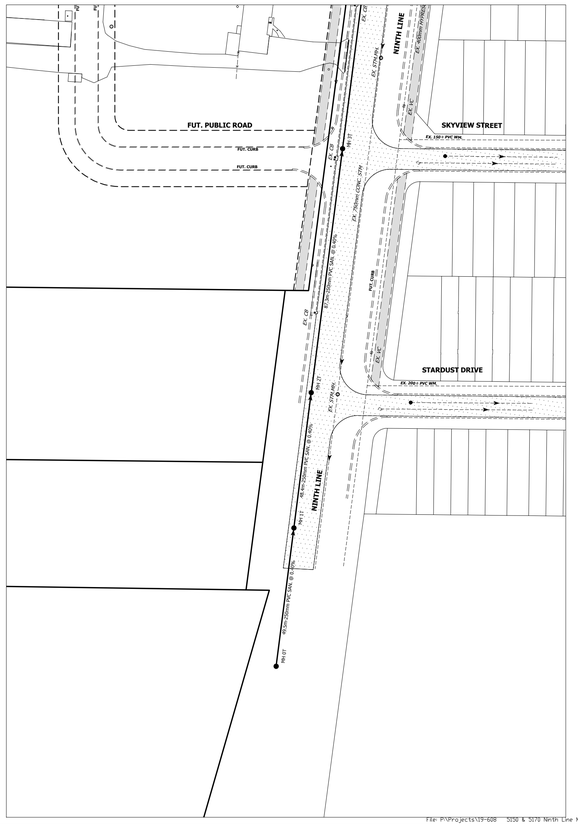
KEY PLAN
SCALE N.T.S

LEGEND

- PHASE 2 DEVELOPMENT (SUBJECT TO MTO TRANSITWAY CORRIDOR EA)
- HOLDOUT PROPERTY
- WOODLOT
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- SINGLE CATCHBASIN
- DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE AND BOX
- CHECK VALVE IN CHAMBER

UNDERGROUND STORMWATER TANK

- TOTAL STORAGE VOLUME = 2632m³
- TANK AREA = 940m²
- TANK DEPTH = 2.80m (MINIMUM COVER =1.2m)
- INVERT IN (NORTH) = 187.00m
- INVERT IN (SOUTH) = 186.65m
- INVERT OUT = 186.51m



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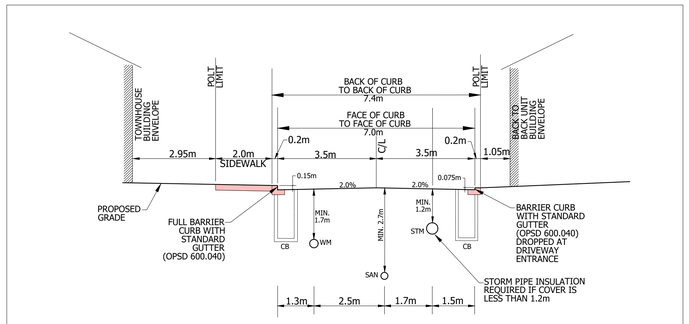
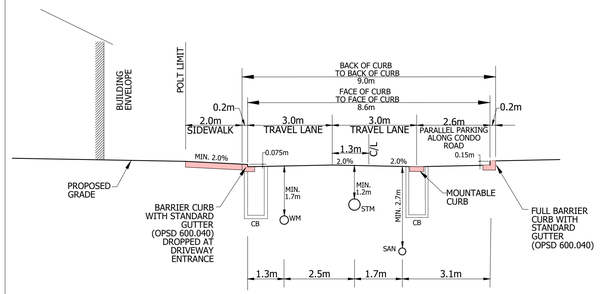
SITE SERVICING

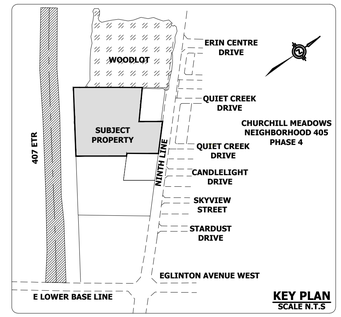
PROJECT No.	DATE	SCALE	DWG No.
19-608	OCT. 2019	1:1000	3



TYPICAL 7.0m PAVEMENT ROAD CROSS SECTION

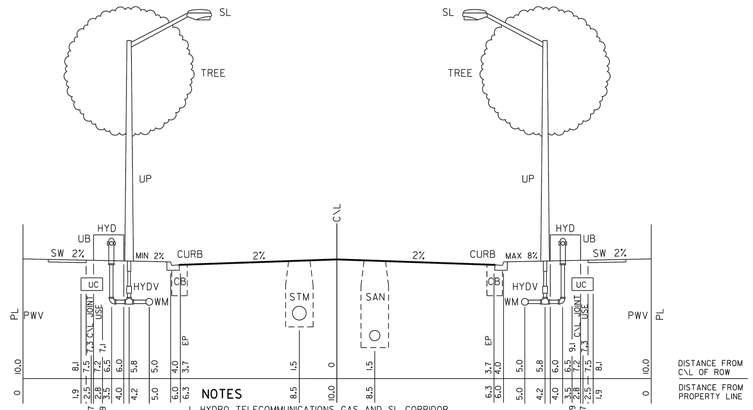


TYPICAL PRIVATE LANEWAY CROSS SECTION (WITH ON STREET PARKING)



KEY PLAN
SCALE N.T.S

METRIC
ALL DIMENSIONS IN METRES



LEGEND

EP - EDGE OF PAVEMENT
CB - CATCH BASIN
CURB - CURB OR CURB AND GUTTER
C/L - CENTRELINE
GAS - GAS MAIN
HYD - FIRE HYDRANT
HYDV - FIRE HYDRANT VALVE
PWV - PRIVATE WATER VALVE
PL - PROPERTY LINE
SL - STREETLIGHT
SW - SIDEWALK
SAN - SANITARY SEWER
STM - STORM SEWER
UB - UTIITY BOX (HYDRO,TELECOMMUNICATIONS)
UC - UTILITY CORRIDOR (HYDRO,TELECOMM,GAS,SL)
UP - UTILITY POLE
WM - WATERMAIN

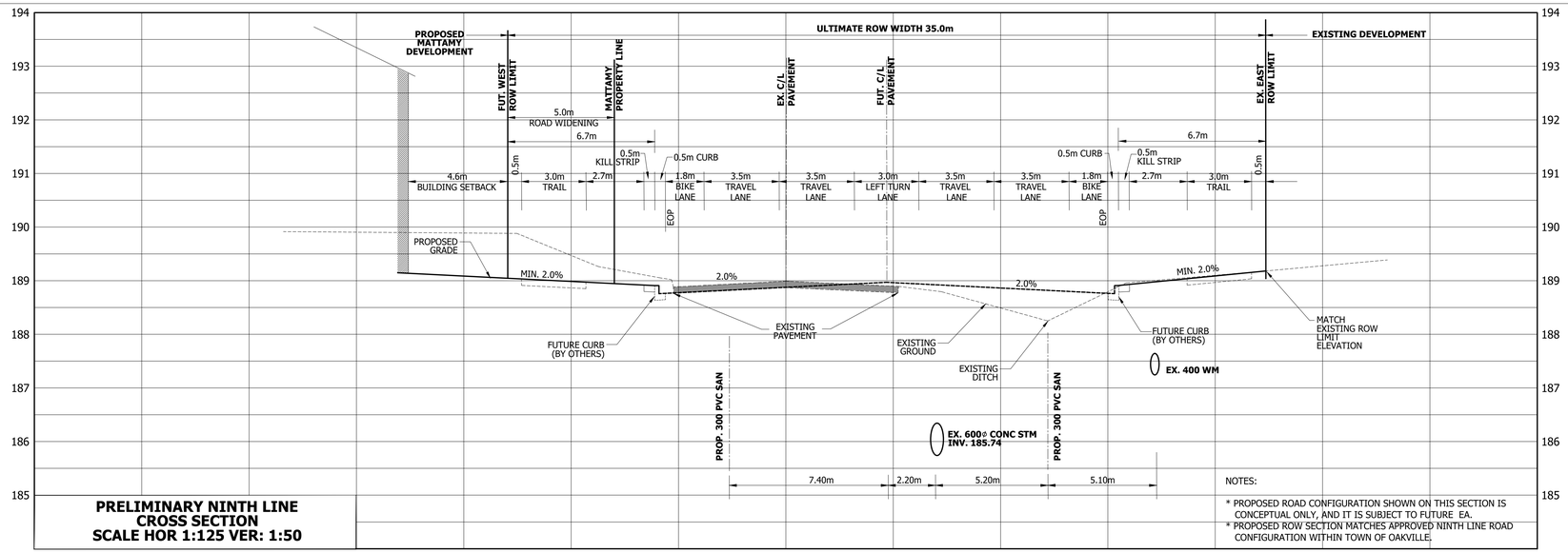
NOTES

1. HYDRO, TELECOMMUNICATIONS, GAS AND SL CORRIDOR TO HAVE A MINIMUM COVER OF 0.965m.
2. WATERMAIN TO HAVE A MINIMUM COVER OF 1.7m.
3. IF UTILITIES CANNOT BE INSTALLED ACCORDING TO THIS STANDARD THEY ARE TO BE INSTALLED AS CLOSE AS POSSIBLE TO THE PRESCRIBED LOCATION SUBJECT TO THE APPROVAL OF THE TRANSPORTATION AND WORKS DEPARTMENT OF THE CITY OF MISSISSAUGA.
4. A 0.4m - 0.6m CLEARANCE MUST BE MAINTAINED BETWEEN CABLES AND HYDRANTS.
5. A 0.3m CLEARANCE MUST BE MAINTAINED BETWEEN WATERMAINS AND UTILITY POLES.
6. ROAD WIDTH IS MEASURED FROM FACE OF CURB TO FACE OF CURB AS DEFINED ON OPSD STD. 600.040 CURB & GUTTER. PAVEMENT WIDTH IS MEASURED FROM EDGE OF PAVEMENT (EP) TO EDGE OF PAVEMENT (EP).
7. FOR LOCATION OF GAS MAIN WITHIN UTILITY CORRIDOR REFER TO STD. 2211.280

MISSISSAUGA

STANDARD
LOCAL RESIDENTIAL ROAD
8.0m ROAD ON 20m ROW

EFF. DATE	2002-01-01	SCALE	N.T.S.
REV. 7	2015-06-05	STANDARD No.	2211.070



PRELIMINARY NINTH LINE CROSS SECTION SCALE HOR 1:125 VER: 1:50

NOTES:

* PROPOSED ROAD CONFIGURATION SHOWN ON THIS SECTION IS CONCEPTUAL ONLY, AND IT IS SUBJECT TO FUTURE EA.
* PROPOSED ROW SECTION MATCHES APPROVED NINTH LINE ROAD CONFIGURATION WITHIN TOWN OF OAKVILLE.

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ROW CROSS SECTIONS

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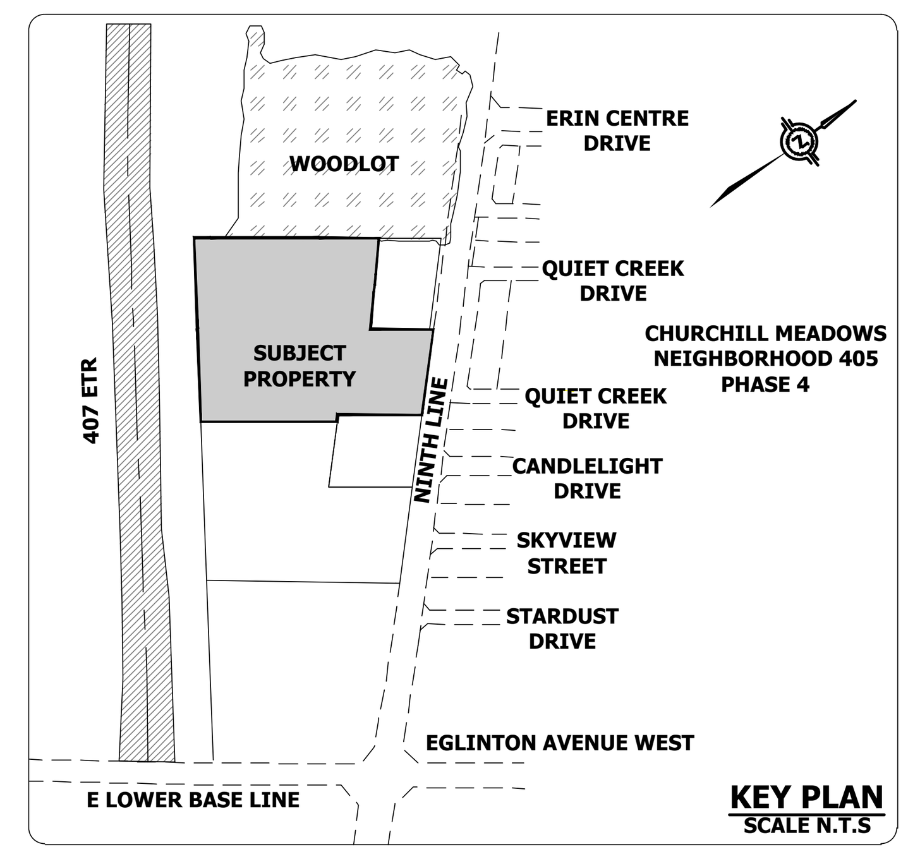
19-608	OCT. 2019	1:100	4



KEY PLAN
SCALE N.T.S

LEGEND

- SUBJECT PROPERTY
- NON-PARTICIPATING LAND OWNERS
- WETLAND
- EXISTING CONTOUR
- DRAINAGE AREA (ha) / IMPERVIOUSNESS (2.50ha 50%)
- EXISTING STORM SEWER AND MANHOLE
- EXISTING OVERLAND FLOW DIRECTION
- EXISTING DRAINAGE BOUNDARY

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EXISTING STORM DRAINAGE

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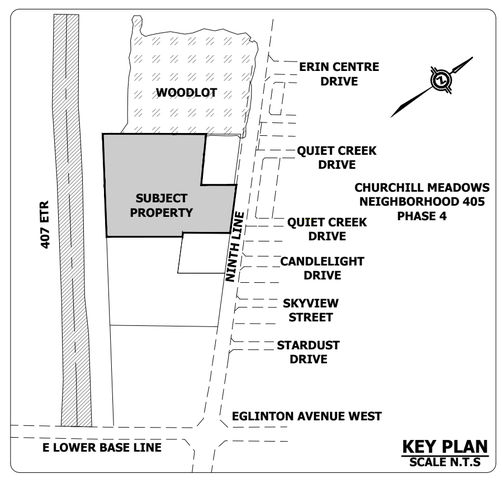
19-608	OCT. 2019	1:1250	5A



LEGEND

- PHASE 2 DEVELOPMENT (SUBJECT TO MTO TRANSITWAY CORRIDOR EA)
- HOLDOUT PROPERTY
- WOODLOT
- 247.00 — EXISTING GROUND CONTOUR AND ELEVATION
- PROPOSED STORM SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- SINGLE/REARLOT CATCHBASIN
- DOUBLE CATCHBASIN
- 0.75Ha / 0.50 — DRAINAGE AREA (ha) FOR MINOR SYSTEM (10 YEAR) FLOW / RUNOFF COEFFICIENT
- MINOR SYSTEM DRAINAGE AREA BOUNDARY
- PUBLIC ROW MINOR SYSTEM DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE AREA BOUNDARY
- OVERLAND FLOW ROUTE

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STORM DRAINAGE PLAN

PROJECT No.	DATE	SCALE	DWG No.
19-608	OCT. 2019	1:1000	5

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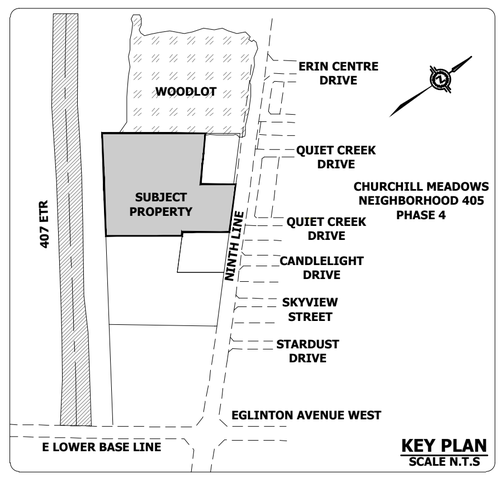

KEY PLAN
SCALE N.T.S

LEGEND

- PHASE 2 DEVELOPMENT (SUBJECT TO MTO TRANSITWAY CORRIDOR EA)
- HOLDOUT PROPERTY
- WOODLOT
- FUTURE SANITARY DRAINAGE DIRECTION
- SANITARY MANHOLE AND FLOW DIRECTION ARROW
- EXISTING SANITARY SEWER
- SANITARY DRAINAGE AREA BOUNDARY
- EXTERNAL SANITARY DRAINAGE AREA BOUNDARY

0.73ha	SANITARY DRAINAGE AREA (HECTARES)
27UNITS	NUMBER OF PROPOSED UNITS
3.24 PPU	DENSITY (PEOPLE PER UNIT)
89	POPULATION

407 ETR

407 CORRIDOR LIMIT

EXISTING WOODLOT

PHASE 1 LIMIT

ERIN CENTRE DRIVE

EX. 825ø CONC. SAN.

EX. SAN.MH.

20.9m-300mm PVC SAN. @ 0.35%

MH 5T

MH 6T

MH 7T

128.9m-300mm PVC SAN. @ 0.35%

122.4m-300mm PVC SAN. @ 0.35%

NINTH LINE

QUIET CREEK DRIVE

MEDIUM DENSITY

5170 NINTH LINE (HOLDOUT PROPERTY)

0.73ha
27UNITS
3.24 PPU
89

3.99ha
164 UNITS
3.24 PPU
532

MH 3A — 37.3m-250mm PVC SAN. @ 0.50% — MH 2A — 59.4m-250mm PVC SAN. @ 1.00% — MH 1A

16.2m-250mm PVC SAN. @ 0.50%

MH 4A — 50.0m-250mm PVC SAN. @ 0.50%

MH 9A — 62.4m-250mm PVC SAN. @ 1.00%

MH 10A — 90.6m-250mm PVC SAN. @ 1.00%

MH 11A — 35.4m-250mm PVC SAN. @ 0.50%

MH 6A — 54.5m-250mm PVC SAN. @ 1.00%

MH 7A — 37.0m-250mm PVC SAN. @ 0.50%

MH 16A — 24.2m-250mm PVC SAN. @ 0.50%

MH 17A — 37.0m-250mm PVC SAN. @ 0.50%

MH 5A — 54.2m-250mm PVC SAN. @ 1.00%

MH 12A — 76.0m-250mm PVC SAN. @ 1.00%

MH 13A — 37.2m-250mm PVC SAN. @ 0.50%

MH 14A — 8.5m-250mm PVC SAN. @ 1.00%

MH 15A — 49.2m-250mm PVC SAN. @ 0.70%

MH 18A — 8.5m-250mm PVC SAN. @ 0.50%

MH 19A — 71.5m-250mm PVC SAN. @ 0.50%

MH 20A — 53.6m-250mm PVC SAN. @ 0.50%

13.2m-250mm PVC SAN. @ 0.50%

11.5m-250mm PVC SAN. @ 1.00%

MH 24A

25.2m-250mm PVC SAN. @ 1.00%

MH 22A

MH 21A — 58.5m-250mm PVC SAN. @ 1.00%

MH 23A — 14.9m-250mm PVC SAN. @ 1.00%

2.22ha
-
-
-

14.9m-300mm PVC SAN. @ 0.35%

MH 5T

MH 3T

91.2m-300mm PVC SAN. @ 0.35%

0.77ha
29 UNITS
3.24 PPU
94

5104 NINTH LINE (HERITAGE HOME)

121.2m-300mm PVC SAN. @ 0.35%

2.86ha
835 UNITS
1.84 PPU
1536

5080 NINTH LINE (FUTURE DEVELOPMENT BY YOUR HOME DEVELOPMENTS)

SKYVIEW STREET

MH 3T

87.2m-250mm PVC SAN. @ 0.40%

1.03ha
298 UNITS
1.84 PPU
548

5054 NINTH LINE (FUTURE DEVELOPMENT)

MH 2T

48.4m-200mm PVC SAN. @ 0.40%

MH 1T

0.72ha
209 UNITS
1.84 PPU
385

5034 NINTH LINE (FUTURE DEVELOPMENT)

49.5m-250mm PVC SAN. @ 0.40%

MH 0T

STARDUST DRIVE

CANDLELIGHT DRIVE

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SANITARY DRAINAGE PLAN

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19-608	OCT. 2019	1:1000	6

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