SITE SERVICING REPORT
21 HUNTMAR DRIVE

Project: 127134-6.04.01

City No.: D07-12-21-0035

Prepared for North American Development Group
by IBI Group
October 29, 2021

January 24, 2022

1 INTRODUCTION

1.1 Scope

The purpose of this report is to outline the required municipal services, including water supply, stormwater management and wastewater disposal, needed to support the redevelopment of the subject property. The property is approximately 1.6 hectares in area and is located on the west of Huntmar Drive just south of the intersection of Huntmar Drive and Hazeldean Road. The parcel is located across the road from the owners commercial development, and prior to the creation of Huntmar Drive the subject parcel was part of the main parcel located now located on the east side of Huntmar Dr.. Please refer to **Figure 1 – Location Plan** in **Appendix A** for more details.

This Site Servicing Study, which also includes the Stormwater Management Plan, and Erosion and Sedimentation Control Plans, are being completed in support of the Site Plan Application.

1.2 Subject Site

The subject lands are located within the Kanata West Development Area (KWDA) and therefore are subject to the requirements of the KWDA Master Servicing Reports. Since the first site plan approval in 2010, this parcel was intended to be developed as a commercial site, to address market demands the owner is submitting for Site Plan Approval for two six storey residential buildings, with a total of 344 residential units. The proposed development also includes two level of underground parking. Vehicular access to the site will be from Huntmar Drive, where the proposed driveway is opposite the existing entrance for the existing commercial site. Please refer to Site Plan prepared by RLA Architects located in **Appendix A** for more information.

The site currently consists of vacant lot, a copy of the site topographic survey and legal boundary plan prepared by Fairhall Moffatt and Woodland is included in **Appendix A**

1.3 Pre-consultation

It should be noted that a pre-consultation with the Ministry of the Environment is not required since this site is serviced by existing separated municipal sanitary and storm sewers and is a single owner residential site, thus an ECA is not required. A preconsulation meeting with the City of Ottawa was held on July 31, 2020 and a copy of the meeting notes are included in **Appendix A.**

2 WATER DISTRIBUTION

2.1 Existing Conditions

As previously noted, the site is located west of Huntmar Drive just north of Hazeldean Road. An existing 400 mm diameter watermain is located within the Huntmar Drive right of way. The watermains fall within the City of Ottawa's pressure zone 3W which will provide the water supply to the site. When the CDP and MSS were first completed to support the Kanata West development area, the planning for this area envisioned the adjacent parcels to the west to be serviced through this site. As development projects have advance those parcels have been constructed or designed to be serviced independently from this site.

2.2 Design Criteria

2.2.1 Water Demands

The population for apartment buildings is assumed at 1.4, 2.1 and 2.8 persons per unit for one, two and three bedroom units respectively, as found in Table 4.1 of the Design Guidelines. A watermain demand calculation sheet is included in **Appendix B** and the total water demands are summarized as follows:

	Subject Site
Average Day	2.00 l/s
Maximum Day	5.01 l/s
Peak Hour	11.02 l/s

2.2.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 480 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rates

A calculation using the Fire Underwriting Survey (FUS) method was conducted to determine the fire flow requirement for both buildings on the site. The buildings are considered non-combustible construction. Results of the analysis provides a maximum fire flow rate of 11,000 l/min or 183 l/s is required. A copy of the FUS calculation is included in **Appendix B**. The buildings will be designed with a Siamese fire connection for each building and they will be located on the building's frontage on Huntmar Drive.

2.2.4 Boundary Conditions

A boundary condition was provided by the City of Ottawa for the development based on connecting to the 400mm diameter watermain on Huntmar Drive. A copy of the boundary conditions is included in **Appendix B** and summarized in the following table. Since the proposed buildings are adjacent to the supply main and are connected with twin 200mm services no significant headloss is anticipated between the building and the source main which would impact the below noted analysis.

BOUNDARY CONDITIONS	
SCENARIO	HGL (m) Huntmar Drive
Maximum HGL	161.1m
Minimum HGL (Peak Hour)	156.7m
Max Day + Fire Flow	155.9m

2.3 Proposed Water Plan

The minimum water pressure inside the building at the connection is determined by the difference between the water entry elevation of 100.6m and the minimum HGL condition, resulting in a pressure 550 kPa which exceeds the minimum requirement of 276 kPa per the guidelines. Because the pressure at the 6th floor under minimum HGL conditions is close to the minimum requirement of 276 kPa, an onsite test will be required to confirm if a domestic water pump will be necessary for this building.

Maximum water pressure is determined by the difference between the water entry elevation of 100.6 m and the maximum HGL condition resulting in a pressure of 593.1 kPa, which is greater than the 552 kPa threshold in the guideline in which pressure control is required. Based on this result, pressure control is required for this building.

The boundary condition for Maximum Day and Fire Flow results in a pressure of 513.44 kPa at the ground floor level. In the guidelines, a minimum residual pressure of 140 kPa must be maintained in the distribution system for a fire flow and maximum day event. As a pressure of 513 kPa is achieved, the fire flow requirement is exceeded.

To service the property twin 200mm dia water services off Huntmar Drive are proposed, the services straddle an existing valve which will provide redundancy for the site, see site servicing plan 127134-C-001 in **Appendix B.** The proposed twin 200mm dia services will provide adequate supply to the building to meet demands while also providing service redundancy for the buildings.

3 WASTEWATER

3.1 Existing Conditions

When the MSS for the area was developed a 750mm dia trunk was designed to service this area, and as previously noted the usage was assumed to be commercial and based on the criteria at the time (50,000 l/d/Ha) this site was to drain into the 750 sewer. The site was also to convey flow from upstream lands to the west, however as previously noted the adjacent lands have been serviced independently.

3.2 Design Criteria

The sanitary sewers for the subject site will be based on the City of Ottawa design criteria. It should be noted that the sanitary sewer design for this study incorporates the latest City of Ottawa design parameters identified in Technical Bulletin ISTB-2018-01. Some of the key criteria will include the following:

- Commercial/Institutional flow 28,000 l/ha/d
- Residential flow 280 l/c/d
- Peaking factor 1.5 if ICI in contributing area >20%
1.0 if ICI in contributing area <20%
- Infiltration allowance 0.33 l/s/ha
- Velocities 0.60 m/s min. to 3.0 m/s max.
-

Given the above criteria, the average wastewater flow from the proposed development will be 2.51 l/s, the detailed sanitary sewer calculations and Tributary area plan are included in **Appendix C**. As noted previously when the supporting sewers were designed the site was assumed to be developed as a commercial site with an average flow of 50,000 l/d/Ha, and an infiltration factor of 0.28l/s/Ha, which would have resulted in an average flow of 1.33 l/s. The current plan estimates an average flow of 2.51 l/s which is approximately 1.18 l/s greater then original design, which within the larger context of discharging into a 750mm truck with a capacity of over 500l/s it is not anticipated to yield any negative impact on the down stream system.

3.3 Recommended Wastewater Plan

A 250mm dia sanitary service lateral is proposed to be extended from the existing sanitary MH in Huntmar Drive to service this site. Please refer to the site servicing plan 127134-C-001 in **Appendix A** for details.

4 STORMWATER SYSTEM

4.1 Existing Conditions

When the Kanata West MSS was completed this site was limited to a minor system flow (5yr) to 85 l/s/Ha and major flow was to be directed to Huntmar Drive. As noted previously the CDP envisioned a connection through this site to service the adjacent lands to the west, however those parcels have advanced their design/construction and are now independently serviced for both minor and major flows. The MSS noted this parcel to be serviced by an end of pipe SWM facility, Pond 5 and the connecting sewers have yet to be constructed. To allow this parcel and Mattamy's Fairwinds development proceed in advance of Pond 5, an interim SWM pond was constructed by Mattamy and cost shared by North American. The interim pond is constructed an operational providing end of pipe treatment of stormwater runoff which includes 80%TSS removal. See excerpt from SWM report by JF Sabourin and storm tributary area plan by DSEL for the Fairwinds Phase 5 and 8 in **Appendix D**.

4.2 Design Criteria

Since this site is serviced by a storm sewer system that was designed based on 85 l/s/Ha City of Ottawa requires the site to follow the following design criteria;

- Storm sewers designed to a 2 year level of service
- Site to be designed to limit the 100 year post development flow to a maximum of 132.74l/s (1.562 Ha @ 85 l/s/Ha).

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

• Design Storm	1:2 year return (Ottawa)
• Rational Method Sewer Sizing	
• Initial Time of Concentration	10 minutes
• Runoff Coefficients	
- Landscaped Areas	C = 0.30
- Asphalt/Concrete	C = 0.90
- Roof	C = 0.90
• Pipe Velocities	0.80 m/s to 6.0 m/s
• Minimum Pipe Size	250 mm diameter (200 mm CB Leads)

4.3 Proposed Minor System

Using the above-noted criteria, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan are included in **Appendix D**. The current servicing drawing outlines the proposed underground parking structure, all of the deck drains are located above the underground parking structure will be routed inside the building via the mechanical plumbing systems and directed to the building cistern located adjacent to the northern wall. All roof deck inlets will be controlled and will utilize rooftop storage, restricted flow from the roof decks will bypass the cistern and discharge to the storm service. The runoff from the landscaped areas will be collected and conveyed through a series of clear stone infiltration cells. These cells will provide both infiltration and stormwater storage. Volume of storage below the invert of the perforated pipe will be used for infiltration, and the volume of storage above the invert of the perforated pipe will be used for stormwater storage. Flow from the system will be controlled with an ICD and the outlet will connect to the joint outlet servicing the roof drains, and onsite cistern.

4.4 Stormwater Management

The subject site will be limited to a release rate established using the criteria described in section 4.2. This will be achieved through an inlet control device (ICD) at the outlet of the cistern, and inlet control devices on all roof deck inlets, and ICD at the outlet of the infiltration cells.

When rainfall events generate flows that are in excess of the site`s allowable release rate excess volume will be stored within the combination of a cistern, roof top and infiltration cells.

At certain locations within the site, the opportunity to capture runoff is limited due to grading constraints and building geometry. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties, and it is not always feasible to capture or store stormwater runoff. These “uncontrolled” areas, 0.121 hectares in total, based on 1:100 year storm uncontrolled flows the uncontrolled areas generate 50.76 l/s runoff (refer to Section 4.5 for calculation). The various roof decks will have inlets that control flow to a total of 27.72 l/s, which leaves 54.26l/s for the remaining surface inlets discharging into the cistern and infiltration cell, which have been sized to accommodate flow during the 1:100-year event, with no overflow leaving the site.

4.5 Inlet Controls

The allowable release rate for the 1.562 Ha site as noted previously is 132.74 l/s.

As noted in Section 4.4, a portion of the site will be left to discharge to the surrounding boulevards and roadways uncontrolled.

Based on a 1:100 year event, the flow from the three uncontrolled areas can be determined as:

$\mathbf{Q_{uncontrolled}}$ = $\mathbf{2.78} \times \mathbf{C} \times \mathbf{i_{100yr}} \times \mathbf{A}$ where:

C = Average runoff coefficient of uncontrolled area

$\mathbf{i_{100yr}}$ = Intensity of 100-year storm event (mm/hr)

$= 1735.688 \times (T_c + 6.014)^{0.820} = 178.56$ mm/hr; where $T_c = 10$ minutes

$\mathbf{A_1}$ = Uncontrolled Area = 0.037 Ha, C_{100} =1.0, Q_1=18.37l/s
$\mathbf{A_2}$ = Uncontrolled Area = 0.025 Ha, C_{100} =0.25, Q_2=3.10l/s
$\mathbf{A_3}$ = Uncontrolled Area = 0.057 Ha, C_{100} =1.00, Q_3=28.29l/s

Therefore, the uncontrolled release rate can be determined as:

$\mathbf{Q_{uncontrolled}}$ = **18.37+3.10+28.29= 49.76L/s**

The maximum allowable release rate from the remainder of the site can then be determined as:

$\mathbf{Q_{max\ allowable}}$ = $\mathbf{Q_{restricted} - Q_{uncontrolled}}$

= 132.74 L/s – 49.76 L/s = **82.97 L/s**

4.6 On-Site Detention

As noted in section 4.4 any excess storm water up to the 100-year event is to be stored on-site within the building cistern, infiltration cells, and on the roof decks in order to not surcharge the downstream municipal storm sewer system.

4.6.1 Site Inlet Control

The roof decks will utilize restrictor inlets such as the Watts RD-100-A-ADJ (or approved equal) to limit the inflow from each section of roof to the identified flow rates. Storage of runoff on the roof decks will be required to accommodate the 1:100 yr event, and scuppers will provide for overflow should a more extreme event occur or should an inlet become blocked. The Modified Rational Method (MRM) was used to identify the required storage, see the MRM calculations in **Appendix D** for details. The deck and driveway areas drain to the storm water cistern located adjacent to the building north wall, where a Tempest HF ICD (or approved equal) will restrict the flow from the tank to 42.51l/s at 1.26m head. The landscape areas will drain to the infiltration cells where additional storage above the infiltration volume will be used to accommodate restricting the flow from this system to 11.74 l/s with a Tempest MHF ICD at 0.71m head, the MRM spreadsheet in **Appendix D** identifies the required storage to accommodate the 1:100yr event. The following table summarizes the on-site storage requirements during both the 1:2-year and 1:100-year events.

ICD AREA	TRIBUTARY AREA	AVAILABLE STORAGE (M^3)	100-YEAR STORM		2-YEAR STORM	
			RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)	RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)
Cistern	0.510	210.00	42.51	208.88	42.51	54.60
Roof Deck 1A	0.044	17.60	2.52	16.02	2.52	3.88
Roof Deck 1B	0.041	16.40	2.52	14.50	2.52	3.43
Roof Deck 1C	0.030	12.00	1.89	10.51	1.89	2.47
Roof Deck 1D	0.058	23.49	2.52	23.41	2.52	6.06
Roof Deck 1E	0.061	24.40	3.15	23.11	3.15	5.75
Roof Deck 2A	0.044	17.60	2.52	16.01	2.52	3.87
Roof Deck 2B	0.078	33.15	3.15	32.29	3.15	8.50
Roof Deck 2C	0.029	11.60	1.89	10.01	1.89	2.33
Roof Deck 2D	0.057	23.09	2.52	22.86	2.52	5.89
Roof Deck 2E	0.030	12.00	1.89	10.51	1.89	2.47
Roof Deck 2F	0.058	23.20	3.15	21.56	3.15	5.29
Landscape	0.400	64.80	11.74	64.63	11.74	15.26
Unrestricted	0.119		49.76		23.00	
TOTAL	**1.559**	**489.33**	**131.73**	**474.27**	**104.97**	**119.81**

In all instances the required storage is met with the building cistern, landscape and roof top storage, respectively.

4.6.2 Overall Release Rate

As demonstrated above, the site uses various inlet control devices to restrict the 100 year storm event to 131.73 l/s. Restricted stormwater will be contained onsite by the building cistern, landscape clear stone cells, and roof top storage. Up to and including the 100 year event, there will be no overflow off-site from restricted areas, if however an more intense storm or should an inlet become blocked, overland routing has been provided to the approved outlet per the original system design.

5 SEDIMENT AND EROSION CONTROL PLAN

During construction, existing stream and storm water conveyance systems can be exposed to significant sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings may be used such as;

- Filter socks will remain on open surface structures such as manholes and catchbasins until these structures are commissioned and put into use;

- Installation of silt fence, where applicable, around the perimeter of the proposed work area.

During construction of the services, any trench dewatering using pumps will be fitted with a “filter sock.” Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. Consequently, until the surrounding surface has been completed these structures will be protected with a sediment capture filter sock to prevent sediment from entering the minor storm sewer system. These will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

The Sediment and Erosion Control Plan 127134-C-900 is included in **Appendix E**.

6 SOILS

Paterson Group was retained to prepare a geotechnical investigation for the proposed development. The objectives of the investigation were to prepare a report to:

- Determine the subsoil and groundwater conditions at the site by means of boreholes and monitoring well program.
- To provide geotechnical recommendations pertaining to design of the proposed development including construction considerations.

The geotechnical report PG5006-1 rev 2, “Geotechnical Investigation 21 Huntmar Drive” dated December 1, 2020. A copy of the report has been included with the SPA application. The report contains recommendations for building construction and site services, which include but are not limited to the following for site servicing:

- Bedding and cover for service pipes: bedding min 150mm compacted (95% SPMDD) OPSS Gran. A to the springline, and covered with OPSS Gran A

- Fill for driveway to be suitable native material or OPSS Select Subgrade Material placed in thin lifts compacted to 95% SPMDD

- Long term groundwater level 3 to 4m below grade

- Permissible Grade raise 1.2m

MATERIAL	Layer Thickness
• **Car Only Parking Areas**	
• Asphalt Wearing Course (Superpave 12.5)	• 50 mm
• Well Graded Granular Base Course (Granular ‘A’)	• 150 mm
• Well Graded Granular Sub-Base Course (Granular ‘B’ Type II)	• 300 mm
• **Access Lanes and Heavy Truck Parking**	
• Asphalt Wearing Course (Superpave 12.5)	• 40 mm
• Asphalt Binder Course (Superpave 19.0)	• 50 mm
• Well Graded Granular Base Course (Granular ‘A’)	• 150 mm
• Well Graded Granular Sub-Base Course (Granular ‘B’ Type II)	• 400 mm

Infiltration targets for the proposed site were outlined in the KWDA MSP. As indicated in Figure 5.4 of the MSS, the soil type within the proposed development area is characterized as clay with low recharge potential, and the geotechnical engineer confirmed the soil has a typical permeability of 7 to 25mm/hr . The infiltration target for the area, as identified within the MSP is 50-70mm/year, subsequently the MSS increased the requirement by 25%, hence the target range is now 62.5-87.5mm/yr. The subject site consists of approximately 1.56 Ha of development, the site is comprised of impervious Building deck and roof surfaces, and pervious landscape areas. It is proposed to install three infiltration cells within the 4000 m^2 of landscape areas.

The Infiltration cells will be drywells constructed approximately 1.5 to 1.8m below grade with clear stone, each cell will be 4m wide by 60m long, and 0.2m clear depth from bottom of perforated pipe to the bottom of the cell. The gross volume of each cell is $48m^3$, when clear Granular A stones are packed together they typically have approximately 30% voids, the voids will be used to retain water while infiltration occurs. To this end the approximate net volume of storage available for each cell is $14.4m^3$. This equates to a total net volume of $43.2m^3$ for the proposed infiltration system. The geotechnical engineer has confirmed the long range water table is 3 to 4m below the surface and to this end will not impact the infiltration cells operation. The infiltration cells will be fed storm runoff collected by the landscape drainage system which will be comprised of a series of catchbasins and storm pipes connected to the infiltration cells, see the Servicing Plan C-100 in **Appendix A**, and the Grading Plan C-200 in **Appendix E** for details on the proposed infiltration cells and the storm system collecting and discharging runoff into the infiltration cell.

The cells are set up such that if the volume of collected runoff from the landscape area exceeds the storage capacity of the infiltration cell excess runoff will be discharged to the downstream municipal storm sewer. As noted above the cells have a capacity of $43.2m^3$ for the 4000 m^2 drainage area 10.8mm of rainfall would be required to fill the cells.

Based on 2021 rainfall data from Environment Canada where for the months of March up to and including November, there were 63 days of rainfall of 0 to 5mm, and 39 days of 5mm or more rain occurred. Assuming the first 5mm of any rainfall does don’t reach the infiltration cell and all other rainfall events either infiltrate naturally or collected by the catchbasins and discharged into the infiltration cells, the following illustrates the volume of rainfall will supply the runoff to meet the infiltration targets:

The rainfall summary table in **Appendix E** illustrates the first 5mm is excluded, the next 10.8mm is collected, for 2021 data that equates to 256.7mm, for the 4000sm tributary area that equals

0.2567mX4000=1026.8m3, for the 1.56Ha site that equates to 1026.8/15600=0.658m, which is within the modified range of 62.5-87.5mm/yr.

For 2021 data there was only one back to back rain days of 15.8mm or more. Since the cells have a relatively shallow storage depth (200mm) the anticipated time to infiltrate is between 8 to 28hrs (7 to 25mm/hr), which could accommodate historic back to back events.

7 CONCLUSIONS

Municipal water, wastewater and stormwater systems required to accommodate the proposed development are available to service the proposed development. Prior to construction, existing sewers are to be CCTV inspected to assess sewer condition.

This report has demonstrated sanitary and storm flows from and water supply to the subject site can be accommodated by the existing infrastructure. Also, the proposed servicing has been designed in accordance with MECP and City of Ottawa current level of service requirements.

The use of lot level controls, conveyance controls and end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the sediment and erosion control plan during construction will minimize harmful impacts on surface water.

Based on the information provided herein, the development can be serviced to meet City of Ottawa requirements.

Report prepared by:

Demetrius Yannoulopoulos, P. Eng.
Director, Ottawa Office Lead

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APPENDIX A

- Site Plan
- Topographic Survey
- Preconsultation Meeting Notes

rla/architecture
roderick lahey architect inc.

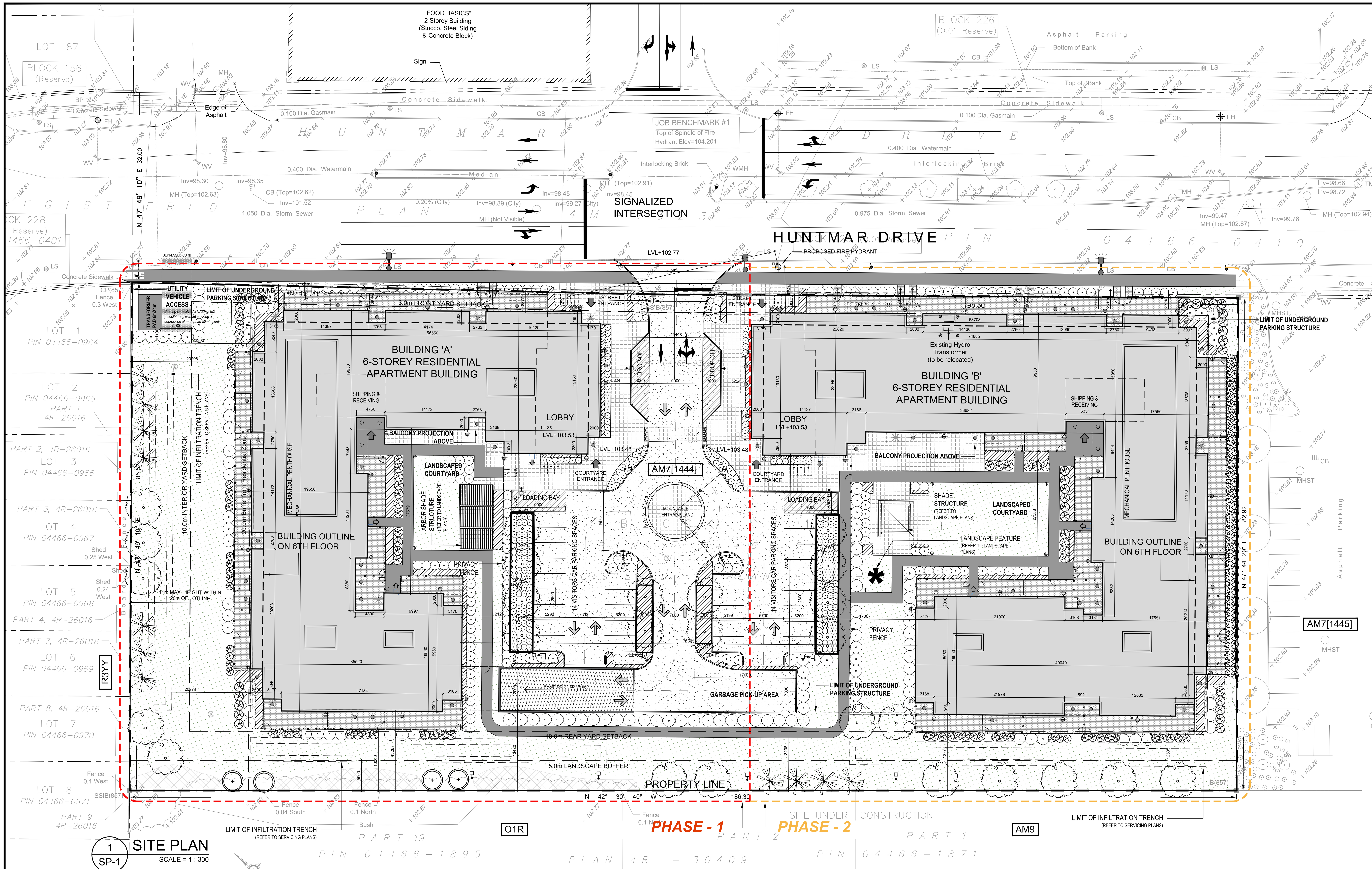
SITE LOCATION

February 2020

21 HUNTMAR DRIVE

OTTAWA, ONTARIO

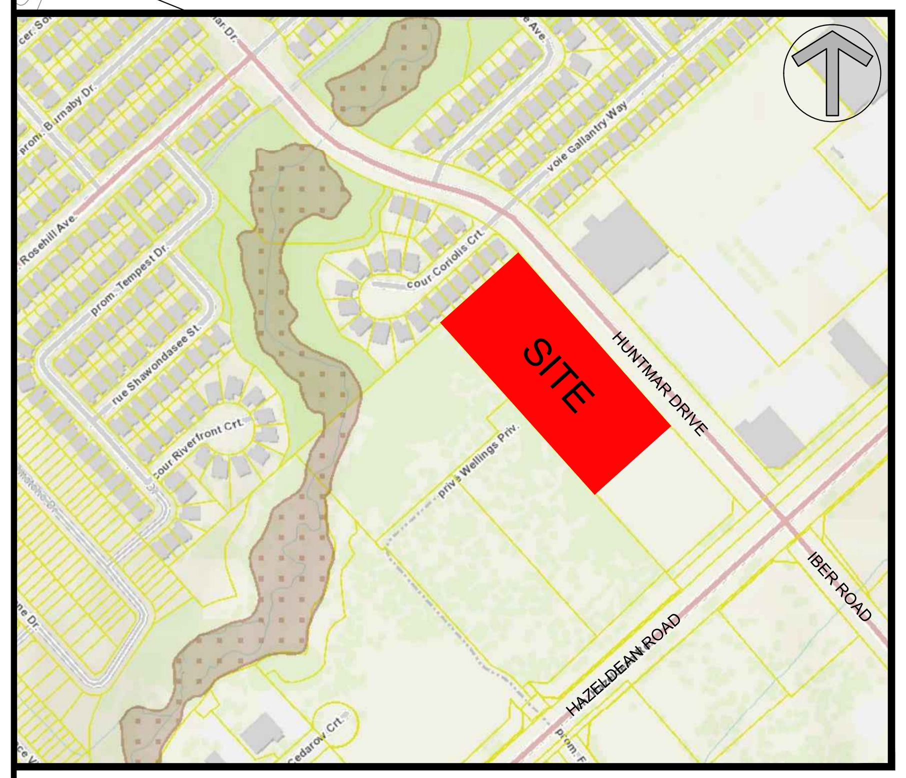
1A



SITE PLAN

1 / SP-1

SCALE = 1 : 300



KEY MAP

SITE PLAN SYMBOLS

- DRIVEWAYS AND PARKING
- PAVED SURFACE
- LANDSCAPE PLANTING
- CONCRETE SIDEWALK
- PRIVATE TERRACE FOR GROUND FLOOR UNITS
- PROPERTY LINE
- ZONING SETBACKS
- TWO WAY VEHICLE CIRCULATION
- MAIN ENTRANCE
- UNIT BALCONY DOOR / FIRE EXIT
- BIKE RACK
- EXTERIOR WALL LIGHT
- POT LIGHT UNDER CANOPY
- EXTERNAL LIGHT
- BOLLARD WITH LIGHTING
- SIAMESE CONNECTION
- FIRE HYDRANT

REFER TO ELECTRICAL PLANS FOR DETAILS

NOTE: SEE LANDSCAPE PLAN FOR PLANTATION, SURFACE MATERIALS AND PATTERNS

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

NOTATION SYMBOLS:

- 00 — INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- 00 — INDICATES ASSEMBLY TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDULE.
- 00 — INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- 000 — INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.

DETAIL NUMBER
00 TITLE
A000 A000 SCALE
DETAIL REFERENCE PAGE
DETAIL CROSS REFERENCE PAGE

NOTES:

- THE SITE WILL BE DEVELOPED IN TWO PHASES AS SHOWN.
- HUNTMAR DRIVE IS INTENDED TO BE USED AS THE FIRE ACCESS ROUTE. BUILDING ENTRANCES ARE LOCATED WITHIN A DISTANCE OF LESS THAN 15M FROM THE CURB OF HUNTMAR DRIVE.
- SNOW SHALL BE REMOVED FROM THE SITE.

No.	DESCRIPTION	DATE
5	REVISED FOR SPCA AS PER CITY'S 2nd ROUND COMMENTS	Sep. 25, 21
4	REVISED FOR SPCA AS PER CITY'S COMMENTS	Jul. 12, 21
3	ISSUED FOR SITE PLAN CONTROL APPLICATION (SPCA)	Feb. 09, 21
2	ISSUED FOR MINOR VARIANCE APPLICATION	Aug. 13, 20
1	ISSUED FOR DESIGN CONCEPT	Mar. 02, 19

REVISIONS:

ARCHITECT SEAL:

ONTARIO ASSOCIATION OF ARCHITECTS
RODERICK I. LAHEY
LICENCE
4375

SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT:

NorthAmerican DEVELOPMENT GROUP

ARCHITECT:

rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t 613.724.9932 f 613.724.1209 rla@rlaarchitecture.ca

PROJECT TITLE:

35 HUNTMAR DRIVE
&
21 HUNTMAR DRIVE

OTTAWA ONTARIO

SHEET TITLE:

SITE PLAN

DRAWN:	CHECKED:
AK	RL
SCALE: 1:300	SHEET No. SP-1
DATE: March 02, 2019	
PROJECT No. 1930	

D07-12-21-0035

ZONING INFORMATION

ZONE: AM7 [1444]

SITE AREA: 15,616.6 sq. m. (168,096 sq. ft.)

	REQUIRED	PROVIDED
MAX. BUILDING HEIGHT AS APPROVED THROUGH MINOR VARIANCE APPLICATION (FILE NO. D08-02-20/A-00195)	20.8m	20.8m
FRONT YARD SETBACK	3.0m	3.0m
MIN. INTERIOR YARD SETBACK ABUTTING 'R' ZONE	10.0m	20.0m
MIN. REAR YARD SETBACK	10.0m	12.5m
MIN. BUILDING FRONTAGE WITHIN 3.0m	30%	36.9% [68.71 / (87.71+98.5)]
LANDSCAPE BUFFER @ 'R' ZONE	10.0m	17.0m
LANDSCAPE BUFFER @ REAR LOT LINE	5.0m	9.4m
MAXIMUM LOT COVERAGE	50%	34%

BUILDING STATISTICS

TOTAL GROSS BUILDING AREA (Efficiency @86%): 26,869.71 sq. m. / 289,226 sq. ft.

TOTAL DWELLING UNITS: 349 DU

PHASE-1 BUILDING 'A'

BUILDING AREAS (BUILDING FOOTPRINT)

GROUND FLOOR		2,343.73 sq. m. 25,288 sq. ft.
2nd to 5th FLOOR	4 x 2,343.73 sq. m. 4 x 25,288 sq. ft.	9,374.92 sq. m. 100,912 sq. ft.
6th FLOOR		2,091.24 sq. m. 22,510 sq. ft.
TOTAL AREA		13,809.89 sq. m. 148,650 sq. ft.
GROSS BUILDING AREA (Estimated Efficiency @85%)		11,734.90 sq. m. 126,314 sq. ft.

UNIT STATISTICS

1 BEDROOM UNIT	63
2 BEDROOM UNIT	88
TOTAL	151

CAR PARKING		BICYCLE PARKING	
SURFACE PARKING	14	OUTDOOR STALLS	12
PARKING LEVEL P1	155	LEVEL P1	70
PARKING LEVEL P2	187		
TOTAL	356	TOTAL	82

PHASE-2 BUILDING 'B'

BUILDING AREAS (BUILDING FOOTPRINT)

GROUND FLOOR		2,962.63 sq. m. 31,890 sq. ft.
2nd to 5th FLOOR	4 x 2,962.63 sq. m. 4 x 31,890 sq. ft.	11,850.50 sq. m. 127,559 sq. ft.
6th FLOOR		2,682.36 sq. m. 28,873 sq. ft.
TOTAL AREA		17,495.48 sq. m. 188,321 sq. ft.
GROSS BUILDING AREA (Estimated Efficiency @87%)		15,134.81 sq. m. 162,911 sq. ft.

UNIT STATISTICS

1 BEDROOM UNIT	95
2 BEDROOM UNIT	103
TOTAL	198

CAR PARKING		BICYCLE PARKING	
SURFACE PARKING	14	OUTDOOR STALLS	12
PARKING LEVEL P1	143	LEVEL P1	115
TOTAL	157	TOTAL	127

CAR PARKING

REQUIRED

RESIDENCE	@ 1.2 PER UNIT (349 UNITS)	419
VISITOR	@ 0.2 PER UNIT	70
TOTAL		489

PROVIDED

SURFACE PARKING	28
PARKING LEVEL P1	298
PARKING LEVEL P2	187
TOTAL	513

BICYCLE PARKING

REQUIRED

RESIDENCE	@ 0.5 PER UNIT (349 UNITS)	175

PROVIDED

TOTAL BICYCLE PARKING	209

LOT COVERAGE

BUILDING FOOTPRINT =	34.00%	5,306.35 sq. m.
LANDSCAPE AREA =	53.45%	8,347.50 sq. m.
DRIVING+PARKING SURFACE =	12.55%	1,959.24 sq. m.
TOTAL =	100.00%	15,616.60 sq. m.

AMENITY SPACE

REQUIRED

REQUIRED - 6.0M² PER UNIT (349) =	2,094 sq. m.
REQUIRED COMMUNAL @ 50% =	1,047 sq. m.

PROVIDED

EXTERIOR AT GRADE =	2165.0 sq. m.
GROUND FLOOR COMMUNAL INTERIOR =	947.0 sq. m.
GROUND FLOOR PRIVATE TERRACES =	924.0 sq. m.
PRIVATE BALCONIES =	1429.0 sq. m.
6th FLOOR PRIVATE DECKS =	541.0 sq. m.
ROOF FLOOR COMMUNAL TERRACE =	480.0 sq. m.
TOTAL =	6,486.0 sq. m.
TOTAL COMMUNAL =	3,592.0 sq. m.

SOLID WASTE COLLECTION:

BUILDING 'A'	REQUIRED	PROVIDED
GARBAGE @ 0.110 cu yd per unit	15.40 yd	16 yd
GMP CONTAINERS @ 0.018 cu yd per unit	2.52 yd	3 yd
FIBRE CONTAINERS @ 0.038 cu yd per unit	5.32 yd	6 yd
ORGANICS CONTAINERS @ one 240L per 50 unit	2.80	3

BUILDING 'B'	REQUIRED	PROVIDED
GARBAGE @ 0.110 cu yd per unit	22.44 yd	24 yd
GMP CONTAINERS @ 0.018 cu yd per unit	3.67 yd	4 yd
FIBRE CONTAINERS @ 0.038 cu yd per unit	7.75 yd	8 yd
ORGANICS CONTAINERS @ one 240L per 50 unit	4.08	5

PROJECT DEVELOPER	CIVIL ENGINEER
NORTH AMERICAN DEVELOPMENT GROUP 2851 John Street, Suite One Markham, Ontario L3R 5R7 Tel: (905) 477-9200 E-Mail: vmccrum@nadg.com	**IBI GROUP** 400-333 Preston Street Ottawa ON K1S 5N4 Canada Tel: (613)225-1311 Email: dyannoulopoulos@IBIGroup.com
SURVEYOR	**LANDSCAPE DESIGNER**
FAIRHALL, MOFFATT & WOODLAND LIMITED 100-600 TERRY FOX DRIVE KANATA, ONTARIO K2L 4B6 Tel: (613) 591-2580 • Fax: (613) 591-1495 Email: info@fmw.on.ca	**NAK Design Strategies** 1285 Wellington St. W Ottawa, ON K1Y 3A8 Tel: (613) 237-2345 E-Mail: ottawa@nak-design.com
GEOTECHNICAL ENGINEER	**TRANSPORTATION ENGINEER**
paterson group 154 Colonnade Road South Ottawa, Ontario, K2E 7J5 Tel: 613.226-7381 Email: DGilbert@Patersongroup.ca	**D. J. Halpenny & Associates Ltd.** Consulting Transportation Engineers. P. O. Box 774, Manotick, ON K4M 1A7 Tel (613) 692-8662 • Fax (613) 692-1945 Email: david@djhalpenny.com

METRIC
DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

TOPOGRAPHIC SURVEY OF
BLOCK 1
REGISTERED PLAN 4M–1432
CITY OF OTTAWA

SCALE 1 : 400

0 10 20 40 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

ELEVATION NOTES

1. ELEVATIONS SHOWN HEREON ARE REFERRED TO GEODETIC DATUM.
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARKS HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THEIR RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

LEGEND

■	SURVEY MONUMENT FOUND
SIB	STANDARD IRON BAR
SSIB	SHORT STANDARD IRON BAR
IB	IRON BAR
CP	CONCRETE PIN
DIA.	DIAMETER
BLK	BLOCK
PIN	PROPERTY IDENTIFIER NUMBER
CB	CATCH BASIN
MH	MANHOLE
MHST	STORM MANHOLE
MHSA	SANITARY MANHOLE
WMH	WATER MANHOLE
TMH	TRAFFIC MANHOLE
HMH	HYDRO MANHOLE
FH	FIRE HYDRANT
TCB	TRAFFIC CONTROL BOX
WV	WATER VALVE
TL	TRAFFIC LIGHT
LS	LAMP STANDARD
UP	UTILITY POLE
BP	BELL PEDESTAL
MW	MONITORING WELL
	BOREHOLE
	BOLLARD
	GUY WIRE AND ANCHOR
	SIGN
	DECIDUOUS TREE
	CURB
—G—	GASMAIN
—S—	SANITARY SEWER
—ST—	STORM SEWER
—W—	WATERMAIN
—UB—	UNDERGROUND BELL
—UH—	UNDERGROUND HYDRO
—SL—	STREET LIGHTING
—C—	ROGERS CABLE
—W—	TRAFFIC
	EDGE OF TREES

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
2. UNDERGROUND UTILITIES, AS REPORTED ON THIS DRAWING, ARE NOT BASED ON AN ACTUAL 'FIELD LOCATE' BY THE RESPECTIVE UTILITY AGENCIES BUT HAVE BEEN COMPILED FROM DATA OBTAINED FROM THE FOLLOWING SOURCE:
   a) CITY OF OTTAWA PUBLIC UTILITIES REGISTRY
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

NOTES

1. THE SURVEY REPRESENTED BY THIS PLAN WAS COMPLETED ON AUGUST 25, 2015.
2. THE SURVEY REPRESENTED BY THIS PLAN WAS UPDATED ON JULY 29, 2019.
3. BEARINGS ARE GRID REFERRED TO THE SOUTHERLY LIMIT OF HUNTMAR DRIVE SHOWN ON PLAN 4M-1432 AS HAVING A BEARING OF N41°11'45"W.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 29, 2019.

2019/08/07
DATE

JOHN H. GUTRI
ONTARIO LAND SURVEYOR

THIS IS NOT A VALID COPY UNLESS EMBOSSED WITH SEAL

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100-600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591-2580 FAX: (613) 591-1495
www.fmw.on.ca

JOB No.	Z24700
	E 350751, N 5016205
REFERENCE No.	4(a) – 4M – 1432
S:\JOBS\Z24700\DWG 2019-07-31	z247_topo-up.dwg

21 Huntmar Drive
Pre-Consultation Meeting Minutes

Location: Room 4106E, City Hall
Date: July 31, 2019, 3pm to 4pm

Attendee	Role	Organization
Mark Young	Planner	City of Ottawa
Julie Candow	Project Manager (Infrastructure)	
Mike Giampa	Project Manager (Transportation)	
Matthew Ippersiel	Planner (Urban Design)	
Sami Rehman	Planner (Environmental)	
Samantha Gatchene	Planning Assistant	
Ron Richards	Owner's Representative	North American
Paul Ferarro	Owner's Representative	
Abhinav Sukumar	Architect	Roderick Lahey Architects

Comments from Applicant

1. The applicant is proposing the development of two (2) five-storey mid-rise buildings at 21 Huntmar Drive. The buildings would be residential apparments with 210 units total.
2. 334 underground parking spaces and 12 surface parking spaces would be provided.
3. One new access point is proposed off of Huntmar Drive. This driveway would lead to the surface parking lot on the interior of site, providing access to both buildings and the underground parking.

Planning Comments

1. This is a pre-consultation for a Site Plan Control application, Complex, subject to Public Consultation. Application form, timeline and fees can be found here.
2. With regards to maximum building height, the Zoning By-law permits a maximum of 11 metres in areas up to 20 metres from a property line abutting a residential zone.
3. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the Parkland Dedication By-law.

Urban Design Comments

1. The general built form approach and the L-shaped building footprints framing the street are supported and it is recommended that the applicant pursue this approach.
2. The ground-oriented units and proposed individual walkways are supported.
3. As the site plan and landscape plan progress, be mindful of demonstrating how the pedestrian pathway network will be properly lit and CPTED design principles have been applied.

Engineering Comments

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

2. Servicing and site works shall be in accordance with the following documents:
   ⇨ Ottawa Sewer Design Guidelines (October 2012)
   ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   ⇨ City of Ottawa Environmental Noise Control Guidelines (January 2016)
   ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   ⇨ City of Ottawa Accessibility Design Standards (2012)
   ⇨ Ottawa Standard Tender Documents (latest version)
   ⇨ Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

4. The Stormwater Management Criteria for the subject site is to be based on the following:
   i. The allowable storm release rate for the subject site is limited to 85 L/s/ha as per the Kanata West Master Servicing Study.
   ii. Onsite storm runoff, in excess of the allowable release rate, and up to the 1:100 year storm event must be detained on site.

iii. Post development infiltration rates are to be increased by 25 percent above the pre-development infiltration rates as per the Kanata West Master Servicing Study.
iv. Quantity control to be provided by the downstream stormwater management facility and/or as determined by the Mississippi Valley Conservation Authority (MVCA). Please include correspondence from the MVCA in the stormwater management report.
v. A letter of acknowledgment will be required to be obtained from Mattamy to allow storm flows from 21 Huntmar Drive to discharge to Mattamy's temporary SWM pond, within Mattamy's Phase 5 development.

5. No sanitary sewer capacity constraints were identified on Huntmar Drive during the initial review of the concept plan. A sanitary sewer connection to the existing 750mm diameter sanitary sewer within Huntmar Drive is acceptable.

6. As per Section 4.3.1 of the Water Design Guidelines, two watermain connections will be required to provide a looped connection if the basic day demand is greater than 50 m3/day (approx. 50 homes).

7. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
   i. Location of service
   ii. Type of development and the amount of fire flow required (as per FUS, 1999).
   iii. Average daily demand: ___ l/s.
   iv. Maximum daily demand: ___l/s.
   v. Maximum hourly daily demand: ___ l/s.

8. An MECP Environmental Compliance Approval is not anticipated to be required for the subject site.

9. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x13850 or by email at Julie.Candow@ottawa.ca.

Transportation Comments

1. A TIA is triggered for this site and they should proceed to Scoping (Step 2). This should be done prior to an application.

2. The signalization of the Huntmar access should be further explored.

3. The application will not be deemed complete until the submission of the draft Step 1-4, including the functional draft RMA package (if applicable).

4. A noise study is required.

Environmental Planning

1. The subject property is within the adjacency distance to the Natural Heritage Systems (See OP Section 2.4.2 and Schedule L3) and thus, triggers a requirement for an Environmental Impact Statement (EIS), as per OP Section 4.7.8. Given that butternut trees were identified in the adjacent woodlot, there is a potential for butternuts to be on the subject property. The field on the subject property may also host other endangered or threatened species.

2. The EIS should address and demonstrate no negative impacts on the NHS and to determine the presence of endangered or threatened species or their habitats on the subject property. Further details on the EIS requirements can be found in OP section 4.7.8 and the EIS guidelines. https://documents.ottawa.ca/sites/default/files/documents/eis_guidelines2015_en.pdf

Forestry

1. Any tree information can be combined into the EIS.

2. A tree permit is required if any trees need to be cut that are 10cm or larger in diameter.

Parks Planning

1. Recommend there is a pathway connection to the Poole Creek corridor (UNA 185);
2. Assumption that play area(s) are to remain as private ownership.
3. Although play area(s) are private, recommend the Owner adhere to City specifications and standards for play area(s) design, construction and maintenance.

4. The site is located within Kanata West CDP area, therefore 100% CIL direction to District Park

Mississippi Valley Conservation Authority

1. There does not appear to be any hazards or heritage features, however it appears to drain into Poole Creek so it is enhanced level of treatment and we generally recommend using LIDs.

2. The Master Serving Study for Kanata West (SWM) indicates infiltration targets 50 – 70 mm/yr., but it should be confirmed.

Requested Plans and Studies

1. A list of required plans and studies required for a complete Site Plan Control application have been attached.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at Mark.Young@ottawa.ca or at 613-580-2424 extension 41396 if you have any questions.

Sincerely,

Mark Young, MCIP RPP
Planner III
Development Review - West

APPENDIX B

- Watermain Demand Calculation Sheet
- FUS Fire Flow Calculation
- Watermain Boundary Condition
- C-001 General Plan
- C-010 Details Plan

WATERMAIN DEMAND CALCULATION SHEET

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT : 21 HUNTMAR DR
LOCATION : City of Ottawa
DEVELOPER : NORTH AMERICAN DEVELOPMENT GROUP

FILE: 127134-6.4.4
DATE PRINTED: 2021-02-08
DESIGN: 2021-01-19

NODE	RESIDENTIAL				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS			POP'N	INDTRL	COMM.	RETAIL										
	1bd	2bd	3bd		(ha.)	(ha.)	(m^2)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
BUILDING A	38	102		267				0.87	0.00	0.87	2.17	0.00	2.17	4.77	0.00	4.77	
BUILDING B	111	93	0	351				1.14	0.00	1.14	2.84	0.00	2.84	6.25	0.00	6.25	
Total	149	195	0	**618**				2.00	0.00	**2.00**	5.01	0.00	**5.01**	11.02	0.00	**11.02**	**11,000**

ASSUMPTIONS

RESIDENTIAL DENSITIES

One-bedroom/Studio (1bd)	1.4	p / p / u
Two-bedroom (2bd)	2.1	p / p / u
Three-bedroom (3bd)	2.8	p / p / u

** Residential Daily Demand reduced to coincide with current waste water guidelines

AVG. DAILY DEMAND

Residential:**	280	l / cap / day
Industrial:		l / ha / day
Commercial:		l / ha / day
Retail:		l / 1000m^2 / day

MAX. DAILY DEMAND

Residential:	700	l / cap / day
Industrial:		l / ha / day
Commercial:		l / ha / day
Retail:		l / 1000m^2 / day

MAX. HOURLY DEMAND

Residential:	1,540	l / cap / day
Industrial:		l / ha / day
Commercial:		l / ha / day
Retail:		l / 1000m^2 / day

FIRE FLOW

From FUS Calculation 11,000 l / min

Fire Flow Requirement from Fire Underwriters Survey - 21 Huntmar Drive

Building A

Floor	Area (m^2)	Two Largerst	Floors Above at
1	2341	2341	
2	2341	2341	
3	2341		1170.5
4	2341		1170.5
5	2341		1170.5
6	2091		1045.5
Total	13796	4682	**4557**

(**Note**: For fire-resistive buildings, consider two largest adjoining floors plus 50% of each of any floors immediately above them

Floor Area (1 & 2)	4,682	m^2
50% Floor Area (3 to 8)	4,557	
Total Floor Area	9,239	m^2

$F = 220C\sqrt{A}$

C	0.6	C =	1.5	wood frame
A	9,239 m^2		1.0	ordinary
			0.8	non-combustible
F	12,688 l/min		0.6	fire-resistive
use	13,000 l/min			

Occupancy Adjustment

		-25%	non-combustible
		-15%	limited combustible
Use	-15%	0%	combustible
		+15%	free burning
Adjustment	-1950 l/min	+25%	rapid burning
Fire flow	11,050 l/min		

Sprinkler Adjustment

		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	-30%		
Adjustment	-3315 l/min		

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall Length	Stories	L*H Factor	Exposure Charge *
north	40.0				5%
east	25.5	20.0	6	120	9%
south	> 45				0%
west	28.0	100.0	2	200	15%
Total					29%

Adjustment	3,205	l/min
Total adjustments	(111)	l/min
Fire flow	10,940	l/min
Use	**11,000**	**l/min**
	183	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Fire Flow Requirement from Fire Underwriters Survey - 21 Huntmar Drive

Building B

Floor	Area (m^2)	Two Largerst Floor	Floors Above at 50%
1	2968	2968	
2	2968	2968	
3	2968		1484
4	2968		1484
5	2968		1484
6	2682		1341
Total	17522	5936	**5793**

(**Note**: For fire-resistive buildings, consider two largest adjoining floors plus 50% of each of any floors immediately above them up to eight.)

Floor Area (1 & 2)	5,936	m^2
50% Floor Area (3 to 8)	5,793	
Total Floor Area	11,729	m^2

F = 220C√A

C	0.6		C =	1.5	wood frame
A	11,729	m^2		1.0	ordinary
				0.8	non-combustible
F	14,296	l/min		0.6	fire-resistive
use	14,000	l/min			

Occupancy Adjustment

			-25%	non-combustible
			-15%	limited combustible
Use	-15%		0%	combustible
			+15%	free burning
Adjustment	-2100	l/min	+25%	rapid burning
Fire flow	11,900	l/min		

Sprinkler Adjustment

			-30%	system conforming to NFPA 13
			-50%	complete automatic system
Use	-30%			
Adjustment	-3570	l/min		

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall Length	Stories	L*H Factor	Exposure Charge *
north	> 45				0%
east	> 45				0%
south	> 45				0%
west	25.5	20.0	6	120	9%
Total					9%

Adjustment	1,071	l/min
Total adjustments	(2,499)	l/min
Fire flow	9,401	l/min
Use	**9,000**	**l/min**
	150	**l/s**

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Boundary Conditions
21 Huntmar Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	120	2.00
Maximum Daily Demand	301	5.01
Peak Hour	661	11.02
Fire Flow Demand #1	11,000	183.33

Location

Results

Connection 1 – Huntmar Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.1	82.4
Peak Hour	156.7	76.0
Max Day plus Fire 1	155.9	74.9

Ground Elevation = 103.2 m

Connection 2 – Huntmar Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.1	82.4
Peak Hour	156.7	76.0
Max Day plus Fire 1	155.9	74.9

Ground Elevation = 103.2 m

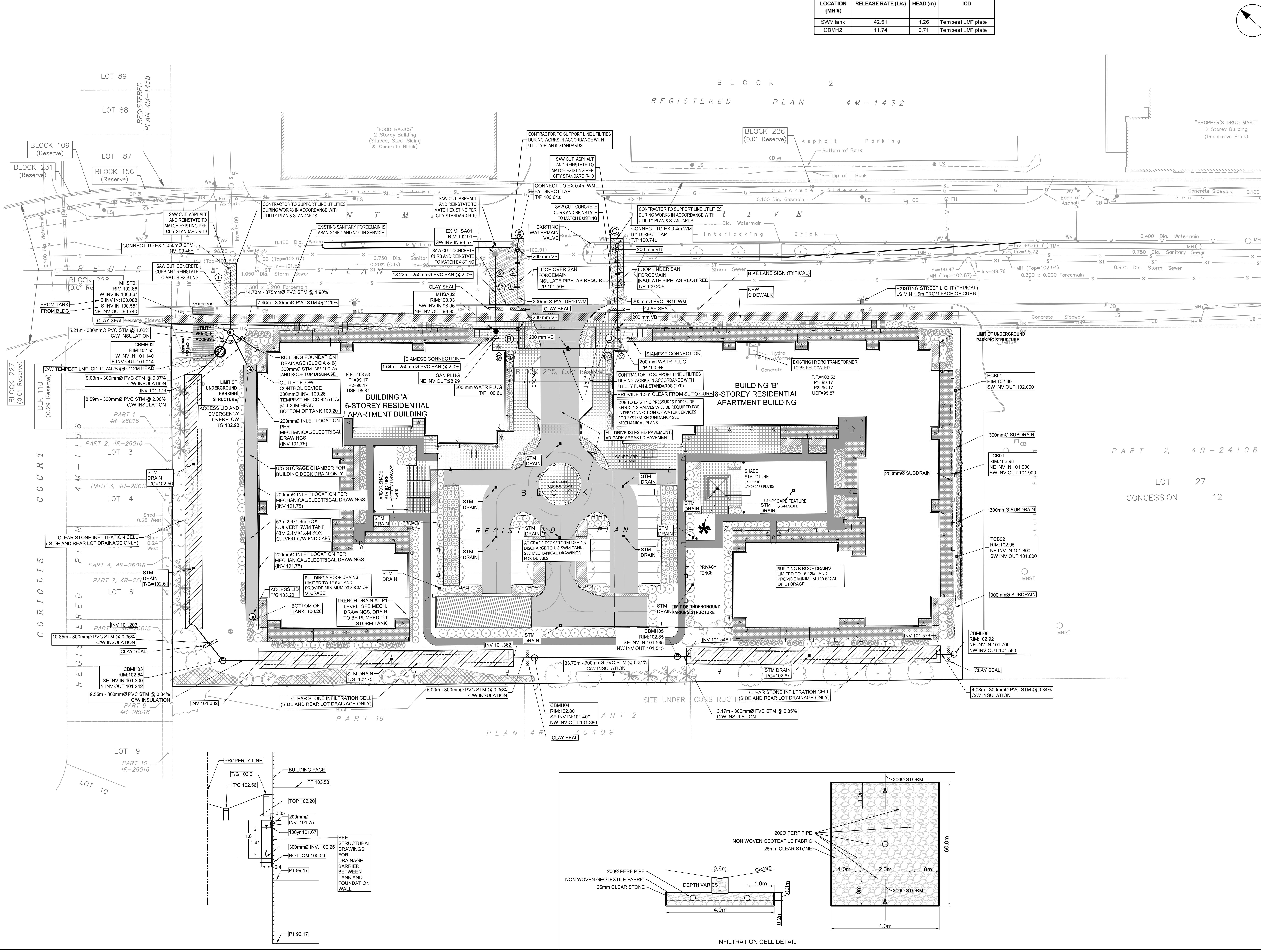
Notes

1. Two service connection with a separation valve in-between.
2. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
   a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
   b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

ICD LOCATION (MH #)	RELEASE RATE (L/s)	HEAD (m)	ICD
SWM tank	42.51	1.26	Tempest LMF plate
CBMH2	11.74	0.71	Tempest LMF plate



CLIENT

NorthAMERICAN® DEVELOPMENT GROUP

2851 John Street, Suite One, Markham, Ontario L3R 5R7 T:905-968-3185

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ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPA	2021-02-16
2	SPA SUBMISSION	2021-06-30
3	SPA SUBMISSION	2021-08-17
4	SPA SUBMISSION	2021-10-29

SEE 010 FOR NOTES, LEGEND

KEY PLAN

SITE

CONSULTANTS

Project Coordinator: North American Development Group
Architect: RLA Architecture
Surveyor: Fairhall, Moffatt and Woodland ltd.
Geotechnical: Paterson Group
Traffic: JD Halpenny & Assoc.
Electrical: Hammerschlag & Joffe Inc.
Landscape: NAK Design Strategies

1:400

SEAL

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2021/10/29 PROVINCE OF ONTARIO

IBI GROUP
Suite 400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 / 613 241 3300 fax 613 225 9868
ibigroup.com

PROJECT

21/35 HUNTMAR DRIVE

PROJECT NO: 127134

DRAWN BY: EH | CHECKED BY: DGY

PROJECT MGR: DGY | APPROVED BY: DGY

SHEET TITLE

GENERAL PLAN OF SERVICES

SHEET NUMBER C-001 | ISSUE 1

CITY FILE No. D07-12-21-0035

CITY PLAN No. 18424

CROSSING SCHEDULE

1	EX300x200 mm SAN	0.681 m	CLEARANCE	OVER	375 mm ø STM
2	EX975 mm ø STM	0.262 m	CLEARANCE	OVER	250 mm ø SAN
3	EX300x200 mm ø SAN	1.711 m	CLEARANCE	OVER	250 mm ø SAN
4	200 mm ø W/M	1.324 m	CLEARANCE	OVER	EX750 mm ø SAN
5	200 mm ø W/M	0.482 m	CLEARANCE	OVER	EX975 mm ø STM
6	200 mm ø W/M	0.296 m	CLEARANCE	OVER	EX300x200 mm ø SAN
7	200 mm ø W/M	1.152 m	CLEARANCE	OVER	EX750 mm ø SAN
8	200 mm ø W/M	0.493 m	CLEARANCE	OVER	EX975 mm ø STM
9	EX300x200 mm ø SAN	0.493 m	CLEARANCE	OVER	200 mm ø W/M

PAVEMENT STRUCTURE **

CAR ONLY PARKING AREAS:

50mm WEAR COURSE - HL-3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE
150mm BASE - OPSS GRANULAR "A" CRUSHED STONE
300mm SUBBASE - OPSS GRANULAR "B" TYPE II
SUBGRADE - EITHER FILL, IN SITU SOIL, OR OPSS GRANULAR "B" TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL OR FILL

ACCESS LANES AND HEAVY TRUCK PARKING AREAS

40mm WEAR COURSE - HL-3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE
50mm BINDER COURSE - HL-8 OR SUPERPAVE 19.0 ASPHALTIC CONCRETE
150mm BASE - OPSS GRANULAR "A" CRUSHED STONE
400mm SUBBASE - OPSS GRANULAR "B" TYPE II
SUBGRADE - EITHER FILL, IN SITU SOIL, OR OPSS GRANULAR "B" TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL OR FILL

** REFER TO GEOTECHNICAL REPORT BY PATERSON GROUP. REV # 2 DATED DECEMBER 20, 2020

DRAWING NOTES

1.0 GENERAL

1.1 CONTRACTOR TO VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.

1.2 DO NOT SCALE DRAWINGS.

1.3 CONTRACTOR TO REPORT ALL DISCOVERIES OF ERRORS, OMISSIONS OR DISCREPANCIES TO THE ARCHITECT OR DESIGN ENGINEER AS APPLICABLE.

1.4 USE ONLY THE LATEST REVISED DRAWINGS OR THOSE THAT ARE MARKED “ISSUED FOR CONSTRUCTION”.

1.5 ALL CONSTRUCTION SHALL COMPLY WITH CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.

1.6 THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATIONS.

1.7 FOR LEGAL SURVEY INFORMATION REFER TO REGISTERED PLAN FROM FAIRHALL, MOFFATT AND WOODLAND LTD.

1.8 REFER TO SITE PLAN BY RLA ARCHITECTURE.

1.9 CONTRACTOR TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES AS IDENTIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.). DURING ALL PHASES OF THE SITE PREPARATION AND CONSTRUCTION THE MEASURES ARE TO BE MAINTAINED TO THE SATISFACTION OF THE ENGINEER AND CITY OF OTTAWA IN ACCORDANCE WITH THE BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL. SHOULD ANY ADDITIONAL MEASURES BE REQUIRED TO ADDRESS FIELD CONDITIONS THEY SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER OR THE CITY OF OTTAWA. SUCH ADDITIONAL MEASURES MAY INCLUDE BUT NOT BE LIMITED TO INSTALLATION OF SEDIMENT CAPTURE FILTER SOCKS WITHIN MANHOLES AND CATCHBASINS TO PREVENT SEDIMENT FROM ENTERING THE STRUCTURE AND INSTALLATION AND MAINTENANCE OF A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.

1.10 ALL IRON WORK ELEVATIONS SHOWN ARE APPROXIMATE AND ARE SUBJECT TO MINOR ADJUSTMENTS AS DETERMINED BY THE ENGINEER.

1.11 ALL CONCRETE CURBS AND SIDEWALKS TO CONFORM TO O.P.S. AND CONSTRUCTED TO CITY STANDARDS. ALL ONSITE CURBS TO BE BARRIER TYPE, WITH DEPRESSIONS AS NOTED.

1.12 ALL CONCRETE SHALL BE “NORMAL PORTLAND CEMENT” IN ACCORDANCE WITH O.P.S.S. 1350 AND SHALL ACHIEVE A MINIMUM STRENGTH OF 30MPa AT 28 DAYS.

1.13 ALL CONSTRUCTION TRAFFIC TO ACCESS SITE FROM HUNTMAR DRIVE.

1.14 FOR GEOTECHNICAL REPORT SEE GEOTECHNICAL INVESTIGATION BY PATERSON GROUP. REPORT PG5006-1 REVISION 2 DATED DECEMBER 1, 2020. EXISTING MONITORING WELLS DOCUMENTED IN SECTION 4.1 OF THE GEOTECHNICAL INVESTIGATION WILL BE DECOMMISSIONED PER MOE REQUIREMENTS PRIOR TO COMMENCING CONSTRUCTION.

1.15 CONTRACTOR TO PROTECT EXISTING INFRASTRUCTURE AND PROPERTY SUCH AS TREES, PARKING METERS, SIDEWALKS, CURBS, ASPHALT, AND STREET SIGNS FROM DAMAGE DURING CONSTRUCTION. CONTRACTOR TO PAY THE COST TO REINSTATE OR REPLACE ANY DAMAGED INFRASTRUCTURE OR PROPERTY TO THE SATISFACTION OF THE CITY.

1.16 THE POSITION OF POLE LINES, CONDUITS, WATERMAIN, SEWERS, AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM ITSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, SHALL PROTECT ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

1.17 CONTRACTOR TO SUPPLY SUITABLE FILL MATERIAL WHERE REQUIRED TO ROUGH GRADE THE SITE. ALL IMPORTED FILL MATERIAL TO BE CERTIFIED AS ACCEPTABLE BY THE GEOTECHNICAL ENGINEER.

1.18 CONTRACTOR TO HAUL EXCESS MATERIAL OFFSITE AS NECESSARY TO GRADE SITE TO MEET THE PROPOSED GRADES. ALL EXCESS MATERIAL TO BE HAULED OFFSITE AND DISPOSED OF AT AN APPROVED DUMP SITE. SHOULD THE CONTRACTOR DISCOVER ANY HAZARDOUS MATERIAL, CONTRACTOR IS TO NOTIFY ENGINEER. ENGINEER TO DETERMINE APPROPRIATE DISPOSAL METHOD/LOCATION.

1.19 FILL MATERIAL WITHIN THE PARKING LOT AND BUILDING PAD AREAS, AND SUPPORTING BUILDING FOUNDATIONS SHALL BE COMPACTED TO 98% STANDARD MODIFIED PROCTOR DENSITY AND TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.

1.20 ALL COMPACTION METHODS TO BE PERFORMED TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER TO INCLUDE BUT NOT BE LIMITED TO THE THICKNESS OF LIFTS, AND COMPACTION EQUIPMENT USED.

1.21 ALL DISTURBED BOULEVARDS TO BE REINSTATED WITH SOD ON 100mm TOPSOIL.

1.22 UTILITY DUCTS TO BE INSTALLED PRIOR TO ROAD BASE CONSTRUCTION.

1.23 CLAY DIKES TO BE INSTALLED WHERE INDICATED ON THE DRAWINGS OR AS APPROVED AND DIRECTED BY THE GEOTECHNICAL ENGINEER ALL IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.

1.24 BACKWATER VALES, PER CITY STANDARDS S14, S14.1 AND S14.2 RE TO BE INSTALLED FOR ALL STORM AND SANITARY SERVICE CONNECTIONS.

1.25 EXISTING STREET LIGHT (TYPICAL) LS MIN 1.5M FROM FACE OF CURB.

2.0 SANITARY

2.1 ALL SANITARY SEWER MAINS TO BE CSA CERTIFIED, BELL AND SPIGOT TYPE. ONLY FACTORY FITTINGS TO BE USED. SEWER TO BE INSTALLED AS PER OSPD 1005.01. SANITARY SEWER MATERIALS TO BE: 250mmØ AND SMALLER - PVC DR 35

2.2 ALL SANITARY MAINTENANCE HOLES TO BE 1.2m DIAMETER AS PER CITY OF OTTAWA STANDARDS COMPLETE WITH BENCHING, RUNGS, FRAME AND COVER, DROP PIPES AND LANDINGS WHERE NEEDED.

2.3 SANITARY MANHOLE COVERS TO BE CITY OF OTTAWA STD. S25 (MOD. OPSD. 401.020). SANITARY MANHOLE COVER TO BE CLOSED COVER TYPE, AS PER CITY STANDARD S24.

2.4 SANITARY SEWER LEAKAGE TEST AND CCTV INSPECTION SHALL BE COMPLETED AS PER CITY SPECIFICATIONS PRIOR TO INSTALLATION OF BASE COURSE ASPHALT.

2.5 ANY SANITARY SEWER WITH LESS THAN 2.0m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

2.6 CONNECTION TO THE EXISTING SANITARY SEWER TO BE INCLUDED IN THE COST FOR SANITARY SEWER INSTALLATION. THIS INCLUDES REINSTATEMENT OF ROAD CUTS TO CITY STANDARDS.

2.7 ALL SANITARY CONNECTION TO INCLUDE BACKWATER VALVE TYPE 1 PER CITY STANDARD S14.1

3.0 STORM

3.1 ALL STORM SEWERS TO BE CSA CERTIFIED, BELL AND SPIGOT TYPE. ALL STORM SEWERS TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS. ONLY FACTORY FITTINGS TO BE USED. STORM SEWER MATERIALS TO BE : 375mmØ AND SMALLER - PVC DR 35 - 450mmØ AND LARGER - 100-D REINFORCED CONCRETE. UNLESS NOTED OTHERWISE

3.2 ALL STORM MAINTENANCE HOLES TO BE SIZED IN ACCORDANCE WITH THE PLANS AND AS PER CITY OF OTTAWA STANDARDS COMPLETE WITH BENCHING, RUNGS, AND FRAME AND COVER.

3.3 STORM MH COVERS TO BE OPEN TYPE, AS PER CITY STANDARD S24, FRAMES TO BE PER CITY OF OTTAWA STD. S25. CONTRACTOR TO INSTALL FILTER FABRIC UNDER STORM MH COVER UNTIL SODDING IS COMPLETE.

3.4 STORM MAINTENANCE HOLES TO BE OPSD, SIZE AS SPECIFIED, TAPER TOP.

3.5 ALL CATCH BASINS TO BE AS PER OPSD 705.010, FRAME & FISH TYPE GRATE AS PER CITY OF OTTAWA STD. S19.1.

3.6 ANY STORM SEWER WITH LESS THAN 2.0m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

3.7 CONNECTION TO THE EXISTING STORM SEWER TO BE INCLUDED IN THE COST FOR STORM SEWER INSTALLATION. THIS INCLUDES REINSTATEMENT OF ROAD CUT TO CITY STANDARDS.

3.8 CONTRACTOR TO PROVIDE IPEX-TEMPEST MHF ICD'S SHOP DRAWINGS, OR EQUIVALENT, FOR ENGINEERS REVIEW PRIOR TO ORDERING ICD'S.

3.9 ALL STORM CONNECTION TO INCLUDE FOUNDATION BACKWATER VALVE TYPE 1 PER CITY STANDARD S14.

3.10 LANDSCAPE SUBDRAIN AND APPURTENANCES TO BE INSTALLED PER CITY OF OTTAWA STANDARDS INCLUDING BUT NOT LIMITED TO S29, S30, S31

4.0 WATER

4.1 ALL WATERMAINS 100mmØ OR GREATER TO BE PVC DR 18, LESS THAN 100mm Ø TO BE COPPER OR APPROVED EQUAL WITH MINIMUM COVER OF 2.4m AND INSTALLED PER CITY OF OTTAWA STANDARDS. ALL DOMESTIC WATER SERVICES ARE TO BE 25mmØ.

4.2 THRUST BLOCKS TO BE INSTALLED AT ALL BENDS, TEES, AND CAPS ALL AS PER OPSD 1103.01 AND 1103.02.

4.3 CONTRACTOR TO CONDUCT PRESSURE AND LEAKAGE TESTING OF ALL WATERMAINS AND DISINFECT AND CHLORINATE ALL WATERMAINS TO THE SATISFACTION OF M.O.E. AND THE CITY OF OTTAWA.

4.4 TRACER WIRE TO BE INSTALLED ALONG THE FULL LENGTH OF WATERMAIN AND ATTACHED TO EACH MAIN STOP AS PER CITY OF OTTAWA STANDARDS.

4.5 ALL COMPONENTS OF THE WATER DISTRIBUTION SYSTEM SHALL BE CATHODICALLY PROTECTED AS PER CITY OF OTTAWA STANDARDS.

4.6 ALL VALVES & VALVE BOXES AND CHAMBERS, HYDRANTS, AND HYDRANT VALVES AND ASSEMBLIES SHALL BE INSTALLED AS PER CITY OF OTTAWA STANDARDS.

4.7 ANY WATERMAIN WITH LESS THAN 2.4m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER. OR IN CLOSE PROXIMITY TO OPEN STRUCTURES INSULATE PER W23.

4.8 CONTRACTOR IS RESPONSIBLE FOR ACQUIRING THE WATER PERMIT FROM THE CITY OF OTTAWA AND PAYMENT OF ANY FEES ASSOCIATED WITH SECURING THE WATER PERMIT. OWNER IS RESPONSIBLE FOR REIMBURSING THE CONTRACTOR FOR THE ACTUAL COST OF ACQUIRING THE WATER PERMIT.

4.9 CONNECTION TO EXISTING WATERMAIN TO BE INCLUDED IN THE COST FOR THE WATERMAIN INSTALLATION. THIS COST INCLUDES REINSTATEMENT OF ROAD CUTS TO CITY STANDARDS.

4.10 ALL WATERMAIN CROSSINGS TO BE COMPLETED AS PER CITY OF OTTAWA STANDARDS W25 AND W25.2

5.0 PARKING LOT AND WORK IN PUBLIC RIGHTS OF WAY

5.1 CONTRACTOR TO REINSTATE ROAD CUTS PER CITY OF OTTAWA STANDARD R-10.

5.2 THE CONTRACTOR SHALL PREPARE A TRAFFIC MANAGEMENT PLAN FOR REVIEW AND APPROVAL BY THE CITY OF OTTAWA. CONTRACTOR TO MAINTAIN TRAFFIC FLOW DURING THE ENTIRE CONSTRUCTION PERIOD. MAINTENANCE OF ROAD CUTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. PROVISION OF FLAGMEN, DETOURS AS NECESSARY, BARRICADES AND SIGNS TO THE FULL SATISFACTION OF THE ENGINEER AND ROAD AUTHORITY SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

5.3 CONTRACTOR TO PREPARE SUBGRADE, INCLUDING PROOFROLLING, TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER PRIOR TO THE COMMENCEMENT OF PLACEMENT OF GRANULAR B MATERIAL.

5.4 FILL TO BE PLACED AND COMPACTED PER THE GEOTECHNICAL REPORT REQUIREMENTS.

5.5 CONTRACTOR TO SUPPLY, PLACE AND COMPACT GRANULAR B MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOETCHNICAL ENGINEER. CONTRACTOR TO PROVIDE ENGINEER WITH SAMPLES OF GRANULAR B MATERIAL FOR TESTING AND CERTIFICATION FROM THE GEOTECHNICAL ENGINEER THAT THE MATERIAL MEETS THE GRADATION REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT.

5.6 GRANULAR A MATERIAL TO BE PLACED ONLY UPON APPROVAL BY THE GEOTECHNICAL ENGINEER OF GRANULAR B PLACEMENT.

5.7 ASPHALT MATERIAL TO BE PLACED ONLY UPON APPROVAL BY THE GEOTECHNICAL ENGINEER OF GRANULAR A PLACEMENT.

5.8 CONTRACTOR TO SUPPLY, PLACE AND COMPACT ASPHALT MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER. CONTRACTOR TO PROVIDE ENGINEER WITH SAMPLES OF ASPHALT MATERIAL FOR TESTING AND CERTIFICATION FROM THE GEOTECHNICAL ENGINEER THAT THE MATERIAL MEETS THE REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT.

5.9 CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING LINE AND GRADE IN ACCORDANCE WITH THE PLANS, AND FOR PROVIDING THE ENGINEER WITH VERIFICATION PRIOR TO PLACEMENT.

5.10 PAVEMENT STRUCTURE (MATERIAL TYPES AND THICKNESSES) FOR HEAVY DUTY AND LIGHT DUTY AREAS TO BE AS SPECIFIED IN THE GEOTECHNICAL REPORT AND SHOWN ON THE PLANS.

LEGEND:

MHSA3A	SANITARY MANHOLE STORM
MHST01	MANHOLE
CB01	CATCHBASIN
CBMH01	CATCHBASIN MANHOLE
CBMH02	CATCHBASIN MANHOLE C/W ICD
ECB01	REAR YARD "END" CATCHBASIN
	SUBDRAIN
200mmØ SAN	SANITARY SEWER
300mmØ STM	STORM SEWER
VB	VALVE AND VALVE BOX
200Ø WATERMAIN	WATERMAIN
	VERTICAL BEND LOCATION
M	METER
RM	REMOTE METER
2R	NUMBER OF RISERS

FAIRHALL, MOFFATT AND WOODLAND LTD.
TOPOGRAPHIC LEGEND

	- SURVEY MONUMENT FOUND
SIB	- STANDARD IRON BAR
SSIB	- SHORT STANDARD IRON BAR
IB	- IRON BAR
CP	- CONCRETE PIN
DIA	- DIAMETER
BLK	- BLOCK
PIN	- PROPERTY IDENTIFIER NUMBER
CB	- CATCH BASIN
MH	- MANHOLE
MHST	- STORM MANHOLE
MHSA	- SANITARY MANHOLE
WMH	- WATER MANHOLE
TMH	- TRAFFIC MANHOLE
HMH	- HYDRO MANHOLE
FH	- FIRE HYDRANT
TCB	- TRAFFIC CONTROL BOX
WV	- WATER VALVE
TL	- TRAFFIC LIGHT
LS	- LAMP STANDARD
UP	- UTILITY POLE
BP	- BELL PEDESTAL
MW	- MONITORING WELL
	- BOREHOLE
	- BOLLARD
	- GUY WIRE AND ANCHOR
	- SIGN
	- DECIDUOUS TREE
	- CURB
	- GASMAIN
	- SANITARY SEWER
	- STORM SEWER
	- WATERMAIN
	- UNDERGROUND BELL
	- UNDERGROUND HYDRO
	- STREET LIGHTING
	- ROGERS CABLE
	- TRAFFIC
	- EDGE OF TREES

STORM STRUCTURE TABLE

NAME	RIM ELEV.	INVERT IN	INVERT IN ASBUILT	INVERT OUT	INVERT OUT ASBUILT	DESCRIPTION
MHST01	102.66	W100.961 W100.540 SW 100.088		99.974		1200ø OPSD 701.010
CBMH02	102.53	101.164		101.014		1200ø OPSD 701.010
CBMH03	102.64	101.300		101.240		1200ø OPSD 701.010
CBMH04	102.80	101.400		101.380		1200ø OPSD 701.010
CBMH05	102.85	101.540		101.520		1200ø OPSD 701.010
CBMH06	102.92	101.700		101.590		1200ø OPSD 701.010

WATERMAIN SCHEDULE

	Station	Description	Finished Grade	Top of Waterain	As Built Waterain
A	0+000.00	TEE 400mmX200mm	102.91	100.51	
	0+001.10	VB 200mm	102.90	100.50	
	0+004.06	V-BEND 200mm	102.94	100.54	
	0+004.36	V-BEND 200mm	102.94	101.09	
	0+009.71	V-BEND 200mm	102.84	101.50	
	0+010.01	V-BEND 200mm	102.84	100.44	
	0+019.83	VB 200mm	103.04	100.64	
B	0+022.17	CAP 200mm	103.05	100.65	
C	0+000.00	TEE 400mmX200mm	103.08	100.68	
	0+001.10	VB 200mm	103.13	100.73	
	0+003.79	V-BEND 200mm	103.24	100.84	
	0+004.09	V-BEND 200mm	103.26	101.14	
	0+006.75	V-BEND 200mm	103.11	101.14	
	0+007.05	V-BEND 200mm	103.07	100.20	
	0+009.71	V-BEND 200mm	102.95	100.20	
	0+010.01	V-BEND 200mm	102.94	100.54	
	0+019.83	VB 200mm	103.13	100.73	
D	0+022.17	CAP 200mm	103.01	100.61	

CLIENT

NorthAMERICAN DEVELOPMENT GROUP

2851 John Street, Suite One, Markham, Ontario L3R 5R7 T:905-968-3185

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPA	2021-02-16
2	SPA SUBMISSION	2021-06-30
3	SPA SUBMISSION	2021-08-17
4	SPA SUBMISSION	2021-10-29

SEE 010 FOR NOTES, LEGEND

KEY PLAN

CONSULTANTS

Project Coordinator:
North American Development Group
Architect:
RLA Architecture
Surveyor:
Fairhall, Moffatt and Woodland ltd.
Geotechnical:
Paterson Group
Traffic:
JD Halpenny & Assoc.
Electrical:
Hammerschlag & Joffe Inc.
Landscape:
NAK Design Strategies

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2021/10/29
PROVINCE OF ONTARIO

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

PROJECT
21/35 HUNTMAR DRIVE

PROJECT NO: 127134	
DRAWN BY: EH	CHECKED BY: DGY
PROJECT MGR: DGY	APPROVED BY: DGY

SHEET TITLE
GENERAL NOTES, LEGEND AND TABLES

SHEET NUMBER	ISSUE
C-010	1

File Location: J:\127134_21_Huntmar\7.0_Production\7.03_Design\04_Civil\Sheets\C-010 NOTES-LEGEND-CB DATA.dwg Last Saved: August 17, 2021, by Ehennie Plotted: Friday, October 29, 2021 8:32:17 AM by Eric Hennie

CITY FILE No. D07-12-21-0035

CITY PLAN No. 18424

APPENDIX C

- C-400 Sanitary Tributary Area Plan
- Sanitary sewer design sheet

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
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ibigroup.com

SANITARY SEWER DESIGN SHEET

21 Huntmar Rd
CITY OF OTTAWA
North American Group

LOCATION: STREET	LOCATION: AREA ID	LOCATION: FROM MH	LOCATION: TO MH	RESIDENTIAL: AREA w/ Units (Ha)	RESIDENTIAL: UNIT TYPES 1B	UNIT TYPES 2B	UNIT TYPES 3B	UNIT TYPES APT	RESIDENTIAL: AREA w/o Units (Ha)	POPULATION IND	POPULATION CUM	RES PEAK FACTOR	PEAK FLOW (L/s)	ICI AREAS: AREA (Ha) INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	ICI PEAK FACTOR	PEAK FLOW (L/s)	INFILTRATION ALLOWANCE: AREA (Ha) IND	AREA (Ha) CUM	FLOW (L/s)	FIXED FLOW (L/s) IND	FIXED FLOW (L/s) CUM	TOTAL FLOW (L/s)	PROPOSED SEWER DESIGN: CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	AVAILABLE CAPACITY (%)
OUTLET TO HUNTMAR RD																																		
	1	BLDG A& B	2	1.56	149	195				618.1	618.1	3.34	6.69	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.56	1.6	0.51	0.00	0.00	7.21	87.74	1.64	250	2.00	1.731	80.53	91.79%
		2	1							0.0	618.1	3.34	6.69	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.6	0.51	0.00	0.00	7.21	87.74	18.22	250	2.00	1.731	80.53	91.79%
				1.56	149		0			618.1																								

Design Parameters:

Residential			ICI Areas			
3B	2.8	p/p/u				
2B	2.1	p/p/u	INST	28,000	L/Ha/day	
1B	1.4	p/p/u	COM	28,000	L/Ha/day	
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

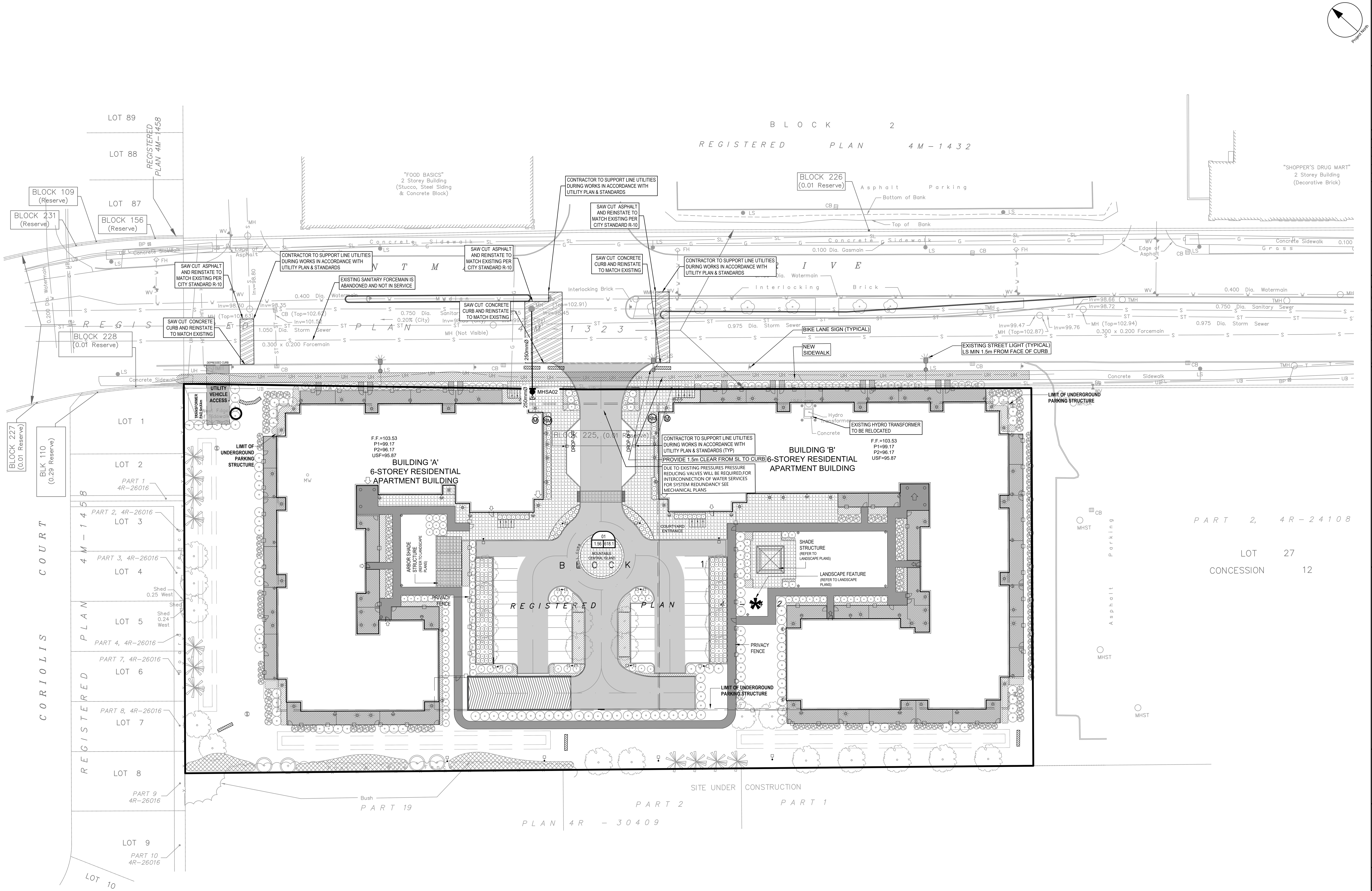
Designed: R.M,

Checked: D.G.Y.

Dwg. Reference: 127134-400

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2021-02-04

File Reference:		Date:	Sheet No:
127134.6.4.4.		2021-02-04	1 of 1



LEGEND :

01 — AREA NUMBER
1.56 | 619.2 — POPULATION
AREA IN HECTARES

CLIENT

NorthAMERICAN DEVELOPMENT GROUP

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SEE 010 FOR NOTES, LEGEND

KEY PLAN

SITE

CONSULTANTS

Project Coordinator:
North American Development Group
Architect:
RLA Architecture
Surveyor:
Fairhall, Moffatt and Woodland ltd.
Geotechnical:
Paterson Group
Traffic:
JD Halpenny & Assoc.
Electrical:
Hammerschlag & Joffe Inc.
Landscape:
NAK Design Strategies

1:400

SEAL

LICENSED PROFESSIONAL ENGINEER
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2021/10/29
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ibigroup.com

PROJECT

21/35 HUNTMAR DRIVE

PROJECT NO:
127134

DRAWN BY:	CHECKED BY:
EH	DGY
PROJECT MGR:	APPROVED BY:
DGY	DGY

SHEET TITLE

SANITARY DRAINAGE PLAN

SHEET NUMBER
C-400

ISSUE
1

CITY FILE No. D07-12-21-0035

CITY PLAN No. 18424

APPENDIX D

- JF Sabourin SWM report
- DSEL Storm Tributary Area Plan
- C-500 Storm Tributary Area Plan
- Storm sewer design sheets
- Modified Rational Method design sheets

Stormwater Management Report and Pond Design Brief for FAIRWINDS PHASES 5A and 5B of the Mattamy Homes Subdivision

Reviewed By
Development Review Branch
For MOE Submission

Signed: ____________

Date: Dec 2/09.

City of Ottawa

April 2008
Updated October 2009

Prepared for : Mattamy Homes

Prepared by : JFSA Water Resources and Environmental Consultants

JFSA Ref. No.: 677-08
J.F. Sabourin and Associates Inc.
www.jfsa.com

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52 Springbrook Drive, Ottawa, ON K2S 1B9
tel.: 613.836.3884, fax: 613.836.0332, www.jfsa.com

Stormwater Management Report and Pond Design Brief for FAIRWINDS PHASES 5A and 5B of the Mattamy Homes Subdivisions

in the City of Ottawa

April 2008
Updated October 2009

Prepared for :

Mattamy Homes

Prepared by :

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Oct 16/09
PROVINCE OF ONTARIO

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Stormwater Mangement Report and Pond Design Brief for FAIRWINDS PHASES 5A and 5B of the Mattamy Homes Subdivision

in the City of Ottawa

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APPENDICES

Background: Rationale for Report Update

This report is an update of the April 2009 Stormwater Management Report and Pond Design Brief for Fairwinds Phases 5A and 5B of the Mattamy Homes Subdivisions. The April 2009 version of this report has been updated to reflect changes to the m-plan, including changes to catchbasin locations, lead pipe connectivity, ponding at major low points, overland flow patterns and storm sewer pipe data. Note that overland flow is no longer conveyed to Brigatine Heights from Khamsin Street via a 2 m wide walkway between the two streets. All street catchbasins within the subdivision are now equipped with fishbone grates rather than curb side inlets. Additionally, the delineation of external commercial areas to the south of Phases 5A and 5B were updated to reflect the most recent information provided by North American.

Stormwater Management Report and Pond Design Brief for FAIRWINDS PHASES 5A and 5B of the Mattamy Homes Subdivisions in the City of Ottawa

April 2008
Updated October 2009

1 INTRODUCTION AND OBJECTIVES

The Fairwinds Phases 5A and 5B development is part of the Kanata West Community and is generally bound by Poole Creek to the North and Hazeldean Road to the South. The development has a total drainage area of approximately 24.86 ha, which under interim conditions includes a 0.19 ha park block and 0.50 ha of rear yard area draining directly to Poole Creek, a 1.41 ha temporary pond block, 14.85 ha of external commercial area to the south of the development, 1.14 ha of Huntmar Road to the south of the subdivision and approximately 6.78 ha of residential lots. The general location of the Faiwinds Phases 5A and 5B development is provided in Figure A, while Figure 1 shows its overall layout.

Fairwinds Phases 5A and 5B are located within the future Pond 5 tributary drainage area, as presented in the City of Ottawa's Kanata West Master Servicing Study (KWMSS). Note that under ultimate conditions, the 1.41 ha temporary pond block will be developed as residential land (Fairwinds Phase 8).

The purpose of the present study/report is to: i) evaluate the adequacy of the proposed Fairwinds Phases 5A and 5B minor and major drainage systems, as designed by David Schaeffer Engineering Ltd (DSEL) ii) to size the proposed interim wet pond and configure the outlet structure to provide the required quality and quantity control and iii) to verify and demonstrate that the hydraulic characteristics of the pond components will meet the MOE's and the City of Ottawa's design criteria. Background documents that were reviewed in preparing this report include the following:

- Kanata West Master Servicing Study, Stantec Consulting Ltd., June 2006
- Carp River Watershed / Subwatershed Study, Robinson Consultants, December 2004
- Post-Development Flow Characterization and Flood Level Analysis, Carp River, Feedmill Creek and Poole Creek, CH2MHILL, June 2006
- Stormwater Management Planning and Design Manual, MOE, March 2003.

- Fairwinds Development of the Mattamy Homes Subdivisions / Hydraulic Impact Analysis of Poole Creek, Carp River and Interim Ponds, JFSA, April 14, 2009.

As with other phases of the Fairwinds subdivisions, the DDSWMM program is used to model the major system flows while the XPSWMM program is used to model the conveyance of the minor systems flows as well as surcharge levels to verify that basements are sufficiently protected against flooding. The general SWM design criteria and guidelines which are to be met are described in Section 2.

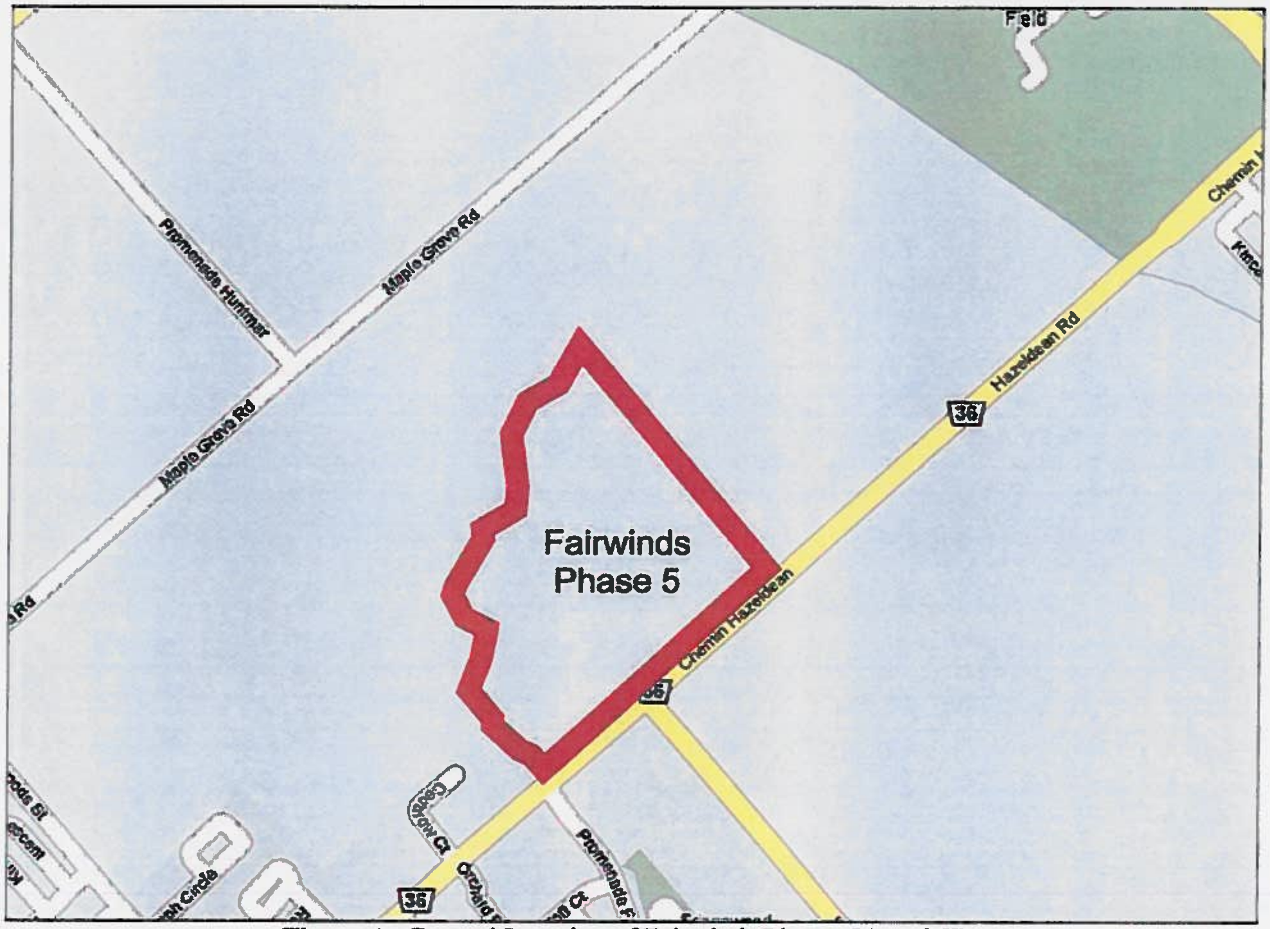


Figure A: General Location of Fairwinds Phases 5A and 5B

2 DESIGN CRITERIA AND GUIDELINES

The design criteria and guidelines used for the stormwater management for the subject subdivision are those that were developed in the background documents for the Kanata West Community as well as those provided in the 2004 City of Ottawa Sewer Design Guidelines.

During the course of the detailed design of the proposed development of Fairwinds Phases 5A and 5B, it was determined that the average imperviousness of this subdivision will be approximately 46% (excluding the commercial sites and Huntmar Drive). Including the external areas, the overall imperviousness of the Phases 5A and 5B development was estimated at 71%.

As with other phases within the Fairwinds Subdivision, it was also determined that in order to minimize overland flows to Poole Creek, other options to collect, store and convey the major system flows would need to be incorporated in the drainage design of this subdivision. Under these conditions, a detailed analysis of the proposed dual drainage system was required to confirm that the following general design criteria and guidelines for the minor and major systems would be met.

2.1 Minor System

a) Storm sewers on local roads are to be designed to provide a 5-year level of service, while storm sewers on arterial roads are to be designed to provide a 10-year level of service. Note that the existing Huntmar Road was designed to provide a 10-year level of service.

b) For less frequent storms (i.e. larger than 5 years), the minor system may surcharge but the hydraulic grade line (HGL) elevations within the system must be maintained to at least 0.30 m below the underside of basement footings.

2.2 Major System

a) The proposed major system of Fairwinds Phases 5A and 5B is to collect and safely convey the major system flows from within the subdivision as well as any external areas.

b) The maximum water depths on the streets and rear yards should not exceed 0.3 m and 0.4 m respectively and a minimum of 0.30 m freeboard is to be provided to building openings. When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas.

c) The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.6 m^2/s.

d) The target allowable 100-year discharge rate to Poole Creek from Fairwinds Phases 5A and 5B, including major system and pond outflows, should be limited to 1.0 m^3/s or less.

3 ASSUMPTIONS AND SOURCE OF DATA USED IN THIS STUDY

Sources of information and assumptions made in this study are listed below:

- DDSWMM Model parameters:	*Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, Imperviousness: based on development layout and taken as fully effective in the front lot portion and taken as half effective in rear lot portion of each house.*
- Design Storms:	*2-, 5-, 10-, 25-, 50-, and 100-year SCS 12-hour Design Storms plus 5-, 10- and 100-year Chicago 3-hour Design Storms based on 2004 City of Ottawa Sewer Design Guideline. Maximum intensity averaged over 10 minutes.*
- Historical Events:	*July 1st 1979 and August 8th 1996.*
- Street catchbasin covers:	*Fishbone; existing curb side inlets are used on Huntmar Drive*
- Manning's' roughness coeff.:	*0.013 for concrete pipes (free flow)*
- Minor system losses:	*As per Ottawa Sewer Design Guidelines, November 2004 (design chart of Appendix 6-B.1). Refer to Appendix C for manhole loss coefficients.*
- Underside of footing elevations:	*As provided by DSEL*
- Freeboard in HGL analysis:	*0.3 m (ie. between underside of footing elevation & HGL)*
- Inlet Control Devices:	*As required based on present analysis*
- Depth of backyard swales:	*As per DSEL's Grading Plan*
- Street and pipe slopes:	*As per DSEL's Plan and Profiles*
- Right-of-way characteristics:	*As per DSEL's Details of Roads*
- Flows from commercial sites:	*Assumed that minor system would capture the 5-year flow (as calculated using DDSWMM) and excess flow is to be stored on-site.*
- Interim Pond characteristics:	*Permanent pool level taken as 95.75 m. Quality control provided by circular orifice (0.14 m diameter) with invert set to 95.75 m. Quantity control provided by rectangular orifice (0.35 m wide by 0.15 m high) with invert set to 95.98 m and sharp crested weir (0.4 m wide) with invert set to 96.80 m. Emergency overflow provided by 6.0 m wide spillway set at 97.883 m.*

4 PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

The proposed minor and major system drainage routes are shown in plan view in Figures 1 and 2 respectively.

The minor system for the proposed Fairwinds Phases 5A and 5B was initially sized by DSEL with the Rational Method, for a 1:5 year level of service on lateral streets and a 1:10 year level of service on Huntmar Drive. DSEL's Rational Method design sheets are provided in Appendix A.

The runoff generated within the backyard areas will be captured by catchbasins located at low points within the grassed swales (see Figures 1 and 2). For the current design of Fairwinds Phases 5A and 5B, all nine (9) rear lot catchbasins with lead pipes directly connected to the main storm sewer will be equipped with Inlet Control Devices (ICDs) as per Figure 1, except for the catchbasin in subcatchment A14R3, southwest of the intersection of Coriolis Court and Huntmar Drive, which has no ICD to prevent overflow onto Huntmar Drive, and the catchbasin in subcatchment A801R3, south of the intersection of Gallantry Way and Khamsin Street, which has no ICD as it is located at main storm sewer MH 800. Capture at catchbasins without ICDs is limited by the capacity of the lead pipe.

The street segments within the proposed development have been designed using a 'saw tooth' or 'sagged' road profile. The runoff from within these segments will be conveyed to catchbasins located at the lowest point within the street segment. Flows in excess of the catchbasin capture rate (limited by inlet control devices) will be temporarily stored within the 'sagged' street segments and released slowly to the storm sewers. When the storage on a specific street segment is surpassed, the excess water will flow towards the next downstream street sag, and eventually to the interim SWM pond.

As per the detail of MH 167 on Huntmar Drive prepared by DSEL, the north leg of the 600 mm pipe will be plugged to force the minor flow from the external areas to the south of Fairwinds Phases 5A and 5B to be diverted to the minor system that will drain to the proposed interim pond.

Note that, within Fairwinds Phases 5A and 5B, there are three (3) locations where it will be necessary to capture 100% of the 100-year flow. These are located on Coriolis Crescent west of Huntmar Drive, on Brigatine Heights east of Huntmar Drive and on Brigatine Heights north of the park and southeast of Poole Creek. As determined by the DDSWMM analysis, the 100-year peak flows at these three locations are 171 L/s, 68 L/s and 356 L/s, respectively. To capture these flows, even if the catchbasin grates are 50% blocked, the first two low points will need two (2) sets of double catch basins, each equipped with one (1) 250 mm diameter lead pipe. The low point on Brigatine Avenue south east of Poole Creek will require one (1) set of DCBs equipped with one (1) 250 mm diameter lead pipe on the west side of the street, and two (2) sets of DCBs equipped with one (1) 300 mm diameter lead pipe on the east side of the street (refer to Calculation Sheets 2A, 2B and 2C in Appendix B for detailed calculations).

The DDSWMM and XPSWMM analyses, discussed in the next sections, have demonstrated that the proposed drainage system for the Fairwinds Phases 5A and 5B development will have sufficient capacity to control the excess flow during a 100-year event and safely capture and convey the 5-year flow to the interim pond.

4.1 Major System and DDSWMM Analysis

The DDSWMM computer program was used to model the major and minor system flows and on-site detention within the proposed development. Based on the model results, the need for inlet control devices and on-site detention volumes were determined.

The DDSWMM model presented in Appendix B was developed based on the information provided in Figures 1 and 2. A total of eleven simulations were conducted, one for each of the following rainfall events:

1) 2-yr, 12-hr SCS storm
2) 5-yr, 12-hr SCS storm
3) 10-yr, 12-hr SCS storm
4) 25-yr, 12-hr SCS storm
5) 50-yr, 12-hr SCS storm
6) 100-yr, 12-hr SCS storm
7) 5-yr, 3-hr Chicago storm
8) 10-yr, 3-hr Chicago storm
9) 100-yr, 3-hr Chicago storm
10) July 1st, 1979 historical event
11) August 8th, 1996 historical event

Runoff capture and storage within the sagged street segments, as well as the controlled flow capture in rear lot catchbasins, were modelled with the DDSWMM model. Within the subdivision, standard inlet control devices were used in all street catchbasins and rearyard catchbasins with lead pipes directly connected to the main storm sewer, except at the three 100-year intakes, on Huntmar Drive, and in rearyard subcatchments A14R3 and A801R3 as discussed in Section 4.0. A summary of inlet control devices and maximum capture rate is provided in Table B-2 of Appendix B. Capture on the commercial sites to the south of the subdivision was limited to the 5-year flow as determined using DDSWMM.

The available surface storage volumes were evaluated based on the grading plan provided by DSEL. In the event that the drainage system's capacity would be exceeded, Figure 3 presents the maximum extent of surface ponding that could be observed on the street. Details of street storage results (i.e. actual volume used) are provided in Table B-6 of Appendix B. No surface storage volumes were accounted for in rear lot swales. For the commercial sites south of Fairwinds Phases 5A and 5B, future on-site storage was assumed to be sufficient to retain and control the post-development 100-year peak flows to the 5-year level.

Note that the sum of used surface storage for the 100-year Chicago event for the total drainage area to the interim pond is approximately 2223 m^3, including 1943 m^3 in the commercial blocks, 84 m^3 on Huntmar Drive and 196 m^3 in Phases 5A and 5B. For an area of 24.86 ha, this represents a unit storage volume of approximately 89 m^3/ha (refer to Table B-7 of Appendix B). It should be noted that the major system would outlet to the interim pond without flooding any of the properties within the subdivision.

The DDSWMM results presented in Table B-1 of Appendix B show that none of the maximum flow depths on any of the street segments will exceed the maximum allowable value of 30 cm during either the 100-year Chicago Storm or the 100-year SCS Storm. Within Fairwinds Phases 5A and 5B, the maximum simulated flow depth on the street is 9.7 cm on Brigatine Heights in Phase 5A (refer to Calculation Sheet B-1). Furthermore, it was determine that, for the 100-year event and for all major system segments, the product of the depth of water (m) at the gutter multiplied by the velocity of flow (m/s) does not exceed the maximum allowable 0.6 m^2/s (refer to Calculation Sheet B-1 of Appendix B, where the calculated maximum was 0.083 m^2/s).

4.2 Minor System and Hydraulic Gradeline Analysis

The minor system and hydraulic gradeline (HGL) analyses were completed using the XPSWMM program to verify that the proposed storm sewer system will not surcharge to within 0.3 m of the proposed basement underside of footing elevations. The HGL analysis was based by the peak controlled flows captured during the 5-year Chicago storm, the 100-year Chicago storm, the 100-yr SCS storm, the July 1st, 1979 storm and the August 8th, 1996 storm, as calculated with the DDSWMM program.

The minor system was analysed both for freeflow and restrictive conditions at the pond outfall. Restrictive conditions for all events were based on the 100-year, 12-hour SCS event water level in Poole Creek at Old Log Bridge, upstream of the pond outfall, as determined using a modified version of the hydrologic (XPSWMM) and hydraulic (HEC-RAS) models of Poole Creek, Carp River and Feedmill Creek recently provided by CH2M Hill (March 2009).

The CH2M Hill models were first modified to account for the impact of the Fairwinds North Phases 1, 2A, 2B, 3 and 4 and Fairwinds South Phases 1, 2 and 3 development, as described in the April 2, 2009 "Hydraulic Impacts of Poole Creek on Interim Pond Operation" memo to Mattamy Homes from JFSA. The 100-year SCS CH2M Hill XPSWMM model was further modified to add the uncontrolled major system and control pond outflow hydrographs to Poole Creek from Fairwinds Phases 5A and 5B at Old Logs Bridge (Node 3899).

Under pre-development conditions, approximately 17.22 ha of the future Fairwinds Phases 5A and 5B development drainage area is tributary to Poole Creek. As such, 17.23 ha was removed from pre-development subcatchment 115P at Node 202 in the CH2M Hill XPSWMM model to avoid double counting the pre- and post-development area. Similarly, the 7.64 ha of Fairwinds Phases 5A and 5B tributary to Carp River under pre-development conditions was removed from pre-development sub-catchment 102-1 at Node 2055 in the CH2M Hill XPSWMM model.

The maximum flows resulting from this modified version of the CH2M Hill XPSWMM model were then input into the CH2M Hill 100-year SCS HEC-RAS model of Poole Creek, and the 100-year water level at Old Logs Bridge (cross-section 21116.5) was determined to be 96.19 m.

The results of the HGL analysis are presented in tabular form in Tables C-2 and C-3 in Appendix C, for freeflow and restrictive conditions, respectively, at the pond outfall. Table C-4 of Appendix C presents the maximum HGL at each manhole for all design storms and historical events. As shown in the results presented in Appendix C, the minimum freeboard of 0.3 m between the computed HGL elevation and underside of footings can be provided for all properties in Fairwinds Phases 5A and 5B. The minimum computed freeboard is 0.605 m, at Lot 54 of Phase 5A.

5 SWM POND COMPONENTS DETAILS AND OPERATING CHARACTERISTICS

The objective of the interim SWM Pond is to provide quality and quantity control of surface runoff from the entire Fairwinds Phases 5A and 5B drainage area of 24.86 ha with an estimated average imperviousness of 71%. The purpose of quality control for the proposed SWM pond is to provide 80% long-term suspended sediment removal, which is known as "Enhanced" protection level and to ensure the pond's active storage volume is released over a minimum period of 24 hours.

The inlet structure to the pond consists of a 1650 mm concrete storm sewer and a headwall located at the west end of the pond. The invert of the storm sewer at the inlet of the pond will be at approximately 95.774 m, which is 0.024 m above the permanent pool level of 95.75 m.

The pond outlet structure will consist of three main components; i) a quality controlling circular orifice with a diameter of 0.14 m and an invert set at 95.75 m, ii) a quantity controlling rectangular orifice 0.35 m wide by 0.15 m high with an invert set at 95.98 m, and iii) a 0.4 m wide sharp crested weir with an invert set at 96.80 m (Refer to Table B-5 of Appendix B for the stage-storage outflow curve for the SWM facility). The controlled flows at the outlet structure will be conveyed to Poole Creek via a 750 mm concrete pipe with a 1% slope and a capacity of 1.11 m^3/s. This capacity is greater than the maximum 100-year outflow of 0.71 m^3/s.

In the event of a storm greater than the 100-year design storm, a 6.0 m wide emergency overflow spillway has been provided for the pond. Its crest elevation has been set at the 100-year SCS restricted conditions pond level of 97.833 m. Note that the July 1st, 1979 event has a pond level of 97.997 m under restrictive conditions, for which approximately 0.63 m^3/s of outflow is conveyed by the emergency overflow spillway (refer to Calculation Sheet D-1 of Appendix D).

As determined using the MOE SWMPD Manual, the minimum required permanent pool volume for this facility would be approximately 4,641 m^3 based on a total drainage area of 24.86 ha and an average imperviousness of 71%, calculated as follows:

$$(226.67\ m^3/ha - 40\ m^3/ha) \times 24.86\ ha = 4{,}641\ m^3$$

The proposed facility has been designed with a permanent pool volume of 5,200 m^3, which is more than minimum permanent pool required by the SWMP Design Manual Tables D-1 and D-2 of Appendix D summarize the pond sizing calculations.

The quality control volume is based on a volume of 40 m^3/ha to be released with a drawdown time of 24 to 48 hours. The required quantity control volume is calculated as follows:

$$40\ m^3/ha \times 24.86\ ha = 994\ m^3$$

The proposed facility has been designed with a quality control volume of 1025 m^3 with a drawdown period of approximately 27.6 hours. Tables D-3 and D-4 of Appendix D summarize the drawdown calculations.

The purpose of a sediment forebay is to capture and retain suspended solid particles greater than 150 microns. The proposed depth of the permanent pool in the 56 m long by 24 m wide forebay is 1.5 m, which is lower than the maximum value of 2.5 m suggested by MOE. The required settling length, based on the peak pond outflow of 0.017 m^3/s during the quality storm, is approximately 11 m. The maximum dispersion length, based on the 3.36 m^3/s inflow to the pond during the 10-year, 12-hour SCS storm, is approximately 27 m. These required lengths, as calculated using the MOE SWMP Manual, confirm that the provided forebay length of 56 m is adequate (Refer to Calculation Sheet D-2 of Appendix D).

A guideline for the minimum bottom width of the forebay section of the pond can be estimated as one-eighth of the forebay length. This yields a required width of 3.4 m, and therefore demonstrates that the provided 14.5 m bottom width for the forebay is satisfactory.

In addition to controlling the 100-year outflows from the subdivision to 1.0 m^3/s or less, target outflow rates based on pre-development flows to Poole Creek for the 2- to 100-year SCS events, as determined using SWMHYMO, were also met (refer to Appendix D for model input and output files). Target pond outflow rates, based on pre-development flows to Poole Creek minus uncontrolled post-development major system flows to Poole Creek, are summarized in Table 1 below.

Table 1: Target Outflows to Poole Creek Based on Pre-Development Flows

Storm Event	Pre-Development Flows to Poole Creek (1) (m^3/s)	Post-Development Major System Flows to Poole Creek (2) (m^3/s)	Target Pond Outflow (m^3/s)
2yr/12hr SCS	0.245	0.010	0.235
5yr/12hr SCS	0.400	0.051	0.349
10yr/12hr SCS	0.515	0.075	0.440
25yr/12hr SCS	0.666	0.108	0.558
50yr/12hr SCS	0.788	0.133	0.655
100yr/12hr SCS	0.925	0.153	0.772

Note: (1) Based on SWMHYMO model POND5.* (Refer to Appendix D)
(2) Based on DDSWMM Model L* for the 12-hour SCS events (Refer to Appendix B)

Simulated pond operating characteristics are summarized in Table 2 below.

Table 1: Summary of SWM Pond Operating Characteristics

Storm Event	Pond Inflow	Target Pond Outflow (1)	Free Outfall Conditions			Restrictive Downstream Conditions		
			Pond Level	Pond Outflow	Volume Used (2)	Pond Level	Pond Outflow	Volume Used (2)
	(m^3/s)	(m^3/s)	(m)	(m^3/s)	(m^3)	(m)	(m^3/s)	(m^3)
2yr/12hr SCS	1.862	0.235	96.645	0.149	4583	96.728	0.099	5060
5yr/12hr SCS	2.818	0.349	96.972	0.233	6531	97.065	0.147	7112
10yr/12hr SCS	3.362	0.440	97.156	0.340	7691	97.281	0.177	8502
25yr/12hr SCS	4.028	0.558	97.369	0.484	9084	97.508	0.286	10023
50yr/12hr SCS	4.426	0.655	97.547	0.610	10290	97.684	0.397	11245
100yr/12hr SCS	4.575	0.772	97.688	0.710	11273	97.833	0.500	12308
5yr/3hr Chicago	3.867	N/A	96.846	0.178	5760	96.902	0.126	6100
10yr/3hr Chicago	4.469	N/A	97.024	0.261	6855	97.102	0.151	7346
100yr/3hr Chicago	5.227	N/A	97.561	0.620	10387	97.666	0.385	11118
July 1st, 1979	4.724	N/A	97.895	1.004	12758	97.997	0.617	13509
August 8th, 1996	4.540	N/A	97.539	0.604	10235	97.674	0.390	11174

Note: (1) Based on pre-development flows to Poole Creek; Refer to Table 1
(2) Active storage only

6 EROSION AND SEDIMENT CONTROL DURING AND AFTER CONSTRUCTION

This section is provided as a reminder that Best Management Practices should be used for erosion and sediment control during construction.

As such is recommended that silt fences be installed along the perimeter of construction areas to prevent the migration of sediments to surrounding areas. Figure 4 demonstrates a typical installation of silt fences. The posts should be approximately 1.0 m in total length extending approximately 0.5 m above ground. Fence posts should be installed at a rate of 1 per metre and the burlap cloth should be stapled to posts as necessary.

Catchbasins, especially the ones installed along the backyard swales, should also be protected from silt and sediments. This can be achieved by installing a geotextile underneath the catchbasin covers as shown in Figure 5.

Post-construction sediment control measures are not deemed necessary but care should be taken to prevent homeowners from dumping grass clippings or other detritus in any of the backyard catchbasins. To achieve this, a specific condition to this effect could be included in the Sales Agreement.

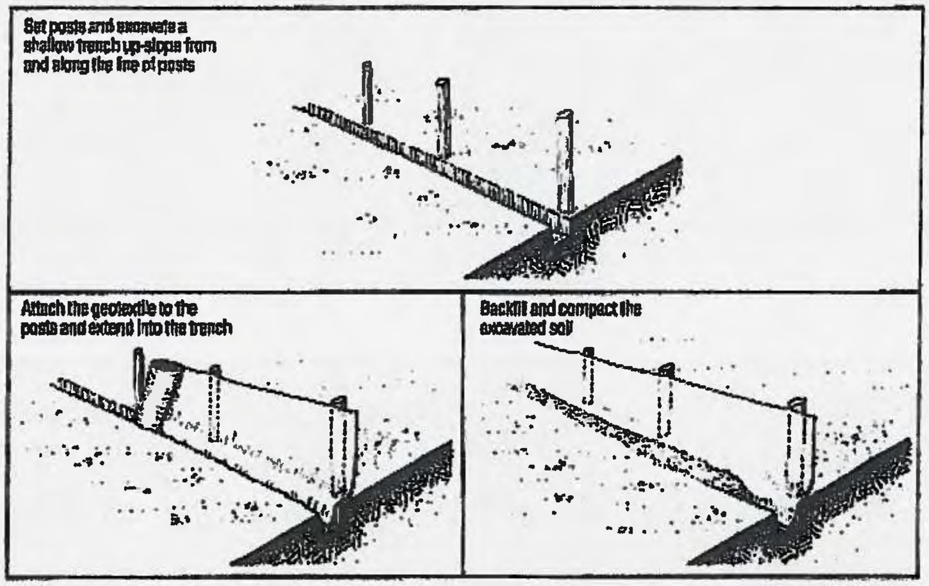


Figure 5: Typical installation of silt fences

Figure 6: Catchbasin with geotextile to protect storm sewer pipes from sediment contamination

7 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

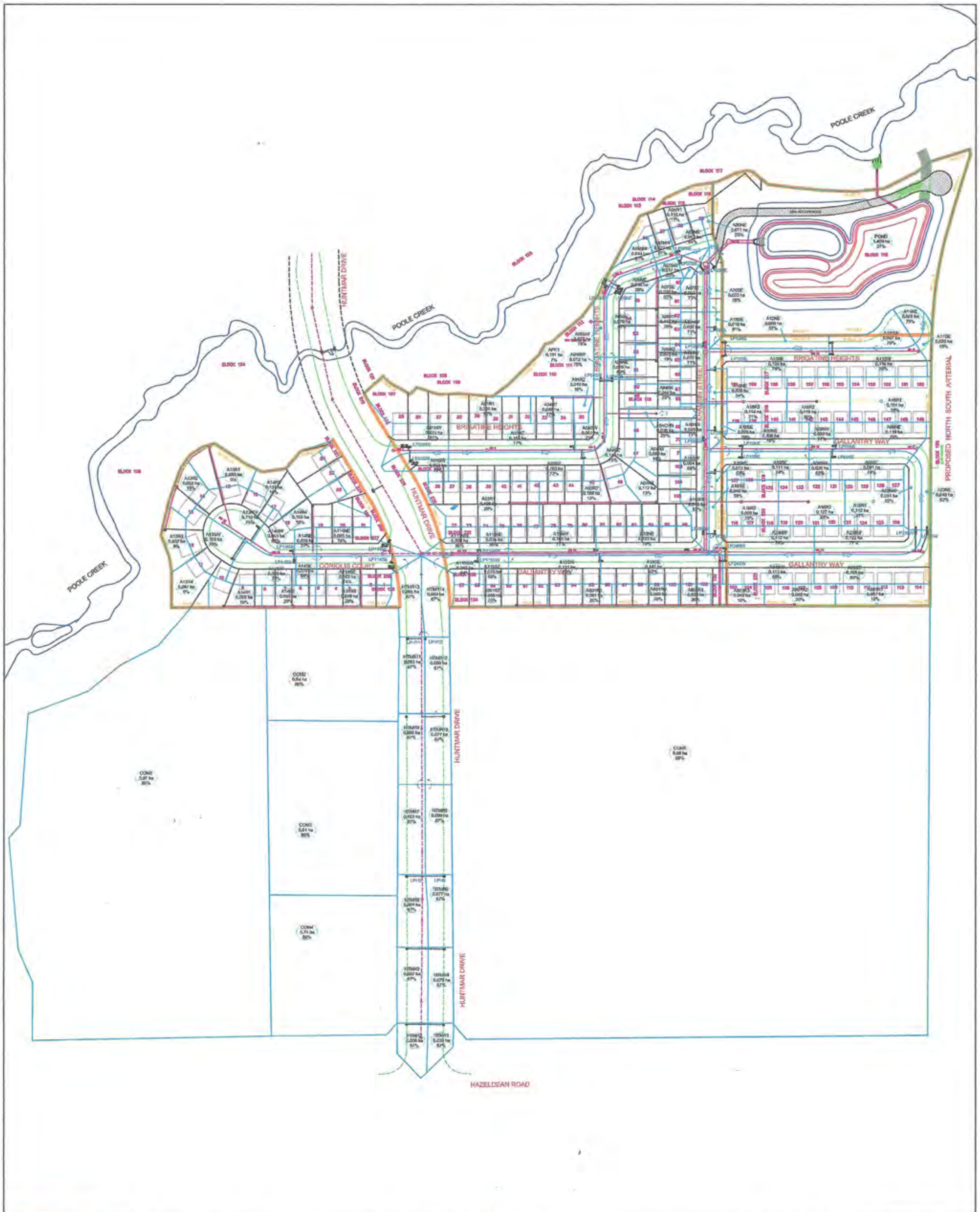
The Fairwinds Phases 5A and 5B development is located within the Kanata West Community. The subject development of 24.86 ha is bound by Poole Creek to the North and Hazeldean Road to the South (refer to Figure A).

In accordance with the City of Ottawa design guidelines and other criteria as presented in the background documents, the minor system has been designed to capture the 5-year design flows on lateral streets and the 10-year design flows on arterial roads, namely, Huntmar Drive. The minor system drains to the temporary SWM pond under interim conditions, and to Pond 5 under ultimate conditions. The major system was designed to safely convey excess flows to the interim pond for storms up to the 100-year event. Note that excess major system flows generated by a 0.19 ha park block and 0.50 ha of rear yard area will overflow directly to Poole Creek.

The DDSWMM modelling analysis has determined that, for the 100-year event, none of the maximum flows depths on any of the street segments in Fairwinds Phases 5A and 5B will exceed the maximum allowable value of 30 cm. Furthermore, it was determine that, for the 100-year event, the product of depth of water (m) at the gutter multiplied by the velocity of flow (m/s) does not exceed the maximum allowable value of 0.6 m^2/s.

The DDSWMM/XPSWMM simulations have determined that, with the selected use of ICDs, a freeboard of 0.3 m between the computed hydraulic grade line elevation and the underside of footings can be provided for all properties under interim conditions throughout the proposed development.

The interim SWM pond for Fairwinds Phases 5A and 5B has been sized to provide quality and quantity control for the entire Fairwinds Phases 5A and 5B development. The quality control portion of the pond has been sized to provide an enhance level of sediment removal (80%) and the quantity control portion of the pond has been sized to limit the 100-year post-development flow from the entire subdivision, including uncontrolled flows from rearyards and the park block, to less than pre-development flows.



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LEGEND :
LIMITS OF SUBDIVISION
MAJOR SYSTEM CATCHMENT BOUNDARY TO LOW POINTS AND OTHER AREAS
MAJOR SYSTEM FLOW DIRECTION
FIRST DIRECTION OF EXCESS MAJOR SYSTEM FLOW AT LOW POINT
LP15NE LOW POINT
A15NE 0.018 ha 75% — SUB-CATCHMENT ID — SUB-CATCHMENT AREA — TOTAL IMPERVIOUSNESS

SCALE :
0 25 50 75 100 125 150m

CLIENT :
DSEL
david schaeffer engineering ltd
120 IBER ROAD, SUITE 205
OTTAWA, ONTARIO, K2S 1E3
(613) 836-0856

Fairwinds Phases 5A and 5B
Proposed Major System

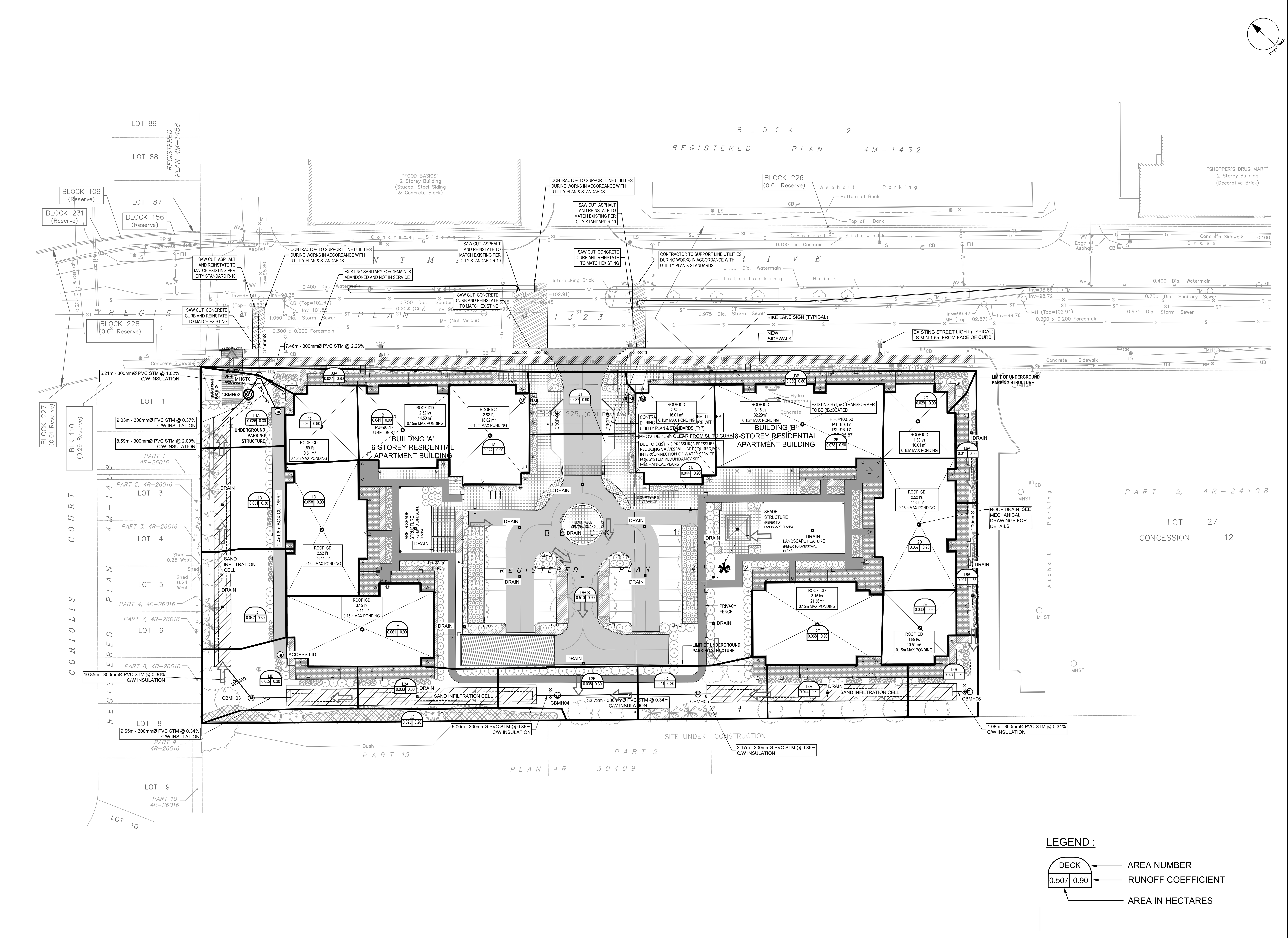
FIGURE 2

DRAWN: LP
VERIFIED: JFS
APPROVED: JFS

DRAWING REF.
677-08\Update 4 (200910)\Design\CAD\JFSA Figures.dwg

DATE
Oct/09

PROJECT No.
677-08



CLIENT

NorthAMERICAN DEVELOPMENT GROUP

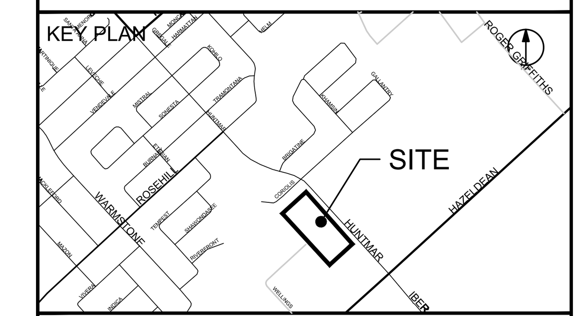
2851 John Street, Suite One, Markham, Ontario L3R 5R7 T:905-968-3185

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPA	2021-02-16
2	SPA SUBMISSION	2021-06-30
3	SPA SUBMISSION	2021-08-17
4	SPA SUBMISSION	2021-10-29

SEE 010 FOR NOTES, LEGEND

KEY PLAN



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1:400 0 4 12 20m

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LICENSED PROFESSIONAL ENGINEER
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2021/10/29
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PROJECT

21/35 HUNTMAR DRIVE

PROJECT NO:
127134

DRAWN BY:	CHECKED BY:
EH	DGY
PROJECT MGR:	APPROVED BY:
DGY	DGY

SHEET TITLE

STORM DRAINAGE PLAN

SHEET NUMBER	ISSUE
C-500	1

CITY FILE No. D07-12-21-0035

CITY PLAN No. 18424

Last Saved: October 28, 2021, by Ehenrie Plotted: Friday, October 29, 2021 8:33:09 AM by Eric Henrie

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STORM SEWER DESIGN SHEET

21 Huntmar Rd
City of Ottawa
North American Group

LOCATION				AREA (Ha)							RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.55	C= 0.83	C= 0.85	C= 0.87	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET TO HUNTMAR RD																																		
	Landscape 6a, 6b,4b	CBMH6	cell		0.026	0.032					0.07	0.07	10.00	0.08	10.08	76.81	104.19	122.14	178.56	5.42	7.36	8.62	12.61		5.42	58.82	4.08	300			0.34	0.806	53.40	90.78%
	Landscape 4a	Cell	CBMH5		0.043						0.04	0.11	10.08	0.06	10.15	76.48	103.75	121.62	177.79	8.14	11.05	12.95	18.93		8.14	59.68	3.17	300			0.35	0.818	51.54	86.36%
	Landscape 2c	CBMH5	CBMH4		0.041						0.03	0.14	10.15	0.70	10.85	76.24	103.41	121.22	177.21	10.72	14.55	17.05	24.93		10.72	58.82	33.72	300			0.34	0.806	48.10	81.77%
	Landscape 2b	CBMH4	Cell		0.038						0.03	0.17	10.85	0.10	10.95	73.70	99.93	117.12	171.18	12.70	17.22	20.19	29.50		12.70	60.53	5.00	300			0.36	0.830	47.83	79.01%
	Landscape 2a	Cell	CBMH3		0.032						0.03	0.20	10.95	0.20	11.14	73.35	99.45	116.55	170.35	14.60	19.79	23.20	33.91		14.60	58.82	9.55	300			0.34	0.806	44.22	75.18%
	Landscape 1d	CBMH3	Cell		0.050						0.04	0.24	11.14	0.22	11.36	72.68	98.52	115.45	168.74	17.50	23.72	27.80	40.62		17.50	60.53	10.85	300			0.36	0.830	43.03	71.09%
	Landscape 1c, 1b	Cell	CBMH2		0.098						0.08	0.32	11.36	0.18	11.54	71.94	97.51	114.27	167.00	23.20	31.45	36.85	53.85		23.20	61.36	9.03	300			0.37	0.841	38.16	62.19%
	Landscape 1a	CBMH2	MH1		0.036						0.03	0.35	11.54	0.06	11.60	71.36	96.70	113.32	165.60	25.15	34.09	39.95	58.38		25.15	101.89	5.21	300			1.02	1.396	76.73	75.31%
	roofs 1 and 2	BLDG	MH1							0.529	1.32	1.32	10.00	0.06	10.06	76.81	104.19	122.14	178.56	101.66	137.91	161.66	236.33		101.66	151.66	7.46	300			2.26	2.078	50.00	32.97%
	deck	cistern	MH1							0.507	1.27	1.27	10.00	0.07	10.07	76.81	104.19	122.14	178.56	97.43	132.17	154.94	226.50		97.43	142.67	8.59	300			2.00	1.955	45.24	31.71%
		MH1	EX								0.00	2.94	11.54	0.11	11.65	71.36	96.70	113.32	165.60	210.11	284.75	333.68	487.63		210.11	252.13	14.73	375			1.90	2.211	42.02	16.66%
				0.000	0.364	0.032	0.000	0.000	0.000	1.036	2.94																							
											1.43	Total A																						
											0.74	Avg. C																						

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) =

Designed: RM

Checked: DY

Dwg. Reference: 125600-500

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2021-02-04
2.	Servicing Brief - Submission No. 2	2021-06-26
3.	Servicing Brief - Submission No. 3	2021-10-28

File Reference:	Date:	Sheet No:
127134.6.4.4	2021-02-04	1 of 1

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PROJECT:	21 HUNTMAR RD
DATE:	2021-06-29
FILE:	127134-6.4
REV #:	2
DESIGNED BY:	R.M.
CHECKED BY:	D.G.Y.

STORMWATER MANAGEMENT

Maximum Allowable Release Rate

Restricted Flowrate (based on 85l/s/Ha)

A_{site} = 1.562 Ha

$Q_{restricted}$ = 132.74 L/s

unrestricted flow to boulevards	Area (Ha)	C (C*1.25)	100yr Q (l/s)	5yr
area 1	0.0370	1	18.37	8.49
area 2	0.0250	0.25	3.10	1.43
Area 3	0.0570	1	28.29	13.08
	0.1190		49.76	23.00

i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$ tc=10

Maximum Allowable Release Rate ($Q_{max\ allowable} = Q_{restricted} - Q_{uncontrolled}$)

$Q_{max\ allowable}$ = 82.97 L/s

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = 732.951 / $(T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = 998.071 / $(T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area: *Roof Area 1A*
Area (Ha): 0.044
C = 1.00
Restricted Flow Q_r (L/s)= 2.520

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
33	86.03	10.52	2.52	8.00	15.85
38	77.93	9.53	2.52	7.01	15.99
43	71.35	8.73	2.52	6.21	**16.02**
48	65.89	8.06	2.52	5.54	15.95
58	57.32	7.01	2.52	4.49	15.63

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	16.02	17.60	0	0.00

Drainage Area: *Roof Area 1A*
Area (Ha): 0.044
C = 0.90
Restricted Flow Q_r (L/s)= 2.520

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
11	99.19	10.92	2.52	8.40	5.54
16	80.46	8.86	2.52	6.34	6.08
21	68.13	7.50	2.52	4.98	**6.28**
26	59.35	6.53	2.52	4.01	6.26
31	52.74	5.81	2.52	3.29	6.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.28	17.60	0	0.00

Drainage Area: *Roof Area 1A*
Area (Ha): 0.044
C = 0.90
Restricted Flow Q_r (L/s)= 2.520

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	9.41	2.52	6.89	3.31
13	66.93	7.37	2.52	4.85	3.78
18	55.49	6.11	2.52	3.59	**3.88**
23	47.66	5.25	2.52	2.73	3.76
33	37.54	4.13	2.52	1.61	3.19

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.88	17.60	0	0.00

Drainage Area	Roof Area 1B		
Area (Ha)	0.041		
C =	1.00	Restricted Flow Q_r (L/s)=	2.520

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
31	89.83	10.24	2.52	7.72	14.36
36	80.96	9.23	2.52	6.71	14.49
41	73.83	8.42	2.52	5.90	**14.50**
46	67.96	7.75	2.52	5.23	14.42
56	58.83	6.71	2.52	4.19	14.06

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	14.50	16.40	0	0.00

Drainage Area	Roof Area 1B		
Area (Ha)	0.041		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
14	86.93	8.92	2.52	6.40	5.37
19	72.53	7.44	2.52	4.92	5.61
24	62.54	6.42	2.52	3.90	**5.61**
29	55.18	5.66	2.52	3.14	5.46
34	49.50	5.08	2.52	2.56	5.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.61	16.40	0	0.00

Drainage Area	Roof Area 1B		
Area (Ha)	0.041		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	8.77	2.52	6.25	3.00
13	66.93	6.87	2.52	4.35	3.39
18	55.49	5.69	2.52	3.17	**3.43**
23	47.66	4.89	2.52	2.37	3.27
33	37.54	3.85	2.52	1.33	2.64

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.43	16.40	0	0.00

Drainage Area	Roof Area 1C		
Area (Ha)	0.030		
C =	1.00	Restricted Flow Q_r (L/s)=	1.890

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
30	91.87	7.66	1.89	5.77	10.39
35	82.58	6.89	1.89	5.00	10.49
40	75.15	6.27	1.89	4.38	**10.51**
45	69.05	5.76	1.89	3.87	10.45
55	59.62	4.97	1.89	3.08	10.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.51	12.00	0	0.00

Drainage Area	Roof Area 1C		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
10	104.19	7.82	1.89	5.93	3.56
15	83.56	6.27	1.89	4.38	3.94
20	70.25	5.27	1.89	3.38	**4.06**
25	60.90	4.57	1.89	2.68	4.02
30	53.93	4.05	1.89	2.16	3.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.06	12.00	0	0.00

Drainage Area	Roof Area 1C		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
6	96.64	7.25	1.89	5.36	1.93
11	73.17	5.49	1.89	3.60	2.38
16	59.50	4.47	1.89	2.58	**2.47**
21	50.48	3.79	1.89	1.90	2.39
31	39.17	2.94	1.89	1.05	1.95

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.47	12.00	0	0.00

Drainage Area	1D		
Area (Ha)	0.058		
C =	1.00	Restricted Flow Q_r (L/s)=	2.520

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
43	71.35	11.50	2.52	8.98	23.18
48	65.89	10.62	2.52	8.10	23.34
53	61.28	9.88	2.52	7.36	**23.41**
58	57.32	9.24	2.52	6.72	23.40
68	50.89	8.21	2.52	5.69	23.20

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.41	23.49	0	0.00

Drainage Area	1D		
Area (Ha)	0.058		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
19	72.53	10.52	2.52	8.00	9.13
24	62.54	9.08	2.52	6.56	9.44
29	55.18	8.01	2.52	5.49	**9.55**
34	49.50	7.18	2.52	4.66	9.51
39	44.98	6.53	2.52	4.01	9.38

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.55	23.49	0	0.00

Drainage Area	1D		
Area (Ha)	0.058		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
14	64.23	9.32	2.52	6.80	5.71
19	53.70	7.79	2.52	5.27	6.01
24	46.37	6.73	2.52	4.21	**6.06**
29	40.96	5.94	2.52	3.42	5.96
39	33.45	4.85	2.52	2.33	5.46

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.06	23.49	0	0.00

Drainage Area	Roof Area 1E		
Area (Ha)	0.061		
C =	1.00	Restricted Flow Q_r (L/s)=	3.150

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
35	82.58	14.00	3.15	10.85	22.79
40	75.15	12.74	3.15	9.59	23.02
45	69.05	11.71	3.15	8.56	**23.11**
50	63.95	10.85	3.15	7.70	23.09
60	55.89	9.48	3.15	6.33	22.78

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.11	24.40	0	0.00

Drainage Area	Roof Area 1E		
Area (Ha)	0.061		
C =	0.90	Restricted Flow Q_r (L/s)=	3.150

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
15	83.56	12.75	3.15	9.60	8.64
20	70.25	10.72	3.15	7.57	9.09
25	60.90	9.29	3.15	6.14	**9.22**
30	53.93	8.23	3.15	5.08	9.14
35	48.52	7.40	3.15	4.25	8.94

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.22	24.40	0	0.00

Drainage Area	Roof Area 1E		
Area (Ha)	0.061		
C =	0.90	Restricted Flow Q_r (L/s)=	3.150

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
9	80.87	12.34	3.15	9.19	4.96
14	64.23	9.80	3.15	6.65	5.59
19	53.70	8.20	3.15	5.05	**5.75**
24	46.37	7.08	3.15	3.93	5.66
34	36.78	5.61	3.15	2.46	5.03

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.75	24.40	0	0.00

Drainage Area	Roof Area 2A		
Area (Ha)	0.044		
C =	1.00	Restricted Flow Q_r (L/s)=	2.520

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
30	91.87	11.24	2.52	8.72	15.69
35	82.58	10.10	2.52	7.58	15.92
40	75.15	9.19	2.52	6.67	**16.01**
45	69.05	8.45	2.52	5.93	16.00
55	59.62	7.29	2.52	4.77	15.75

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	16.01	17.60	0	0.00

Drainage Area	Roof Area 2A		
Area (Ha)	0.044		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
14	86.93	9.57	2.52	7.05	5.92
19	72.53	7.98	2.52	5.46	6.23
24	62.54	6.88	2.52	4.36	**6.29**
29	55.18	6.07	2.52	3.55	6.18
34	49.50	5.45	2.52	2.93	5.98

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.29	17.60	0	0.00

Drainage Area	Roof Area 2A		
Area (Ha)	0.044		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
9	80.87	8.90	2.52	6.38	3.45
14	64.23	7.07	2.52	4.55	3.82
19	53.70	5.91	2.52	3.39	**3.87**
24	46.37	5.11	2.52	2.59	3.72
34	36.78	4.05	2.52	1.53	3.12

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.87	17.60	0	0.00

Drainage Area	Roof Area 2B		
Area (Ha)	0.078		
C =	1.00	Restricted Flow Q_r (L/s)=	3.150

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
50	63.95	13.87	3.15	10.72	32.15
55	59.62	12.93	3.15	9.78	32.27
60	55.89	12.12	3.15	8.97	**32.29**
65	52.65	11.42	3.15	8.27	32.24
75	47.26	10.25	3.15	7.10	31.94

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	32.29	33.15	0	0.00

Drainage Area	oof Area 2B		
Area (Ha)	0.078		
C =	0.90	Restricted Flow Q_r (L/s)=	3.150

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
24	62.54	12.21	3.15	9.06	13.04
29	55.18	10.77	3.15	7.62	13.26
34	49.50	9.66	3.15	6.51	**13.28**
39	44.98	8.78	3.15	5.63	13.17
44	41.29	8.06	3.15	4.91	12.96

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.28	33.15	0	0.00

Drainage Area	oof Area 2B		
Area (Ha)	0.078		
C =	0.90	Restricted Flow Q_r (L/s)=	3.150

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
14	64.23	12.54	3.15	9.39	7.88
19	53.70	10.48	3.15	7.33	8.36
24	46.37	9.05	3.15	5.90	**8.50**
29	40.96	7.99	3.15	4.84	8.43
39	33.45	6.53	3.15	3.38	7.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.50	33.15	0	0.00

Drainage Area	Roof Area 2C		
Area (Ha)	0.029		
C =	1.00	Restricted Flow Q_r (L/s)=	1.890

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
25	103.85	8.37	1.89	6.48	9.72
30	91.87	7.41	1.89	5.52	9.93
35	82.58	6.66	1.89	4.77	**10.01**
40	75.15	6.06	1.89	4.17	10.00
50	63.95	5.16	1.89	3.27	9.80

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.01	11.60	0	0.00

Drainage Area	oof Area 2C		
Area (Ha)	0.029		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
9	109.79	7.97	1.89	6.08	3.28
14	86.93	6.31	1.89	4.42	3.71
19	72.53	5.26	1.89	3.37	**3.84**
24	62.54	4.54	1.89	2.65	3.81
29	55.18	4.00	1.89	2.11	3.68

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.84	11.60	0	0.00

Drainage Area	oof Area 2C		
Area (Ha)	0.029		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
5	103.57	7.51	1.89	5.62	1.69
10	76.81	5.57	1.89	3.68	2.21
15	61.77	4.48	1.89	2.59	**2.33**
20	52.03	3.78	1.89	1.89	2.26
30	40.04	2.91	1.89	1.02	1.83

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.33	11.60	0	0.00

Drainage Area	Roof Area 2D		
Area (Ha)	0.057		
C =	1.00	Restricted Flow Q_r (L/s)=	2.520

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
45	69.05	10.94	2.52	8.42	22.74
50	63.95	10.13	2.52	7.61	22.84
55	59.62	9.45	2.52	6.93	**22.86**
60	55.89	8.86	2.52	6.34	22.81
70	49.79	7.89	2.52	5.37	22.55

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	22.86	23.09	0	0.00

Drainage Area	Roof Area 2D		
Area (Ha)	0.057		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
19	72.53	10.34	2.52	7.82	8.92
24	62.54	8.92	2.52	6.40	9.21
29	55.18	7.87	2.52	5.35	**9.31**
34	49.50	7.06	2.52	4.54	9.26
39	44.98	6.41	2.52	3.89	9.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.31	23.09	0	0.00

Drainage Area	Roof Area 2D		
Area (Ha)	0.057		
C =	0.90	Restricted Flow Q_r (L/s)=	2.520

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
14	64.23	9.16	2.52	6.64	5.58
19	53.70	7.66	2.52	5.14	5.86
24	46.37	6.61	2.52	4.09	**5.89**
29	40.96	5.84	2.52	3.32	5.78
39	33.45	4.77	2.52	2.25	5.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.89	23.09	0	0.00

Drainage Area	Roof Area 2E		
Area (Ha)	0.030		
C =	1.00	Restricted Flow Q_r (L/s)=	1.890

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
30	91.87	7.66	1.89	5.77	10.39
35	82.58	6.89	1.89	5.00	10.49
40	75.15	6.27	1.89	4.38	**10.51**
45	69.05	5.76	1.89	3.87	10.45
55	59.62	4.97	1.89	3.08	10.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.51	12.00	0	0.00

Drainage Area	Roof Area 2E		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
9	109.79	8.24	1.89	6.35	3.43
14	86.93	6.53	1.89	4.64	3.89
19	72.53	5.44	1.89	3.55	**4.05**
24	62.54	4.69	1.89	2.80	4.04
29	55.18	4.14	1.89	2.25	3.92

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.05	12.00	0	0.00

Drainage Area	Roof Area 2E		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	1.890

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
5	103.57	7.77	1.89	5.88	1.77
10	76.81	5.76	1.89	3.87	2.32
15	61.77	4.64	1.89	2.75	**2.47**
20	52.03	3.91	1.89	2.02	2.42
30	40.04	3.01	1.89	1.12	2.01

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.47	12.00	0	0.00

Drainage Area	Roof Area 2F				
Area (Ha)	0.058				
C =	1.00	Restricted Flow Q_r (L/s)=		3.150	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
35	82.58	13.31	3.15	10.16	21.35
40	75.15	12.12	3.15	8.97	21.52
45	69.05	11.13	3.15	7.98	**21.56**
50	63.95	10.31	3.15	7.16	21.49
60	55.89	9.01	3.15	5.86	21.10

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	21.56	23.20	0	0.00

Drainage Area	Roof Area 2F				
Area (Ha)	0.058				
C =	0.90	Restricted Flow Q_r (L/s)=		3.150	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
16	80.46	11.68	3.15	8.53	8.18
21	68.13	9.89	3.15	6.74	8.49
26	59.35	8.61	3.15	5.46	**8.52**
31	52.74	7.65	3.15	4.50	8.38
36	47.58	6.90	3.15	3.75	8.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.52	23.20	0	0.00

Drainage Area	Roof Area 2F				
Area (Ha)	0.058				
C =	0.90	Restricted Flow Q_r (L/s)=		3.150	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	12.40	3.15	9.25	4.44
13	66.93	9.71	3.15	6.56	5.12
18	55.49	8.05	3.15	4.90	**5.29**
23	47.66	6.92	3.15	3.77	5.20
33	37.54	5.45	3.15	2.30	4.55

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.29	23.20	0	0.00

Drainage Area	deck				
Area (Ha)	0.510	ICD Size (L/s)=		42.51	
C =	1.00	Reduced Restricted Flow Q_r (L/s)=		21.255	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
50	63.95	90.67	21.26	69.42	208.26
55	59.62	84.53	21.26	63.28	208.82
58	57.32	81.27	21.26	60.02	**208.86**
61	55.21	78.28	21.26	57.02	208.70
66	52.05	73.79	21.26	52.54	208.04

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	208.86		210	0.00

Drainage Area	deck				
Area (Ha)	0.510	ICD Size (L/s)=		42.51	
C =	0.90	Reduced Restricted Flow Q_r (L/s)=		21.255	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
28	56.49	72.08	21.26	50.83	85.39
30	53.93	68.81	21.26	47.56	85.60
32	51.61	65.85	21.26	44.60	**85.63**
34	49.50	63.16	21.26	41.91	85.50
36	47.58	60.71	21.26	39.45	85.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	85.63	0.00	210	0.00

Drainage Area	deck				
Area (Ha)	0.510	ICD Size (L/s)=		42.51	
C =	0.90	Reduced Restricted Flow Q_r (L/s)=		21.255	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
22	49.02	62.55	21.26	41.30	54.51
23	47.66	60.81	21.26	39.56	54.59
24	46.37	59.18	21.26	37.92	**54.60**
25	45.17	57.63	21.26	36.38	54.57
26	44.03	56.18	21.26	34.92	54.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	54.60	0.00	210	0.00

AREA	AREA	c	ac
L1A	0.036	0.30	0.011
L1B	0.051	0.30	0.015
L1C	0.047	0.30	0.014
L1D	0.052	0.30	0.016
L2A	0.033	0.30	0.010
L2B	0.038	0.30	0.011
L2C	0.041	0.30	0.012
L4A	0.044	0.30	0.013
L4B	0.027	0.30	0.008
L6A	0.014	0.55	0.008
L6B	0.017	0.55	0.009
	0.400		0.128
	Avg C	0.32	

Drainage Area	LANDSCAPE				
Area (Ha)	0.400	ICD Size (L/s)=		11.74	
C =	0.38	Reduced Restricted Flow Q_r (L/s)=		5.870	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
54	60.44	25.76	5.87	19.89	64.43
59	56.60	24.12	5.87	18.25	64.61
62	54.54	23.24	5.87	17.37	**64.63**
65	52.65	22.44	5.87	16.57	64.61
70	49.79	21.22	5.87	15.35	64.47

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	64.63		64.8	0.00

Drainage Area	LANDSCAPE				
Area (Ha)	0.400	ICD Size (L/s)=		11.74	
C =	0.32	Reduced Restricted Flow Q_r (L/s)=		5.870	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
28	56.49	20.06	5.87	14.19	23.84
30	53.93	19.15	5.87	13.28	23.91
32	51.61	18.33	5.87	12.46	**23.92**
34	49.50	17.58	5.87	11.71	23.89
36	47.58	16.90	5.87	11.03	23.82

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.92	0.00	64.8	0.00

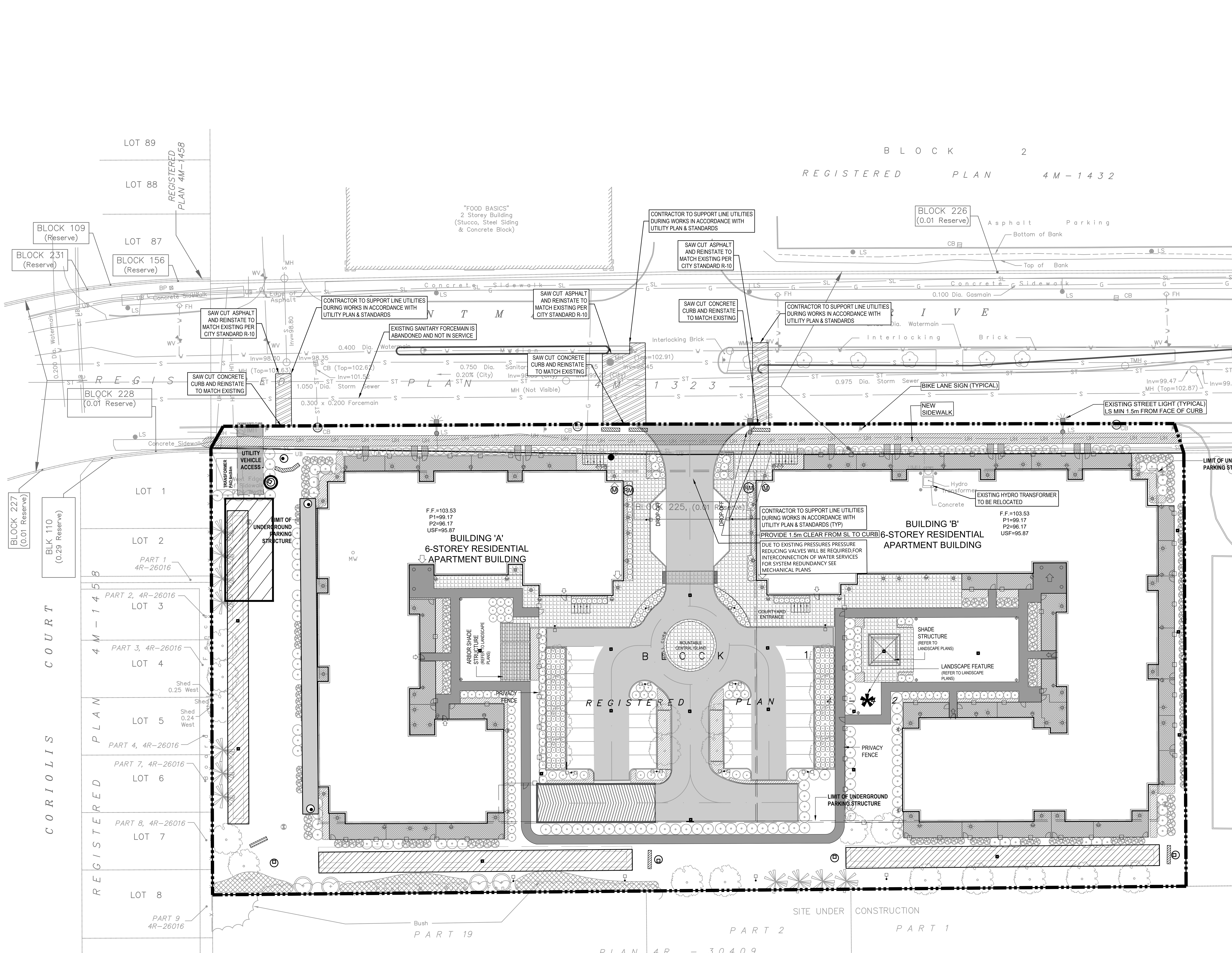
Drainage Area	LANDSCAPE				
Area (Ha)	0.400	ICD Size (L/s)=		11.74	
C =	0.32	Reduced Restricted Flow Q_r (L/s)=		5.870	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
22	49.02	17.41	5.87	11.54	15.23
23	47.66	16.93	5.87	11.06	15.26
24	46.37	16.47	5.87	10.60	**15.26**
25	45.17	16.04	5.87	10.17	15.26
26	44.03	15.64	5.87	9.77	15.24

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	15.26	0.00	64.8	0.00

APPENDIX E

- C-900 Sediment & Erosion Plan
- Rainfall Data/Infiltration table
- C-200 Grading Plan



NOTES:

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY,

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION. ALL DEWATERING EFFLUENT TO BE DISCHARGED TO EXISTING STORM SEWER SYSTEM.
5. WORKS NOTED ABOVE ARE TO BE INSTALLED, INSPECTED, MAINTAINED AND ULTIMATELY REMOVED BY SERVICING CONTRACTOR. EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED FOLLOWING EACH RAINFALL EVENT.
6. THIS IS A "LIVING DOCUMENT" AND MAY BE MODIFIED IN THE EVENT THE PROPOSED CONTROL MEASURES ARE INSUFFICIENT

LIGHT DUTY SILT FENCE AS PER OPSD-219.110

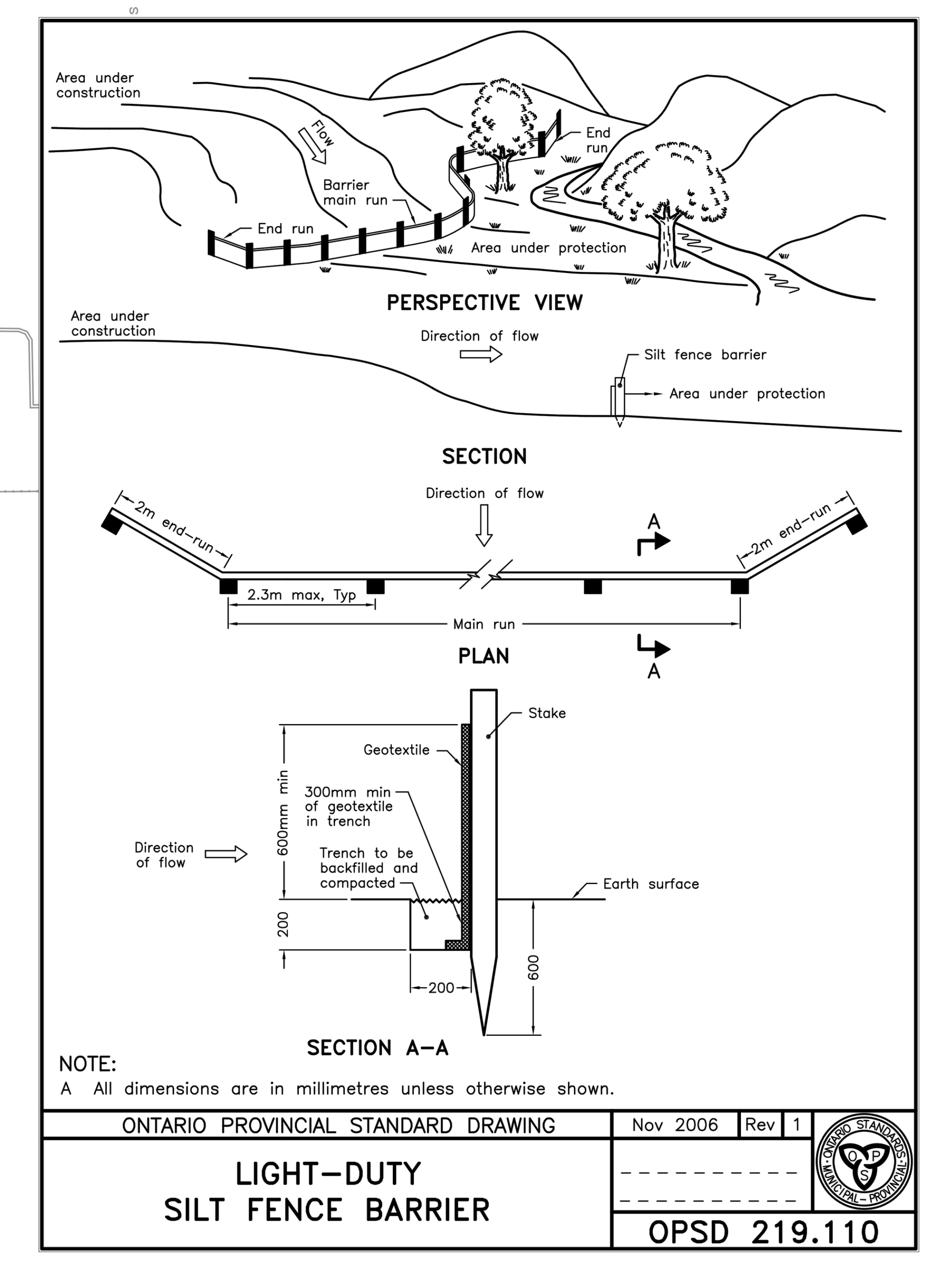
SNOW FENCE

STRAW BALE CHECK DAM AS PER OPSD-219.180

ROCK CHECK DAM AS PER OPSD-219.210

SILT SACK PLACED UNDER EXISTING CB COVER

TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH



CLIENT

NorthAMERICAN® DEVELOPMENT GROUP

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ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPA	2021-02-16
2	SPA SUBMISSION	2021-06-30
3	SPA SUBMISSION	2021-08-17
4	SPA SUBMISSION	2021-10-29

SEE 010 FOR NOTES, LEGEND

KEY PLAN

SITE

CONSULTANTS

Project Coordinator:
North American Development Group
Architect:
RLA Architecture
Surveyor:
Fairhall, Moffatt and Woodland ltd.
Geotechnical:
Paterson Group
Traffic:
JD Halpenny & Assoc.
Electrical:
Hammerschlag & Joffe Inc.
Landscape:
NAK Design Strategies

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2021/10/29 PROVINCE OF ONTARIO

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PROJECT

21/35 HUNTMAR DRIVE

PROJECT NO: 127134	
DRAWN BY: EH	CHECKED BY: DGY
PROJECT MGR: DGY	APPROVED BY: DGY

SHEET TITLE

EROSION AND SEDIMENTATION CONTROL PLAN

SHEET NUMBER	ISSUE
C-900	1

File Location: J:\127134_21_Huntmar\7.0_Production\7.03_Design\04_Civil\Sheets\C-900.dwg Last Saved: September 29, 2021, by Ehenrie Plotted: Friday, October 29, 2021 8:33:25 AM by Eric Henrie

CITY FILE No. D07-12-21-0035

CITY PLAN No. 18424

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2021-11-28	0	0			0
2021-11-27	0	0			0
2021-11-26	4.3	4.3			4.3
2021-11-25	3	3			3
2021-11-24	0	0			0
2021-11-23	0	0			0
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2021-11-21	1.8	1.8			1.8
2021-11-20	0	0			0
2021-11-19	0	0			0
2021-11-18	6.6	5	1.6		6.6
2021-11-17	9.6	5	4.6		9.6
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2021-11-15	1.9	1.9			1.9
2021-11-14	5.2	5	0.2		5.2
2021-11-13	2.6	2.6			2.6
2021-11-12	16.6	5	10.8	0.8	16.6
2021-11-11	0	0			0
2021-11-10	0	0			0
2021-11-09	0	0			0
2021-11-08	0	0			0
2021-11-07	0	0			0
2021-11-06	0	0			0
2021-11-05	0	0			0
2021-11-04	0	0			0
2021-11-03	0	0			0
2021-11-02	1.5	1.5			1.5
2021-11-01	0	0			0
2021-10-31	5.3	5	0.3		5.3
2021-10-30	3.1	3.1			3.1
2021-10-29	0	0			0
2021-10-28	0	0			0
2021-10-27	0	0			0
2021-10-26	16	5	10.8	0.2	16
2021-10-25	3.1	3.1			3.1
2021-10-24	0	0			0
2021-10-23	0	0			0
2021-10-22	0.4	0.4			0.4
2021-10-21	16.8	5	10.8	1	16.8
2021-10-20	0	0			0
2021-10-19	0	0			0
2021-10-18	1.2	1.2			1.2
2021-10-17	0.3	0.3			0.3

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2021-10-15	4.9	4.9			4.9
2021-10-14	0	0			0
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2021-10-12	0	0			0
2021-10-11	0	0			0
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2021-10-08	0	0			0
2021-10-07	0	0			0
2021-10-06	0	0			0
2021-10-05	0	0			0
2021-10-04	0	0			0
2021-10-03	4.2	4.2			4.2
2021-10-02	18.4	5	10.8	2.6	18.4
2021-10-01	7.2	5	2.2		7.2
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2021-09-29	0.3	0.3			0.3
2021-09-28	0	0			0
2021-09-27	3	3			3
2021-09-26	0.3	0.3			0.3
2021-09-25	0	0			0
2021-09-24	0	0			0
2021-09-23	16.9	5	10.8	1.1	16.9
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2021-09-20	0	0			0
2021-09-19	0	0			0
2021-09-18	0	0			0
2021-09-17	0	0			0
2021-09-16	0	0			0
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2021-09-14	12.2	5	7.2		12.2
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2021-09-11	0	0			0
2021-09-10	0	0			0
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2021-09-08	21.6	5	10.8	5.8	21.6
2021-09-07	3.2	3.2			3.2
2021-09-06	3.3	3.3			3.3
2021-09-05	7	7			7
2021-09-04	0	0			0
2021-09-03	0	0			0
2021-09-02	0	0			0
2021-09-01	0	0			0
2021-08-31	0	0			0
2021-08-30	1	1			1

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2021-08-27	0	0			0
2021-08-26	0	0			0
2021-08-25	0	0			0
2021-08-24	0	0			0
2021-08-23	0	0			0
2021-08-22	0	0			0
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2021-08-19	0	0			0
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2021-08-16	0	0			0
2021-08-15	0	0			0
2021-08-14	0	0			0
2021-08-13	6.7	5	1.7		6.7
2021-08-12	0	0			0
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2021-08-09	3.6	3.6			3.6
2021-08-08	0	0			0
2021-08-07	0.2	0.2			0.2
2021-08-06	0	0			0
2021-08-05	0	0			0
2021-08-04	0	0			0
2021-08-03	0	0			0
2021-08-02	0	0			0
2021-08-01	6.9	5	1.9		6.9
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2021-07-23	0	0			0
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2021-07-20	23.9	5	10.8	8.1	23.9
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2021-07-18	0	0			0
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2021-07-15	3.3	3.3			3.3
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2021-07-13	3.9	3.9			3.9

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2021-07-10	0	0			0
2021-07-09	0	0			0
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2021-07-06	0	0			0
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2021-06-16	0	0			0
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2021-06-09	0	0			0
2021-06-08	0	0			0
2021-06-07	0	0			0
2021-06-06	0	0			0
2021-06-05	1.6	1.6			1.6
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2021-06-03	11.1	5	6.1		11.1
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2021-06-01	0.8	0.8			0.8
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2021-05-26	0	0			0

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2021-05-22	0	0			0
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2021-05-19	0	0			0
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2021-05-11	2.3	2.3			2.3
2021-05-10	2.1	2.1			2.1
2021-05-09	0	0			0
2021-05-08	4.3	4.3			4.3
2021-05-07	1.7	1.7			1.7
2021-05-06	0	0			0
2021-05-05	0.4	0.4			0.4
2021-05-04	0.6	0.6			0.6
2021-05-03	0.5	0.5			0.5
2021-05-02	0	0			0
2021-05-01	1.4	1.4			1.4
2021-04-30	22.3	5	10.8	6.5	22.3
2021-04-29	1.7	1.7			1.7
2021-04-28	7.4	5	2.4		7.4
2021-04-27	0	0			0
2021-04-26	0	0			0
2021-04-25	8.8	5	3.8		8.8
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2021-03-28	13.7	5	8.7		13.7
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2021-03-26	30.9	5	10.8	15.1	30.9
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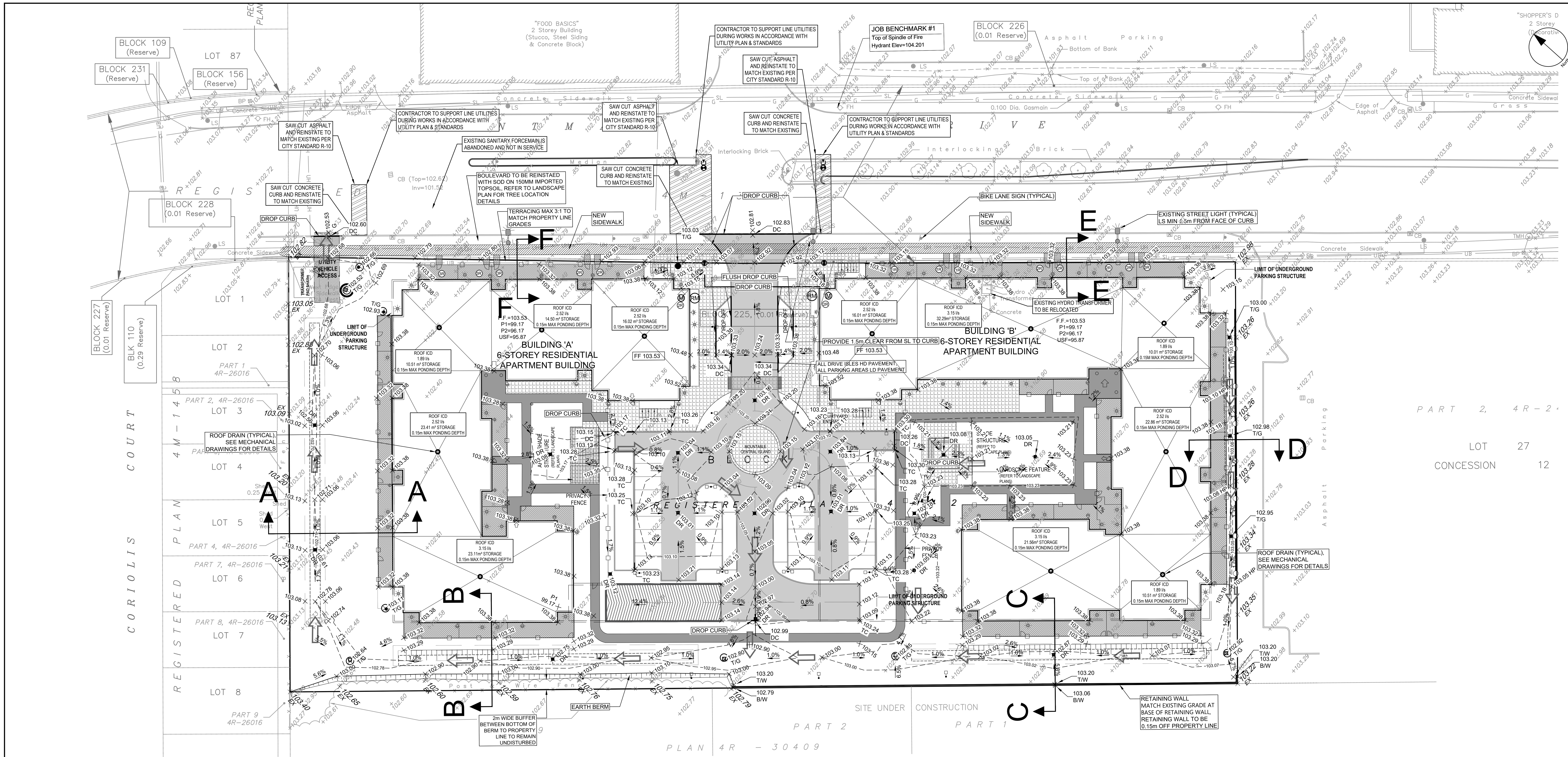
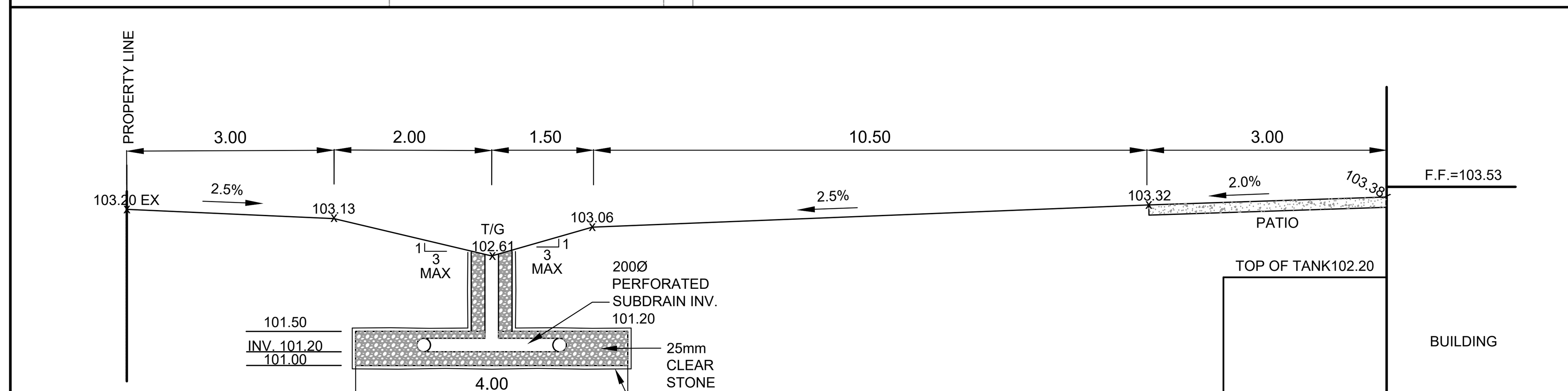
2021-03-08	0	0			0
2021-03-07	0	0			0
2021-03-06	0	0			0
2021-03-05	0	0			0
2021-03-04	0	0			0
2021-03-03	0	0			0
2021-03-02	0	0			0
2021-03-01	1.5	1.5			1.5
	all	0-5	5-15.8	>15.8	total
subtotal	694.90	318.00	256.70	120.20	694.90
collected amount		0.00	256.70	0.00	256.70
% of total		45.76%	36.94%	17.30%	36.94%

4000sm tributary area for cells
1.56 Ha site
Infil rate for site 65.82 mm/yr



SECTION A-A

N.T.S.



SECTION B-B

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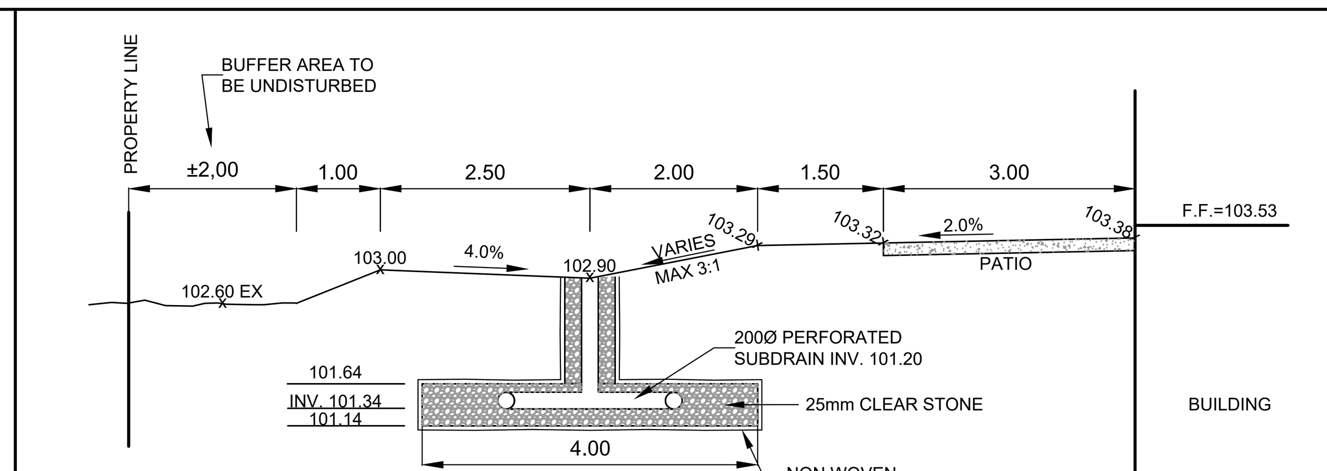

SECTION C-C

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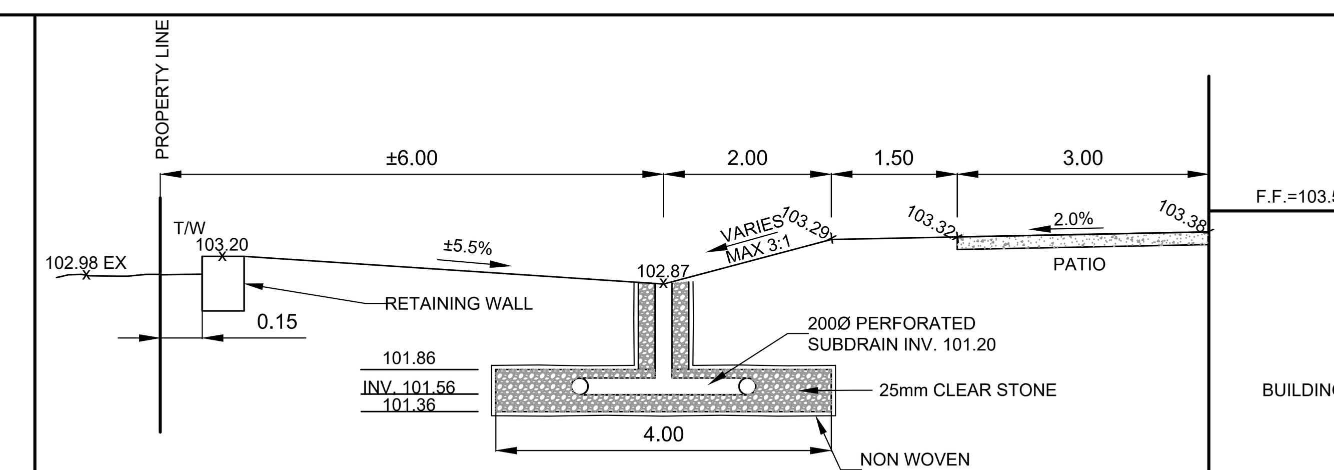

SECTION D-D

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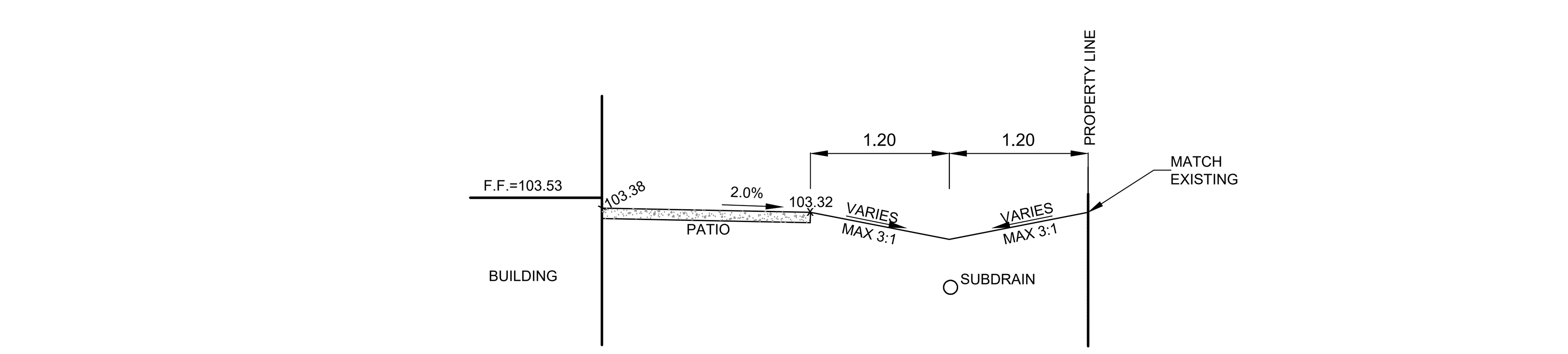

SECTION E-E

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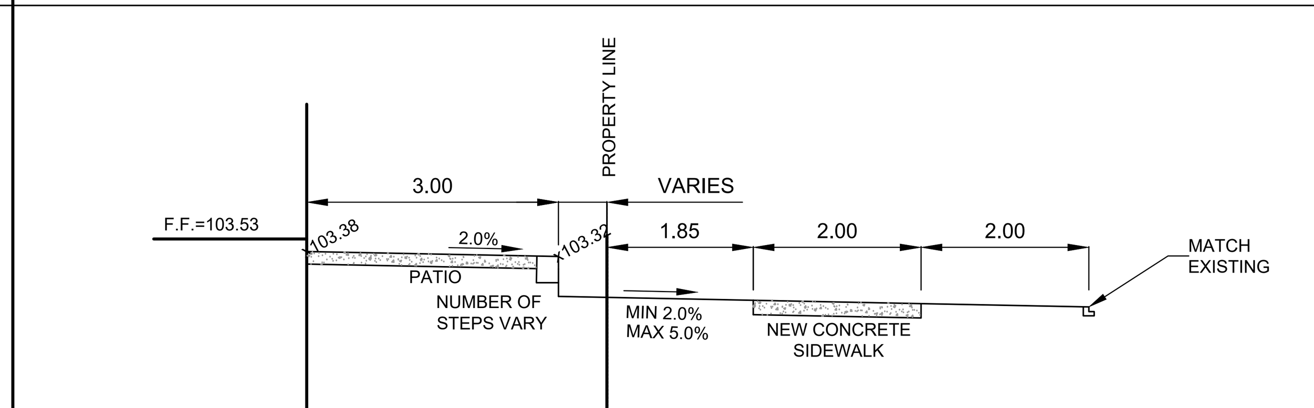

SECTION F-F

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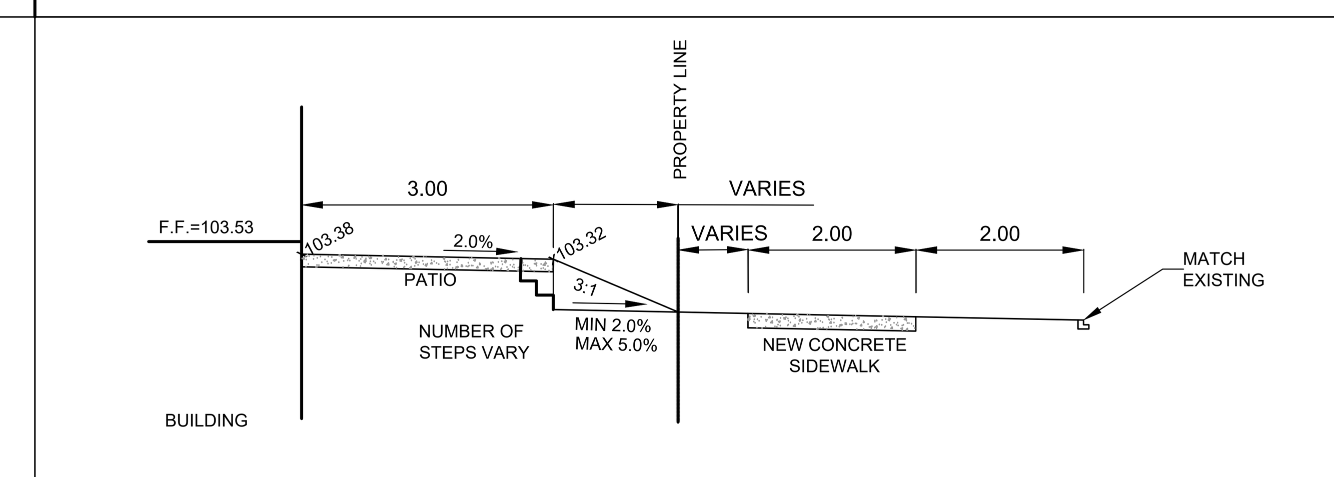

CLIENT

NorthAMERICAN® DEVELOPMENT GROUP

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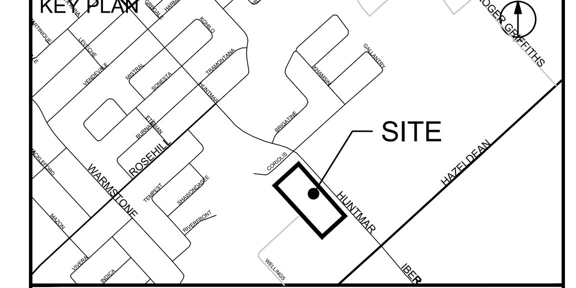
ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPA	2021-02-16
2	SPA SUBMISSION	2021-06-30
3	SPA SUBMISSION	2021-08-17
4	SPA SUBMISSION	2021-10-29

SEE 010 FOR NOTES, LEGEND

KEY PLAN



CONSULTANTS

Project Coordinator:
North American Development Group
Architect:
RLA Architecture
Surveyor:
Fairhall, Moffatt and Woodland ltd.
Geotechnical:
Paterson Group
Traffic:
JD Halpenny & Assoc.
Electrical:
Hammerschlag & Joffe Inc.
Landscape:
NAK Design Strategies

1:400 0 4 12 20m

SEAL

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PROJECT

21/35 HUNTMAR DRIVE

PROJECT NO: 127134	
DRAWN BY: EH	CHECKED BY: DGY
PROJECT MGR: DGY	APPROVED BY: DGY

SHEET TITLE

GRADING PLAN

SHEET NUMBER	ISSUE
C-200	1

CITY PLAN No. 18424

CITY FILE No. D07-12-21-0035

File Location: J:\127134_21_Huntmar\7.0_Production\7.03_Design\04_Civil\Sheets\C-200 GRADING PLAN.dwg Last Saved: October 28, 2021 by Eherrie Plotted: Friday, October 29, 2021 8:32:37 AM by Eric Henrie