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STORMWATER MANAGEMENT REPORT

Proposed Residential Development
3430 Carling Avenue
OTTAWA, ONTARIO

Prepared For:
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PROJECT #: 220978

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1 INTRODUCTION

Kollaard Associates was retained by Rohit Communities Ontario Inc. to complete a Stormwater Management Report for a proposed residential development, consisting of two 6-storey apartment buildings.

This report will summarize the stormwater management (SWM) design requirements and proposed works that will address stormwater flows arising from the site under post-development conditions. The report will identify any stormwater servicing concerns and also describe any measures to be taken during construction to minimize erosion and sedimentation. This report will also address the capacity of the existing municipal storm sewer to hydraulically convey the stormwater runoff from the site.

The proposed development is located at 3430 Carling Avenue, Ottawa, Ontario. The property is on the south side of Carling Avenue between Ullswater Drive and Crystal Beach Drive.

The site has a total area of 0.62 hectares and is currently occupied by a 1-storey commercial building. It is understood that the existing building will be removed and two new residential buildings with approximate footprints of 1342 square meters and 1270 square meters respectively will be constructed. The proposed development is to consist of a two 6-storey buildings interconnected by 2 levels of underground parking.

On-site stormwater detention will be provided and the discharge rate from the stormwater storage will be restricted to ensure that the post-development runoff rate from the site during a 1 to 100 year design storm will be less than or equal to the predevelopment runoff rate for a 5 year design storm event with a runoff coefficient of 0.5. The stormwater storage requirements will be met for all design storm events up to and including the 100-year design storm on the roofs of the proposed buildings and in underground storage tanks adjacent to the south side of the underground parking..

Calculations of the required storage volumes have been prepared based on the modified Rational Method as identified in Section 5.4 and Section 8.3.10.3 of the City's Sewer Guidelines.

Design of the stormwater management system was completed in conformance with the City of Ottawa Sewer Design Guidelines (October 2012 as amended).

2 STORMWATER DESIGN

2.1 Background

The majority of the runoff from the existing property currently drains by a combination of overland sheet flow towards the north flowing onto Carling Avenue, and into a storm manhole which outlets to the storm sewer along Carling Avenue.

The Storm sewer along Carling Avenue to the west of the site consists of a 525mm diameter concrete pipe, which increases in size to 600mm at storm manhole MHST52076. The storm sewer directly adjacent to the site along Carling Avenue consists of a 600 mm diameter concrete pipe. The diameter of the storm sewer increases to 675mm diameter east of the site at storm manhole MHST52081.

2.2 Stormwater Management Design Criteria

The SWM design criteria was provided by the City of Ottawa as a part of a previous SWM project completed by J.J Richards & Associates Limited. (JLR No.: 3114-001). The stormwater management criteria was summarized in the Pre-Consultation Meeting Notes (Included in Appendix C).

2.2.1 Quantity Control Design Criteria

The quantity control design criteria were provided by the City of Ottawa and are as follows:

- Design Storm for receiving sewer: 5-design Storm;
- Runoff Coefficient to model pre-development conditions is to be the lesser of C = 0.5 or C = pre-development;
- Time of Concentration (Tc) to be calculated. Minimum Tc = 10 minutes;
- The post-development runoff rate from a 100-year storm event is to be controlled to the 5-year pre-development runoff rate.
- Storm sewers to be designed and sized based on the rational formula and the Manning's Equation under free flow conditions for the 5-year storm using a 10-minute inlet time.
- If underground/inline stormwater storage is proposed, an average release rate equal to 50% of the determined peak allowable rate must be used. Otherwise, disregard the underground/inline storage as available storage or provide modeling to support the proposed design.

2.2.2 Quality Control Design Criteria

Kollaard Associates has reached out to Rideau Valley Conservation Authority to obtain the quality control design criteria for the site. At time this report was prepared, no criteria has been provided. Since the discharge from the site is being directed into an existing storm sewer

system it has been assumed that there will be no quality control design control requirements for the site. Best management practices will be incorporated where possible to reduce the potential transport of pollutants from the site to the storm sewer system.

2.3 Stormwater Quantity Control

2.3.1 Methodology

The peak flow and runoff rates for quantity control purposes during both Pre-Development and Post-Development stages of the project were calculated using the rational method. The rational method is a common and straightforward calculation, which assumes that the entire drainage area is subject to uniformly distributed rainfall. The formula is:

$$Q = \frac{CiA}{360}$$

Where
Q is the Peak runoff measured in m^3/s
C is the Runoff Coefficient, Dimensionless
A is the runoff area in *hectares*
i is the storm intensity measure in *mm/hr*

All values for intensity, i, for this project were derived from IDF curves provided by the City of Ottawa for data collected at the Ottawa International airport. For this project two return periods were considered, 5 and 100-year events. The formulas for each are:

5-Year Event

$$i = \frac{998.071}{(t_c + 6.053)^{0.814}}$$

100-Year Event

$$i = \frac{1735.688}{(t_c + 6.014)^{0.82}}$$

Where t_c is time of concentration

2.3.2 Runoff Coefficients

Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, gravel areas were taken as 0.60, patio stones were taken as 0.7 and pervious surfaces (grass) were taken as 0.20.

A 25% increase for the post development 100-year runoff coefficients was used as per City of Ottawa guidelines.

2.3.3 Pre-development Site Conditions

As previously indicated, the site is located at 3430 Carling Avenue. The property has a total area of about 0.62 hectares and is currently occupied by a 1 -storey commercial building.

The adjacent property to the west is a community of mid-rise apartment buildings and townhouses serviced with an asphalt parking lot. Limited topographic data and available aerial photography indicate that the abutting parking lot drains away from the subject site and as such will not contribute offsite runoff to pre-development conditions.

The adjacent property to east is a 1 storey commercial building used as the diner with a joined gas station which is serviced by an asphalt parking lot. Limited topographic data and available aerial maps indicate that the abutting parking lot drains away from the subject site and as such, will not contribute to offsite runoff to pre-development conditions.

The adjacent properties to the south consist of single family dwellings with soft landscaping in the north (rear) yards with a hedge separating the subject side from the neighbouring lots. Limited topographic data and available aerial maps indicate that the abutting lots have a high point in the rear yard that drains away from the subject site, and as such will not contribute to offsite runoff to pre-development conditions.

Drawing 220978-PRE Pre-development Conditions shows the pre-development conditions and catchment areas considered for the proposed development.

2.3.4 Time of Concentration

The time of concentration for pre-development conditions was determined by the use of the Bransby-William's Formula. The maximum length of flow under pre-development conditions is about 100 metres towards a catch basin in the asphalt parking lot, which outlets to the existing 600mm storm sewer along Carling Avenue, and about 50 metres towards the north property line along Carling Avenue. The existing ground surface is sloped to the catch basin in the asphalt parking lot at about 0.2 percent and toward Carling Avenue at about 0.6 to 1.5 percent. The existing ground surface is mostly covered with asphaltic concrete pavement and has a runoff coefficient for pre-development conditions of 0.83 as indicated in section 2.3.5 of this report. The Bransby Willam's formula was used on the portion of the parking lot which drains into the existing storm manhole, which outlets into the existing storm sewer on Carling Avenue. The Bransby Williams Formula is:

$$t_c = \frac{0.057 * L}{S_w^{0.2} * A^{0.1}}$$

From the formula, a length of 100 metres, combined with a slope of 0.2 percent and an asphalt pavement surface results in an inlet time of about 8.3 minutes. Since the minimum time of concentration to be used is 10 minutes, a time of concentration of 10 minutes was used to model pre-development conditions and post-development uncontrolled runoff conditions.

2.3.5 Pre-development Runoff Coefficient

Pre-development site conditions are summarised in the following Table 2-1.

Table 2-1 – Summary of Pre-Development Runoff Coefficients

PRE-DEVELOPMENT

Description	Runoff Coefficient		Area (ha)
	5-year	100year	
			0.616
Gravel	0.60	0.75	0.000
Asphalt/ Concrete/ Roof	0.90	1.00	0.556
Patio Stones/Pavers	0.70	0.88	0.000
Grass	0.20	0.25	0.060
Weighted Average C	0.83	0.92	

It is understood that pre-development conditions will be considered as the lesser of current conditions or conditions resulting in a runoff coefficient of 0.5.

Based on the existing ground cover the pre-development runoff coefficient was calculated to be 0.82. However, the predevelopment runoff coefficient used for the purpose of this stormwater management design is C = 0.5.

2.3.6 Pre-development Flow Rate

Using the IDF curve formula for the Ottawa International Airport with a time of concentration of 10 minutes results in a rainfall intensity of 104.19 mm/hr for a 5 year design storm. Using the Rational Method, the previously calculated runoff coefficients and a storm intensity of 104.19 mm/hr, the pre-development runoff rate for the 5-year storm is:

5 year = 2.78 x 0.5 x 104.19 x 0.616= 89.3 L/s

In keeping with the stormwater management criteria, the total allowable runoff rate from the site is equal to the pre-development runoff rate occurring during a 5 year storm event. As such, the total allowable post-development runoff rate for the site is 89.3 L/s.

2.3.7 Post-Development Controlled and Uncontrolled Areas

For the purposes of this storm water management design, the site has been divided into uncontrolled and controlled areas as outlined on drawing 220978-SWMP Stormwater Management Plan and Catchment Areas. The site has one uncontrolled area, and three controlled areas.

The site has one uncontrolled area. Since the building's underground parking footprint occupies the majority of the site, there is insufficient area available adjacent to the buildings to provide for appreciable detention and storage. As such, all of the surface areas in between the footprint of the building and the respective property lines are considered as one uncontrolled area (UA1). UA1 has an area of 0.209 ha and is comprised of a combination of landscaped grass areas, landscaped stone areas at the building entrances, a portion of the asphalt driveway on the northern portion of the lot, and concrete surfaces at the garage entrance. Runoff from UA1 will be conveyed by surface flow and shallow swales without restriction to Carling Avenue.

The first controlled area is comprised of the main roof of the west building. This roof area is considered as catchment 1 (CA1-west roof). The roof has an area of 0.134 ha. The west roof will be constructed to accommodate stormwater storage. Outlet from the upper roof will be restricted by ten WATTS Accutrol Roof Drains (with adjustable flow control) which will direct the roof discharge to internal stormwater plumbing that discharges to the storm service lateral connected to Carling Avenue north of the site.

The second controlled area is the main roof of the east building. This roof area is considered as catchment 2 (CA2 – east roof). The east roof section has an area of 0.128 ha. CA2 will also be constructed to accommodate stormwater storage. Discharge from the east roof will be restricted by two WATTS Accutrol Roof Drains (with adjustable flow control) which will also direct the discharge to the internal stormwater plumbing.

The third controlled area is the surface level parking and adjacent landscaping along the rear (south) of the buildings. The surface runoff is to be captured and conveyed by trench drains into maintenance holes STM-MH1, STM-MH2, STM-MH3 and STM-MH4. These maintenance holes will discharge to a modular underground stormwater storage tank located adjacent the south side of the underground parking. An inlet control device placed in the outlet maintenance hole STM-MH5 will be used to restrict the discharge from the modular storage tanks into the storm sewer system during and following a rain storm event.

The following table provides a summary of the post development conditions.

Table 2-2 – Summary of Post-Development Site Conditions

Catchment Area ID.	Runoff Coefficient (5yr)	Runoff Coefficient (100yr)	Catchment Area (Ha)
Controlled CA1 (west roof)	0.90	1.00	0.134
Controlled CA2 (east roof)	0.90	1.00	0.127
Controlled CA3	0.66	0.75	0.146
Uncontrolled UA1	0.37	0.44	0.209
Total			*0.616*

2.3.8 Uncontrolled Runoff

Flow from the uncontrolled area will be directed without restriction towards Carling Avenue. The maximum allowable release rate from the controlled area equals the allowable post development runoff rate minus the 100-year runoff rate from the uncontrolled portion of the site.

A post-development time of concentration of 10 minutes corresponds to a storm intensity of 104.19 mm/hr and 178.56 mm/hr during the 5-year and 100-year design storm events respectively. The runoff rate from the uncontrolled areas was calculated using the Rational Method.

$$Q = \frac{CiA}{360}$$

The uncontrolled runoff for the 5 year and 100 year design storm events are as follows (calculations are provided in Appendix A):

5 year = 2.78 x 0.37 x 104.19 x 0.209= 22.4 L/s

100 year = 2.78 x 0.44 x 178.56 x 0.209= 45.6 L/s

2.3.9 Allowable Release Rate

The City of Ottawa requires that post-development stormwater runoff rate during a 100 year design storm event be limited to be less than or equal to the pre-development runoff rate, calculated assuming a maximum runoff coefficient of C=0.5, during a 5 year design storm event. To control runoff from the site it will be necessary to limit post-development flows, from the controlled areas, for all design storm events up to and including the 100-year event using onsite inlet controls.

The allowable release rate from the controlled areas of the site is equal to the total allowable runoff rate from the site less the runoff rate from the uncontrolled areas.

$Q_{controlled} = Q_{total\ allowable} - Q_{uncontrolled}$

For the 5-year Storm event
$Q_{controlled}$= 89.3 – 22.4L/s = 66.9 L/s

For the 100-year Storm event
$Q_{controlled}$= 89.3 – 45.6L/s =43.7 L/s

Since the allowable release rate for a 100 year design storm event is less than the allowable release rate for a 5 year design storm event, the flow restriction for the 100 year design storm will govern. As such, the maximum allowable release rate from the combined controlled areas of CA1, CA2 and CA3 is limited to 43.7 L/s for a 100 year storm event.

2.3.10 Post Development Restricted Flow and Storage

Runoff generated on site in excess of the allowable release rate will be temporarily stored on both roof structures; the west roof (CA1) and east roof (CA2) and in modular underground storage tanks (CA3). The stored water will be released during and following the storm event at a controlled rate from each catchment area such that the total release rate is less than or equal to the maximum allowable release rate from the combined controlled areas.

Storm water runoff from the roof CA1 (west roof) will be controlled by ten (10) roof drains fitted with weirs for flow control. The roof drains will be WATTS Large area single slot roof drains with adjustable flow control (RD-100-A1). The weir opening will be adjusted to the three-quarters open setting.

Storm water runoff from the roof CA2 (east roof) will be controlled by ten (10) roof drains fitted with weirs for flow control. The roof drains will be WATTS Large area single slot roof drains with adjustable flow control (RD-100-A1). The weir opening will be adjusted to the three-quarters open setting.

Stormwater runoff from CA3, which is comprised of the surface level parking area and adjacent landscaped area between the surface parking and the building, will be controlled by an ICD placed in the inlet of the outlet pipe of maintenance hole STM-MH5. The ICD will consist of a 75 mm diameter circular orifice. There will be no surface storage on the site.

The roof drain weir opening settings and ICD in STM-MH5 have been selected to ensure that the total allowable combined controlled area release rate is not exceeded while ensuring that the available storage capacity on each roof and below grade is also not exceeded. Calculations for available rooftop storage and underground storage tanks are summarized in Appendix A. Roof drain specifications are provided in Appendix B.

The following tables present a summary of the controlled and uncontrolled runoff for each catchment and the required storage resulting from the restriction in flow rate.

Table 2-3 – Summary of Runoff Rates and Storage

Catchment Area ID.	Outlet Location	100-year design Storm			
		Release Rate (L/s)	Required Storage Volume (m^3)	Required Storage depth (m)	Available Storage (m^3)
UA1	Carling Avenue	45.6	N/A	N/A	N/A
CA1 (west roof)	Storm sewer	15.4	35.5	0.15	35.83
CA2 (east roof)	Storm Sewer	16.8	30.6	0.15	30.64
CA3 (parking lot)	Storm Sewer	9.5	43.1	1.05	52.40
Total Storm Runoff Rate		87.3			

The total allowable runoff rate from the site was 89.3 L/s. The total actual runoff rate during a 100 year design storm event is 87.3 L/s which is less than the total allowable runoff rate. Refer to Appendix A for a detailed summary of the stormwater management.

2.3.11 Rooftop Storage

Rooftop storage will be provided in CA1 (west roof), and CA2(east roof).

The storage on the upper roof, CA1, will consist of 10 sections each containing an outlet drain as previously discussed. The remaining roof area will be divided into ten sections. The roof drainage plans obtained from the Architect have been included in Appendix B. The divide between each of the quadrants has been set at 0.1 m high relative to the drain. When the water is less than 0.10m high relative to the drain, water will be confined within each of the ten quadrants. Water levels in excess of 0.1m will result in overflow of the separation between the quadrants and the stored water will be able to drain through any of the quadrants should one or more drains become inoperable. Additionally the roof will be fitted with overflow scuppers located at 0.15m relative to the drains. In the event that ponding occurs during a storm event which significantly exceeds the required storage during a 100 year storm event, or if some or all drains become plugged water can outlet from the roof and will land on the uncontrolled area below and ultimately deposit into the storm drains located on the adjacent street. The roof top storage has been designed to prevent standing water from pooling and is designed with a slope of 1.5%.

The storage on the east roof, CA2, will consist of ten similar sections, each with an outlet drain as previously discussed. The east roof will have a minimum slope of 1.5%. The separation between the ten sections will overflow above an elevation of 0.09m relative to the elevation of the drains. The roof will be fitted with overflow scuppers at 0.15m relative to the drains at the perimeter of the building.

Routing of the internal storm pipe directing water from the roofs to the storm lateral is the responsibility of the mechanical engineer.

2.3.12 Underground Storage

Storm water runoff originating on the surface parking area and landscaped areas between the surface parking area and the buildings will be captured and conveyed by trench drains into maintenance holes STM-MH1, STM-MH2, STM-MH3 and STM-MH4. These maintenance holes will discharge to a modular underground stormwater storage tank located adjacent the south side of the underground parking.

Since the native soils at the site consist of highly plastic silty clay, there will be no significant infiltration from the tanks to the surrounding soils. For this reason, the proposed stormwater tanks have been designed as storage tanks only and not infiltration tanks. Since the expected groundwater level will be below the tanks and the hydraulic conductivity of the surrounding highly plastic silty clay is low, there is also expected to be no significant infiltration from the ground into the tanks. Therefore, the potential of an elevated groundwater level has no significant impact on the design of the proposed storage tanks.

The underground storage will consist of 172 modules divided between two tanks. The first tank will consist of 96 modules will the second tank will consist of 76 modules. The two tanks will be constructed in line with the storm sewer. The flow to the storage tanks will be facilitated directly by means STM-MH1 and STM-MH2 (constructed as part of the storage tank) and of by means of a 250 mm diameter storm sewer from STM-MH3 and STM-MH4 located east of the storage tank. Discharge from the storage tank will be by means of the 250 mm diameter storm sewer which discharges to a maintenance hole STM-MH5 located at the south east corner of the site. Release from the tanks to the maintenance hole STM-MH5 will be uncontrolled. Discharge from maintenance hole STM-MH5 will be controlled by a 75 mm circular orifice set in an orifice plate in the outlet pipe of the STM-MH5. The orifice in the outlet pipe from STM-MH5 will have an invert of 63.20 m.

The underground storage will be provided using GRAF EcoBloc Maxx modules. An EcoBloc Maxx Module is a subsurface storage unit load-rated for use under surfaces such as parking lots, athletic fields, and parks as well as landscaped areas. Design information for the GRAF EcoBloc Maxx modules is provided in Appendix B. It is considered that there are similar modular stormwater management systems that are directly comparable to the GRAF EcoBloc Maxx modules. The developer / sewer contractor may propose the use of an alternative equivalent modular product. Shop drawings should be submitted to the design engineer prior to acceptance of equivalency. Shop drawings should be submitted, of the GRAF EcoBloc Maxx or accepted equivalent system, to the design engineer for approval prior to installation.

The City of Ottawa Sewer design guideline indicates that an assumed constant flow rate during a storm event underestimates the required storage during a storm event. The discharge rate from the proposed underground storage tank will range from 4.7 L/s when the tank is near

empty to 11.4 L/s when the tank is full. Overflow will discharge into the uncontrolled swales that outlet onto Carling Avenue. The average discharge rate between the when the storage tank is full and when the storage tank is near empty is 8.0 L/s. The required storage volume assuming a discharge rate of 8.0 L/s would be 36.2 m^3 during a 100 year storm event which is less than the total storage available in the underground storage tanks.

As previously indicated, the underground tanks are comprised of GRAF EcoBloc Maxx modules. Each module has dimensions of 0.8 m wide by 0.8 m long by 0.35 m high and has a storage volume of 96%. The modules will be placed in two groups as follows: Tank A will consist of 96 modules placed in 2 rows of 24 modules, stacked two modules high; Tank B will consist of 76 modules placed in 2 rows of 19 modules stacked two modules high. The tanks will be wrapped in a nonwoven 6 oz/yd^2 geotextile filter fabric to prevent stone intrusion into the tanks. The tanks will then be surrounded with a 200 mm thick layer of 25 mm clearstone on all sides and a 200 mm thick clearstone layer on the bottom and a 400 mm thick layer on the top. It is understood that this will potentially promote infiltration into the adjacent soils below the tank. The clearstone will also be separated from the surrounding soils by a nonwoven geotextile. The discharge rate from the tanks into the surrounding soils has not been accounted for in the design as the surrounding soils are silty clay.

The proposed storage tanks will be above the underside of footing and adjacent to the garage foundation wall. If the tanks are placed on granular backfill or relatively pervious unclassified native backfill, an impervious geotextile liner should be placed below the tanks and should extend upward between the tanks and the foundation wall. The liner should extend horizontally outward from the foundation wall below the tanks and be fitted to the undisturbed silty clay present in the south wall of the excavation. If tightly fitting the liner to the adjacent silty clay is not possible, the liner should also be extended upward on the south side of the tanks. The liner is intended to limit potential flow from the tanks to the foundation drain. The liner is not intended to form a perfect seal around the tanks or be completely waterproof. Care should be taken during placement to reduce potential for leakage however joints between panels of the liner can be tightly overlapped as opposed to welded sealed. Openings for storm pipes can be completed using best management practices as opposed to special connections or sealing techniques as the intent is to limit potential for flow to the foundation during the period that the tanks will contain water not for a water tight seal.

2.4 Stormwater Quality Control

As previously indicated in the report, Kollaard Associates has reached out to Rideau Valley Conservation Authority to obtain the quality control design criteria for the site. At time this report was prepared, no criteria has been provided. Since the discharge from the site is being directed into an existing storm sewer system it has been assumed that there will be no quality control design control requirements for the site. Best management practices will be incorporated where possible to reduce the potential transport of pollutants from the site to the storm sewer system.

The major source of stormwater contamination from a site, once development is completed and vegetation is established in the landscaped areas, is the onsite surface parking and roadways.

The surface areas at the site consist of the roof of the building, the landscaped areas, visitor parking area and the walkway and terrace areas.

- Surface parking will be limited to seventeen spaces which will be located at the rear of the buildings. Runoff from this parking will be directed to underground storage tanks and controlled.
- The roof of the building is not considered to be a major source of suspended solids contamination.
- The runoff from surface area of the below grade parking area driveway is limited to a short section not covered by the building. The remainder of the driveway is covered and not subject to precipitation. Snow melt from the vehicles within the parking garage will be directed to the sanitary sewer.
- The landscaped areas are not considered to be a source of suspended solids as the landscaped areas provides vegetative filtration of the surface runoff and the vegetation and landscaping protect the ground surface reducing the potential for erosion and eliminating the landscaped ground surface area as a source of suspended solids.
- The walkways are limited in area and will be graded to direct runoff to vegetated surfaces where possible.
- The use of best management practices for the application of salt, sand and other snow and ice removal products can reduce the potential pollution from the walkways.

2.5 Stormwater System Operation and Maintenance

2.5.1 Roof Drains

The Roof Drains should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. The Roof Drains should be inspected before winter to ensure they have not been clogged with leafs.

2.5.2 Catch basin / Manhole

The catch basins and manholes should be cleaned with a hydrovac excavation truck following completion of construction, paving of the asphaltic concrete surface and establishment of adequate grass cover on the landscaped areas.

Following the initial cleaning the catch basins and manholes should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. Once the sediment accumulation in the catch basins and manhole has reached a level equal to 0.15 metres below the outlet invert of the structure, the sediment should be removed by hydro excavation.

2.5.3 Stormwater Storage Tanks

Detailed installation, operation and maintenance guidelines are provided in the StormTank Module Design Guide included in Appendix B. In general maintenance procedures consist of Inspection and cleaning as follows:

Inspection:

- Inspect all observation ports, inflow and outflow connections, and the discharge area.
- Identify and log any sediment and debris accumulation, system backup, or discharge rate changes.
- If there is a sufficient need for cleanout, contact a local cleaning company for assistance.

Cleaning:

- If a pretreatment device is installed, follow manufacturer recommendations.
- Using a vacuum pump truck, evacuate debris from the inflow and outflow points.
- Flush the system with clean water, forcing debris from the system.
- Repeat steps 2 and 3 until no debris is evident.

2.5.4 Inspections

The owner or designated Property Management Company is responsible for inspections and maintenance. Records of inspections and maintenance should be kept for each visit. The suggested inspection schedule should be followed until the records indicate a more appropriate site specific schedule.

3 STORM SEWER DESIGN AND SUFFICIENCY OF EXISTING MUNICIPAL STORM SEWER

3.1 Storm Sewer Design

The on-site storm sewers were designed to be in general conformance with the City of Ottawa Sewer Design Guidelines (October 2012 as amended). Specifically, storm sewers were sized using Manning's Equation, assuming a roughness coefficient N = 0.013, to accommodate the uncontrolled runoff from the 5-year storm, under 'open-channel' conditions. There are two storm sewer laterals. One lateral is intended to convey the runoff collected on the building roof to the storm sewer along Carling Avenue. The other lateral is intended to convey the runoff from the south side of the building collected in the underground storage tanks (catchment CA3) to the storm sewer along Carling Avenue. The proposed storm sewer lateral conveying the roof runoff will have a diameter of 300 mm and a slope of 1 percent. The proposed storm sewer lateral conveying the runoff from catchment CA3 will have a diameter of 250 mm and a slope of 0.7 percent. From the sewer design calculations included in Appendix A, the minimum capacity of the 300 m lateral is 96.80 L/sec. The unrestricted storm demand on this lateral during a 5-year design storm with a time of concentration of 10 minutes is 68.04 L/sec. From the sewer design calculations included in Appendix A, the minimum capacity of the 250 m lateral is 49.80 L/sec. The unrestricted storm demand on this lateral during a 5-year design storm with a time of concentration of 10 minutes is 27.90 L/sec.

As such, the proposed laterals will be sufficient to meet the storm demand under 'open channel flow' conditions.

3.2 Existing Storm Sewer

The proposed storm lateral from the site will be connected to the existing 600 mm diameter concrete storm sewer along Carling Avenue. The existing storm sewer along the south side of Carling Avenue increases in size from 525 mm in diameter to 600 mm in diameter at storm manhole MHST52076 about 50 mm west of the site and then increases in diameter to 675 mm at storm manhole MHST52081 approximately 42 metres east of the site. The slope of the 525 mm storm sewer west of the site is about 0.15 percent resulting in a capacity of 166.73 L/s. The minimum slope of the 600 mm storm sewer is 0.2 percent resulting in a capacity of 274 L/s. The existing 600 mm diameter storm sewer has a been receiving runoff from the site having a pre-development runoff coefficient of C=0.83 for more than 30 years.

The pre-development conditions result in a peak runoff rate during a 5 year storm event of 148.2 L/s. Due to the design criteria, the peak runoff during a 5 year storm event during post-development conditions will be reduced to 52.6 L/s. The peak runoff during a 100 year event during post-development conditions will be reduced to 88.2 L/s. Since the post development runoff rate from the site will be significantly reduced from the pre-development conditions, it is considered that there will be sufficient capacity within the storm sewer main to accommodate the runoff from the site during post-development conditions.

4 EROSION AND SEDIMENT CONTROL

The owner (and/or contractor) agrees to prepare and implement an erosion and sediment control plan at least equal to the stated minimum requirements and to the satisfaction of the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current best management practices for erosion and sediment control. It is considered to be the owners and/or contractors responsibility to ensure that the erosion control measures are implemented and maintained.

In order to limit the amount of sediment carried in stormwater runoff from the site during construction, it is recommended to install a silt fence along the property, as shown in Kollaard Associates Inc. Drawing #220978-ER. The silt fence may be polypropylene, nylon, and polyester or ethylene yarn.

If a standard filter fabric is used, it must be backed by a wire fence supported on posts not over 2.0 m apart. Extra strength filter fabric may be used without a wire fence backing if posts are not over 1.0 m apart. Fabric joints should be lapped at least 150 mm (6") and stapled. The bottom edge of the filter fabric should be anchored in a 300 mm (1 ft) deep trench, to prevent flow under the fence. Sections of fence should be cleaned, if blocked with sediment and replaced if torn.

Filter socks should be installed across existing storm manhole and catch basin lids. As well, filter socks should be installed across the proposed catch basin and manhole lids immediately after the structures are placed. The filter socks should only be removed once the asphaltic concrete is installed and the site is cleaned.

A sediment trap should be installed in each maintenance hole receiving discharge from the trench drains. The sediment trap should be below the inlet pipe from the trench drain. The sediment traps should be inspected regularly and cleaned/emptied as required. The sediment traps should only be removed once construction is completed.

The proposed landscaping works should be completed as soon as possible. The proposed granular and asphaltic concrete surfaced areas should be surfaced as soon as possible.

The silt fences should only be removed once the site is stabilized and landscaping is completed.

These measures will reduce the amount of sediment carried from the site during storm events that may occur during construction.

5 CONCLUSIONS

This report addresses the adequacy of the existing municipal storm sewer to service the proposed development of the residential apartment buildings at 3430 Carling Avenue. Based on the analysis provided in this report, the conclusions are as follows:

SWM for the proposed development will be achieved by restricting the 100 year post development flow to the 5 year pre-development flow assuming a predevelopment runoff coefficient of 0.5.

The existing municipal storm sewers will have adequate capacity to convey the runoff from the development during post-development conditions.

During all construction activities, erosion and sedimentation shall be controlled.

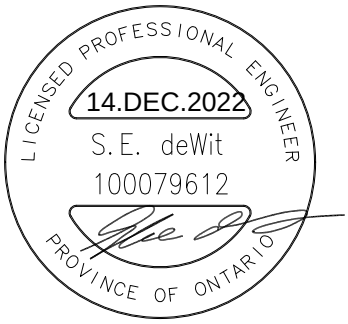
We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates Inc.

Prepared by:

Nick Recoskie, EIT

Reviewed by:



Steve deWit, P.Eng.

Appendix A: Storm Design Information

- Pre Development Runoff Rate, Allowable Release Rate and STM Summary
- Post-Development Runoff Rate - Uncontrolled Area
- Actual Discharge Rate and Storage Volume Requirements (CA-1 West Roof)
- Storage Volume & Discharge Rate Design Sheet - CA-1
- Discharge Storage Curve CA-1 West Roof
- Stage Storage Curve CA-1 West Roof
- Actual Discharge Rate and Storage Volume Requirements (CA-2 East Roof)
- Storage Volume & Discharge Rate Design Sheet - CA-2
- Discharge Storage Curve CA-2 East Roof
- Stage Storage Curve CA-2 East Roof
- Actual Discharge Rate and Storage Volume Requirements (CA-3 Parking Lot)
- Discharge Storage Curve CA-3 Parking Lot
- Discharge Storage Curve CA-3 Underground Storage
- Stage Storage Curve CA-3 Underground Storage
- Sewer Design Sheet – Storm Sewer laterals

APPENDIX A: STORMWATER MANAGEMENT MODEL

PRE-DEVELOPMENT RUNOFF RATE, ALLOWABLE RELEASE RATE AND SWM SUMMARY

Client: Rohit Communities Ontario Inc.
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

PRE DEVELOPMENT FLOW

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2 + A_{gravel} \times 0.6)/A_{tot}$

Area	Surface	Ha	"C"	C_{avg}
Total	Gravel	0.000	0.60	**0.83**
0.6163	Roof/Asphalt/Concrete	0.556	0.90	
	Patio Stones	0.000	0.70	
	Grass	0.060	0.20	

5 Year Event			
Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.83	104.19	0.616
2.78CIA=	148.16		
	148.2 L/s		

**Use a 10 minute time of concentration for 5 year

5 Year Event			
Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.50	104.19	0.616
2.78CIA=	89.25		
	89.3 L/s		

**Use a 10 minute time of concentration for 5 year

Total Allowable Release: **89.3 L/s**

STORMWATER MANAGEMENT SUMMARY

Sub Area I.D.	Sub Area (ha)	5 year C	100 year 'C'	Outlet Location	5 Year Flow Rate (L/s)	Required 5 year Storage (m^3)	100 Year Flow Rate (L/s)	Required 100 year Storage (m^3)	100 year Storage Depth (m)
Total Allowable Runoff Rate from Site									
	0.62				**89.3**		**89.3**		
Post-Development Uncontrolled Runoff Rate from Site									
UA1	0.21	0.37	0.44	Storm	22.4	NA	45.6	NA	
Post-Development Controlled Release Rate from Site									
CA1 (WEST ROOF)	0.134	0.90	1.00	Storm	11.0	12.5	15.4	35.5	0.15
CA2 (EAST ROOF)	0.127	0.90	1.00	Storm	11.4	13.5	16.8	30.6	0.15
CA3 (PARKING LOT)	0.146	0.66	0.75	Storm	7.8	13.6	10.4	32.0	
Total Runoff Rate from Site									
	0.616				**52.6**		**88.2**		

APPENDIX A: STORMWATER MANAGEMENT MODEL

POST-DEVELOPMENT RUNOFF RATE - UNCONTROLLED AREA

Client: **Rohit Communities Ontario Inc.**
Job No.: **220978**
Location: **3430 Carling Avenue**
Date: **December 14, 2022**

UA1 - UNCONTROLLED AREA

Post Dev run-off Coefficient "C"

			5 Year Event		100 Year Event	
Area	**Surface**	**Ha**	**"C"**	**C_{avg}**	**"C"**	**C_{avg}**
Total	Gravel	0.000	0.60	**0.37**	0.75	**0.44**
0.209	Asphalt/ Concrete	0.033	0.90		1.00	
	Patio Stones	0.023	0.70		0.88	
	Grass	0.152	0.20		0.25	

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$

Post Dev Free Flow

5 Year Event

Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.37	104.19	0.209
2.78CIA= 22.35			
22.4 L/S			

**Use a 10 minute time of concentration for 5 year

100 Year Event

Pre Dev.	**C***	**Intensity**	**Area**
100 Year	0.44	178.56	0.209
2.78CIA= 45.55			
45.6 L/S			

**Use a 10 minute time of concentration for 100 year

*C value multiplied by 1.25 for 100 year event

Equations:

Flow Equation

Q = 2.78 x C x I x A

Where:

C is the runoff coefficient

I is the intensity of rainfall, City of Ottawa IDF

A is the total drainage area

APPENDIX A: STORMWATER MANAGEMENT MODEL

ACTUAL DISCHARGE RATE AND STORAGE VOLUME REQUIREMENTS

CA-1 West Roof

Client: Rohit Communities Ontario Inc.
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

**Use a 10 minute time of concentration

(CA1)			5 Year Event				100 Year Event			
Area ha	Surface	Ha	"C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)	"C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)
	Asphalt/ Concrete/Roof	0.134	0.90	**0.90**	104.19	34.98	1.00	**1.00**	178.56	66.62
	Gravel	0.000	0.60				0.75			
	Patio Stone/Semipermeable block	0.000	0.70				0.88			
0.134	Grass	0.000	0.20				0.25			

Storage Requirements for West Roof Area (CA1)

Area = 0.134 hectares
5-year Runoff Coefficient = 0.90 post development
100-year Runoff Coefficient = 1.00 post development

			Release Rate L/s	2	5	8	11	14	17	20
Return Period	**Time (min)**	**Intensity (mm/hr)**	**Flow Q (L/s)**	**Storage Required (m^3)**						
5 Year	10	104.19	34.98	19.8	18.0	16.2	14.4	12.6	10.8	9.0
	20	70.25	23.59	25.9	22.3	18.7	15.1	11.5	7.9	4.3
	30	53.93	18.11	29.0	23.6	18.2	12.8	7.4	2.0	-3.4
	40	44.18	14.84	30.8	23.6	16.4	9.2	2.0	-5.2	-12.4
	50	37.65	12.64	31.9	22.9	13.9	4.9	-4.1	-13.1	-22.1
	60	32.94	11.06	32.6	21.8	11.0	0.2	-10.6	-21.4	-32.2
	70	29.37	9.86	33.0	20.4	7.8	-4.8	-17.4	-30.0	-42.6
			Maximum 5 year storage rate	33.0	23.6	18.7	15.1	12.6	10.8	9.0
			Release Rate L/s	2	5	8	11	14	17	20
100 Year	10	178.56	66.62	38.8	37.0	35.2	33.4	31.6	29.8	28.0
	20	119.95	44.75	51.3	47.7	44.1	40.5	36.9	33.3	29.7
	30	91.87	34.27	58.1	52.7	47.3	41.9	36.5	31.1	25.7
	40	75.15	28.03	62.5	55.3	48.1	40.9	33.7	26.5	19.3
	50	63.95	23.86	65.6	56.6	47.6	38.6	29.6	20.6	11.6
	60	55.89	20.85	67.9	57.1	46.3	35.5	24.7	13.9	3.1
	70	49.79	18.58	69.6	57.0	44.4	31.8	19.2	6.6	-6.0
	80	44.99	16.79	71.0	56.6	42.2	27.8	13.4	-1.0	-15.4
			Maximum 100 year storage rate	71.0	57.1	48.1	41.9	36.9	33.3	29.7

APPENDIX A: STORMWATER MANAGEMENT MODEL

STORAGE VOLUME & DISCHARGE RATE DESIGN SHEET - CA-1

Client: **Rohit Communities Ontario Inc.**
Job No.: **220978**
Location: **3430 Carling Avenue**
Date: **December 14, 2022**

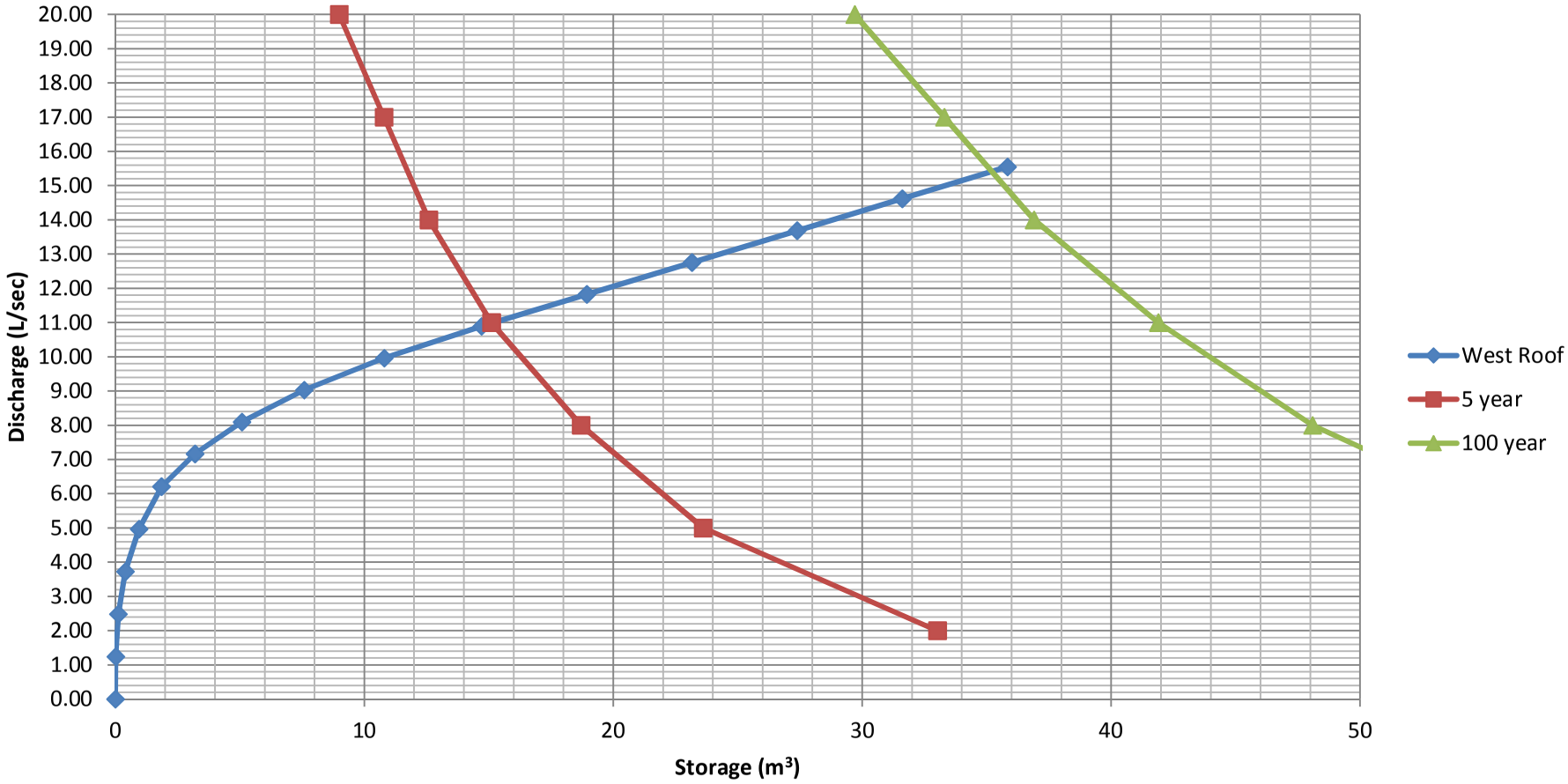
Storage Depth (m)	Layer Thickness (m)	Incremental Volume (upper roof) (m^3)	Cumulative Storage Volume (m3)	Release Rate Per Drain (Fully Open) (L/sec)	Release Rate All Drains (L/sec)	Total Outflow (L/sec)
0.15	0.01	4.23	35.83	1.55	15.55	15.55
0.14	0.01	4.23	31.61	1.46	14.62	14.62
0.13	0.01	4.23	27.38	1.37	13.69	13.69
0.12	0.01	4.23	23.16	1.28	12.75	12.75
0.11	0.01	4.23	18.93	1.18	11.82	11.82
0.10	0.01	3.91	14.71	1.09	10.89	10.89
0.09	0.01	3.21	10.80	1.00	9.96	9.96
0.08	0.01	2.50	7.59	0.90	9.03	9.03
0.07	0.01	1.88	5.08	0.81	8.10	8.10
0.06	0.01	1.35	3.20	0.72	7.17	7.17
0.05	0.01	0.90	1.85	0.62	6.21	6.21
0.04	0.01	0.55	0.95	0.50	4.97	4.97
0.03	0.01	0.28	0.40	0.37	3.73	3.73
0.02	0.01	0.10	0.12	0.25	2.48	2.48
0.01	0.01	0.01	0.01	0.12	1.24	1.24
0.00	0.00	0.00	0.00	0.00	0.00	0.0

Roof Drain Type: Watts Accutrol Large Area Roof Drain RD-100-A1 - 3/4 OPEN
Number of Drains: 10

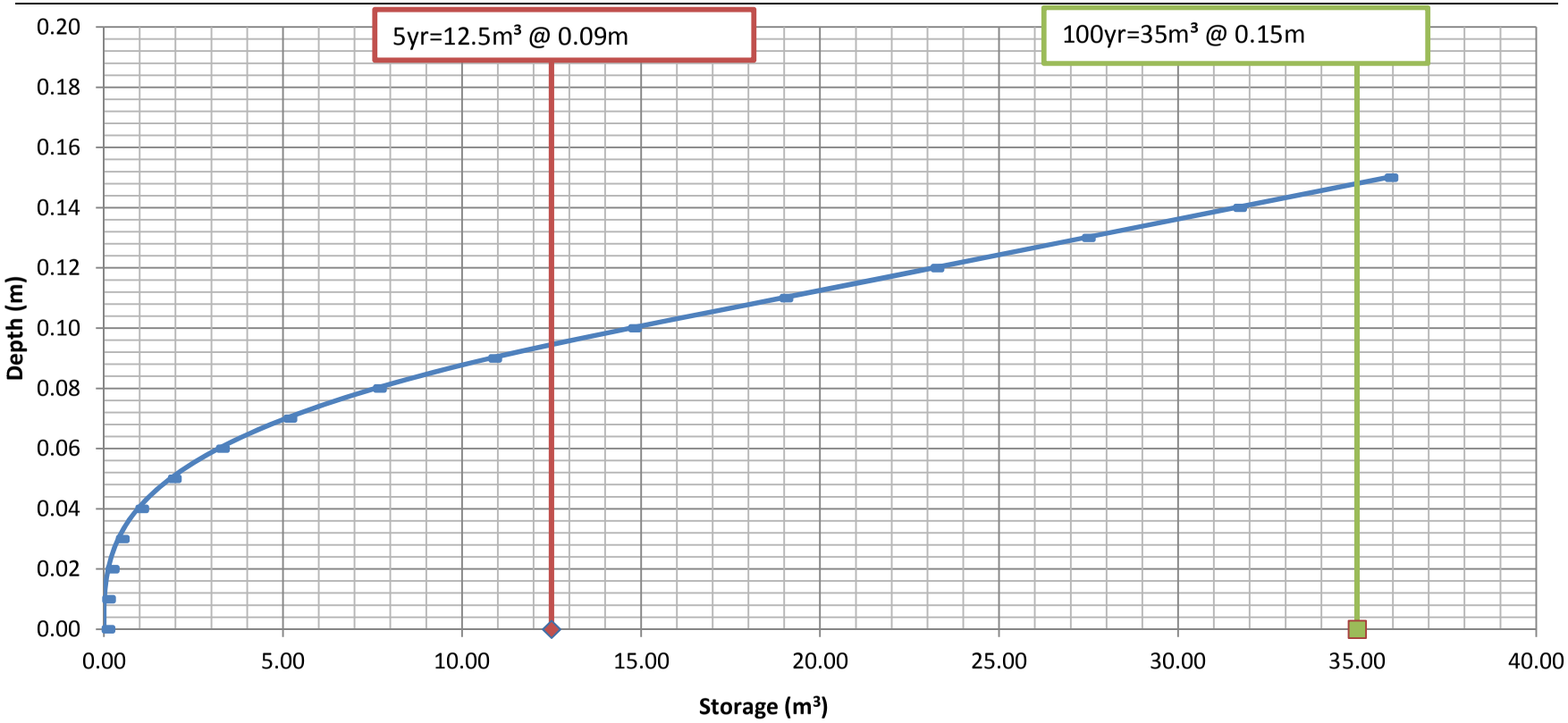
APPENDIX A: STORMWATER MANAGEMENT MODELSTORAGE

Discharge -Storage Curve

CA-1 West Roof



APPENDIX A: STORMWATER MANAGEMENT MODEL
Stage-Storage Curve
CA-1 West Roof



APPENDIX A: STORMWATER MANAGEMENT MODEL

ACTUAL DISCHARGE RATE AND STORAGE VOLUME REQUIREMENTS

CA-2 East Roof

Client: Rohit Communities Ontario Inc.
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

**Use a 10 minute time of concentration

(CA2)			5 Year Event				100 Year Event			
Area ha	Surface	Ha	"C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)	"C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)
	Asphalt/ Concrete/Roof	0.127	0.90	**0.90**	104.19	33.11	1.00	**1.00**	178.56	63.04
	Gravel	0.000	0.60				0.75			
	Patio Stone/Semipermeable block	0.000	0.70				0.88			
0.127	Grass	0.000	0.20				0.25			

Storage Requirements for Roof Area (CA2)

Area = 0.127 hectares
5-year Runoff Coefficient = 0.90 post development
100-year Runoff Coefficient = 1.00 post development

			Release Rate L/s	2	5	8	11	14	17	20
Return Period	**Time (min)**	**Intensity (mm/hr)**	**Flow Q (L/s)**	**Storage Required (m^3)**						
5 Year	10	104.19	33.11	18.7	16.9	15.1	13.3	11.5	9.7	7.9
	20	70.25	22.32	24.4	20.8	17.2	13.6	10.0	6.4	2.8
	30	53.93	17.14	27.2	21.8	16.4	11.0	5.6	0.2	-5.2
	40	44.18	14.04	28.9	21.7	14.5	7.3	0.1	-7.1	-14.3
	50	37.65	11.96	29.9	20.9	11.9	2.9	-6.1	-15.1	-24.1
	60	32.94	10.47	30.5	19.7	8.9	-1.9	-12.7	-23.5	-34.3
	70	29.37	9.33	30.8	18.2	5.6	-7.0	-19.6	-32.2	-44.8
			Maximum 5 year storage rate	30.8	21.8	17.2	13.6	11.5	9.7	7.9
			Release Rate L/s	2	5	8	11	14	17	20
100 Year	10	178.56	63.04	36.6	34.8	33.0	31.2	29.4	27.6	25.8
	20	119.95	42.35	48.4	44.8	41.2	37.6	34.0	30.4	26.8
	30	91.87	32.43	54.8	49.4	44.0	38.6	33.2	27.8	22.4
	40	75.15	26.53	58.9	51.7	44.5	37.3	30.1	22.9	15.7
	50	63.95	22.58	61.7	52.7	43.7	34.7	25.7	16.7	7.7
	60	55.89	19.73	63.8	53.0	42.2	31.4	20.6	9.8	-1.0
	70	49.79	17.58	65.4	52.8	40.2	27.6	15.0	2.4	-10.2
	80	44.99	15.88	66.6	52.2	37.8	23.4	9.0	-5.4	-19.8
			Maximum 100 year storage rate	66.6	53.0	44.5	38.6	34.0	30.4	26.8

APPENDIX A: STORMWATER MANAGEMENT MODEL

STORAGE VOLUME & DISCHARGE RATE DESIGN SHEET - CA-2

Client: Rohit Communities Ontario Inc.
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

Storage Provided for East Roof Area (CA2)

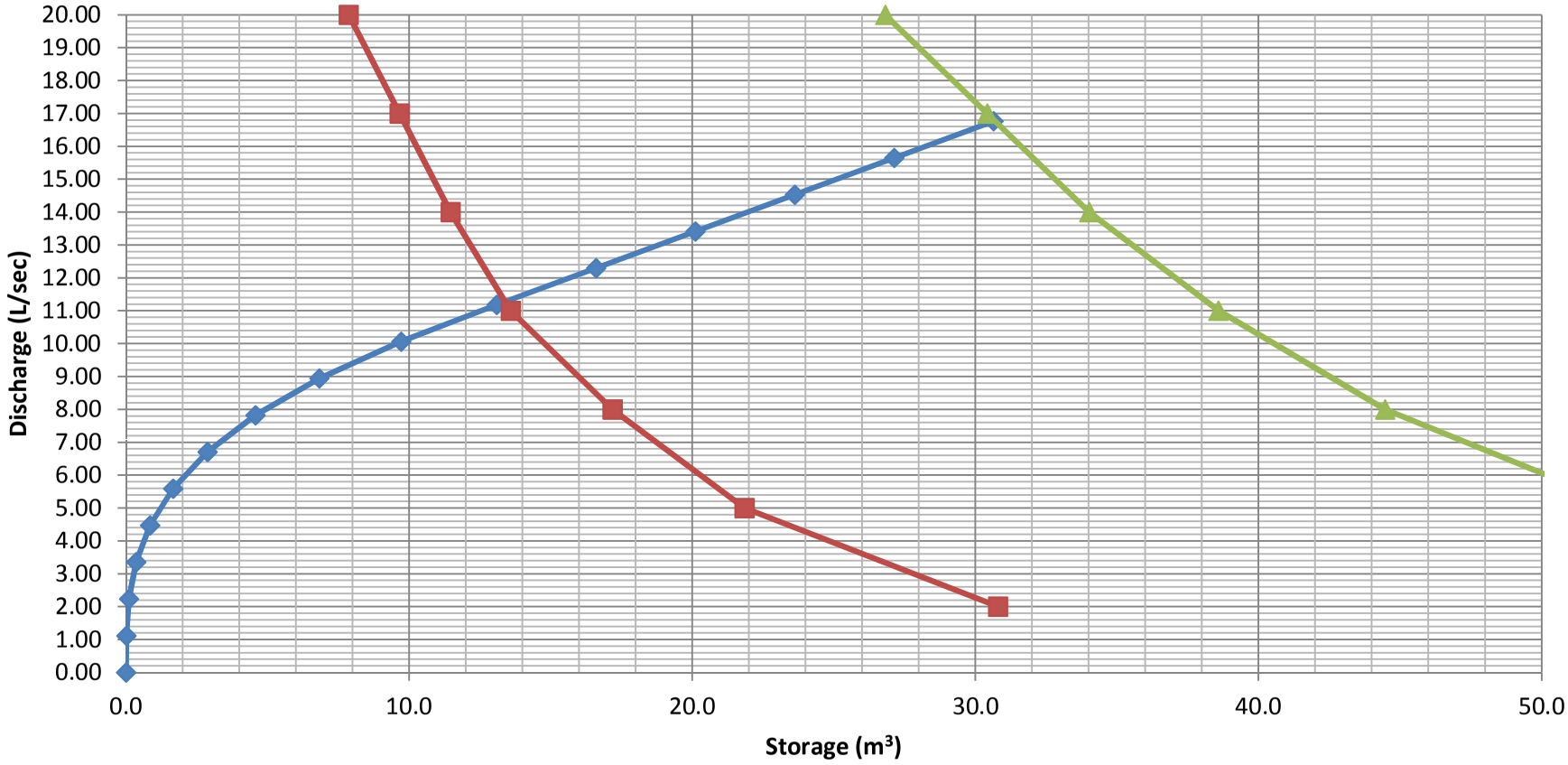
Storage Depth (m)	Layer Thickness (m)	Incremental Volume (Lower Roof) (m^3)	Cumulative Storage Volume (m3)	Release Rate Per Drain (Fully Open) (L/sec)	Release Rate All Drains (L/sec)	Total Outflow (L/sec)
0.15	0.01	3.51	30.64	1.86	16.77	16.77
0.14	0.01	3.51	27.13	1.74	15.65	15.65
0.13	0.01	3.51	23.62	1.61	14.53	14.53
0.12	0.01	3.51	20.11	1.49	13.41	13.41
0.11	0.01	3.51	16.60	1.37	12.30	12.30
0.10	0.01	3.37	13.09	1.24	11.18	11.18
0.09	0.01	2.89	9.72	1.12	10.06	10.06
0.08	0.01	2.25	6.83	0.99	8.94	8.94
0.07	0.01	1.69	4.57	0.87	7.82	7.82
0.06	0.01	1.21	2.88	0.75	6.71	6.71
0.05	0.01	0.81	1.67	0.62	5.59	5.59
0.04	0.01	0.49	0.85	0.50	4.47	4.47
0.03	0.01	0.25	0.36	0.37	3.35	3.35
0.02	0.01	0.09	0.11	0.25	2.24	2.24
0.01	0.01	0.01	0.01	0.12	1.12	1.12
0.00	0.00	0.00	0.00	0.00	0.00	0.00

Roof Drain Type: Watts Accutrol Large Area Roof Drain RD-100-A1 - FULLY OPEN
Number of Drains: 10

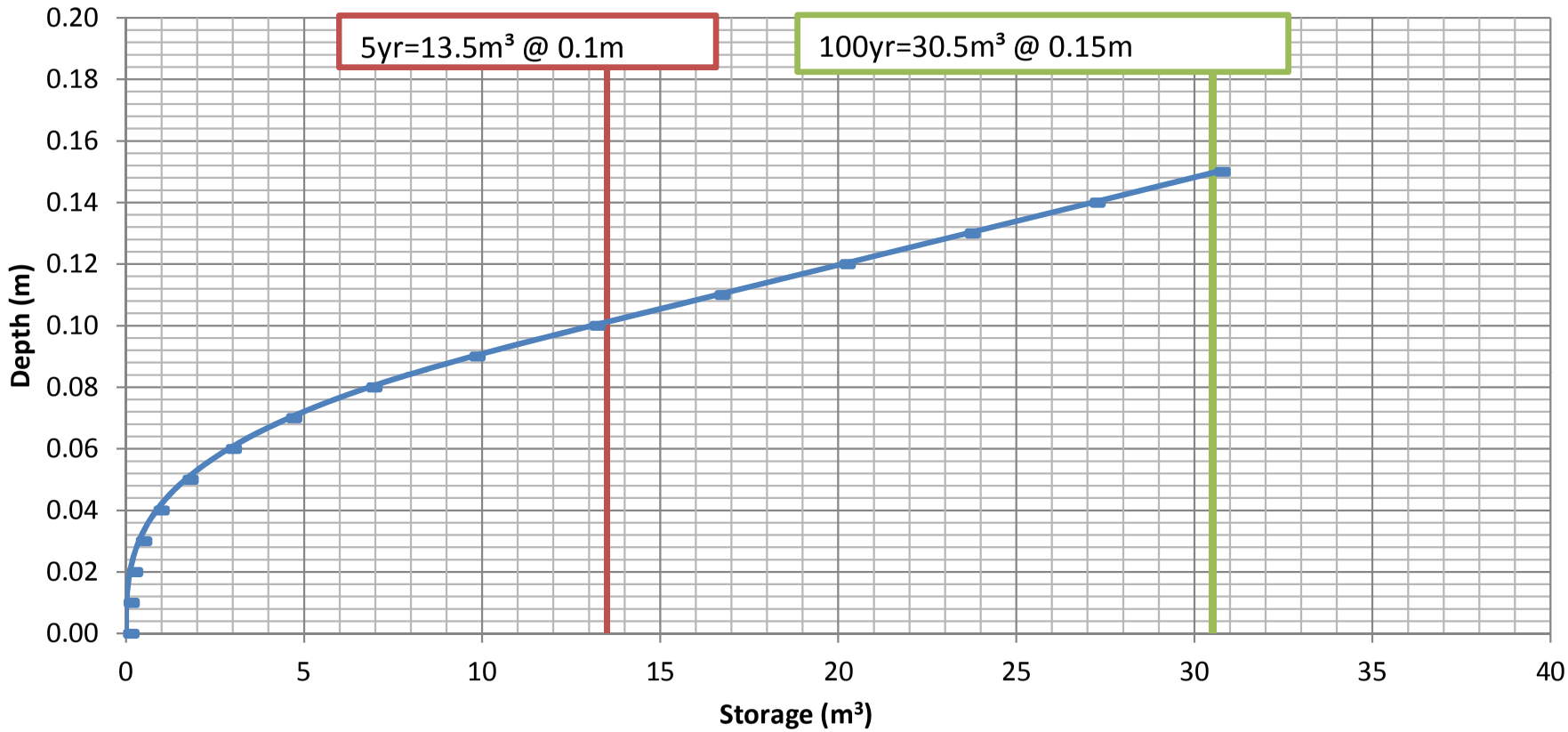
APPENDIX A: STORMWATER MANAGEMENT MODELSTORAGE

Discharge -Storage Curve

CA-2 East Roof



APPENDIX A: STORMWATER MANAGEMENT MODEL
Stage-Storage Curve
CA-2 East Roof



APPENDIX A: STORMWATER MANAGEMENT MODEL

Sheet 3: Required Storage Vs. Release Rate - CA3 (Parking Area)

Client: Rohit Group
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

Controlled Area			5 Year Event		100 Year Event	
Area ha	Surface	Ha	"C"	C_{avg}	"C" 10	C_{avg}
0.1465	Parking Area	0.0887	0.90	**0.66**	1.00	**0.75**
	Walkway	0.0097	0.70		0.88	
	Building Roof	0.0000	0.90		1.00	
	Landscape	0.0480	0.20		0.25	
Impervious Area Ratio		0.67				

Storage Requirements for Controlled Areas

Area = 0.1465 hectares

5-year Runoff Coefficient = 0.66 post development

100-year Runoff Coefficient = 0.75 post development

Duration Interval (min) = 10
Release Rate Start (L/s) = 2
Release Rate Interval (L/s) = 3

			Release Rate L/s	2	5	8	11	14	17	20	23	26	29	32	35	38
Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Storage Required (m^3)												
5 Year	5	141.18	37.94	10.8	9.9	9.0	8.1	7.2	6.3	5.4	4.5	3.6	2.7	1.8	0.9	0.0
	15	83.56	22.45	18.4	15.7	13.0	10.3	7.6	4.9	2.2	-0.5	-3.2	-5.9	-8.6	-11.3	-14.0
	25	60.90	16.36	21.5	17.0	12.5	8.0	3.5	-1.0	-5.5	-10.0	-14.5	-19.0	-23.5	-28.0	-32.5
	35	48.52	13.04	23.2	16.9	10.6	4.3	-2.0	-8.3	-14.6	-20.9	-27.2	-33.5	-39.8	-46.1	-52.4
	45	40.63	10.92	24.1	16.0	7.9	-0.2	-8.3	-16.4	-24.5	-32.6	-40.7	-48.8	-56.9	-65.0	-73.1
	55	35.12	9.44	24.5	14.6	4.7	-5.2	-15.1	-25.0	-34.9	-44.8	-54.7	-64.6	-74.5	-84.4	-94.3
	65	31.04	8.34	24.7	13.0	1.3	-10.4	-22.1	-33.8	-45.5	-57.2	-68.9	-80.6	-92.3	-104.0	-115.7
	75	27.89	7.49	24.7	11.2	-2.3	-15.8	-29.3	-42.8	-56.3	-69.8	-83.3	-96.8	-110.3	-123.8	-137.3
	85	25.37	6.82	24.6	9.3	-6.0	-21.3	-36.6	-51.9	-67.2	-82.5	-97.8	-113.1	-128.4	-143.7	-159.0
	95	23.31	6.26	24.3	7.2	-9.9	-27.0	-44.1	-61.2	-78.3	-95.4	-112.5	-129.6	-146.7	-163.8	-180.9
	105	21.58	5.80	23.9	5.0	-13.9	-32.8	-51.7	-70.6	-89.5	-108.4	-127.3	-146.2	-165.1	-184.0	-202.9
	115	20.12	5.41	23.5	2.8	-17.9	-38.6	-59.3	-80.0	-100.7	-121.4	-142.1	-162.8	-183.5	-204.2	-224.9
	125	18.86	5.07	23.0	0.5	-22.0	-44.5	-67.0	-89.5	-112.0	-134.5	-157.0	-179.5	-202.0	-224.5	-247.0
	135	17.76	4.77	22.5	-1.8	-26.1	-50.4	-74.7	-99.0	-123.3	-147.6	-171.9	-196.2	-220.5	-244.8	-269.1
	Maximum 5 year storage rate			24.7	17.0	13.0	10.3	7.6	6.3	5.4	4.5	3.6	2.7	1.8	0.9	0.0

Duration Interval (min) = 10
Release Rate Start (L/s) = 2
Release Rate Interval (L/s) = 3

			Release Rate L/s	2	5	8	11	14	17	20	23	26	29	32	35	38
Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Storage Required (m^3)												
100 Year	5	242.70	74.11	21.6	20.7	19.8	18.9	18.0	17.1	16.2	15.3	14.4	13.5	12.6	11.7	10.8
	15	142.89	43.63	37.5	34.8	32.1	29.4	26.7	24.0	21.3	18.6	15.9	13.2	10.5	7.8	5.1
	25	103.85	31.71	44.6	40.1	35.6	31.1	26.6	22.1	17.6	13.1	8.6	4.1	-0.4	-4.9	-9.4
	35	82.58	25.22	48.8	42.5	36.2	29.9	23.6	17.3	11.0	4.7	-1.6	-7.9	-14.2	-20.5	-26.8
	45	69.05	21.08	51.5	43.4	35.3	27.2	19.1	11.0	2.9	-5.2	-13.3	-21.4	-29.5	-37.6	-45.7
	55	59.62	18.21	53.5	43.6	33.7	23.8	13.9	4.0	-5.9	-15.8	-25.7	-35.6	-45.5	-55.4	-65.3
	65	52.65	16.08	54.9	43.2	31.5	19.8	8.1	-3.6	-15.3	-27.0	-38.7	-50.4	-62.1	-73.8	-85.5
	75	47.26	14.43	55.9	42.4	28.9	15.4	1.9	-11.6	-25.1	-38.6	-52.1	-65.6	-79.1	-92.6	-106.1
	85	42.95	13.12	56.7	41.4	26.1	10.8	-4.5	-19.8	-35.1	-50.4	-65.7	-81.0	-96.3	-111.6	-126.9
	95	39.43	12.04	57.2	40.1	23.0	5.9	-11.2	-28.3	-45.4	-62.5	-79.6	-96.7	-113.8	-130.9	-148.0
	105	36.50	11.14	57.6	38.7	19.8	0.9	-18.0	-36.9	-55.8	-74.7	-93.6	-112.5	-131.4	-150.3	-169.2
	115	34.01	10.38	57.8	37.1	16.4	-4.3	-25.0	-45.7	-66.4	-87.1	-107.8	-128.5	-149.2	-169.9	-190.6
	125	31.86	9.73	58.0	35.5	13.0	-9.5	-32.0	-54.5	-77.0	-99.5	-122.0	-144.5	-167.0	-189.5	-212.0
	135	30.00	9.16	58.0	33.7	9.4	-14.9	-39.2	-63.5	-87.8	-112.1	-136.4	-160.7	-185.0	-209.3	-233.6
	145	28.36	8.66	57.9	31.8	5.7	-20.4	-46.5	-72.6	-98.7	-124.8	-150.9	-177.0	-203.1	-229.2	-255.3
	155	26.91	8.22	57.8	29.9	2.0	-25.9	-53.8	-81.7	-109.6	-137.5	-165.4	-193.3	-221.2	-249.1	-277.0
	165	25.61	7.82	57.6	27.9	-1.8	-31.5	-61.2	-90.9	-120.6	-150.3	-180.0	-209.7	-239.4	-269.1	-298.8
	175	24.44	7.46	57.4	25.9	-5.6	-37.1	-68.6	-100.1	-131.6	-163.1	-194.6	-226.1	-257.6	-289.1	-320.6
	Maximum 100 year storage rate			58.0	43.6	36.2	31.1	26.7	24.0	21.3	18.6	15.9	13.5	12.6	11.7	10.8

APPENDIX A: STORMWATER MANAGEMENT MODEL

Sheet 4: CA3 - OUTLET CONTROL DESIGN SHEET

Client: Rohit Group
Job No.: 220978
Location: 3430 Carling Avenue, Ottawa
Date: December 14, 2022

Storage Tanks - Subsurface Storage Tank A

Width m	1.6	2	modules wide
Length m	19.2	24	modules long
Total Modules		96	

Storage Tanks - Subsurface Storage Tank B

Width m	1.6	2	modules wide
Length m	15.2	19	modules long
Total Modules		76	

Orifice Information

Dia (m):	0.075
Area (mm.):	0.0044
Orifice Coeff, C:	0.60
Weir Coeff, C:	0.62
Orifice Top (m):	63.28
Orifice Cen (m):	63.24
Orifice Inv (m):	63.20

Stage, WSE Elev (m)	Comments	Layer Thickness (m)	Subsurface			Surface			Total Quantity Storage (m3)	Total Quantity Storage (ha*m)	Orifice 1 Flow			Orifice Flow* (L/sec)
			Top Layer Area (m^2)	Bottom Layer Area (m^2)	Layer Volume (m^3)	Top Layer Area (m^2)	Bottom Layer Area (m^2)	Layer Volume (m^3)			Depth of Flow Orifice (m)	n	Orifice Flow* (m^3/sec)	
64.21	Top of Tank B	0.090	24.3	24.3	2.1	0.0	0.0	0.0	37.0	0.0037	1.010	13.467	0.0114	11.4
64.12		0.030	24.3	24.3	0.7	0.0	0.0	0.0	34.9	0.0035	0.920	12.267	0.0109	10.9
64.09	Top of Tank A	0.030	55.0	55.0	1.6	0.0	0.0	0.0	34.2	0.0034	0.890	11.867	0.0107	10.7
64.06		0.050	55.0	55.0	2.6	0.0	0.0	0.0	32.6	0.0033	0.860	11.467	0.0105	10.5
64.01		0.050	55.0	55.0	2.6	0.0	0.0	0.0	30.0	0.0030	0.810	10.800	0.0102	10.2
63.96		0.100	55.0	55.0	5.3	0.0	0.0	0.0	27.3	0.0027	0.760	10.133	0.0098	9.8
63.86	Top First Layer B	0.020	55.0	55.0	1.1	0.0	0.0	0.0	22.0	0.0022	0.660	8.800	0.0091	9.1
63.84		0.100	55.0	55.0	5.3	0.0	0.0	0.0	21.0	0.0021	0.640	8.533	0.0090	9.0
63.74	Top First Layer A	0.030	55.0	55.0	1.6	0.0	0.0	0.0	15.7	0.0016	0.540	7.200	0.0082	8.2
63.71		0.100	55.0	55.0	5.3	0.0	0.0	0.0	14.1	0.0014	0.510	6.800	0.0080	8.0
63.61		0.100	55.0	55.0	5.3	0.0	0.0	0.0	8.8	0.0009	0.410	5.467	0.0071	7.1
63.51	Bottom of Tank B	0.020	30.7	30.7	0.6	0.0	0.0	0.0	3.5	0.0004	0.310	4.133	0.0061	6.1
63.49		0.100	30.7	30.7	2.9	0.0	0.0	0.0	2.9	0.0003	0.290	3.867	0.0059	5.9
63.39	Bottom of Tank A	0.000	30.7	30.7	0.0	0.0	0.0	0.0	0.0	0.0000	0.190	2.533	0.0047	4.7

*When the flow depth through the orifice is less than full, the orifice will function as a weir and the flow rate through the orifice will be calculated as weir flow

When the storage level is above the orifice obvert, the flow through the orifice will be calculated as orifice flow.
The equations for weir flow and orifice flow can be merged to obtain a unified full-range equation as follows:

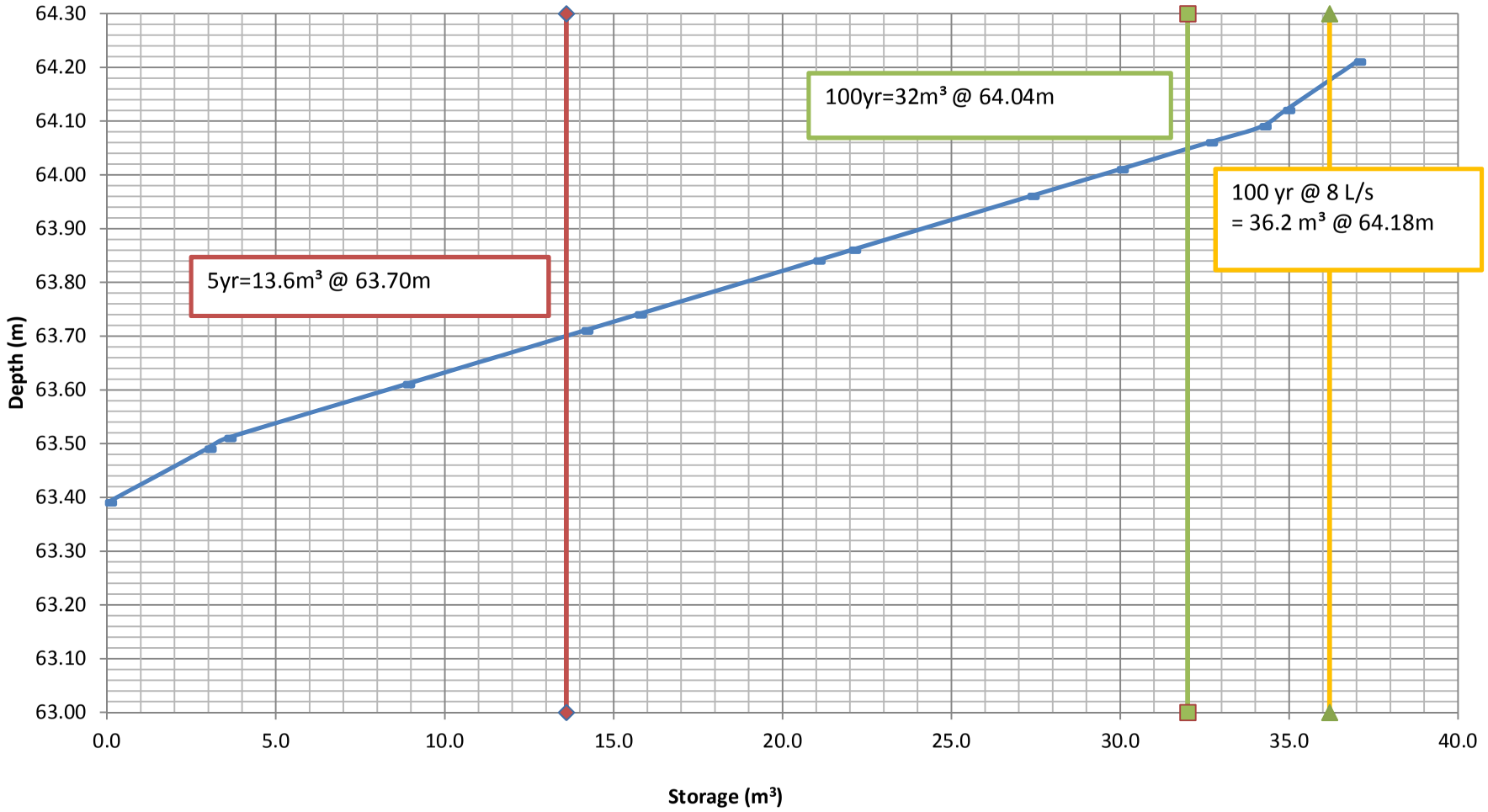
$$Q = \frac{0.72\sqrt{2gD^5}}{[(C_w\eta^{1.98})^{-2.14} + (C_d\eta^{0.52})^{-2.14}]^{0.4673}}$$

Discharge Rate at Bottom of Underground Storage	4.7 L/s
Discharge Rate at Top of Underground Storage	11.4 L/s
Average between these two discharge rates is	8.0 L/s

where:

Cw= weir coeffiicent
Cd= orifice coefficient
n= y/D
y= depth in orifice
D= Orifice Diameter
g= gravitational acceleration

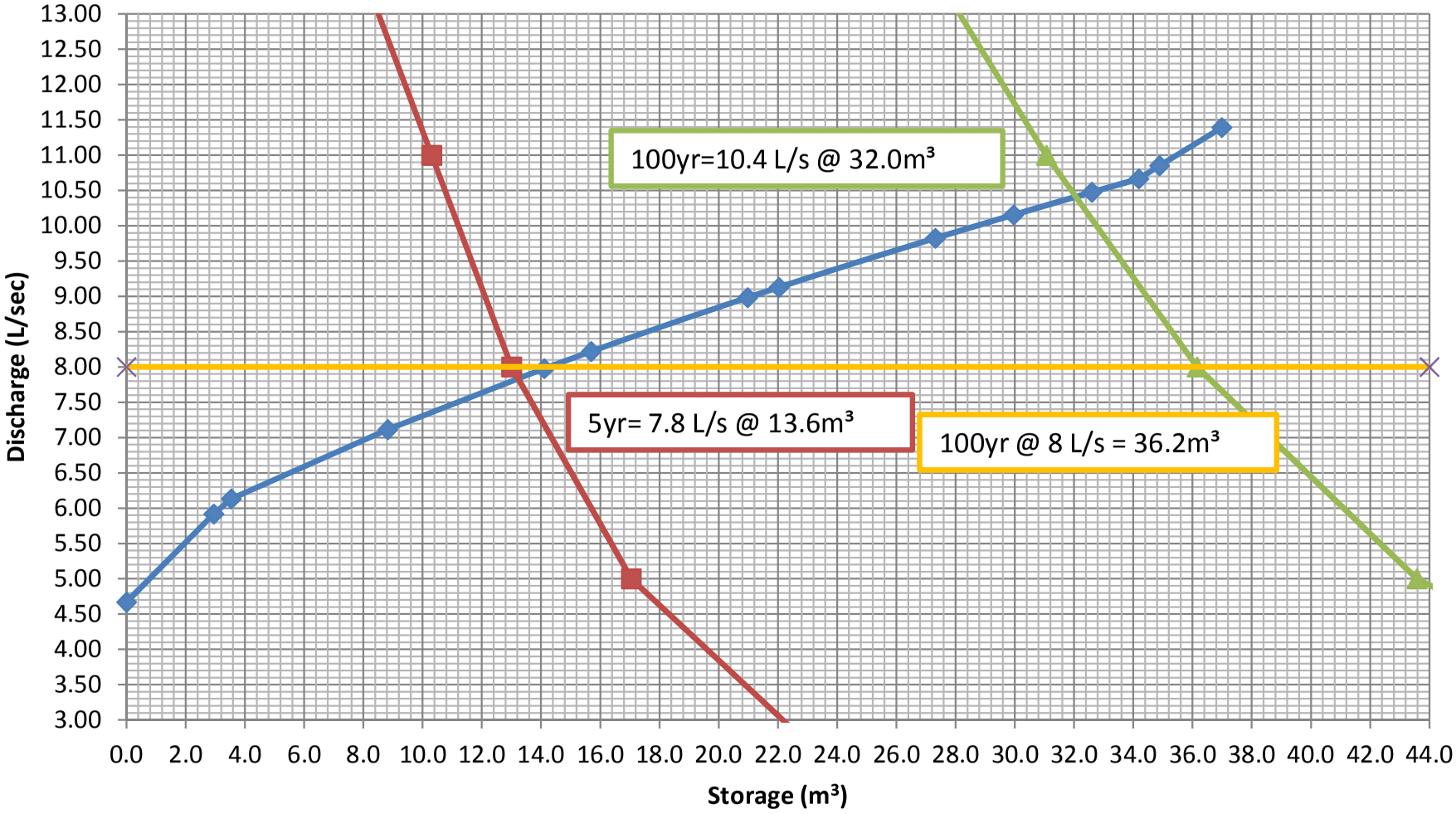
APPENDIX A: STORMWATER MANAGEMENT MODEL
Stage-Storage Curve
CA-3 Underground Storage Tanks



APPENDIX A: STORMWATER MANAGEMENT MODELSTORAGE

Discharge -Storage Curve

CA-3 Underground Storage Tanks



APPENDIX A: STORM SEWER DESIGN SHEET

Client: Rohit Communities
Job No.: 220978
Location: 3430 Carling Avenue
Date: December 14, 2022

Storm Sewer Design Sheet (5-yr storm)

LOCATION									TIME	RAINFALL	PEAK
FROM	TO	Total Area (ha)	C 0.20	C 0.70	C 0.90	Actual R ('C')	INDIV 2.78 AR	ACCUM 2.78 AR	OF CONC.	INTENSITY I	FLOW Q (l/s)
CA1&CA2	MAIN	0.261	0.000	0.000	0.261	0.90	0.65	0.65	10.00	104.19	68.04
CA3	Street	0.147	0.048	0.010	0.089	0.66	0.27	0.27	10.00	104.19	27.90

PROPOSED SEWER											
TYPE OF PIPE	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull	Restricted	Restricted Flow Rate	Q100yr/ Qfull
PVC	300.0	1.00	35.0	96.80	1.37	0.43	28.76	0.70	Yes	32.20	0.33
PVC	250.0	0.70	35.0	49.80	1.01	0.58	21.91	0.56	Yes	10.40	0.21

Rainfall Intensity = $998.071/(T+6.053)^{\wedge -0.814}$ T= time in minutes
(City of Ottawa, 5 year storm)

Appendix B: Product Information and Roof Drawings

- Accutrol Weirs Flow Control and Roof Drains Sheets
- Typical Roof Plan from Architect

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

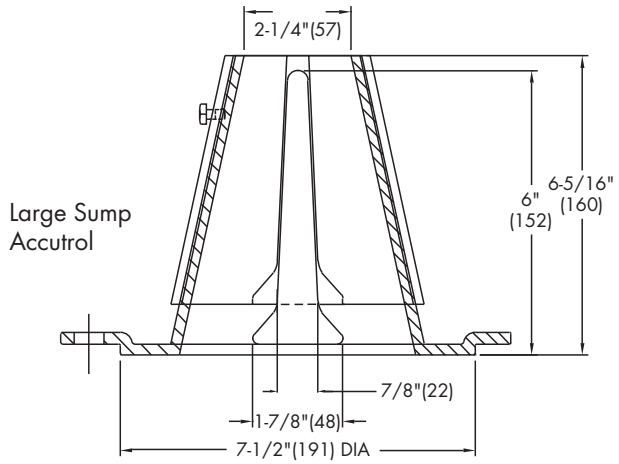
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

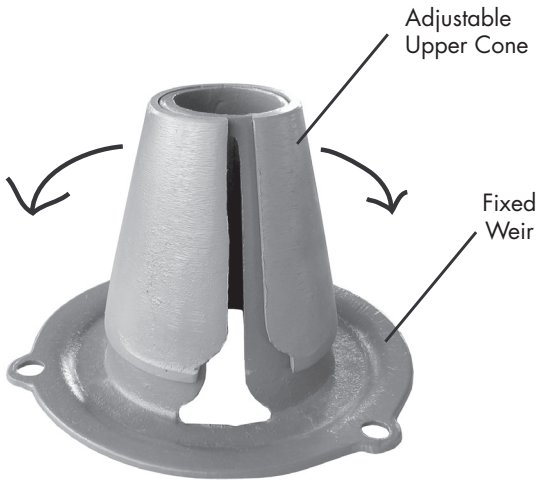
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

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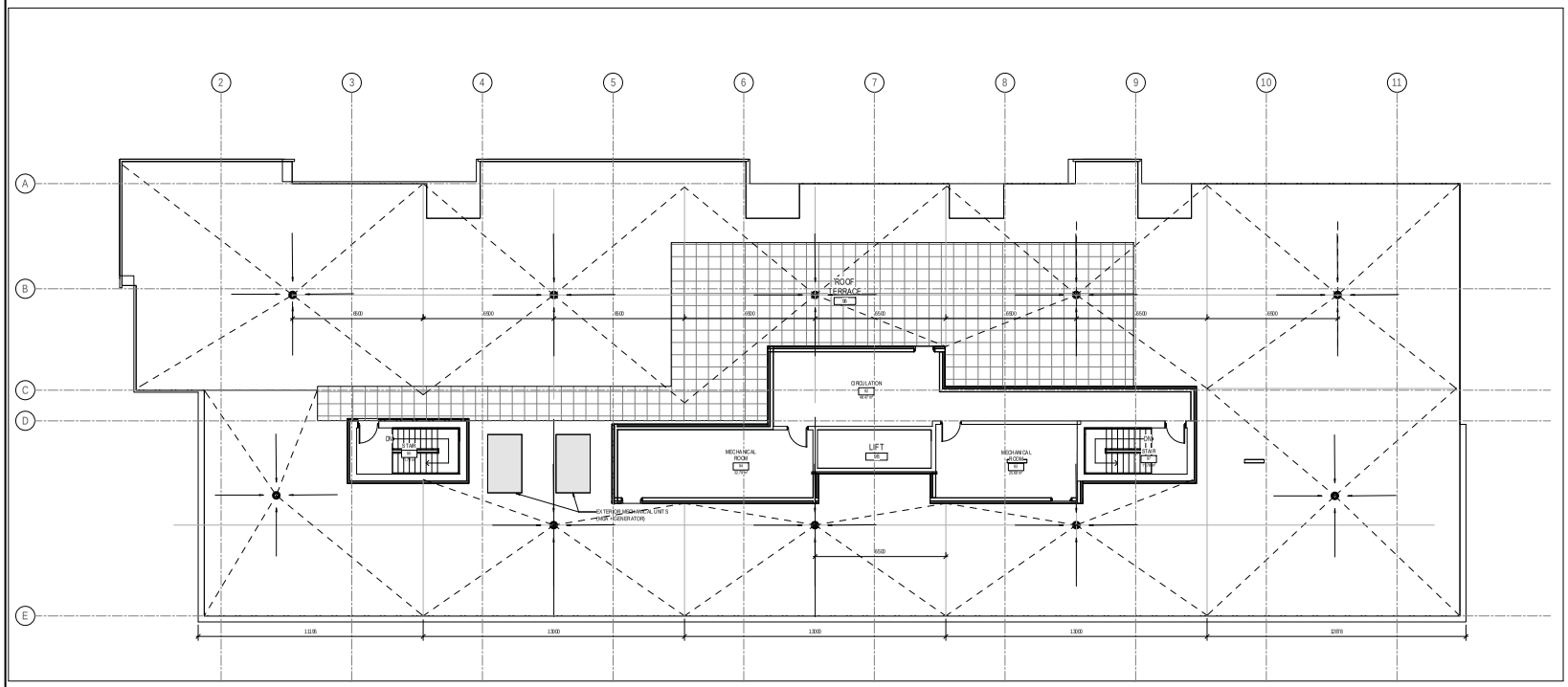

1 A107W ROOF LEVEL - WEST BUILDING
SCALE 1 : 100

GENERAL ARCHITECTURAL NOTES:
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3. Upon notice in writing, the Architect will provide written/graphic clarification or supplementary information regarding the intent of the Contract Documents.
4. The Architectural drawings are to be read in conjuction with all other Contract Documents, including Project Manuals and the Structural, Mechanical and Electrical Drawings.
5. Positions of exposed or finished Mechanical or Electrical devices, fittings and trims are indicated on the Architectural Drawings. Locations shown on the Architectural Drawings shall govern over Mechanical and Electrical Drawings. Mechanical and Electrical items not clearly located will be located as directed by the Architect.
6. These documents are not to be used for construction unless specifically noted for such purpose.

KEYPLAN

ISSUE RECORD

project1 studio

Project1 Studio Incorporated
613.884.4909 | mail@project1studio.ca

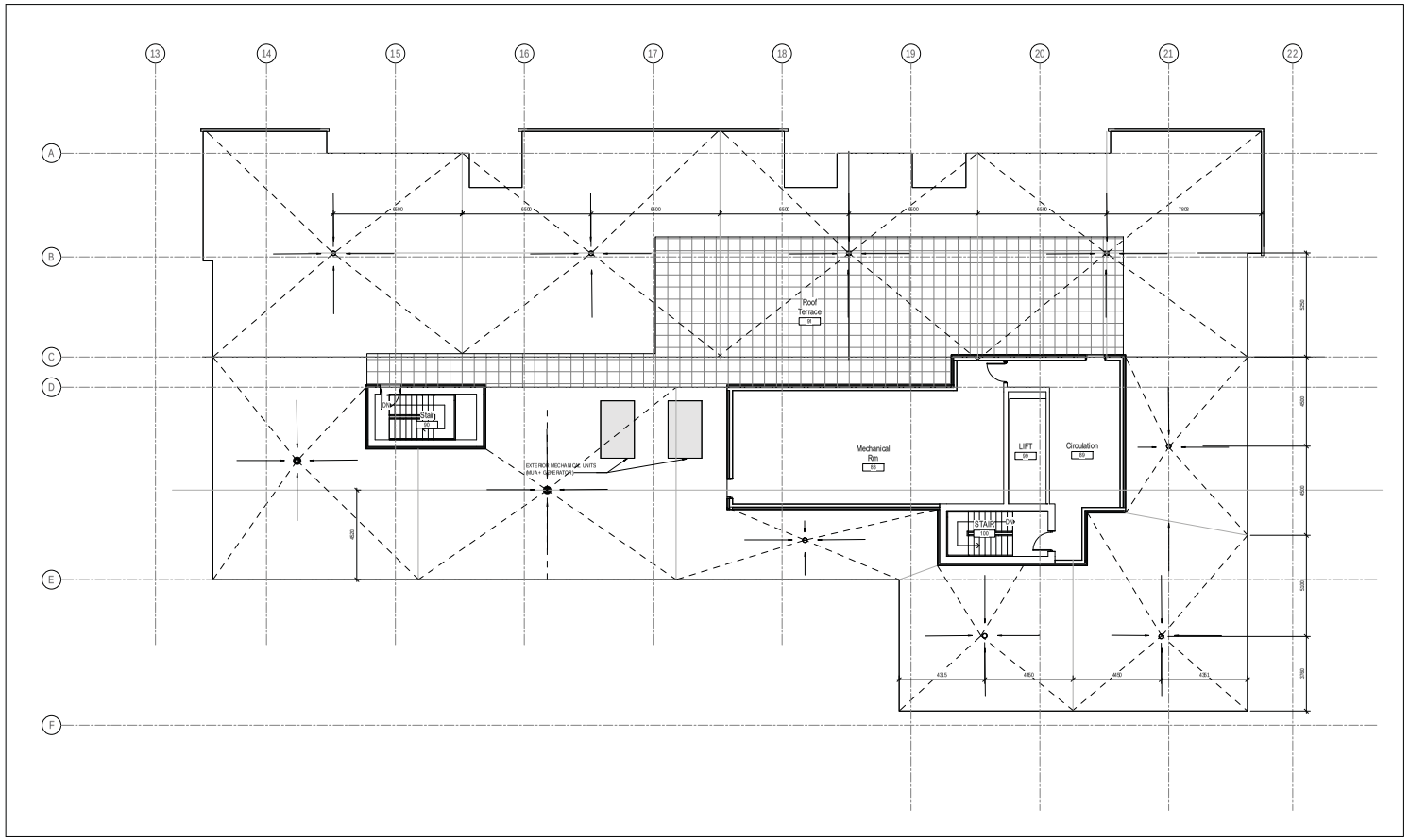
3430 CARLING

3430 Carling Avenue
Ottawa, ON

PROJ	SCALE	DRAWN	REVIEWED
2204	NOTED	GS	RMK

WEST BUILDING ROOF PLAN

A107W



1 / A107E ROOF LEVEL - EAST BUILDING
SCALE: 1 : 100

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3430 CARLING

3430 Carling Avenue
Ottawa, ON

PROJ	SCALE	DRAWN	REVIEWED
2204	NOTED	GS	RW

EAST BUILDING ROOF PLAN

A107E

Appendix C: Correspondence

The pre-consultation notes have been copied without revision from the Assessment of Adequacy of Public Services 3430 Carling Avenue Report prepared by J.L. Richards & Associates Ltd dated July 16, 2021.

The pre-consultation was for a proposed development consisting of 2 buildings of 9 storeys having a similar foot print and number of units.

File No.:
Date: March 2, 2021

3430 Carling
Pre-Consultation Meeting Minutes
Meeting Date: February 22, 2021

Attendee	Role	Organization
Lisa Stern	Planner	City of Ottawa
Randolph Wang	Urban Designer	
Neeti Paudel	Transportation	
Reid Shepherd	Parks Planner	
Jessica Valic	Infrastructure PM	
Mark Richardson	Forester	
Miguel Tremblay	Planner	Fotenn
Nico Church	Planner	
Edward Hayes		
Lucie Dalrymple		
Randy Koolwine		
Guy Forget		
Raphael Esposito		
Mark Baker		

Comments from the Applicant:

1. Develop two 9 storey buildings on a 4 storey podium on the subject lands.

Planning Comments:

1. The proposal is subject to a Major Zoning Bylaw Amendment and Complex Site Plan application. The application form, timeline and fees can be found here.
2. The subject lands are designated General Urban Area in the City's Official Plan and are zoned GM20[2628]H18.5. The site specific exception permits a non-accessory parking lot as a temporary use on the subject lands.
3. The permitted FSI on the site is 2.0, as such Section 37 applies to the proposal.
4. Cash-in-lieu of parkland and associated appraisal fee will be required as a condition of approval as per the Parkland Dedication Bylaw.
5. The site is not located within a target area of intensification as identified under Section 2.2.2 Policy 3, nor is the site located in proximity to rapid transit. Building heights within the General Urban Area will be predominantly low-rise. High-rise may be considered for sites that are in proximity to frequent transit or are in an area already characterized by taller buildings but still subject to compatibility analysis.
6. Although the larger deep parcels at the west and east ends of block permit heights up to 34m, the property to the east zoned LC (Local Commercial) Zone has a permitted height of 12m.
7. It will be up to the applicant to demonstrate what compatibility measures are put in place such that the proposal fits well with the abutting low-rise residential homes as well as those across Carling.
8. The planning rationale should discuss existing context of the surrounding area and demonstrate compatibility with abutting uses including the low rise residential across Carling and should discuss transitions including landscaping along the northerly property line and access/circulation.
9. Please consult with the Ward Councillor prior to submission.

Urban Design:

1. A Design Brief is required as part of the submission. The Terms of Reference of the Design Brief is attached for convenience. The proposed 9-storey buildings are significantly taller than the surrounding buildings. Therefore, a wind study is required in addition to a shadow study. The standard Terms of Reference for a wind study can be found here.
2. With respect to the design concept presented at the preconsulation meeting:
    a. The narrow bar building (approximately 16m in depth) concept is quite refreshing.
    b. The intent to stagger the two buildings is also appreciated. However, the placement of the buildings should take into considerations a number of factors, including the ability to provide effective built form transition to the low-rise area to the south. While a continuous street wall condition along Carling may not be most desirable at this location, it is conceivable that locating the proposed buildings as further away from the low-rise area will be most effective to address concerns of transition.
    c. Considerations should be given to differentiating the two buildings with respect to both massing and architecture.
    d. The proposed 4-storey podium may be inappropriate for the context. Considerations should be given to a 2 or 3 storey podium to reflect the form of the existing buildings in the vicinities.
    e. Please demonstrate how transition will occur at the back of the site. The 45 degree angular plane is a common tool to use to measure the effectiveness of built form transition.
    f. Please ensure the provision of a landscape buffer along the rear fence as required by zoning to allow for landscape screening and healthy growth of canopy trees.
    g. The site is isolated from the surrounding neighbourhood. Sufficient at grade amenity spaces should be provided at the rear of the property.
3. It is important to explore a few site plan and massing options in the next step. A second preconsultation may be required once these options are developed.

Forestry:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    a. an approved TCR is a requirement of Site Plan approval.
    b. The TCR may be combines with the Landscape Plan
2. As of January 1 2021, any removal of privately or publicly (City) owned trees 10cm or larger in diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site by species, diameter and health condition
5. the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site

6. Trees should be identified by ownership – Privately owned on-site trees; Privately owned off-site trees; City owned trees; Co-owned trees (growing on a property boundary)
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
8. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
    a. the location of tree protection fencing must be shown on a plan
    b. show the critical root zone of the retained trees
    c. if excavation will occur within the critical root zone, please show the limits of excavation
9. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
10. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

Transportation:

1. Follow Traffic Impact Assessment Guidelines
    a. Start this process as soon as possible.
    b. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable). Collaboration and communication between development proponents and City staff are required at the end of every step of the TIA process.
    c. Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
2. Noise Impact Studies required for the following:
    a. Road
    b. Stationary (due to the proximity to neighbouring exposed mechanical equipment) or (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)
3. Clear throat requirements for more than 250 apartment units on an arterial/major collector is 40m.
4. Right of way protection on Carling Road at this location is 44.5m. Ensure this is protected.
5. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show lane/aisle widths.
    e. Sidewalk is to be continuous across access as per City Specification 7.1.
6. The City recommends development on private property be in accordance with the Accessibility Design Standards (AODA legislation). As the site proposed is residential, it is suggested that the design conforms to the Site Plan Checklist, which summarizes AODA requirements (attached).

Engineering:

Water

Available Watermain: 305mm (CI)

- Per WDG 4.3.1, where basic demand is greater than 50 m3/day, there shall be a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area
- Per WDG 4.4.7.2, District Meter Area (DMA) Chamber is required for services greater than 150mm in diameter

Boundary Conditions

Request prior to first submission. Contact assigned City Infrastructure Project Manager with the following information:

- Location of service(s)
- Type of development and required fire flow (per FUS method – include FUS calculation sheet with boundary condition request)
- Average Daily Demand (l/s)
- Maximum Hourly Demand (l/s)
- Maximum Daily Demand (l/s)

Sanitary

Available Sanitary Sewer: 375mm PVC

- There may be limited capacity in the downstream sewer system. Coordination will be required to determine if the existing sanitary sewer system has sufficient capacity to support the proposed development. Please confirm the proposed sanitary demands for the proposed development, calculated using the most up to date SDG, and provide to the City of Ottawa Infrastructure Project Manager.

Storm

Available Storm Sewer: 600mm (CONC)

- Roof drains to be connected downstream of any incorporated ICD within the SWM system.
- Where service lateral connection is greater than 50% of the diameter of the main sewer, a maintenance hole will be required at the connection.

Stormwater Management

- Quantity Control
    - Required for the site up to and including the 100-yr storm event.
    - Control to the 2-year storm event
    - Time of Concentration (Tc): pre-development or maximum=10min
    - Allowable runoff coefficient(c): Lesser of pre-development or c=0.5.
    - If underground/inline stormwater storage is proposed, an average release rate equal to 50% of the determined peak allowable rate must be used. Otherwise, disregard the underground/inline storage as available storage or provide modeling to support the proposed design. The reasoning for this restriction is that the discharge rate at full storage is not representative of the discharge rate for more frequent storm events. Halving the discharge rate compensates for the inaccuracies of the modified rational method when underground storage is used.
    - Provide both pre and post development stormwater management plans, showing individual drainage areas and their respective coefficients.
    - If roof storage is proposed, please provide a roof drainage plan showing the 5 and 100-year storm ponding levels. Include the roof drain type, opening settings, and flow rate.

- Quality Control: Please consult with the Mississippi Valley Conservation Authority (MVCA) regarding water quality control restrictions for the subject site. Include correspondence in report.
- Ministry of Environment, Conservation, and Parks (MECP): Designer to determine if approval for sewage works under Section 53 of OWRA is required and to determine the type of application required. Reviews will be done through Transfer of Review or Direct Submission.

Phase I and Phase II ESA

- Phase I ESA is a requirement; Phase II ESA requirement will be dependent on the result of the Phase I ESA.
- Phase I ESA must include Ecolog ERIS Report.
- Phase I ESAs and Phase II ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- Phase I/II ESA to comment on the need for a Record of Site Condition for property development.

Geotechnical Investigation

- Required for entire development area
- Retaining walls greater than 1.0m must be designed by a Professional Engineer. Plans to be submitted with the Application.

Exterior Lighting

- If exterior light fixtures are proposed, provide a plan showing the location of all exterior fixtures and include a table providing fixture details (make, model, mounting heights). All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), resulting in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). Provide certification from a relevant Professional Engineer.

Other

- Road cut moratorium in place on Carling Avenue. Road cuts may be prohibited in upcoming years and/or road cut fees increased. Specifics can be discussed when application is submitted.

General Information

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#servicing-study-guidelines-development-applications
2. Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines (October 2012) (including subsequent Technical Bulletins)
- Ottawa Design Guidelines – Water Distribution (2010) (including subsequent Technical Bulletins)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- Ottawa Standard Tender Documents (latest version)

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. Any proposed work in utility easements requires written consent of easement owner.
5. All submitted report and plan pdf documents to be flattened and unsecured to allow for editing.
6. All documents prepared by Engineers shall be signed and dated on the seal.

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 Lisa.Stern@ottawa.ca or at 613-580-2424 extension 21108 if you have any questions.

Appendix D: Drawings

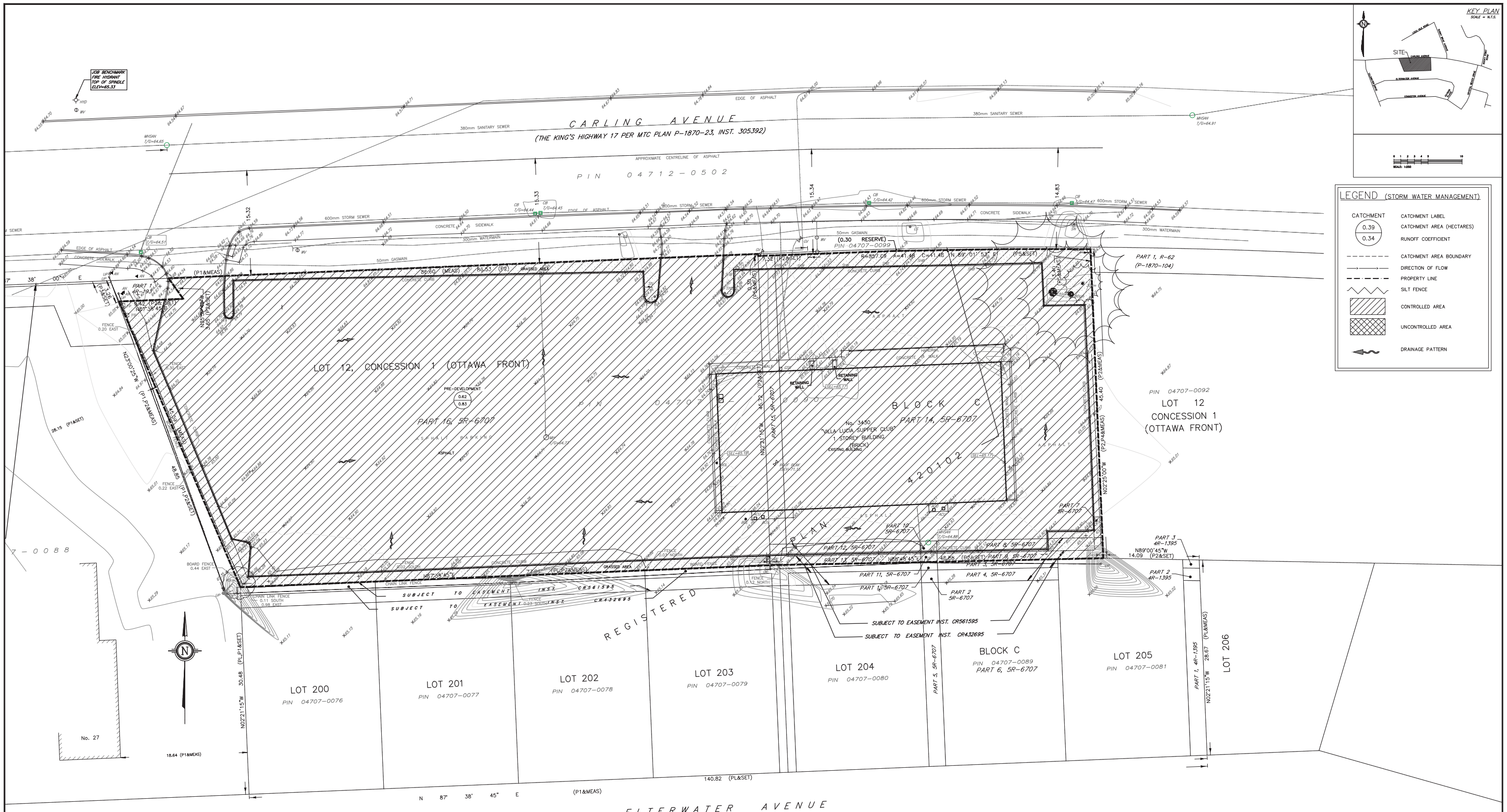
220978– PRE – Pre-Development Conditions

220978 –SWMP – Stormwater Management Plan and Catchment Areas

220978 – GR – Grading Plan

220978 – SER – Site Servicing Plan

220978 – ER – Erosion Control Plan



PRE-DEVELOPMENT CONDITIONS

SCALE = 1:250

NOTES:

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0	ISSUED FOR SITE PLAN CONTROL	14.DEC.2022	NJR

CONSULTANTS

Rohit COMMUNITIES™

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DRAWN	NJR
CHECKED	SD
APPROVED	SD

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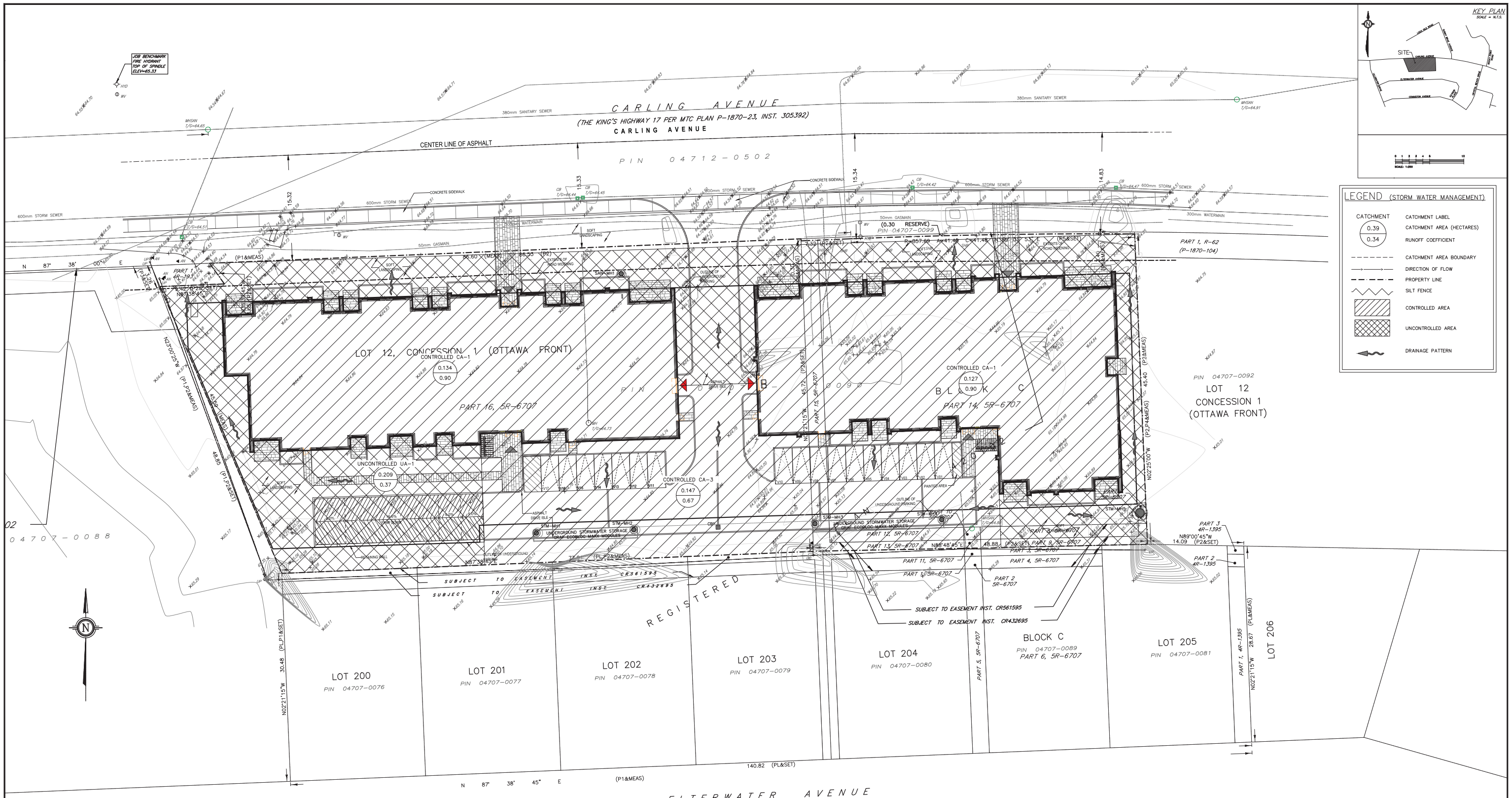
CLIENT NAME	ROHIT COMMUNITIES INC.
PROJECT NAME	PROPOSED RESIDENTIAL DEVELOPMENT
PROJECT LOCATION	3430 CARLING AVENUE, OTTAWA, ONTARIO
DRAWING	PRE-DEVELOPMENT CONDITIONS
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	1:250
DRAWING No.	220978 – PRE

D07-12-22-0015

#18658



KEY PLAN
SCALE = N.T.S.

LEGEND (STORM WATER MANAGEMENT)

- CATCHMENT: CATCHMENT LABEL
- 0.39: CATCHMENT AREA (HECTARES)
- 0.34: RUNOFF COEFFICIENT
- CATCHMENT AREA BOUNDARY
- DIRECTION OF FLOW
- PROPERTY LINE
- SILT FENCE
- CONTROLLED AREA
- UNCONTROLLED AREA
- DRAINAGE PATTERN

STORMWATER MANAGEMENT PLAN & CATCHMENT AREAS

SCALE = 1:150

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DRAWING	STORMWATER MANAGEMENT PLAN & CATCHMENT AREAS
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	1:250
DRAWING No.	220978 – SWMP

007-12-22-0015

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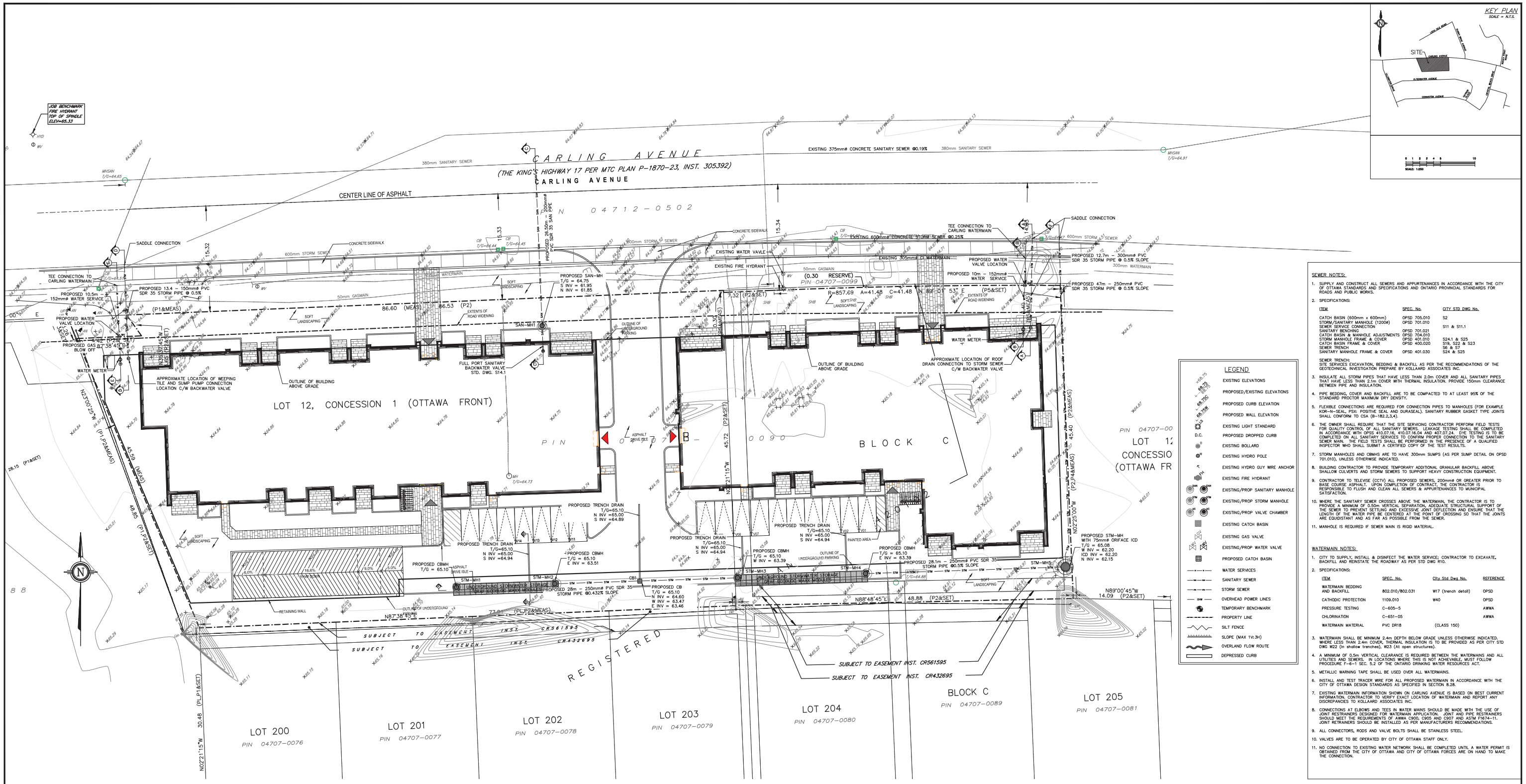

SITE SERVICING PLAN

SCALE = 1:250

LEGEND

- EXISTING ELEVATIONS
- PROPOSED/EXISTING ELEVATIONS
- PROPOSED CURB ELEVATION
- PROPOSED WALL ELEVATION
- EXISTING LIGHT STANDARD
- PROPOSED DROPPED CURB
- EXISTING BOLLARD
- EXISTING HYDRO POLE
- EXISTING HYDRO GUY WIRE ANCHOR
- EXISTING FIRE HYDRANT
- EXISTING/PROP SANITARY MANHOLE
- EXISTING/PROP STORM MANHOLE
- EXISTING/PROP VALVE CHAMBER
- EXISTING CATCH BASIN
- EXISTING GAS VALVE
- EXISTING/PROP WATER VALVE
- PROPOSED CATCH BASIN
- WATER SERVICES
- SANITARY SEWER
- STORM SEWER
- OVERHEAD POWER LINES
- TEMPORARY BENCHMARK
- PROPERTY LINE
- SILT FENCE
- SLOPE (MAX 1V:3H)
- OVERLAND FLOW ROUTE
- DEPRESSED CURB

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	CITY STD DWG No.
CATCH BASIN (600mm x 600mm)	OPSD 705.010	S2
STORM/SANITARY MANHOLE (1200ø)	OPSD 701.010	
SEWER SERVICE CONNECTION		S11 & S11.1
SANITARY BENCHING	OPSD 701.021	
CATCH BASIN & MANHOLE ADJUSTMENTS	OPSD 704.010	
STORM MANHOLE FRAME & COVER	OPSD 401.010	S24.1 & S25
CATCH BASIN FRAME & COVER	OPSD 400.020	S19, S22 & S23
SEWER TRENCH		S6 & S7
SANITARY MANHOLE FRAME & COVER	OPSD 401.030	S24 & S25

SEWER TRENCH:
SITE SERVICES EXCAVATION, BEDDING & BACKFILL AS PER THE RECOMMENDATIONS OF THE GEOTECHNICAL INVESTIGATION PREPARE BY KOLLAARD ASSOCIATES INC.

3. INSULATE ALL STORM PIPES THAT HAVE LESS THAN 2.0m COVER AND ALL SANITARY PIPES THAT HAVE LESS THAN 2.1m COVER WITH THERMAL INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTION PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX, POSITIVE SEAL AND DURASEAL). SANITARY RUBBER GASKET TYPE JOINTS SHALL CONFORM TO CSA (B-182.2,3,4).
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A QUALIFIED INSPECTOR WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS (AS PER SUMP DETAIL ON OPSD 701.010), UNLESS OTHERWISE INDICATED.
8. BUILDING CONTRACTOR TO PROVIDE TEMPORARY ADDITIONAL GRANULAR BACKFILL ABOVE SHALLOW CULVERTS AND STORM SEWERS TO SUPPORT HEAVY CONSTRUCTION EQUIPMENT.
9. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmø OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES TO MUNICIPAL SATISFACTION.
10. WHERE THE SANITARY SEWER CROSSES ABOVE THE WATERMAIN, THE CONTRACTOR IS TO PROVIDE A MINIMUM OF 0.50m VERTICAL SEPARATION, ADEQUATE STRUCTURAL SUPPORT OF THE SEWER TO PREVENT SETTLING AND EXCESSIVE JOINT DEFLECTION AND ENSURE THAT THE LENGTH OF THE WATER PIPE BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS ARE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
11. MANHOLE IS REQUIRED IF SEWER MAIN IS RIGID MATERIAL.

WATERMAIN NOTES:

1. CITY TO SUPPLY, INSTALL & DISINFECT THE WATER SERVICE; CONTRACTOR TO EXCAVATE, BACKFILL AND REINSTATE THE ROADWAY AS PER STD DWG R10.
2. SPECIFICATIONS:

ITEM	SPEC. No.	City Std Dwg No.	REFERENCE
WATERMAIN BEDDING AND BACKFILL	802.010/802.031	W17 (trench detail)	OPSD
CATHODIC PROTECTION	1109.010	W40	OPSD
PRESSURE TESTING	C-605-5		AWWA
CHLORINATION	C-651-05		AWWA
WATERMAIN MATERIAL	PVC DR18	(CLASS 150)	

3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED. WHERE LESS THAN 2.4m COVER, THERMAL INSULATION IS TO BE PROVIDED AS PER CITY STD DWG W22 (in shallow trenches), W23 (At open structures).
4. A MINIMUM OF 0.5m VERTICAL CLEARANCE IS REQUIRED BETWEEN THE WATERMAINS AND ALL UTILITIES AND SEWERS. IN LOCATIONS WHERE THIS IS NOT ACHIEVABLE, MUST FOLLOW PROCEDURE F-6-1 SEC. 5.2 OF THE ONTARIO DRINKING WATER RESOURCES ACT.
5. METALLIC WARNING TAPE SHALL BE USED OVER ALL WATERMAINS.
6. INSTALL AND TEST TRACER WIRE FOR ALL PROPOSED WATERMAIN IN ACCORDANCE WITH THE CITY OF OTTAWA DESIGN STANDARDS AS SPECIFIED IN SECTION 8.28.
7. EXISTING WATERMAIN INFORMATION SHOWN ON CARLING AVENUE IS BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION OF WATERMAIN AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
8. CONNECTIONS AT ELBOWS AND TEES IN WATER MAINS SHOULD BE MADE WITH THE USE OF JOINT RESTRAINERS DESIGNED FOR WATERMAIN APPLICATION. JOINT AND PIPE RESTRAINERS SHOULD MEET THE REQUIREMENTS OF AWWA C900, C905 AND C907 AND ASTM F1674-11. JOINT RETRAINERS SHOULD BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS.
9. ALL CONNECTORS, RODS AND VALVE BOLTS SHALL BE STAINLESS STEEL.
10. VALVES ARE TO BE OPERATED BY CITY OF OTTAWA STAFF ONLY.
11. NO CONNECTION TO EXISTING WATER NETWORK SHALL BE COMPLETED UNTIL A WATER PERMIT IS OBTAINED FROM THE CITY OF OTTAWA AND CITY OF OTTAWA FORCES ARE ON HAND TO MAKE THE CONNECTION.

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DESIGN: NJR
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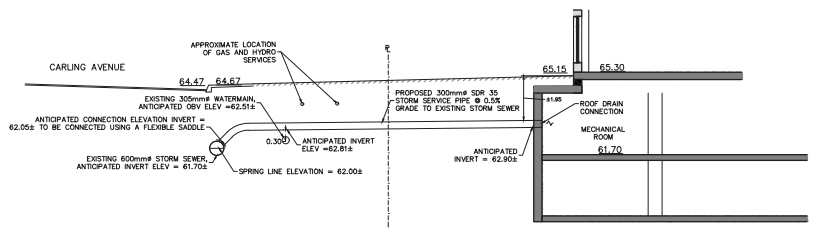
DRAWING	SITE SERVICING PLAN
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	1:250
DRAWING No.	220978 – SER

D07-12-22-0015

#18658



SECTION A–A STORM

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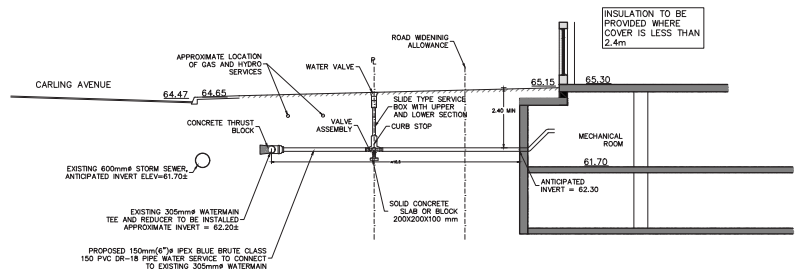

SECTION B–B WATER

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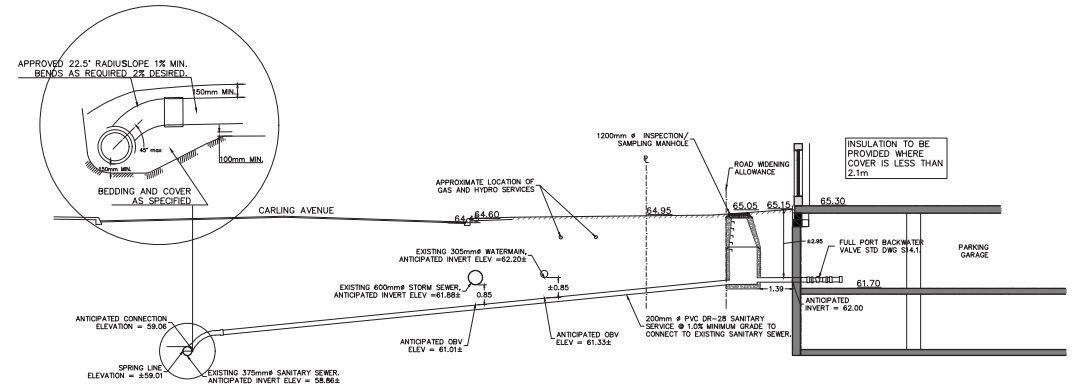

SECTION C–C SANITARY

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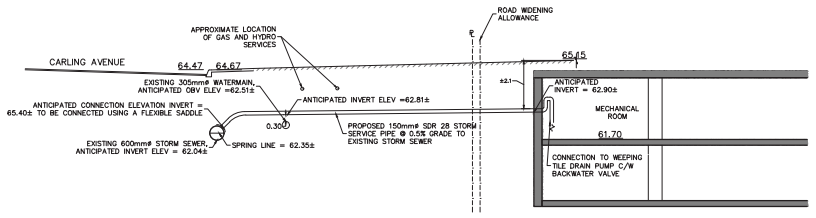

SECTION D–D STORM

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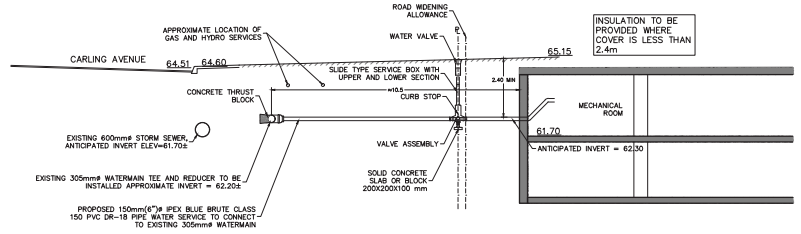
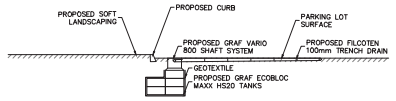


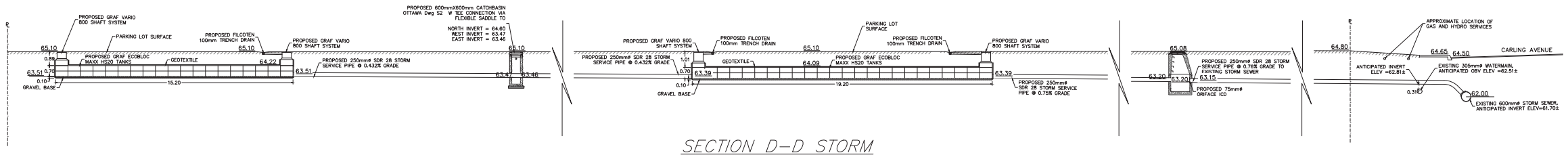
SECTION E–E WATER

SCALE = N.T.S.



SECTION G–G STORM

SCALE = N.T.S.



SECTION D–D STORM

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210 PRESCOTT STREET
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K0G 1J0
FACSIMILE (613) 258-0475
(613) 860-0923

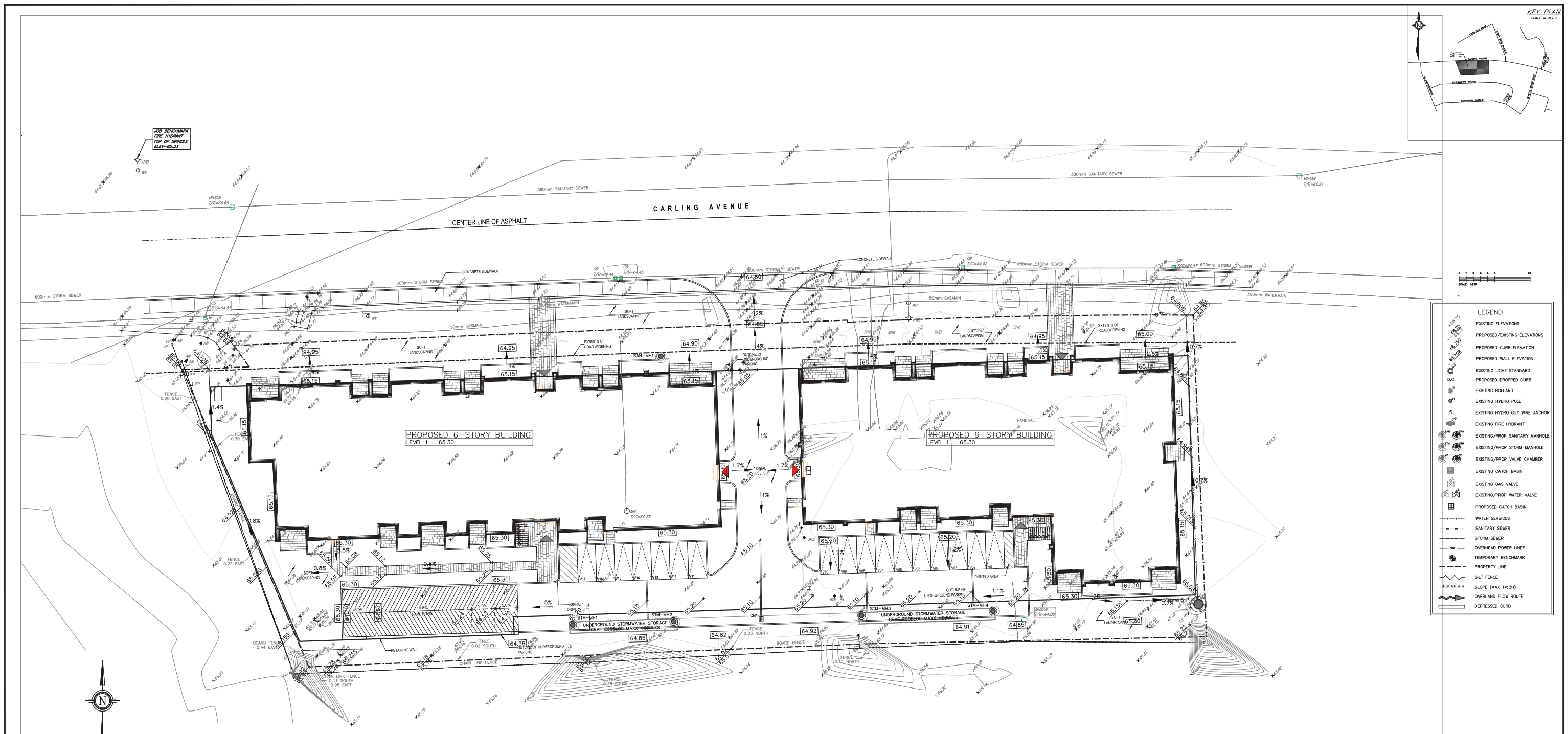
DESIGN	NJR
DRAWN	NJR
CHECKED	SD
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — 14.DEC.2022 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	ROHIT COMMUNITIES INC.
PROJECT NAME	PROPOSED RESIDENTIAL DEVELOPMENT
PROJECT LOCATION	3430 CARLING AVENUE, OTTAWA, ONTARIO
DRAWING	SITE SERVICING DETAILS
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	N.T.S.
DRAWING No.	220978 – DET

D07-12-22-0015

#18658



SCALE: 1:250

LEGEND

- EXISTING ELEVATIONS
- PROPOSED/EXISTING ELEVATIONS
- PROPOSED CURB ELEVATION
- PROPOSED WALL ELEVATION
- EXISTING LIGHT STANDARD
- D.C. PROPOSED DROPPED CURB
- EXISTING BOLLARD
- EXISTING HYDRO POLE
- EXISTING HYDRO GUY WIRE ANCHOR
- EXISTING FIRE PYRANT
- EXISTING/PROP SANITARY MANHOLE
- EXISTING/PROP STORM MANHOLE
- EXISTING/PROP VALVE CHAMBER
- EXISTING CATCH BASIN
- EXISTING GAS VALVE
- EXISTING/PROP WATER VALVE
- PROPOSED CATCH BASIN
- WATER SERVICES
- SANITARY SEWER
- STORM SEWER
- OVERHEAD POWER LINES
- TEMPORARY BENCHMARK
- PROPERTY LINE
- SILT FENCE
- SLOPE (MAX 1V:3H)
- OVERLAND FLOW ROUTE
- DEPRESSED CURB

GRADING PLAN

SCALE = 1:250

NOTES:

1. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED. TOPOGRAPHIC SURVEY WAS PROVIDED BY STANTEC GEOMATICS LTD. TOPOGRAPHIC SURVEY IS GEODETIC AND REFERRED TO THE CGVD-1928:1978 GEODETIC DATUM. BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ARE REFERENCED TO SPECIFIED CONTROL POINTS 01919680005 AND 19773035 AND 19680191, MTM ZONE 9 (76°30' WEST LONGITUDE) NAD-83 (ORIGINAL)
2. THIS IS NOT A LEGAL SURVEY.
3. BOUNDARY INFORMATION DERIVED FROM STANTEC GEOMATICS LTD.
4. EXISTING SERVICES INFORMATION SHOWN ARE BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
5. CLIENT IS RESPONSIBLE FOR ACQUIRING ALL NECESSARY PERMITS.
6. CONTRACTOR TO VERIFY THAT APPROPRIATE PERMITS HAVE BEEN ACQUIRED PRIOR TO ANY CONSTRUCTION.
7. CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF UTILITIES.
8. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
9. THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL ALL APPROVALS HAVE BEEN GRANTED.
10. INSPECTION OF ROUGH GRADE BY KOLLAARD ASSOCIATES INC. AND CITY OF OTTAWA MUST BE CONDUCTED PRIOR TO PLACEMENT OF TOPSOIL OR SOD.
11. HYDRO, GAS, COMMUNICATIONS SERVICE TO BE INSTALLED ACCORDING TO THE SPECIFICATIONS OF SERVICE PROVIDER AND THE MECHANICAL ENGINEER.
12. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS
13. ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES, INC.
14. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #220978.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL	14.DEC.2022	NJR

CONSULTANTS

Rohit COMMUNITIES™

Kollaard Associates Engineers
BOX 189
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K0G 1J0
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(613) 860-0923

DESIGN	NJR
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CHECKED	SD
APPROVED	SD

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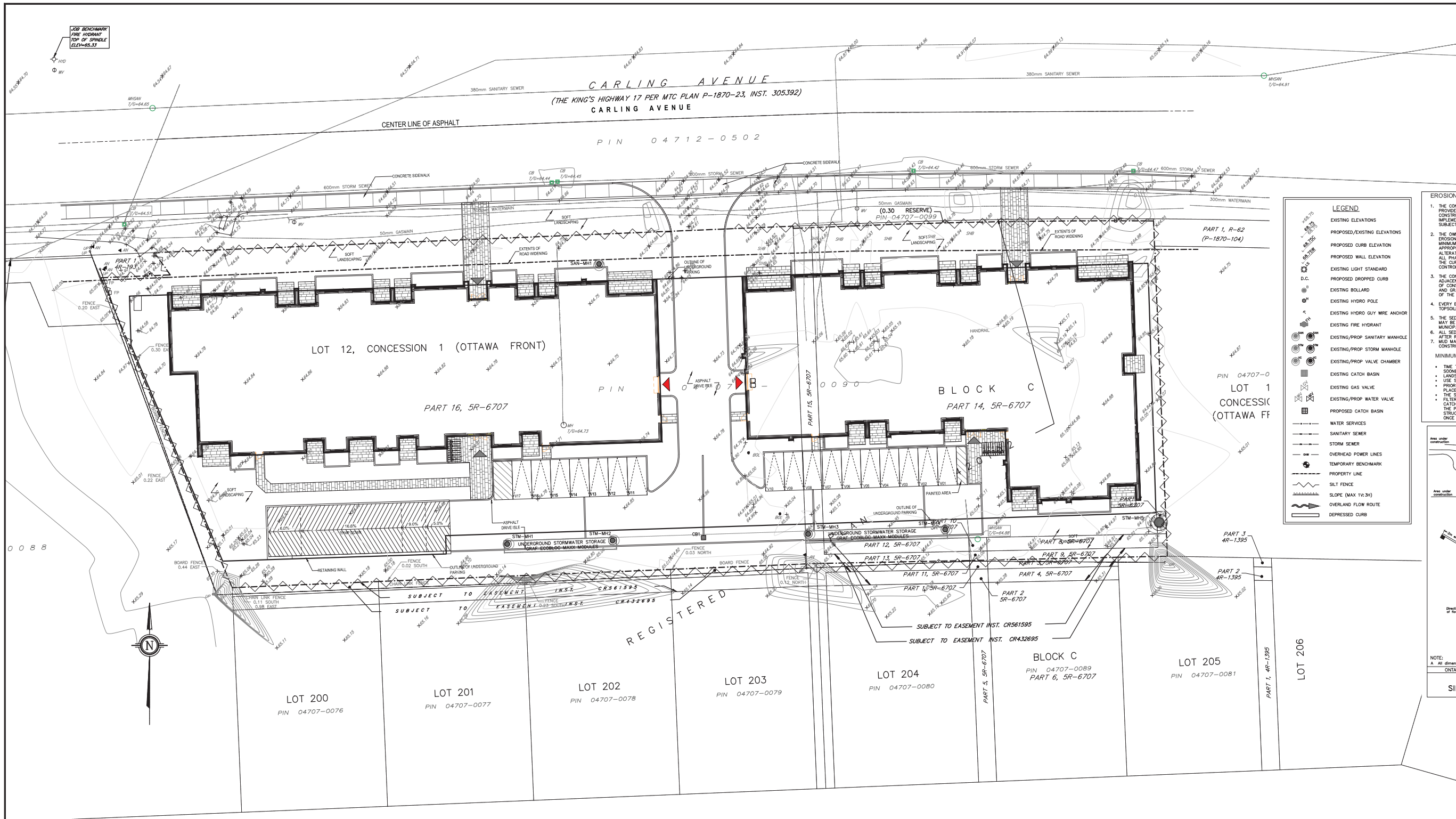
CLIENT NAME	ROHIT COMMUNITIES INC.
PROJECT NAME	PROPOSED RESIDENTIAL DEVELOPMENT
PROJECT LOCATION	3430 CARLING AVENUE, OTTAWA, ONTARIO
DRAWING	GRADING PLAN
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	1:250
DRAWING No.	220978 – GR

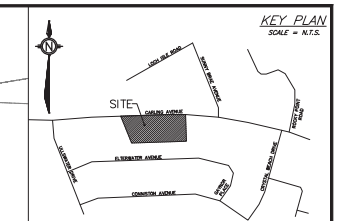
007-12-22-0015

#18658



EROSION CONTROL PLAN

SCALE = 1:250

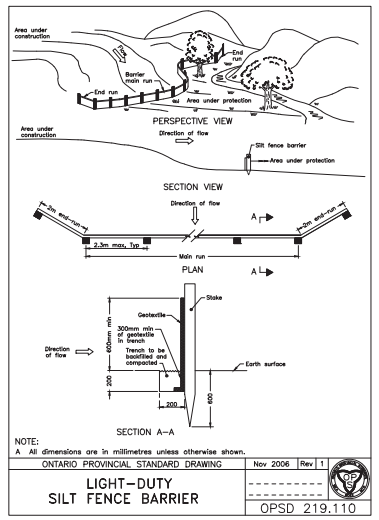


EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE STORM SEWER SYSTEM, 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.
2. THE OWNER (AND/OR CONTRACTOR) AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN AT LEAST EQUAL TO THE STATED MINIMUM REQUIREMENTS AND TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL.
3. THE CONTRACTOR IS TO ENSURE THAT THE SITE ACCESS POINTS AND ADJACENT STREETS TO THE ACCESS POINTS ARE MAINTAINED AND KEPT CLEAN OF CONSTRUCTION MATERIALS SUCH AS, BUT NOT LIMITED TO MUD, DIRT, CLAY AND GRANULARS ON A DAILY BASIS OR AS NECESSARY, TO THE SATISFACTION OF THE CITY OF OTTAWA.
4. EVERY EFFORT WILL BE MADE TO ENSURE THAT ALL DISTURBED AREAS ARE TOPSOILED AND SEEDED AS SOON AS REASONABLY POSSIBLE.
5. THE SEDIMENT AND EROSION CONTROL PLAN IS A LIVING DOCUMENT WHICH MAY BE AMENDED BY ONSITE REQUIREMENTS AT THE APPROVAL OF THE MUNICIPALITY AND THE CONSERVATION AUTHORITY.
6. ALL SEDIMENT AND ERROSION CONTROL MEASURES TO BE INSPECTED/CLEANED AFTER RAIN EVENTS.
7. MUD MAT OR MECHANICAL TRACKOUT PLATE TO BE INSTALLED AT CONSTRUCTION SITE ENTRANCE.

MINIMUM EROSION AND SEDIMENT CONTROL PLAN REQUIREMENTS:

- TIME THE DEMOLITION AND EXCAVATION ACTIVITIES SO THAT THEY OCCUR NO SOONER THAN IS NECESSARY FOR SUBSEQUENT CONSTRUCTION ACTIVITIES.
- LANDSCAPE THE SITE AS SOON AS PRACTICALLY POSSIBLE.
- USE SILT FENCES AROUND ANY STOCKPILES OF SOIL.
- PRIOR TO CONSTRUCTION, SILT FENCE BARRIERS (OPSD 219.110) WILL BE PLACED ALONG THE PROPERTY LINES AS ON THE DRAWING.
- THE SILT FENCE SHOULD BE REMOVED ONLY WHEN THE SITE IS STABILIZED.
- FILTER SOCKS SHOULD BE INSTALLED ACROSS EXISTING STORM MANHOLE AND CATCH BASIN LIDS. AS WELL, FILTER SOCKS SHOULD BE INSTALLED ACROSS THE PROPOSED CATCH BASIN AND MANHOLE LIDS IMMEDIATELY AFTER THE STRUCTURES ARE PLACED. THE FILTER SOCKS SHOULD ONLY BE REMOVED ONCE THE ASPHALTIC CONCRETE IS INSTALLED AND THE SITE IS CLEANED..



NOTE:
A. All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
LIGHT-DUTY SILT FENCE BARRIER		
	OPSD 219.110	

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CLIENT NAME	ROHIT COMMUNITIES INC.
PROJECT NAME	PROPOSED RESIDENTIAL DEVELOPMENT
PROJECT LOCATION	3430 CARLING AVENUE, OTTAWA, ONTARIO
DRAWING	EROSION CONTROL PLAN
PROJECT No.	220978
DATE	14.DEC.2022
SCALE	1:250
DRAWING No.	220978 – ER

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