STORMWATER MANAGEMENT REPORT

Burnhamthorpe/Oakville Holdings Inc.

Type of Document:
Final Report

Project Name:
Neyagawa & Hwy 407, Oakville

Location:
Northwest corner of Neyagawa Boulevard and Burnhamthorpe Road West

Project Number:
ALL-23012713-A0

Prepared and Reviewed By:
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Approved By:
Scott Passmore

Date + Time Submitted:
2025-09-08

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1. Introduction

EXP Services Inc. has been retained by Burnhamthorpe/Oakville Holdings Inc ("Owner") to prepare a Stormwater Management (SWM) Report in support of an application for an Official Plan and Zoning By-Law Amendment on approximately 2.40 ha of land ("site") in the Town of Oakville, Region of Halton. Refer to Figure 1 for site location plan.

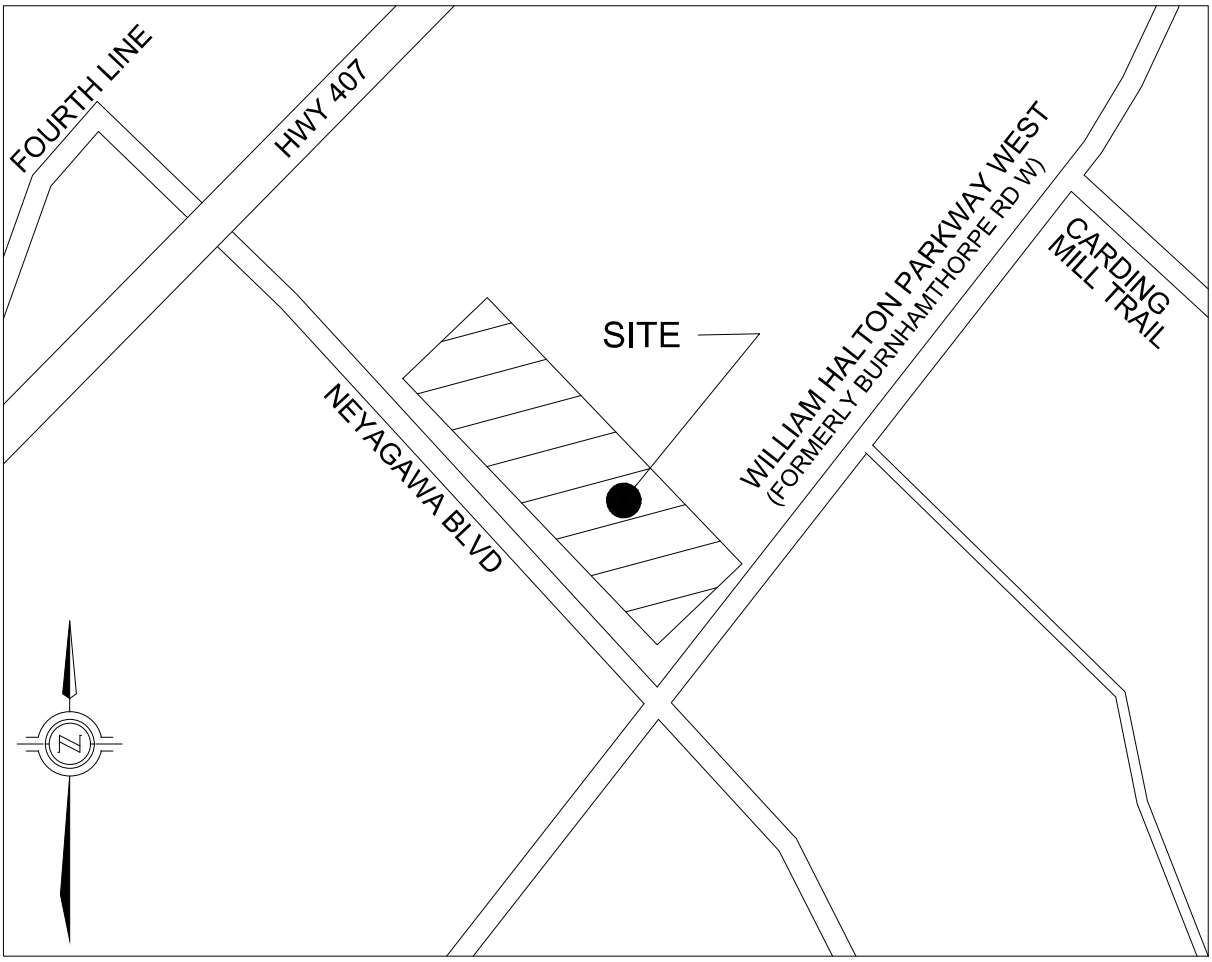
The subject site is located on the northeast corner of Neyagawa Boulevard and Burnhamthorpe Road West with an existing driveway entrance to Burnhamthorpe Road West. The site is bound by Neyagawa Boulevard to the west, Burnhamthorpe Road West to the south, an on-ramp to Highway 407 to the north and an existing private property to the east. The site is currently unoccupied with existing vegetated areas. Finally, the Owner is a member of the North Oakville East Developers Group which has undertaken master studies including the *East Sixteen Mile Creek ES6-East Environmental Implementation Report and Functional Servicing Study (EIR/FSS).*

The objective of this SWM Report is to give an overview of the proposed SWM strategy for the site while demonstrating conformance to the Town of Oakville SWM design requirements and the master EIR/FSS study.

2. Site Characteristics

Along the north side of the site, the property is located immediately adjacent to the existing on-ramp from Neyagawa Boulevard to the Highway 407. Therefore, a portion of the site is located with MTO's regulated area and permit control requirements. In reviewing the Halton Region Conversation Authority (HRCA) mapping, the site is not located within any existing HRCA regulated areas. Refer to Figure 1 for Site Location Plan.

The proposed mixed-use development will comprise two (2) separate blocks, featuring a total of five (5) residential condominium buildings with retail spaces all under single ownership. The development shows approximately 898 units with an approximate GFA of 24,052 m^2 over a shared underground parking structure with driveway access to both Neyagawa Boulevard and William Halton Parkway West (former Burnhamthorpe Road West). Through the Owner's pre-consultation meetings and correspondence with the Town and MTO, portions of the site are to be dedicated various agencies resulting in a net development area of approximately 1.77 ha. Refer to the Owner's Site Plan located in Appendix A for reference.



Project: NEYAGAWA & HWY 407, OAKVILLE, ON			
Title: LOCATION PLAN			
Approved by: S.P	Date: SEPT. 2025	Project No.: ALL-23012713-A0	
Drawn by: W.K	Scale: N.T.S.	Figure no.: FIG-01	

E:\MRK\ALL-23012713-A0\60 Execution\65 Drawings\Civil\Drawings\xxxx-FIG-01 LOCATION PLAN.dwg

3. Existing Drainage Conditions

To assess the existing site topography within and surrounding the site, EXP staff visited the site and reviewed the topographic survey completed by KRCMAR Surveyors Ltd for the site. The topographic survey information indicates that the site's overall elevations generally slope in the southerly direction with an approximate fall in the range of 10 m. The topographic survey also shows the northerly portion of the site also drains in the easterly direction towards the existing neighbouring property via sheet flow. Refer to the topographic survey in Appendix A for reference.

The existing minor and major drainage patterns are divided in the northern and southern boundaries. Surface runoff from the northern boundary flows eastward toward the adjacent property, while runoff from the southern boundary drains toward the existing ditch along William Halton Parkway West. Refer to the Existing Conditions Drainage Plan in Figure 2 for details.

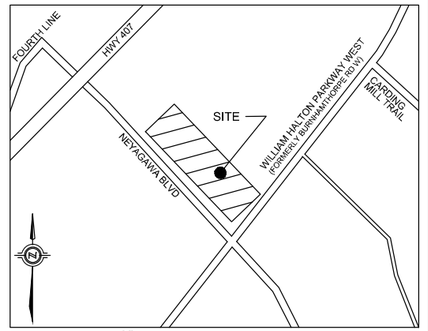
In order to calculate the theoretical peak flow runoff rates for the site under existing conditions, the Modified Rational Method was used with a runoff coefficient of C=0.35 and time of concentration of 10 min were used per Town of Oakville development engineering procedures and guidelines. The following peak flows were calculated for the site and can be summarized in Table 1 below.

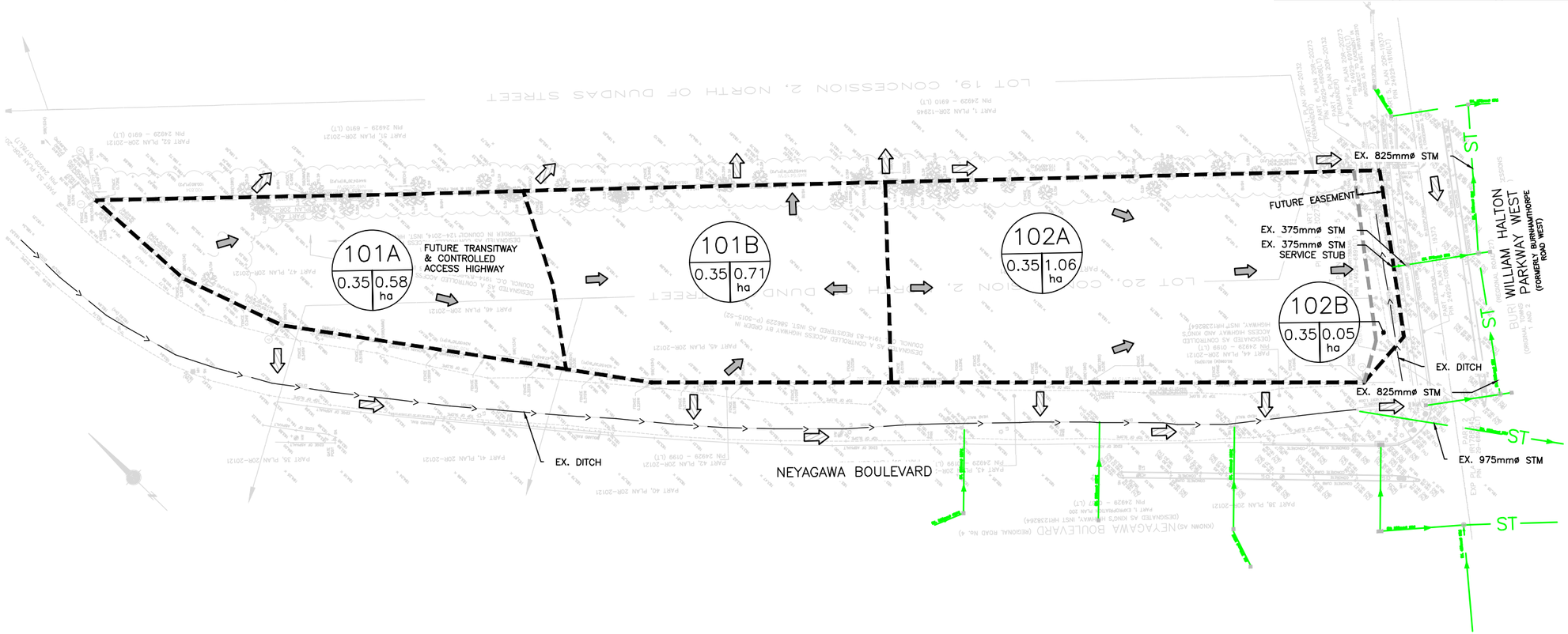
Table 1: Peak Flow Summary (Existing Conditions):

Contributing Area	ID#	Area (ha)	Peak Flow -5 Year (L/sec)	Peak Flow -25 Year (L/sec)	Peak Flow -100 Year (L/sec)
Drainage to Neighbouring Lands to the East:					
Future Transitway & Controlled Access Highway	101A	0.58	64.4	91.4	113.2
North Drainage	101B	0.71	78.8	111.9	138.6
Sub-Total =		**1.29**	**143.2**	**203.3**	**251.8**
Drainage to William Halton Parkway West to the South:					
South Drainage	102A	1.06	117.7	167.1	206.9
Future Easement	102B	0.05	5.6	7.9	9.8
Sub-Total =		**1.11**	**123.3**	**175.0**	**216.7**
Total =		**2.40**	**266.5**	**378.3**	**468.5**

The results showed the total runoff leaving the site towards the William Halton Parkway West (Catchment ID#102A and ID#102B) under the 5-year storm event was calculated to be 123.3 L/s, which should be considered when designing the maximum allowable release rate for the proposed SWM facility discharging to Town's storm system in William Halton Parkway West. The peak flow runoff calculations can be found in Appendix B.

KEY PLAN





exp.

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m / 1.0m) (227)
- EXISTING GRADE (227.00)
- OVERLAND FLOW DIRECTION
- EXTERNAL FLOW DIRECTION
- STORM DRAINAGE ID NUMBER (101)
- AREA (ha) (0.5)
- RUNOFF COEFFICIENT (0.5)
- CATCHMENT BOUNDARY

Project:	NEYAGAWA & HWY 407 TOWN OF OAKVILLE		
Title:	EXISTING CONDITIONS DRAINAGE PLAN		
Approved by: S.P	Date: SEPT. 2025	Project No.: ALL-23012713-A0	
Drawn by: W.K	Scale: N.T.S.	Figure no.: FIG-02	

4. Proposed Drainage Conditions

4.1 Proposed Grading

The proposed grading design for the site is to be completed in concert with the proposed stormwater management (SWM) strategy for the site which includes a network of high and low points, two (2) underground SWM chambers, and inlets designed to capture and attenuate the 100-year storm event to the allowable release rate for the site. Overall, the proposed grading design complies with the Town of Oakville criteria and ensuring emergency major overland flow is directed south towards William Halton Parkway West (formerly Burnhamthorpe Road West) without any negative impact to neighbouring property to the north or south. For additional grading details refer to the Preliminary Site Grading Plan provided in Appendix D.

4.2 Groundwater

The hydrogeological investigation completed by EXP indicates a calculated short-term discharge of 15.4 L/s (1,331,000 L/day) during construction which would require a permit to take water approval with the MECP for the construction works. The hydrogeological investigation also notes that pre-treatment methods may be required to meet the Town's storm sewer by-law requirements prior to discharging any groundwater during construction. For the long-term groundwater management strategy, it was confirmed with the Owner and consulting team that a watertight foundation will be implemented for the building design as the Town of Oakville no longer accepts discharge from any permanent groundwater dewatering to their municipal storm sewer system.

4.3 Methodology

The following is a summary of the key design standards that have been referenced as part of the proposed SWM strategy for the site:

- Town of Oakville Development Engineering Procedures and Guidelines;
- Development Charges Background Water Report & Wastewater Linear Design Manual, Region of Halton;
- Record Plan and Profile Drawings for Neyagawa Boulevard and Burnhamthorpe Road West provided by the Town of Oakville and Region of Halton;
- Water and Wastewater Operation Maps, Region of Halton;
- The East Sixteen Mile Creek ES6-East Environmental Implementation Report and Functional Servicing Study (EIR/FSS) prepared by North Oakville East Developers Group;
- MECP Stormwater Management Planning and Design Manual;
- Conservation Halton Policies and Guidelines for Administration of O.Reg. 162/06; and,
- North Oakville Sustainable Development Checklist & User Guide.

For the required peak storm runoff and SWM storage calculations, the Modified Rational Method was used.

4.4 Proposed Conditions Peak Flows

Based on the proposed preliminary grading and storm servicing design for the site, each catchment area was reviewed and calculated with corresponding coefficients. The runoff coefficient calculations can be found in Appendix C, where the corresponding drainage areas and runoff coefficients are shown on Figure 3.

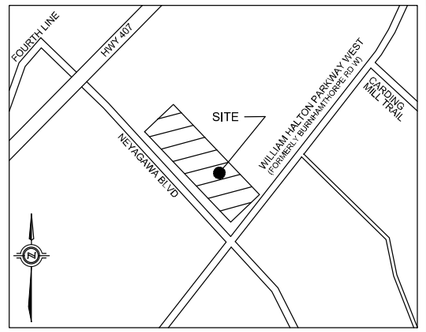
The theoretical peak flow runoff rates were then calculated using the Modified Rational Method for each year storm event using the conservatively estimated runoff coefficients and a time of concentration of 10 min, where the results are summarized in Table 2 below:

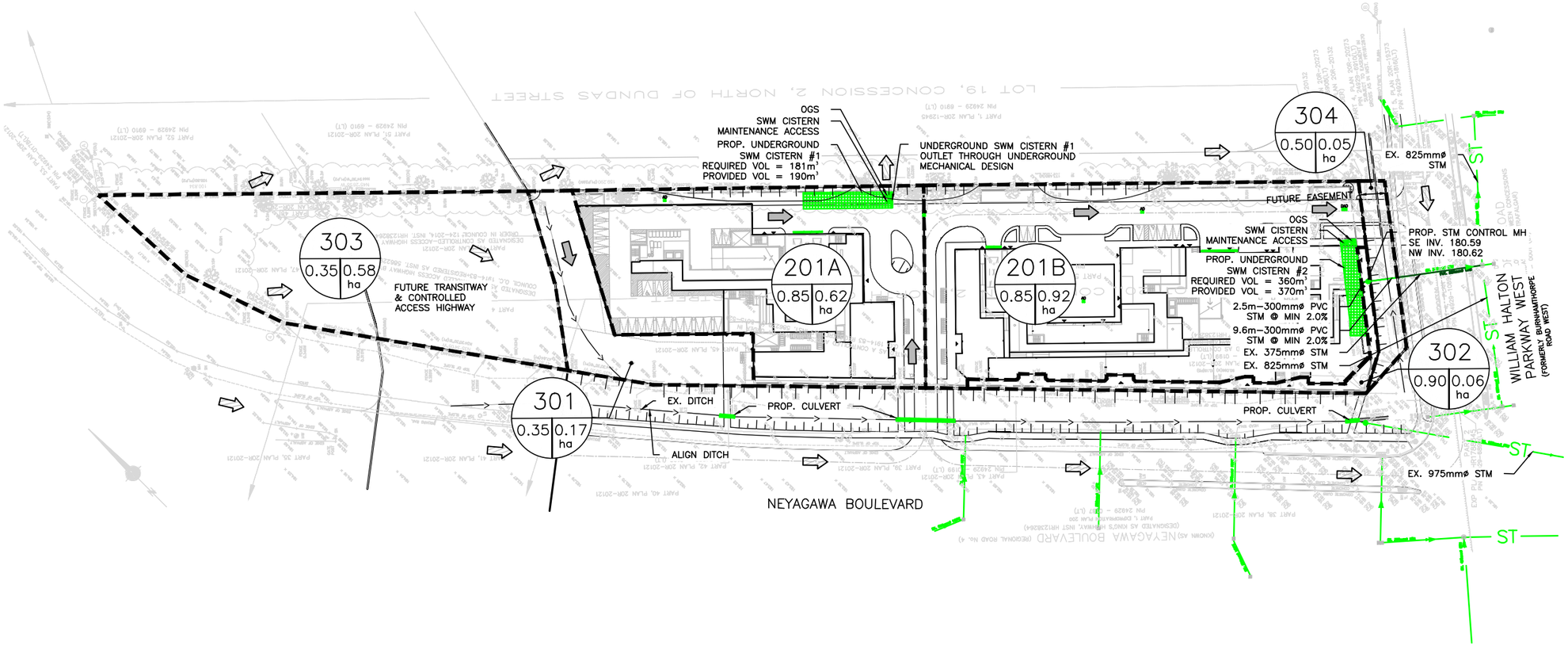
Table 2: Peak Flow Summary (Proposed Conditions – no SWM Controls)

Contributing Area	ID#	Area (ha)	Peak Flow -5 Year (L/sec)	Peak Flow -25 Year (L/sec)	Peak Flow -100 Year (L/sec)
Drainage to William Halton Parkway West to the South:					
Controlled Site	201A	0.62	167.2	237.4	294.0
Controlled Site	201B	0.92	248.1	352.3	436.2
Sub-Total =		**1.54**	**415.3**	**589.7**	**730.2**
Drainage to Neyagawa Boulevard to the West:					
Uncontrolled Site – North Catchment	301	0.17	18.9	26.8	33.2
Uncontrolled Site – South Catchment	302	0.06	17.1	24.3	30.1
Uncontrolled Site – Future Transitway & Controlled Access Highway	303	0.58	64.4	91.4	113.2
Sub-Total =		**0.81**	**100.4**	**142.5**	**176.5**
Drainage from Lands to be Conveyed as Future Easement to Town:					
Uncontrolled Site – Future Easement	304	0.05	7.9	11.3	13.9
Sub-Total =		**0.05**	**7.9**	**11.3**	**13.9**
Total =		**2.40**	**523.6**	**743.5**	**920.6**

The above peak flows under proposed conditions were then reviewed to determine the SWM storage measures to attenuate flows to meet the maximum allowable release rate for the site. The results showed the total uncontrolled runoff leaving the site towards the William Halton Parkway West during the 100-year storm event to be 730.2 L/s. For the peak flow runoff calculations please refer to Appendix C.

KEY PLAN





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m / 1.0m)
- EXISTING GRADE
- OVERLAND FLOW DIRECTION
- EXTERNAL FLOW DIRECTION
- 101 / 0.5 | 0.5 — STORM DRAINAGE ID NUMBER / AREA (ha) / RUNOFF COEFFICIENT
- CATCHMENT BOUNDARY

exp.

Project:	NEYAGAWA & HWY 407 TOWN OF OAKVILLE
Title:	PROPOSED CONDITIONS DRAINAGE PLAN

Approved by:	S.P	Date:	SEPT. 2025	Project No.:	ALL-23012713-A0
Drawn by:	W.K	Scale:	N.T.S.	Figure no.:	FIG-03

4.5 Proposed SWM Quantity Controls

The Town of Oakville SWM design standards for new developments requires that all stormwater quantity controls ensure all flows up to and including the 100-year storm event are captured and controlled to the allowable release rate of the pre-development flow for the 5-year storm event.

As the Owner is a member of the North Oakville East Developers Group, the completed EIR/FSS study recommended that the subject site discharge into the municipal storm system on William Halton Parkway West where all flows are then conveyed into a future municipal SWM facility for the required SWM quantity and quality controls. Therefore, until the future ultimate servicing scenario, the site will require on-site SWM quantity control measures to ensure the Town standards are met on the interim.

After reviewing the Owner's site plan where all development is under single ownership with limited ability to infiltrate flows due to the underground parking structure, it was confirmed that the preliminary SWM quantity controls shall consist of the following configuration:

- Positioning two (2) underground SWM cisterns of minimum combined SWM storage volume of 573 m^3 (excluding the rainwater harvester components) with orifice controls designed to meet the maximum allowable release rate for the site all coordinated with the future building mechanical design; and,
- Providing a site grading design with the provision of above-ground SWM storage to a maximum depth of 0.3 m without any ponding in accessible parking areas.

To determine the required SWM quantity volumes for the site discharging to the municipal storm system on William Halton Parkway West, the previously calculated uncontrolled peak flow rates outlined in Table 2 were used with the overall maximum allowable release rate of 123.3 L/s. The peak flow and SWM storage summary using the proposed SWM controls can be summarized in Table 3 below:

Table 3: Peak Flow and SWM Storage Summary (Proposed Conditions – with SWM Controls)

Contributing Area	Controlled Area (ha)	Uncontrolled 100-year Flows (L/sec)	Maximum Allowable Release Rate (L/sec)	Actual Release Rate (L/sec)	Required SWM Storage (m^3)	Provided SWM Storage (m^3)
Drainage to William Halton Parkway West to the South:						
201A	0.62	294.0	49.6	44.5 (200 mm dia orifice)	181	190
201B	0.92	436.2	73.7	71.7 (185 mm dia orifice)	360	370
Total =	**1.54**	**730.2**	**123.3**	**116.2**	**541**	**560**

Therefore, based on the proposed preliminary SWM quantity control design, the Town's SWM quantity control requirements can be met for the site prior to discharging to the municipal storm system on William Halton Parkway West. For the SWM storage calculations please refer to Appendix C.

4.6 Proposed SWM Quality Controls

The Town of Oakville SWM design standards for new developments requires that all stormwater quality meet a minimum of 80% Total Suspended Solids (TSS) removals meeting MECP Enhanced Level 1 SWM criteria. Also, for any oil and grit separators (OGS), those devices must be ETV Canada certified and be sized to ensure 90% of the average annual runoff volume is treated without by-pass.

As previously mentioned, the Owner is a member of the North Oakville East Developers Group where the EIR/FSS study recommended the subject site discharge into the municipal storm system on William Halton Parkway West into a future municipal SWM facility for the required SWM quantity and quality controls. Therefore, until the future ultimate servicing scenario, the site will require on-site SWM quality control measures to ensure the Town standards are met on the interim.

After reviewing the Owner's site plan where all development is under single ownership with limited ability to infiltrate flows due to the underground parking structure, it was confirmed that the preliminary SWM quality controls shall consist of the following configuration:

- Positioning two (2) oil grit separators (OGS) inside each of the underground SWM cisterns designed to treat all incoming site flows (not building roof drainage) to the required 80% TSS removal target; and,
- Directing roof drainage from all buildings into a separate rainwater harvester component of the underground SWM cistern for rainwater re-use for irrigation and within the building mechanical design.

Finally, the selected OGS system will include the required ETV certification and will be sized for the required particle size distribution by the manufacturer all as part of the future detailed design process. Therefore, based on the proposed preliminary SWM quality control design, the Town's SWM quality requirements can be met for the site.

4.7 Water Balance

The Town of Oakville's sustainable development guidelines, require that new developments retain the first 5 mm depth of all storm events on site to meet water balance objectives. Industry standard methods for optimizing water balance requirements include various methods of infiltration and re-using rainwater on site for various uses within the site and building design.

EXP staff carefully reviewed the opportunities to optimize the water balance for the site within the available site grading and storm servicing design. Based on the proposed underground parking structure design and the limited ability to infiltrate flows, it was confirmed that the preliminary water balance design shall consist of the following configuration:

- Directing roof drainage from all buildings into a separate rainwater harvester component of each the underground SWM cistern for a minimum combined volume of 88.5 m^3 for rainwater re-use for irrigation and within the building mechanical design; and,
- Enhancing the proposed landscaping design to optimize the possible initial abstraction of runoff across the site.

Therefore, the findings from the water balance review show that the preliminary water balance design can meet the Town's requirements and can be coordinated through during the future detailed design process. For the water balance and initial abstraction calculations please refer below:

Town of Oakville minimum requirement (5 mm across site) = 0.005 m x 1.77 ha = 88.5 m^3

4.8 Phosphorus Removal

Based on the Town of Oakville's sustainable development guidelines, all new developments are to provide phosphorus removal methods to offset any post development increases in phosphorus before discharging into the municipal storm system. Industry standard methods for reducing phosphorus loading include various methods of infiltration, filtration of stormwater flows and other Best Management Practices (BMP's).

EXP staff carefully reviewed the possible impact from phosphorus loading from the site, while referencing Conservation Authority guidelines and policies. The key findings from the phosphorus review can be briefly summarized as follows:

- The pre-development condition of the site for phosphorus loading should consider the existing site conditions as poorly graded with significant vegetation;
- The proposed roof drainage is not deemed to contribute any phosphorus loading to the site based on the quality of the runoff and by directing roof flow to the dedicated underground rainwater harvesters within the SWM cisterns for rainwater reuse;
- The paved areas are not deemed to contribute any significant phosphorus loading based on the grading design which does not drain paved areas over any landscaped areas and are not designed for excessive above ground site SWM storage;
- All landscaped areas could possibly contribute phosphorus loading within the site and should be addressed as part of the future phosphorus analysis during detailed design; and,
- Additional best management practices (BMP) such as the use of phosphate free fertilizers, end-of-pipe filtration methods, oil and grit separators and the retention component in the rainwater harvesters within the underground SWM cisterns can further reduce the potential for phosphorus loading within the site.

Therefore, the findings from the phosphorus loading review show that the potential increase from phosphorus loads from the proposed development can be significantly reduced from the pre-development conditions by using various filtration methods and with the use of BMP's during the future detailed design process.

5. Erosion and Sediment Controls during Construction

During construction it is imperative that the contractor installs and maintains all the necessary erosion and sediment control (ESC) measures to ensure there is no negative impact to surrounding properties and the local municipal sewer systems.

Outside the site, sediment control measures such as catch basin silt sacks are to be installed inside the existing catch basins along Neyagawa Boulevard and William Halton Parkway West, immediately adjacent to the site. These silt sacks are to be monitored and maintained after all rainfall events. Within the site, silt fencing is required to be installed around the perimeter of the sediment to ensure during grading and building activity, that sediment is not transported overland during a rainfall event to neighbouring properties. Similar to the required silt sacks within the catch basins along Neyagawa Boulevard and William Halton Parkway West (formerly Burnhamthorpe Road West), the silt fence is to be monitored after every rainfall event and repaired as necessary. Mud tracking from construction truck transport is to be mitigated through the use of a proposed mud mat and any other maintenance requirements necessary by the contractor before driving back on municipal roads. For additional details regarding the proposed erosion and sediment control measures to be used during construction, refer to the Preliminary Erosion and Sediment Control Plan (Figure 4) located in Appendix D.

6. Conclusions

Overall, our findings outlined in this SWM report demonstrate that the proposed SWM strategy can meet the requirements of the proposed development, the Town of Oakville design requirements including the ultimate servicing design outlined within the East Sixteen Mile Creek ES6-East EIR/FSS study, where the results can be summarized as follows:

- Based on the existing topographic information, approximately 46% (1.11 ha) of the site drains in the southerly direction towards Burnhamthorpe Road West where no external drainage is conveyed across the site
- Based on the Town of Oakville's SWM design criteria, a pre-development runoff coefficient of C=0.35 will result in a peak flow of approximately 123.3 L/s under the 5-year storm event and shall be considered the maximum allowable release rate for the site discharging flows to the municipal storm system on the future William Halton Parkway West (formerly Burnhamthorpe Road West)
- Based on the proposed grading and storm servicing design for the site, all post development runoff up to and including the 100-year storm event will be captured and controlled to the 5-year storm pre-development flow rate before discharging flows to the existing 375 mm diameter storm sewer on William Halton Parkway West
- The required SWM quantity controls can be met with the two (2) proposed underground SWM cisterns and orifice designs located within the underground parking structure coordinated with the future building mechanical design
- The required SWM quality controls can be met through the use of the two (2) proposed oil and grit separators located within the underground SWM cisterns all designed to meet the required TSS removal requirements
- Water balance objectives can be met with the proposed landscaping design, and the proposed rainwater harvesters located within the underground SWM cisterns for rainwater re-use within the future site irrigation and building mechanical design
- Phosphorus removal objectives can be met by the use of end-of-pipe treatment measures and various BMP's before discharging to the municipal storm system
- Groundwater management can be accommodated by a proposed watertight foundation design for any new building foundation construction
- Emergency overland flow can be safely conveyed through the site to William Halton Parkway West based on the proposed preliminary grading design for the site

Sincerely,

EXP Services Inc.

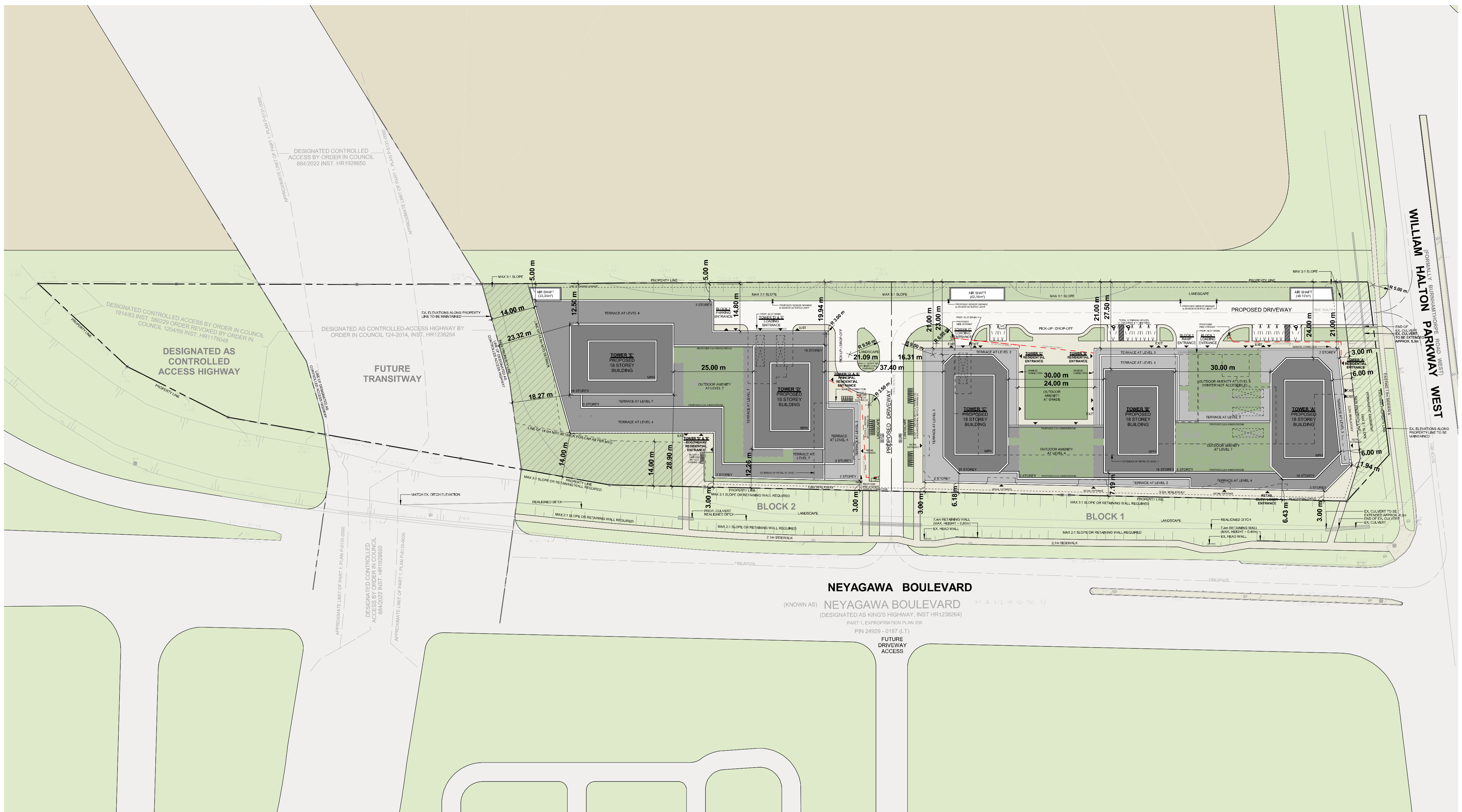
Scott W. Passmore, P.Eng.
Vice President, Land Development

Michelle Yip, EIT
Project Designer, Land Development

Appendix A – Site Plan and Topographic Survey

Notes:

All lighting devices shall be full cut off and night sky friendly to mitigate illumination at the source and not directly projected onto adjacent properties. Illumination levels at the property line shall not exceed 0.0 lux.



1 | Site Plan
1 : 500

Authorities Having Jurisdiction

August 21, 2025

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
1.	Rezoning	xx

Client:
Sky Property Group Inc.
Neyagawa Boulevard & William Halton Parkway West Oakville, ON.
Proposed Residential Development

Drawing Title:
Site Plan

Scale: 1 : 500
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:
dA1.06

Plot Date: 2025-08-20 3:27:52 PMFile Path: Autodesk Docs://ACC-23144/23144P11 - Sky - Oakville - Neyagawa & 407_RVT2025.rvt

RESIDENTIAL WASTE STORAGE ROOM :

WASTE DIVERSION SYSTEM: SINGLE CHUTE EQUIPPED WITH A TRI-SORTER

CITY OF TORONTO REQUIREMENTS FOR GARBAGE, RECYCLING AND ORGANICS COLLECTIONS SERVICES (LAST REVISED - MAY 2023):

THE WASTE STORAGE ROOM MUST PROVIDE A MINIMUM FLOOR AREA OF:
- 25m² FOR THE FIRST 50 UNITS (TO ACCOMMODATRE CONTAINERS AND THE COMPACTOR),
- 0.26m² FOR EACH ADDITIONAL UNIT, OVER 50 UNITS,
- 10m² FOR OVERSIZED ITEM, AND ITEMS ELIGIBLE FOR SPECIAL COLLECTION SERVICES.

NOTE: SPECIAL STORAGE OR CONTAINMENT MAY BE REQUIRED FOR PROPER SAFE STORAGE OF HOUSEHOLD HAZARDOUS WASTE ITEMS.
THIS MAY REQUIRE MORE THAN THE MINIMUM AREA LISTED ABOVE.

WASTE CALCULATION: ((UNIT COUNT - 50) x 0.26) + 25m² + 10m²

TOTAL UNITS PROVIDED: 898 UNITS

BLOCK 1: 529 UNITS **BLOCK 2: 369 UNITS**

BLOCK 1 - CALCULATED WASTE STORAGE ROOM REQUIREMENT: ((529 - 50) x 0.26) + 25m² + 10m² = **159.54m²**
BLOCK 2 - CALCULATED WASTE STORAGE ROOM REQUIREMENT: ((369- 50) x 0.26) + 25m² + 10m² = **117.94m²**

NUMBER OF COLLECTION BINS REQUIRED:
(REFERENCE FROM CITY OF TORONTO WASTE DESIGN GUIDLINES - RECOMMENDED VOLUMN FOR WASTE STORAGE FOR FRONT-END)

CONTAINERS DESIGNATION: G = GARBAGE, R= RECYCLING, O = ORGANIC

BLOCK 1:
GARBAGE STORAGE: TOTAL OF 32 yd³ / 3 yd CONTAINER = 11 CONTAINERS
RECYCLING STORAGE:TOTAL OF 43 yd³ / 3 yd CONTAINER = 15 CONTAINERS
ORGANIC STOAGE: TOTAL OF 11 yd³ / 3 yd CONTAINER = 4 CONTAINERS
CALCULATED TOTAL NUMBER OF CONTAINERS REQUIRED: 30 CONTAINERS

BLOCK 2:
GARBAGE STORAGE: TOTAL OF 24 yd³ / 3 yd CONTAINER = 8 CONTAINERS
RECYCLING STORAGE:TOTAL OF 32 yd³ / 3 yd CONTAINER = 11 CONTAINERS
ORGANIC STOAGE: TOTAL OF 8 yd³ / 3 yd CONTAINER = 3 CONTAINERS
CALCULATED TOTAL NUMBER OF CONTAINERS REQUIRED: 22 CONTAINERS

STAGING PAD:

- 6.1m UNENCUMBERED VERTICAL CLEARANCE THROUGHOUT, AT MINIMUM,
- 5m² IS THE MINIMUM REQUIRED FOR DEVELOPMENTS WITH 50 UNITS OR LESS,
- 0.10m² FOR EACH ADDITIONAL UNIT FOR DEVELOPMENTS WITH 51 UNITS OR MORE, INCLUDING A STARTING BASE OF 5m² FOR THE FIRST 50 UNITS,
- WITH 100 UNITS OR MORE, A MINIMUM OF 8m², OUT OF THE TOTAL STAGING PAD AREA REQUIRED, MUST BE ALLOCATED AT THE FRONT OF THE TYPE G, WITH THE REMAINDER BEING LOCATED ALONG THE SIDE IF ALL OF IT CAN'T BE LOCATED IN FRONT.

CALCULATED STAGING PAD REQUIREMENT: (UNIT COUNT - 50)/50 x 5m² + 5m²

BLOCK 1: 529 UNITS **BLOCK 2: 369 UNITS**

BLOCK 1 - CALCULATED STAGING PAD REQUIREMENT: (529 - 50)/50 x 5m² + 5m² = **52.90m²**
BLOCK 2 - CALCULATED STAGING PAD REQUIREMENT: (369 - 50)/50 x 5m² + 5m² = **36.90m²**

WASTE MANAGEMENT NOTES:

COMPACTOR UNIT:

A STATION COMPACTION UNIT MUST BE INSTALLED IN EACH BUILDING AND SECURED AT ALL TIMES. PRESSURE SHOULD BE SET A 5500 kPa (800 lbs / square inch).

STORAGE:

A WASTE STORAGE ROOM IN EACH BUILDING MUST BE BUILT IN ACCORDANCE WITH ALL APPLICABLE BUILDING AND FIRE CODES AND BE LARGE ENOUGH TO STORE ALL WASTE CONTAINERS BETWEEN COLLECTION DAYS. THE WASTE STORAGE ROOM MUST BE LARGE ENOUGH TO PERMIT MOVEMENT OF THE CONTAINERS, TO ALLOW FOR WASHING OF THE ENTURE ROOM AND CONTAINERS, AND PROVIDE ADDITIONAL SPACE FOR FUTURE PROGRAM EXPANSION. THE WASTE STORAGE ROOM MUST BE LOCATED ON PROVATE PREPERTY, WITHIN THE BUILDING ENVELOPE.

THE WASTE STORAGE ROOM MUST BE DESIGNED IN SUCH A WAY THAT ALL FRONT-END CONTAINERS CAN BE PLACED OUT FOR COLLECTION IN THE LOADING AREA. IT IS RECOMMENDED THAT THE OVERSIZED ITEM STORAGE AREA BE LCOATED WITHIN OR WITH DIRECT ACCESS TO THE LOADING AREA.

ALL DOORWAYS THAT WASTE CONTAINERS TRAVEK THROUGH BETWEEN THE WASTE STORAGE ROOM AND THE COLLECTION POINT MUST BE EITHER DOUBLE DOORS OR OVERHEAD DOORS.

ALL FRONT-END CONTAINERS MUST BE TRANSPORTED THROUGH THE BUILDING THROUGH SERVICE CORRIDORS WHEN THE WASTE STORAGE ROOM DOES NOT DIRECTLY CONNECT TO THE LOADING AREA.

ALL FRONT-END CONTAINERS MUST BE ACCESSABLE AT THE COLLECTION POINT BY 7:00am ON COLLECTION DAYS AND MUST BE RETURNED TO THE WASTE STORAGE ROOM IMMEDIATELY FOLLOWING COLLECTION.

LOADINGA AREA:

TYPE G LOADING SPACE - 13m (length) X 4m (width) X 6.1m (unencumbered vertical clearance thoughout)
* A MINIMUM 2m BUFFER BETWEEN THER FRONT OF THE TYPE G AND ADJACENT WALL IS REQUIRED.

ALL DIMENSIONMS ARE MINIMUM AND UNENCUMBERED FROM SPRINKLER SYSTEM, SUPPORT BEAMS, OVERHEAD DOORS, METERS, PIPES, HVAC SYSTEMS, SUREVILLANCE CAMERAS, MIRROES, ETC.

WITH 100m² UNITS OR MORE , A MINIMUM OF 8m², OUT OF THE TOTAL STAGING PAD AREA REQUIRED, MUST BE ALLOCATED AT THE FRONT OF THE TYPE G, WITH REMAINDER BEING LOCATED ALONG THE SIDE IF ALL OF IT CAN'T BE LOCATED IN FRONT.

THE STAGING PAD AND THE TYPE G LOADING SPACE MUST BE CONSTRUCTED OF:
- 200mm THICK REINFORCED CONCRETE,
- HAVE A SLOPE THAT IS LEVEL, +/- 2% FROM GRADE,
- THE USE OF PAVER STONES, OR OTHER DECORATIVE INTERLOCKING MATERIAL, IS NOT PERMITTED WITHIN THE STAGING PAD AND TYPE G LOADING SPACE DEFINED AREAS

THE STAGING PAD AND THE TYPE G LOADING SPACE MUST HAVE AT LEAST A 6.1m UNENCUMBERED VERTICAL CLEARANCE THROUGHOUT THE ENTIRE FLOOR AREA.
THIS VERTICAL CLEARANCE RESTRICTS DEVELOPMENTS TO USING ONLY 2.3m³ (3 yd³) CONTAINERS.
- CONTAINERS LARGER THAN 2.3m³ (3 yd³) WILL NOT BE COLLECTED WITH THIS HEIGHT RESTRICTION
- THE STAGING PAD AND TYPE G LOADING SPACE IN THIS SITUATION MUST BE OUTDOORS OR HAVE AN APPROPRIATELY HIGHER VERTICAL CLEARANCE IF INDOORS.

THE DESIGN OF THE STAGING PAD SHOULD NOT REQUIRE THE JOCKEYING OF CONTAINERS BY THE DRIVER. IF JOCKEYIONG OF CONTAINERS IS NECESSARY, AN ON-SITE STAFF PERSON MUST BE AVAILABLE TO MANOEUVRE THE CONTAINERS FOR THE DRIVER. THE CITY DOES NOT ALLOW THE DRIVER TO LEAVE THE COLLECTION VEHICLE.

IF THE LOADING AREA IS ENCLOSED, IT SHALL BE ADEQUATELY VENTILATED. FRESH AIR INTAKES SHALL NOT BE LOCATED IN OR NEAR AND LOADING AREA.

THE STAGING PAD AREA MUST BE NO HIGHER THAN 0.6m ABOVE THE TYPE G.

ACCESS:

THE ACCESS ROUTE AND LOADING AREA MUST BE DESIGNED IN SUCH A WAY AS TO ALLOW A COLLECTION VEHICLE TO ENTER THE SITE, COLLECT THE WASTE, AND EXIT THE SITE IN A FORWARD MOTION WITHOUT THE NEED TO REVERSE ONTO A PUBLIC ROAD.

ACCESS DRIVEWAYS MUST BE A MINIMUM OF 6m WIDE AT THE POINT OF INGRESS / EGRESS TO THE SITE AND A MINIMUM OF 4.5m WIDE THROUGHOUT THE SITE WITH AN UNENCUMBERED CERTICAL CLEARANCE OF 4.4m THROUGHOUT. CONSIDERATION MUSH BE MADE REGARDING WIDTH REQUIREMENTS FOR RIGHT OR LEFT HAND TURNS THAT MAY BE REQUIRED ON PRIVATE PROPERTY.

TURNING RADII OF 9.5m INSIDE AND 14m OUTSIDE MUST BE AVAILAVBLE THROUGHOUT THE ACCESS ROUTE.

THE SLOPE OF THE ACCESS ROUTE CAN INCREASE UP TO +/- 8% FROM LEVEL WITH APPROPRIATE GRADUAL CHANGES IN THE SLOPE AT THE TOP AND BOTTOM TO PRECENT BOTH TYPES OF COLLECTION VEHICLES FROM BOTTOMING OUT OR OTHERWISE MAKING CONTRACT WITH THE GROUND. THE SLOPE OF THE ACCESS ROUTE MUST NOT EXCESS +/- 8% FROM LEVEL AND MUST PROVIDE ADEQUATE VERTICAL CLEARANCE THOUGHOUT THE ACCESS ROUTE.

IF THE COLLECTION VEHICLE IS REQUIRED TO DRIVE ONTO OR OVER A SUPPORTED STRUCTURE (SUCH AS AN UNDERGROUND PARKING GARAGE) THE CITY MUST BE PROVIDED WITH A LETTER CERTIFIED BY A PROFESSIONAL ENGINEER THAT THE STRUCTURE CAN SAFELY SUPPORT A DULLY LOADED COLEECTION VEHICLE (35,000 KILOGRAMS) AND CONFORMS TO THE FOLLOWING:
- DESIGN CODE - ONTARIO BUILDING CODE,
- DESIGN LOAD - CITY BULK LIFT VEHICLE IN ADDITION BUILDING CODE REQUIREMENTS,
- IMPACT FACTOR - 5% FOR MAXIMUM VEHICULAR SPEEDS TO 15km/h AND 30% FOR HIGHER SPEEDS.

IT IS THE RESPONSIBILITY OF THE DEVELOPER, AND SUBSEQUENT PREPERTY OWNERS, TO ENSURE THAT THE ACCESS ROUTE IS FREE OF OBSTRUCTIONS AND PROTRUSIONS, INCLUDING, BUT NOT LIMITED TO, SIGHTLINE OBSTRICTIONS, OVERHANGING STRUCTURES AND SPEED BUMPS AT ALL TIMES. THE CITY IS NOT RESPONSIBLE FOR COLLECTING WASTE IN THE EVENMT THAT THE ACCESS ROUTE IS OBSTRUCTED.

FOR SAFETY REASONS, PAVEMENT MARKINGS, WARNING LIGHTS, MIRRORS AND SIGNAGE MAY BE REQUIRED.

WASTE COLLECTION IS NOT PERMITTED IN DESIGNTED FIRE ROUTES.

LOADING SPACE:
TYPE 2: RECYCLING 9.65m (length) X 2.44m (width) X 3.69m (bucket up 5.08m) (height); 13.00m (turning radius)
TYPE 3: FRONT END 9.70m (length) X 2.70m (width) X 3.80m (bucket up 5.08m) (height); 11.50m (turning radius)

ACCESS ROUTE

PROPOSED ACCESS ROUTE FOR WASTE COLLECTION VEHICLE TO HAVE MINIMUM 4.4m VERTICAL CLEARANCE THROUGHOUT AND DESIGNED TO SAFELY SUPPORT 35,000kg.
STRUCTURAL ENGINEER TO DESIGN AREA TO CONFORM AS FOLLOWS:
(A) DESIGN CODE - ONTARIO BUILDING CODE
(B) DESIGN LOAD - CITY BULK LIFT VEHICLE IN ADDITION TO BUILDING CODE REQUIREMENTS
(C) IMPACT FACTOR - 5% FOR MAXIMUM VEHICLE SPEEDS TO 15KM/H AND 20% FOR HIGHER SPEEDS

LOADING AREA

THE ENTIRE LOADING AREA MUST BE CONSTRUCTED OF 8" (0.2m) THICK REINFORCED CONCRETE, WITH GRADE NOT TO EXCEED 2%
TRAINED ON-SITE CUSTODIAL STAFF MUST BE AVAILABLE TO MANEUVER BINS FOR THE COLLECTION DRIVER AND ALSO ACT AS A SIGNAL PERSON WHEN THE TRUCK IS REVERSING.
IN THE EVENT THE ON-SITE STAFF MEMBER IS UNAVAILABLE AT THE TIME THE CITY COLLECTION VEHICLE ARRIVES ON SITE, THE COLLECTION VEHICLE WILL LEAVE THE SITE AND NOT RETURN UNTIL THE NEXT SCHEDULED COLLECTION DAY.

1 | Waste Management Statistics & Notes

Sky Property Group Inc. - Neyagawa Boulevard & Highway 407
Residential Development
Oakville, Ontario

Project Statistics
August 20, 2025 — Project No. 23-144

1.0 Site Information

	hectares	acres	m²	ft²
Gross Site Area	2.4052	5.9436	24,052.49	258,899
Easement	[illegible]	[illegible]	[illegible]	[illegible]
Future Transitway	0.3379	0.8350	3,379.11	36,372
Designated as Controlled Access Highway	[illegible]	[illegible]	[illegible]	[illegible]
Net Site Area	1.7680	4.3688	17,679.94	190,305

2.0 Proposed TFA (Total Floor Area)

2.1 Proposed Underground TFA

		no. floors	m²/fl	m²	ft²
Level	P3	1 x	9,307.74	9,307.74	100,188
Level	P1 - P2	2 x	[illegible]	[illegible]	[illegible]
Level	Lower Level 1	1 x	[illegible]	[illegible]	[illegible]
Total Proposed Underground TFA				45,066.13	485,088

2.2 Proposed Above Ground TFA - Residential TFA

		no. floors	m²/fl	m²	ft²
BLOCK 1					
Podium					
Level	1	1 x	[illegible]	[illegible]	[illegible]
Level	2	1 x	[illegible]	[illegible]	[illegible]
Level	3	1 x	3,556.85	3,556.85	38,286
Levels	4 to 6	3 x	[illegible]	[illegible]	[illegible]
Tower A					
Levels	7 to 18	12 x	[illegible]	[illegible]	[illegible]
Level	MPH	1 x	350.00	350.00	3,767
Tower B					
Levels	7 to 18	12 x	750.00	9,000.00	96,875
Level	MPH	1 x	[illegible]	[illegible]	[illegible]
Tower C					
Levels	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Level	MPH	1 x	350.00	350.00	3,767
BLOCK 2					
Podium					
Level	1	1 x	[illegible]	[illegible]	[illegible]
Level	2	1 x	[illegible]	[illegible]	[illegible]
Level	3	1 x	[illegible]	[illegible]	[illegible]
Levels	4 to 6	3 x	2,399.89	7,199.67	77,497
Tower D					
Levels	7 to 18	12 x	750.00	9,000.00	96,875
Level	MPH	1 x	[illegible]	[illegible]	[illegible]
Tower E					
Levels	7 to 18	12 x	[illegible]	[illegible]	[illegible]
Level	MPH	1 x	350.00	350.00	3,767
Total Proposed Above Ground - Residential TFA					
BLOCK 1				45,051.38	484,929
BLOCK 2				36,283.34	390,551
Total Proposed Above Ground - Residential TFA				[illegible]	[illegible]

2 | Site Statistics

Authorities Having Jurisdiction

August 21, 2025

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.	Revision:	Date:

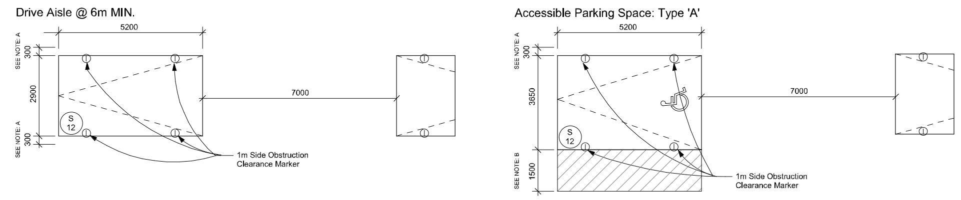
No.	Issued For	Date
1.	Rezoning	xx

Client:
Sky Property Group Inc.
Neyagawa Boulevard & William Halton Parkway West Oakville, ON.
Proposed Residential Development

Drawing Title:
Site Statistics & Waste Management Notes

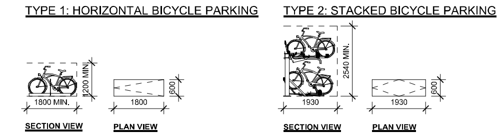
Scale:
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:
dA1.07

TYPICAL PARKING SPACE:



NOTES:
A. PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm.
B. PROVIDE A 1500mm WALKWAY ON AT LEAST ONE SIDE OF AN ACCESSIBLE PARKING STALL, THIS WALKWAY MAY BE SHARED WITH ADJOINING ACCESSIBLE SPACE.

1 | Parking Space Legend



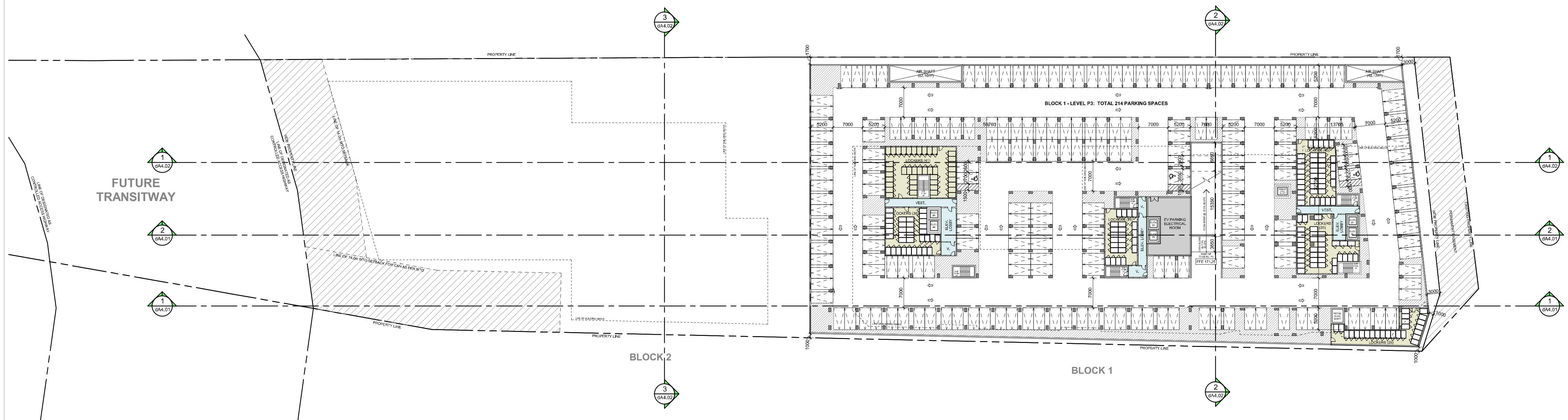
2 | Bicycle Parking Space Legend

CONVEX MIRROR:

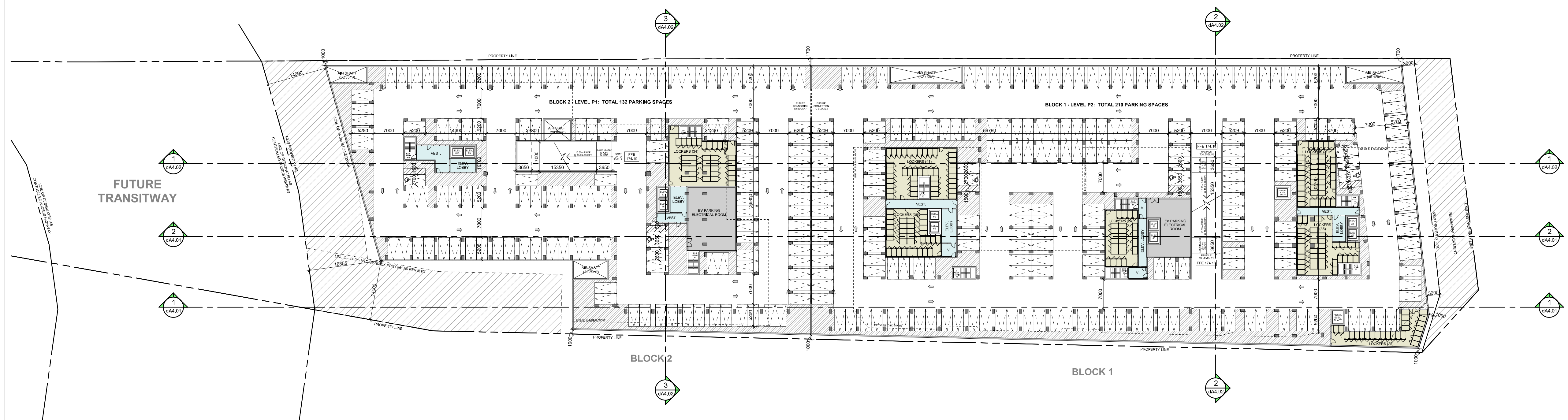
GRATES POROSITY:

MAXIMUM POROSITY OF VENTILATION GRATES IS 20mm X 20mm.

3 | Legend



3 | Floor Plan - Level P3
1 : 400



4 | Floor Plan - Level P2
1 : 400

Authorities Having Jurisdiction

August 21, 2025

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.	Revision:	Date:

No.:	Issued For:	Date:
1.	Rezoning	xx

Client:
Sky Property Group Inc.

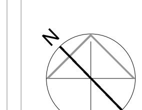
Neyagawa Boulevard & William Halton Parkway West Oakville, ON.

Proposed Residential Development

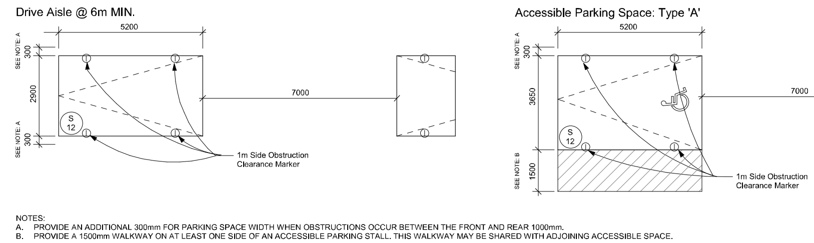
Drawing Title:

Floor Plans - Level P2 & P3

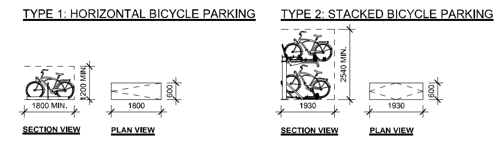
Scale: As indicated
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:



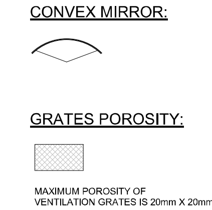
dA2.01



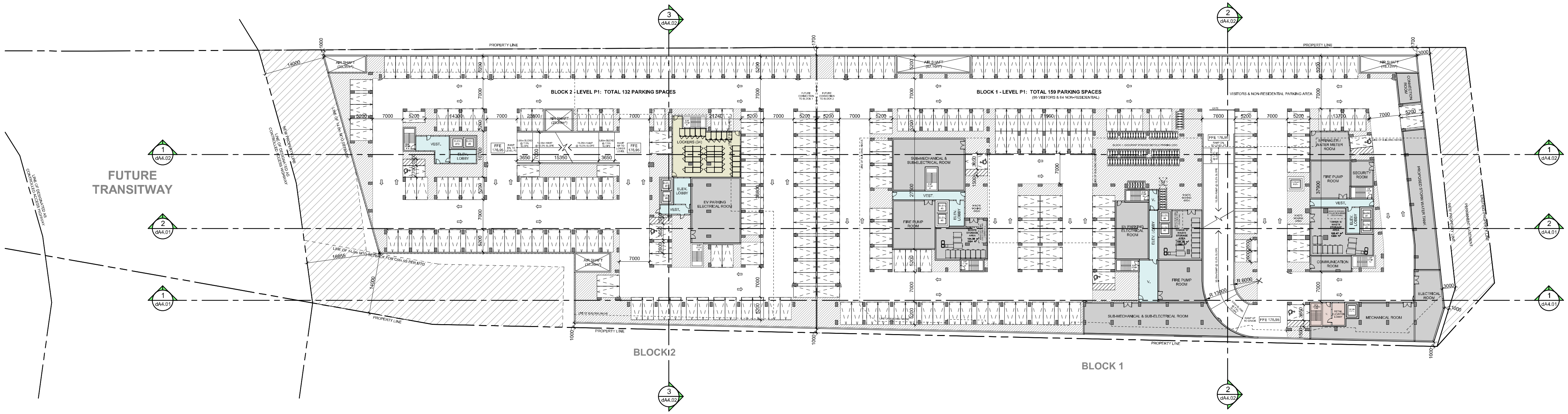
1 | Parking Space Legend



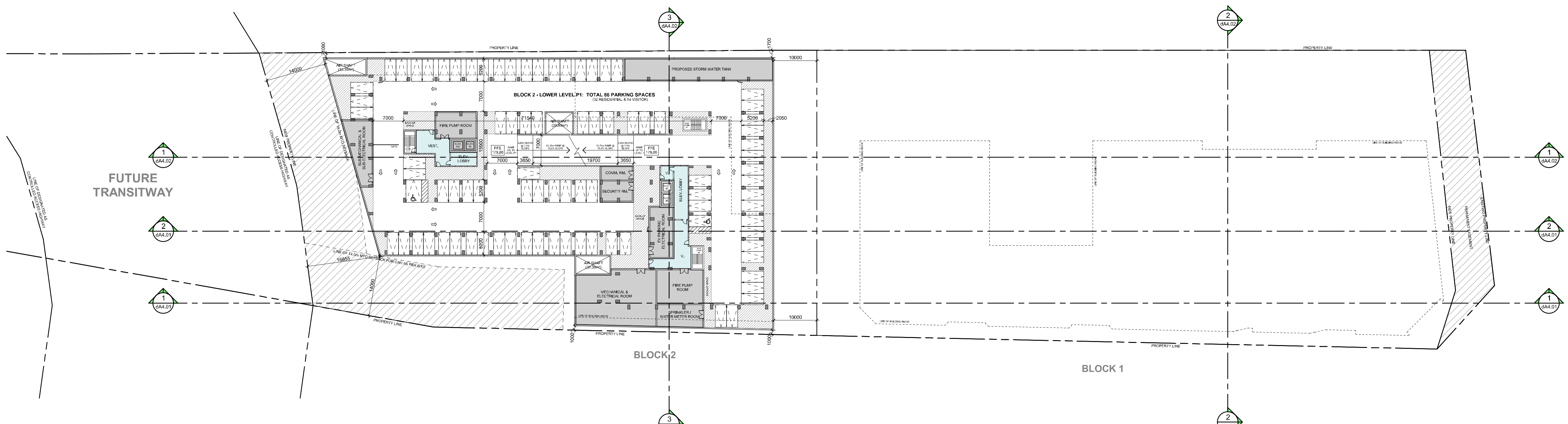
2 | Bicycle Parking Space Legend



3 | Legend



4 | Floor Plan - Level P1
1 : 400



5 | Floor Plan - Lower Level 1
1 : 400

Authorities Having Jurisdiction

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

No.	Revision:	Date:

No.:	Issued For:	Date:
1.	Rezoning	August 28, 2025

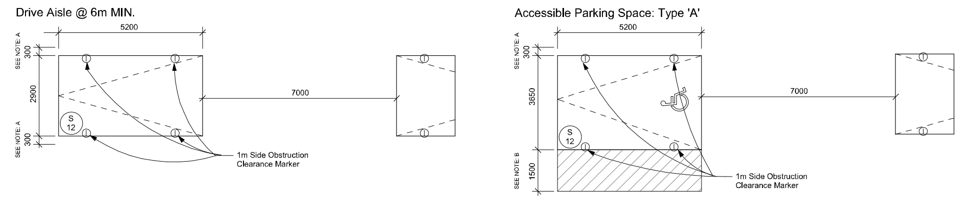
Client:
Sky Property Group Inc.
Neyagawa Boulevard & William Halton Parkway West Oakville, ON.
Proposed Residential Development

Drawing Title:
Floor Plans - Lower Level 1 & P1

Scale: As indicated
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 28, 2025
Drawing No.:
dA2.02

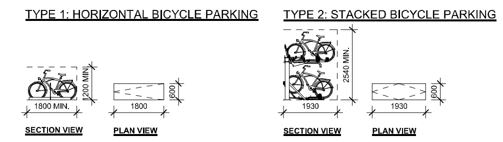
Plot Date: 2025-08-28 9:06:04 AM File Path: Autodesk Docs://ACC-23144/23144P11 - Sky - Oakville - Neyagawa & 407_RVT2025.rvt

TYPICAL PARKING SPACE:



NOTES:
A. PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm.
B. PROVIDE A 1500mm WALKWAY ON AT LEAST ONE SIDE OF AN ACCESSIBLE PARKING STALL, THIS WALKWAY MAY BE SHARED WITH ADJOINING ACCESSIBLE SPACE.

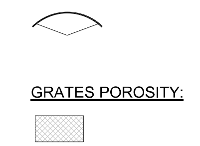
1 | Parking Space Legend



2 | Bicycle Parking Space Legend

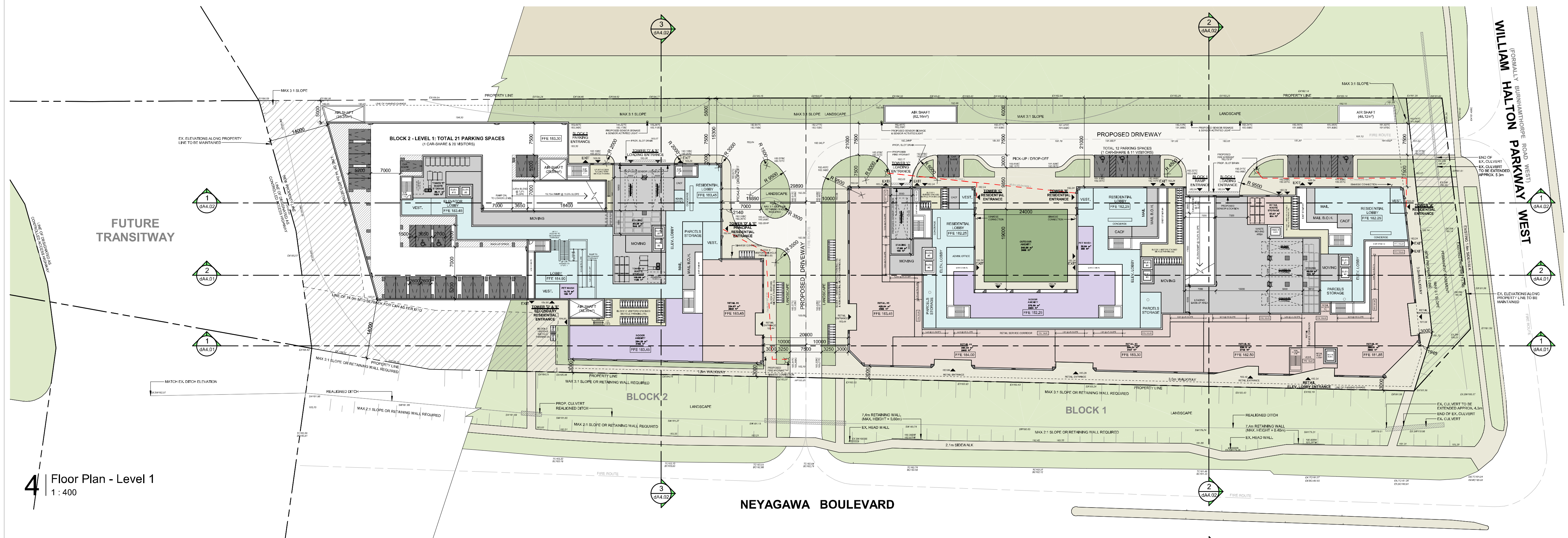
CONVEX MIRROR:

GRATES POROSITY:

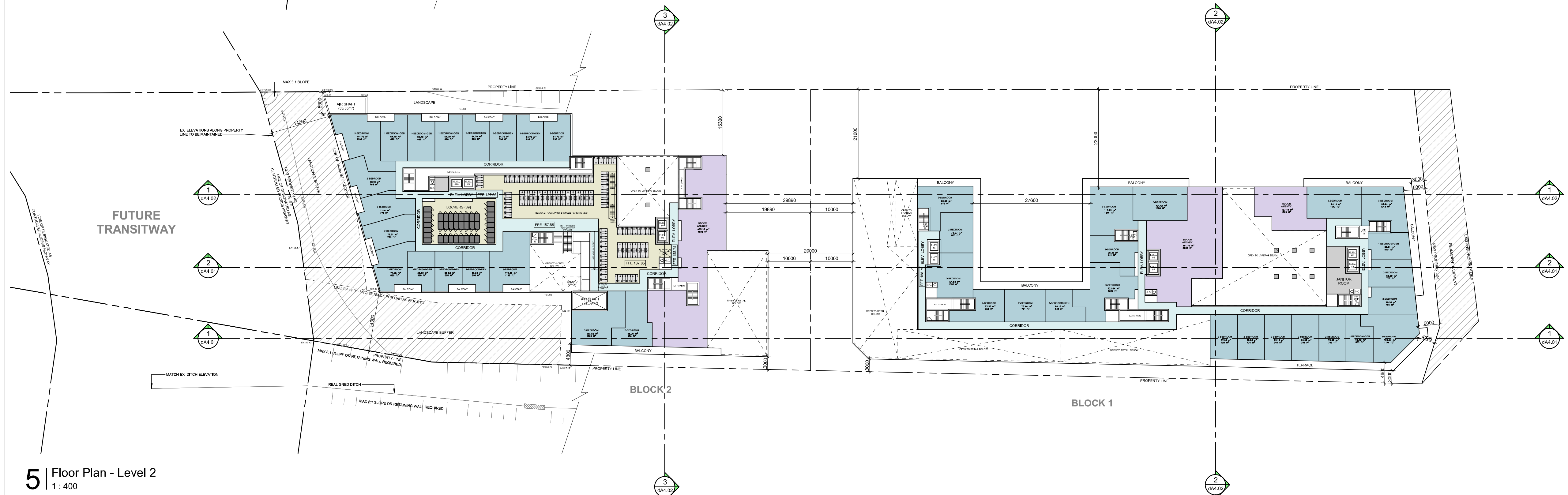


MAXIMUM POROSITY OF VENTILATION GRATES IS 20mm X 20mm.

3 | Legend



4 | Floor Plan - Level 1
1 : 400



5 | Floor Plan - Level 2
1 : 400

Authorities Having Jurisdiction

August 21, 2025

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.	Revision:	Date:

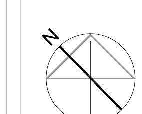
No.	Issued For:	Date:
1.	Rezoning	xx

Client:
Sky Property Group Inc.

Neyagawa Boulevard & William Halton Parkway West
Oakville, ON.
Proposed Residential Development

Drawing Title:
Floor Plans - Level 1 & 2

Scale: As indicated
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:



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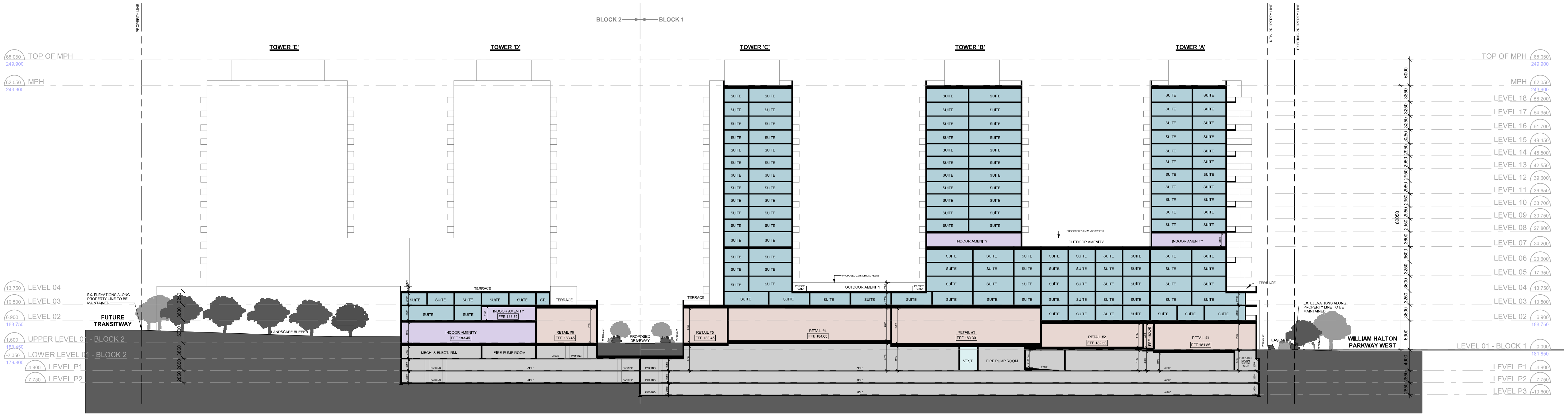
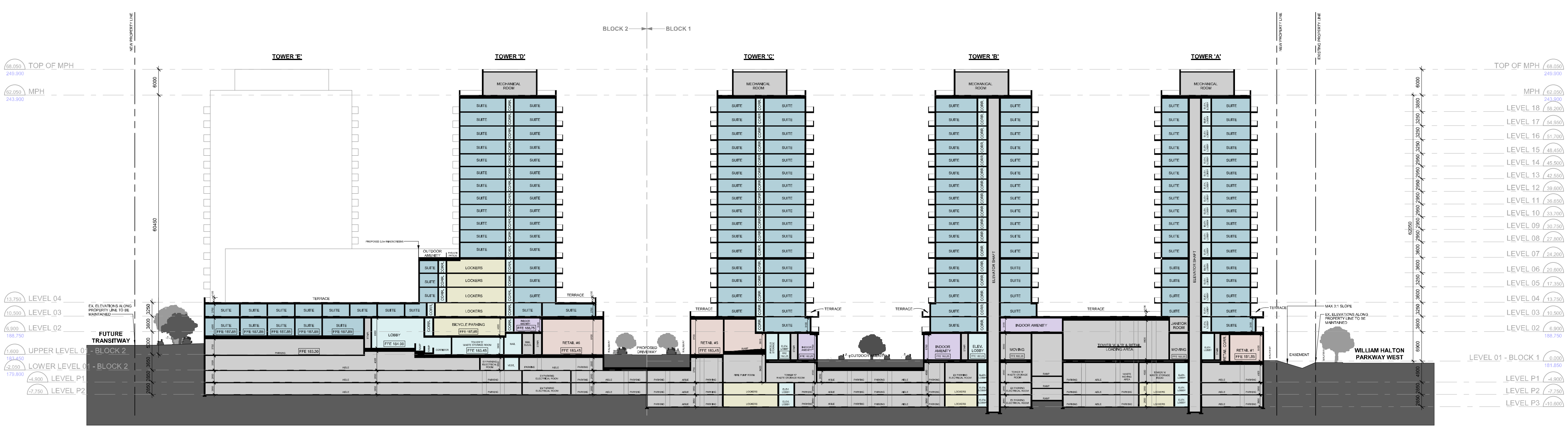


1 | Building Section 'A'
1 : 400



2 | Building Section 'B'
1 : 400

Authorities Having Jurisdiction

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.:	Revision:	Date:
1	Revision 1	Date 1

No.:	Issued For:	Date:
1.	Rezoning	xx

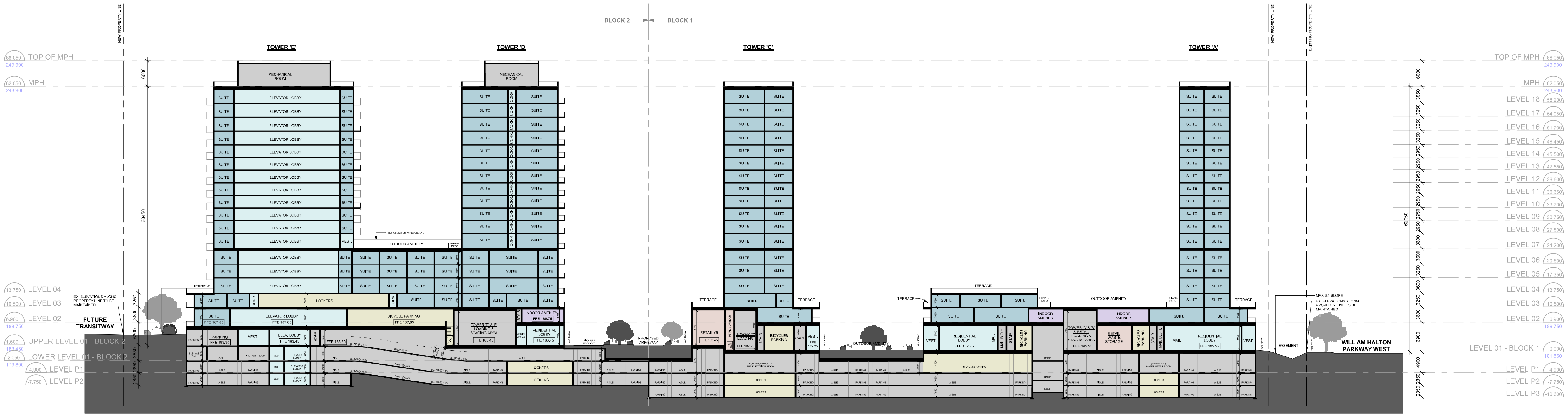
Client:
Sky Property Group Inc.

Neyagawa Boulevard & William Halton Parkway West Oakville, ON.
Proposed Residential Development

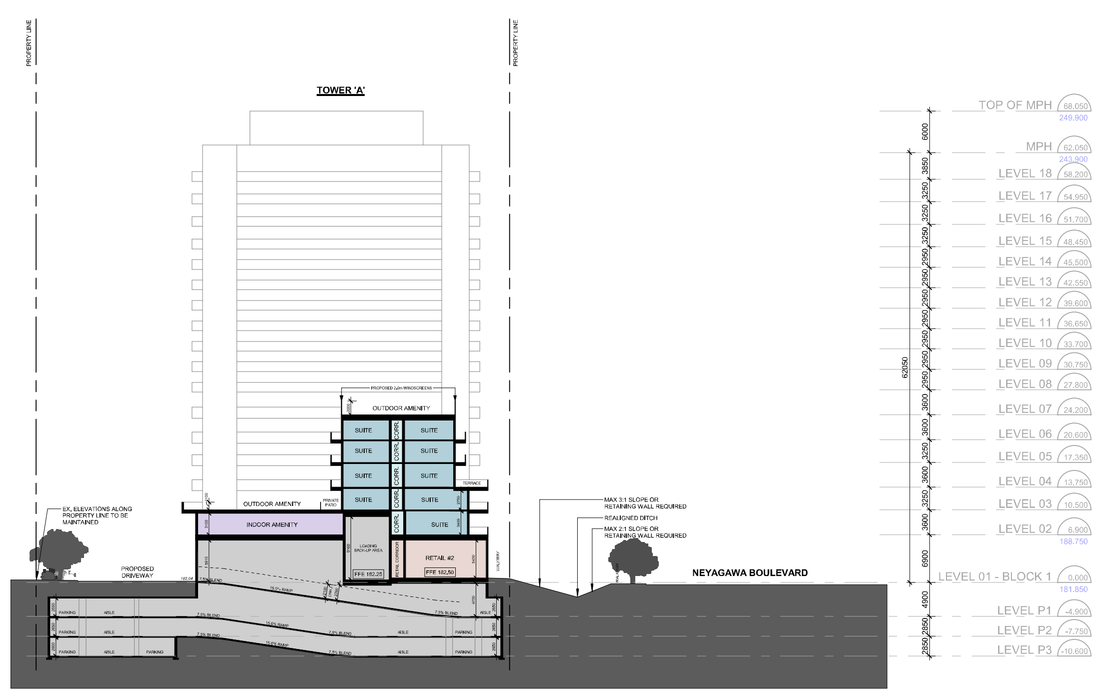
Drawing Title:
Building Sections

Scale: 1 : 400
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:
dA4.01

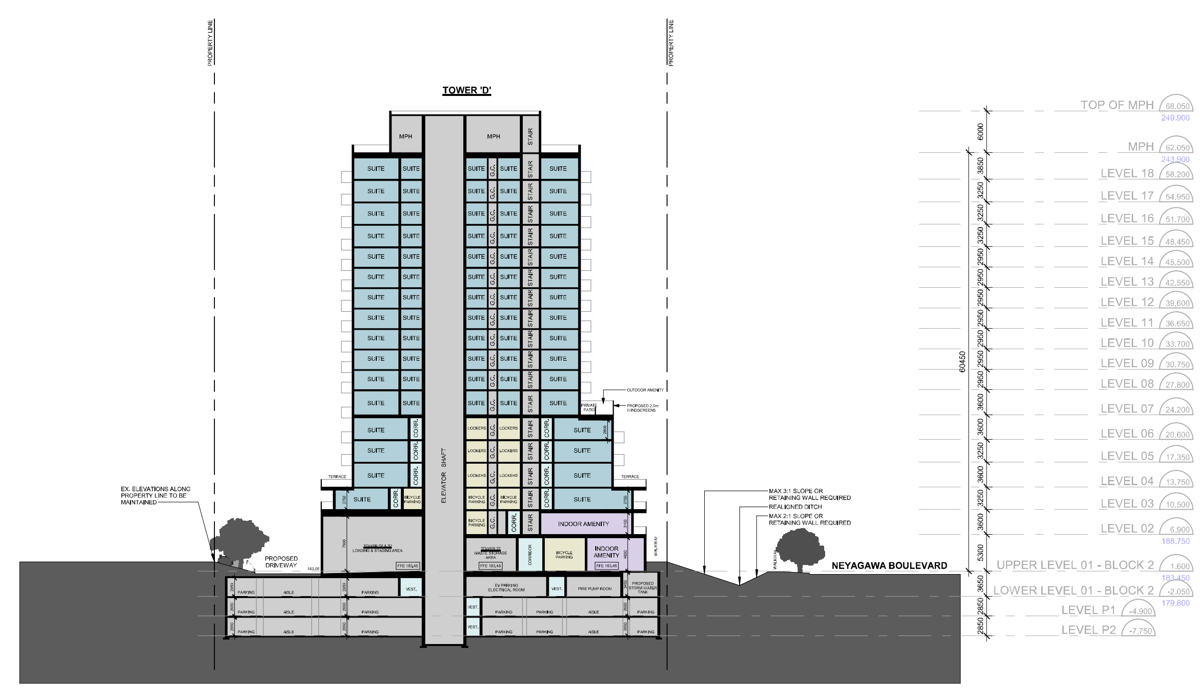
Plot Date: 2025-08-20 3:28:28 PMFile Path: Autodesk Docs://ACC-23144/23144P11 - Sky - Oakville - Neyagawa & 407_RVT2025.rvt



1 | Building Section 'C'
1 : 400



2 | Building Section 'D'
1 : 400



3 | Building Section 'E'
1 : 400

Authorities Having Jurisdiction

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto ON M3J 0H1

Revisions:

No.	Revision:	Date:

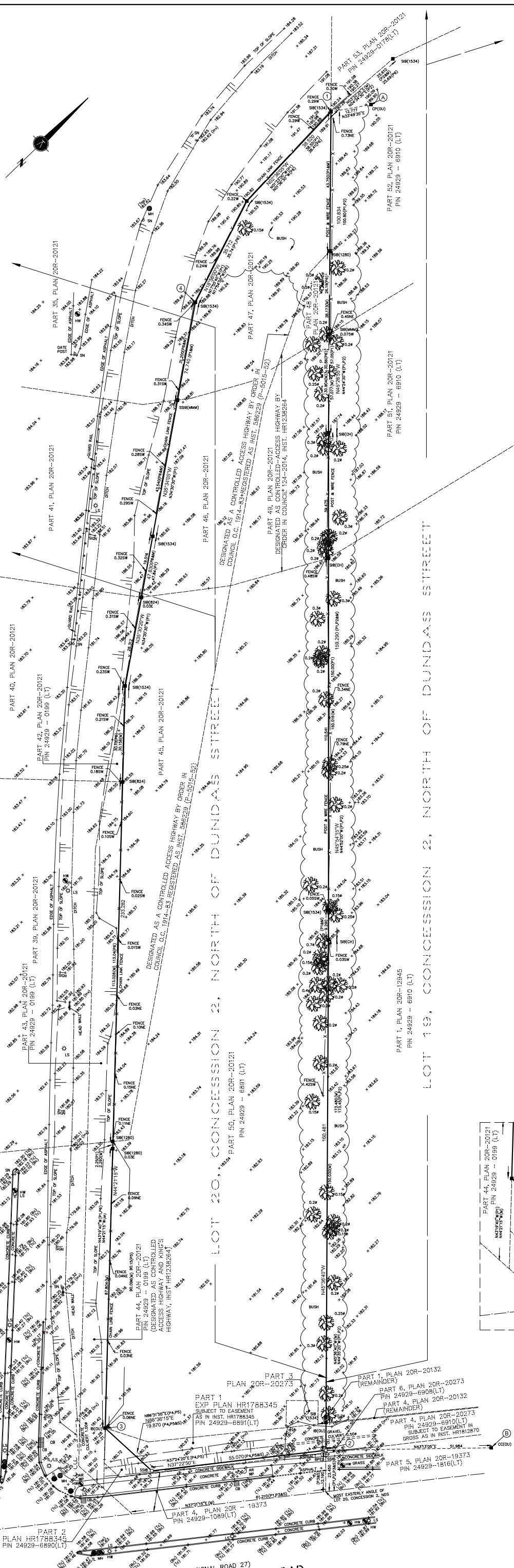
No.	Issued For:	Date:
1.	Rezoning	xx

Client:
Sky Property Group Inc.

Neyagawa Boulevard &
William Halton Parkway West
Oakville, ON.
Proposed Residential Development

Drawing Title:
Building Sections

Scale: 1 : 400
Drawn by: G.H.
Checked by: D.S.
Project No.: 23-144
Date: August 21, 2025
Drawing No.:
dA4.02



PLAN OF SURVEY
SHOWING TOPOGRAPHICAL INFORMATION OF

PART OF LOT 20
CONCESSION 2
NORTH OF DUNDAS STREET
GEOGRAPHIC TOWNSHIP OF TRAFALGAR

TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

SCALE 1:500

10 0 10 20 30 40 50m

KRCMAR SURVEYORS LTD. 2023

METRIC: DISTANCES AND COORDINATES SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

BEARING

BEARINGS SHOWN HEREON ARE GRID DERIVED FROM GPS OBSERVATIONS OF OBSERVED REFERENCE POINTS 'A' AND 'B' USING THE LEICA SMARTNET RTK NETWORK AND ARE REFERRED TO THE 6° UTM COORDINATE SYSTEM, ZONE 17, CENTRAL MERIDIAN 81°00' WEST LONGITUDE. (NAD 83 (CSRS)(2010)).

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.9997215.

INTEGRATION DATA

6° UTM ZONE 17 COORDINATES

NAD 83 (CSRS)(2010) (CENTRAL MERIDIAN 81°00' WEST LONGITUDE)
THE UTM COORDINATES LISTED BELOW ARE TO URBAN ACCURACY AND COMPLY WITH SUBSECTION 14(2) OF ONTARIO REGULATION 216/10 FILED UNDER THE SURVEYORS ACT.

OBSERVED REFERENCE POINTS		
MONUMENT ID.	NORTHING	EASTING
(A) CP(OU)	4 815 333.381	599 940.941
(B) CC(OU)	4 815 066.881	600 270.284
REFERENCE POINTS		
POINT	NORTHING	EASTING
1	4 815 322.76	599 933.82
2	4 815 028.99	600 234.68
3	4 814 984.07	600 181.42
4	4 815 250.52	599 947.16

COORDINATE VALUES SHOWN ARE FOR GEOGRAPHIC INFORMATION SYSTEM INTEGRATION ONLY. COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

ELEVATION

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE RELATED TO THE TOWN OF OAKVILLE BENCHMARK No. 263, HAVING AN ELEVATION OF 158.460 METRES. (VERTICAL DATUM: CGVD28:PRE78)

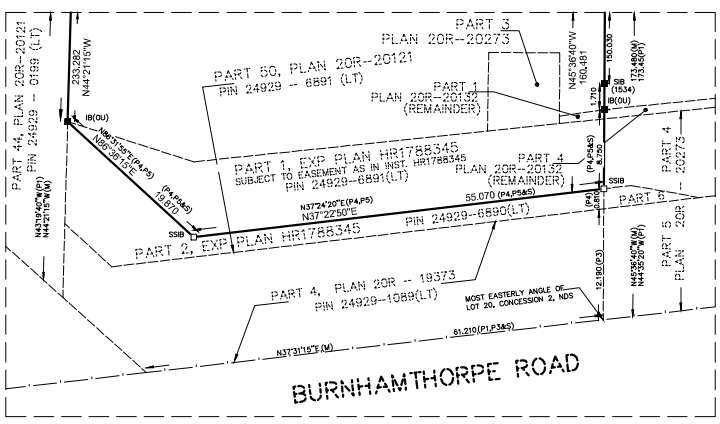
LEGEND

■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
CP	DENOTES CONCRETE PIN
CC	DENOTES CUT CROSS
(M)	DENOTES MEASURED
(S)	DENOTES SET
(OU)	DENOTES ORIGIN UNKNOWN
(WIT)	DENOTES WITNESS
(P1)	DENOTES PLAN 20R-16345
(P2)	DENOTES PLAN 20R-11833
(P3)	DENOTES PLAN 20R-19373
(P4)	DENOTES PLAN 20R-20273
(P5)	DENOTES EXPROPRIATION PLAN HR1788345
(P6)	DENOTES PLAN 20R-20121
(1370)	DENOTES KRCMAR SURVEYORS LTD. O.L.S.
(CH)	DENOTES CARTER & HORWOOD, LIMITED, O.L.S.
(1534)	DENOTES D. E. HUNT, O.L.S.
(824)	DENOTES A. KIKAS, O.L.S.
(MMM)	DENOTES MMM GEOMATICS ONTARIO LIMITED, O.L.S.
EXP.	DENOTES EXPROPRIATION
NDS	DENOTES NORTH OF DUNDAS STREET
(Tc)	DENOTES TOP OF CURB
(Bc)	DENOTES BOTTOM OF CURB
AR WP	DENOTES ANCHOR_WOOD POST
x123.45	DENOTES EXISTING GRADE ELEVATION
BPED	DENOTES BELL PEDESTAL
CB	DENOTES CATCH BASIN
0.01ø	DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER
	DENOTES DOWN GUY ANCHOR
HW	DENOTES HYDRO HAND WELL
LS	DENOTES LAMP STANDARD
MH	DENOTES MANHOLE
SN	DENOTES SIGN
TL	DENOTES TRAFFIC LIGHT
TL/LS	DENOTES TRAFFIC LIGHT WITH LAMP STANDARD

SURVEY REPORT

1. THE RE-ESTABLISHMENT OF THE SUBJECT PROPERTY BOUNDARIES IS BASED ON INFORMATION CONTAINED IN THE RELEVANT TITLE DOCUMENTS, REGISTERED PLANS AND ON THE EVIDENCE OF PRIOR SURVEYS FOUND DURING THE COURSE OF PREPARING THE SUBJECT SURVEY.
2. THE TYPE AND LOCATION OF THE EXISTING BUILDINGS AND OTHER IMPROVEMENTS, FENCES ETC., ON OR NEAR THE SUBJECT PROPERTY ARE AS SHOWN ON THE SURVEY PLAN.
3. COMPLIANCE WITH MUNICIPAL ZONING REQUIREMENTS IS NOT CERTIFIED BY THIS REPORT.
4. THE LAND COMPRISES ALL OF PIN 24929-6891(LT)
5. THE PROPERTY SUBJECT TO EASEMENT AS IN INST. HR1788345 (PART 1, EXPROPRIATION PLAN HR1788345)

TOTAL SITE AREA = 2.4050 ha



SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 31st DAY OF OCTOBER, 2023

DATE NOVEMBER 2 , 2023

STUART M. MOORE
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-60195

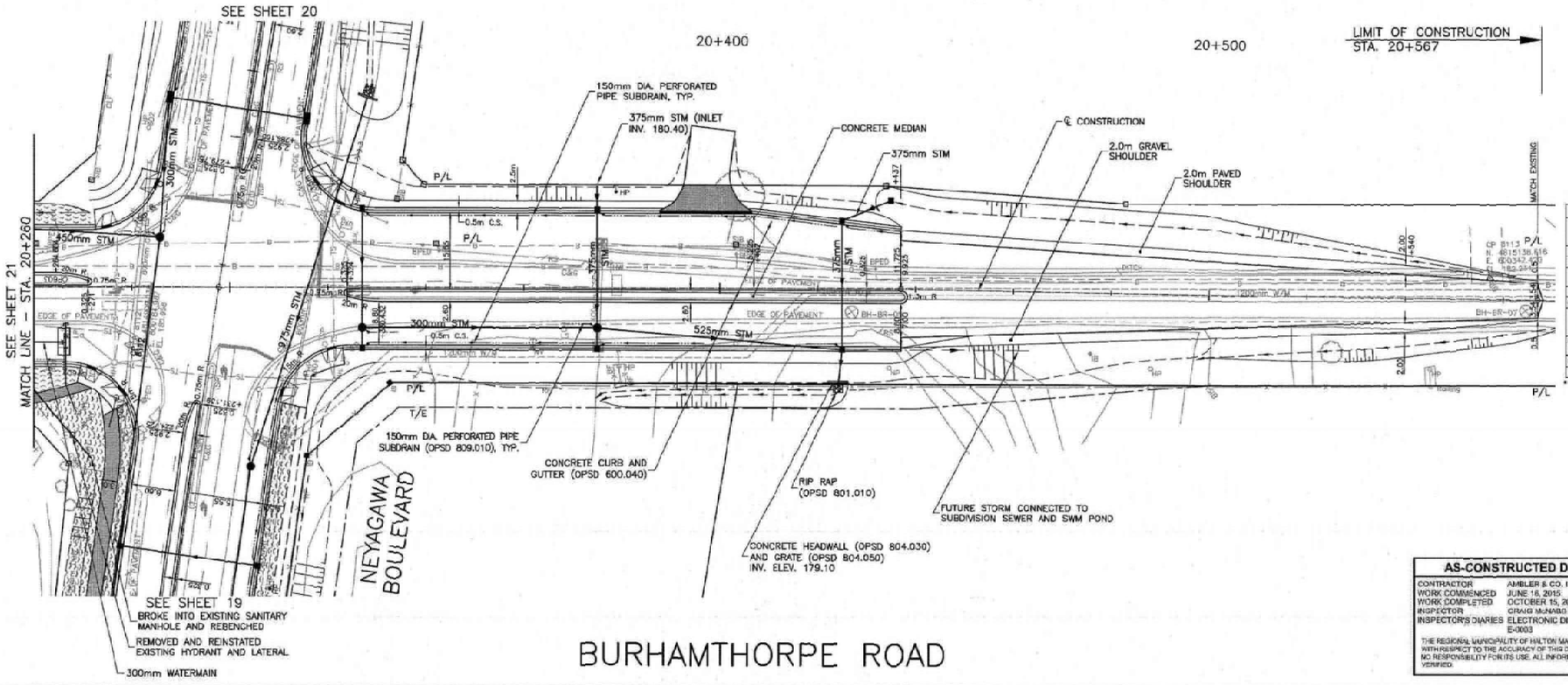
MUNICIPAL ADDRESS: Burnhamthorpe Rd. West & Neyagawa Blvd., Oakville

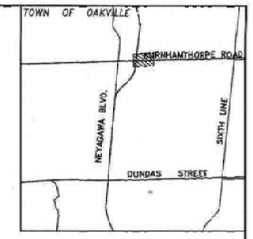
FIELD:	D.L.	DRAWN:	J.M.	CHECKED:	S.M.M.	JOB NO:	23-155
DWG NAME:	23-155BT01	PLOT INFO:	15:23 02/Nov/2023	WORK ORDER NO:	38807		

1137 Centre Street Thornhill ON L4J 3M6 905.738.0053 F 905.738.9221 www.krcmar.ca

PLAN AVAILABLE AT www.ProtectYourBoundaries.ca

KRCMAR





STORM SEWER DATA							
MH	STATION	CONTRELINE CONSTRUCTION OFFSET *	MH STD DWG	INVERTS		FRAME & COVER STD	T/F ELEVATION
				INLET	OUTLET		
CB125	20+327	12.433RT	705.010		N.179.74	400.082	181.37
CB126	20+327	16.164LT	705.010		S.179.96	400.082	181.30
MHS127	20+327	8.175RT	701.010	N.179.66 S.179.60	E.179.57	401.010	181.29
CB128	20+375	12.433RT	705.010		N.179.97	400.082	181.61
CBMH129	20+375	15.933LT	701.010	N.179.87	S.179.88	400.082	181.56
MHS130	20+375	8.175RT	701.010	N.179.53 S.179.77 W.179.39	E.179.34	401.010	181.55
CBMH132	20+425	12.433RT	701.011	N.179.20 W.179.22	S.179.22	400.082	181.88
CBMH133	20+425	13.841LT	701.010	NE.179.31	E.179.29	400.082	181.86
DI134	20+435	18.000LT	705.040		W.179.42	403.010	180.33

* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

NOTES
1. ALL STORM SEWER LATERAL PIPES ARE 300mm DIA. UNLESS OTHERWISE SHOWN.

AS-CONSTRUCTED DRAWING

CONTRACTOR	AMBLER & CO. INC.
WORK COMMENCED	JUNE 16, 2015
WORK COMPLETED	OCTOBER 15, 2018
INSPECTOR	CRAIG McNABB (MMM GROUP)
INSPECTOR'S DIARIES	ELECTRONIC DIARY (MMM GROUP) E-0003

THE REGIONAL MUNICIPALITY OF HALTON MAKES NO WARRANTIES WITH RESPECT TO THE ACCURACY OF THIS DRAWING AND ASSUMES NO RESPONSIBILITY FOR ITS USE. ALL INFORMATION SHOULD BE VERIFIED.

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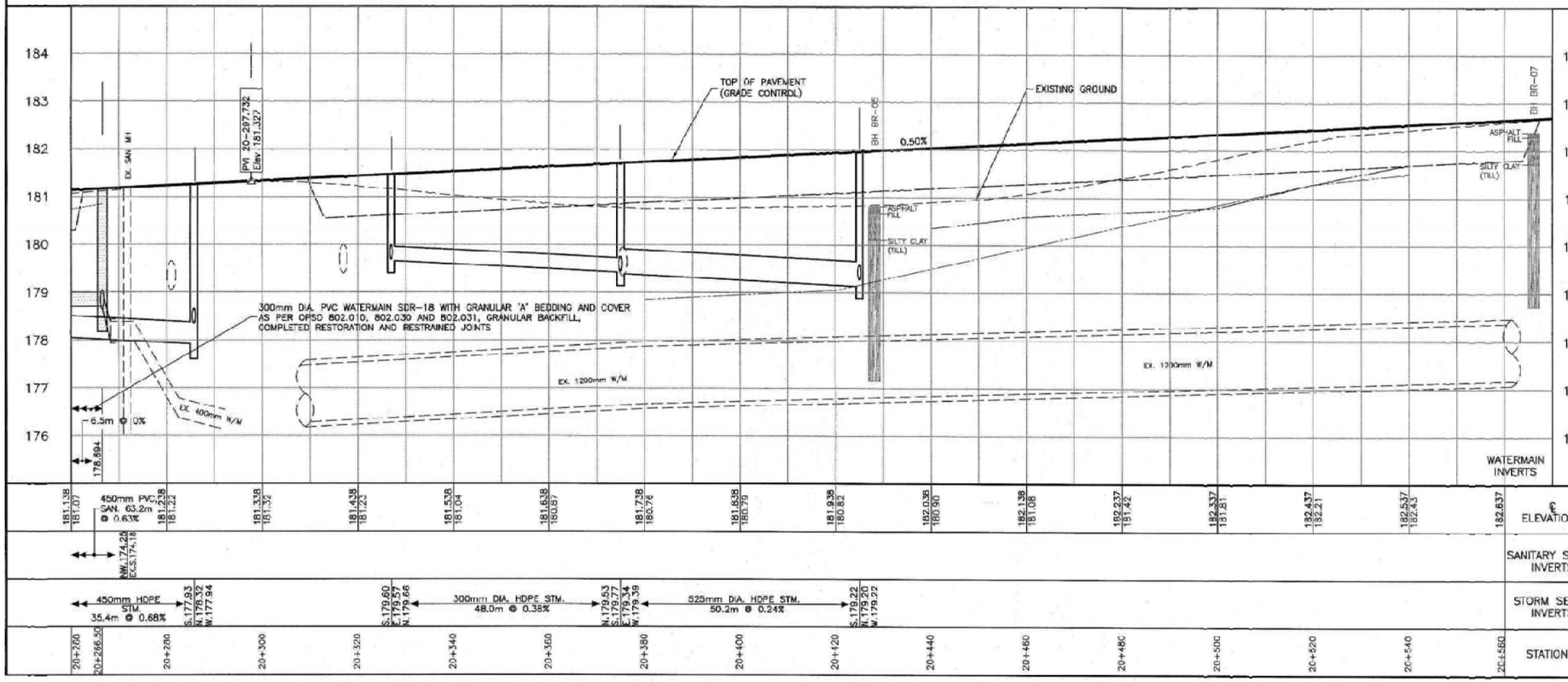


01/16/17	J.F.B.	AS CONSTRUCTED (MMM GROUP)	X
11/24/15	D.S.W.	MOVED MHS113 TO CBMH119 N. CURBLINE	A.S.
08/06/15	D.S.W.	ADDED REINSTATE HYDRANT	S.J.
07/21/15	D.S.W.	MOVED 300mm WATERMAIN & WVC1	S.J.
04/14/15		ISSUED FOR CONSTRUCTION	
02/24/15		ISSUED FOR TENDER	
NO Date	By	REVISIONS	MANU CAD

Design	D.S.W.	Ch'kd	R.I.R.	Date JANUARY, 2017
Drawn	S.J.	Ch'kd	R.I.R.	

Scale 1:500 Horiz. 1:50 Vert.

References

Regional

Field Notes

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE
Reviewed For Compliance With Regional Standards Only.
Director
Manager

Stamp

MMM GROUP

Halton REGION

TITLE **ROAD RECONSTRUCTION**
BURNHAMTHORPE ROAD (REG. RD. 27)
FROM 40m WEST OF NEYAGAWA BOULEVARD TO 270m EAST OF NEYAGAWA BOULEVARD
IN THE TOWN OF OAKVILLE

Consultant File NO **O-21877**

CONTRACT NO R-2388B-15

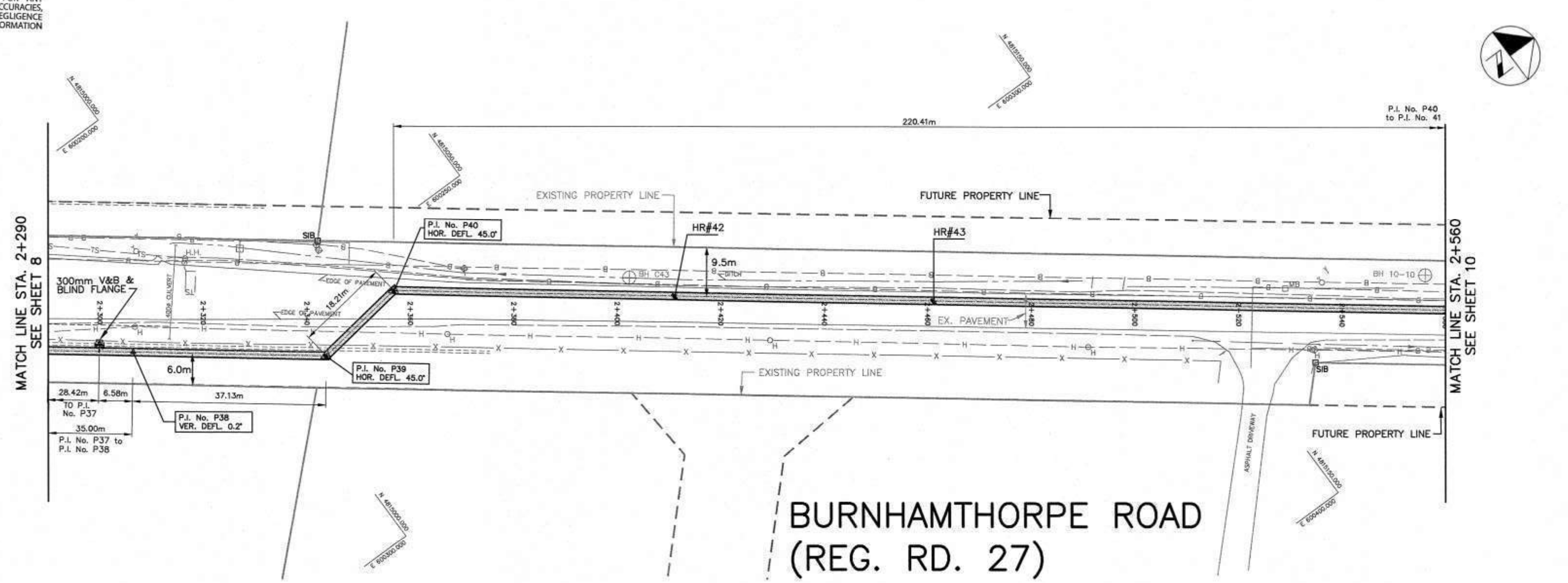
Drawing NO SHEET 22 OF 58

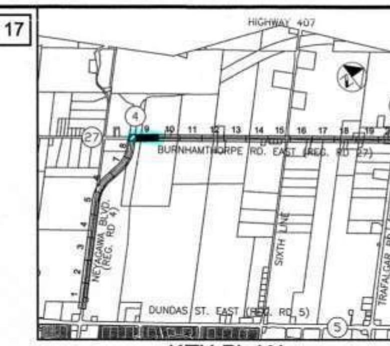
R-2388B-15 22 of 58

DRAWING: S:\32-2001\DWGFILES\AS-BUILTS-DEC-7-2016\MUNICIPAL\32-2001-400-12 TO 23-PLAN AND PROFILES.DWG
LAYOUT TAB: SHT 22
DRAWN BY:
REVISED BY:
LAST SAVED: 05/01/2017 Time: 08:09:01 AM

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

UTM NAD 83, ZONE 17





KEY PLAN
n.t.s.

NOTE:

1. SEE INDEX SHEET FOR GENERAL NOTES.

AS CONSTRUCTED WATERMAIN DATA

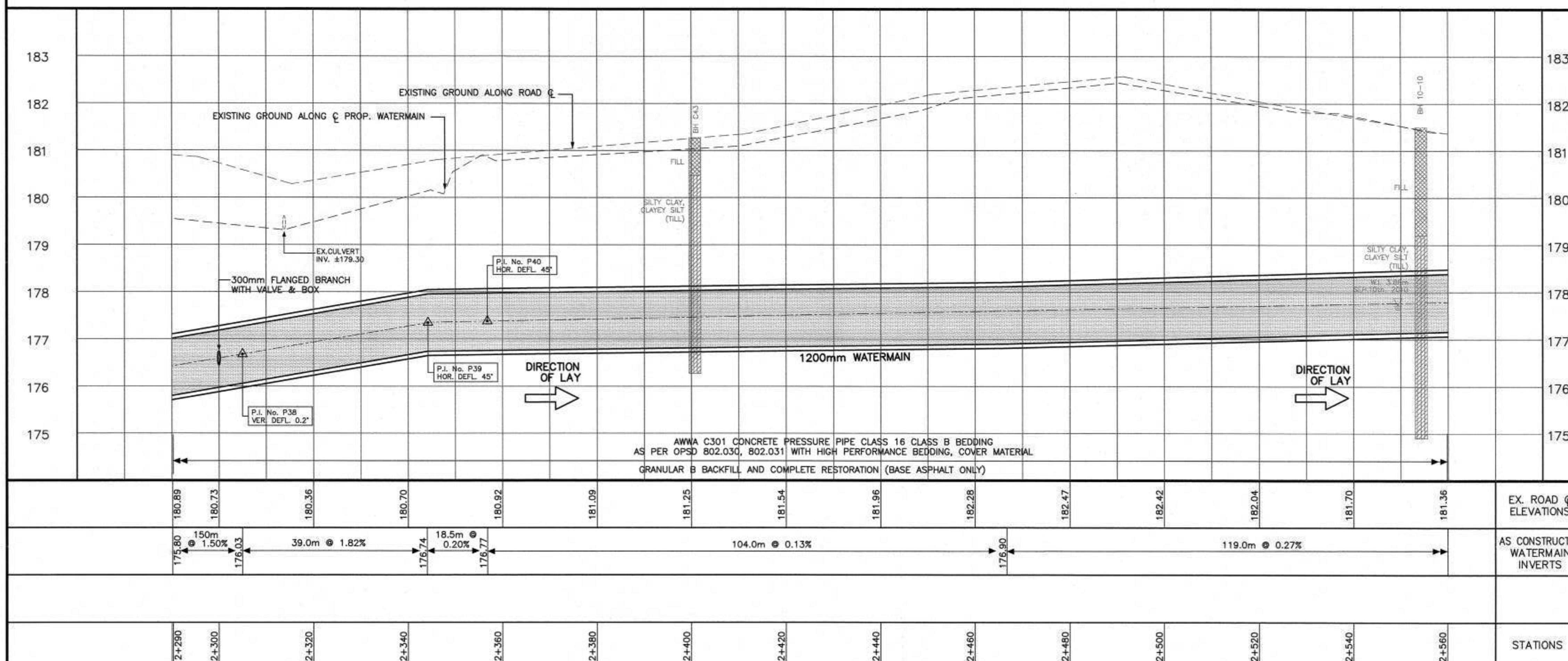
PI No.	EASTING	NORTHING	DESCRIPTION
P38	600239.29	4814977.57	VERT. DEFL. 0.2
P39	600262.81	4815008.34	HOR. DEFL. 45°
P40	600260.39	4815026.35	HOR. DEFL. 45°

HORIZONTAL REFERENCE POINTS C/L WM

HR#	EASTING	NORTHING	DESCRIPTION
42	600293.51	4815069.50	TOP OF PIPE
43	600323.93	4815109.23	TOP OF PIPE

ELEVATIONS AND DIMENSIONS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED PRIOR TO USE FOR DESIGN, LAY-OUT OR CONSTRUCTION PURPOSES.

AS CONSTRUCTED INFORMATION SUPPLIED BY CON-KER CONSTRUCTION CORPORATION DATED APRIL 24, 2012



NO	Date	By	REVISIONS	MANU	CAD
1	MAR 2014	P.B.	AS CONSTRUCTED		

Design	WYC	Ch'kd	J.S.	Date FEBRUARY 2011
Drawn	10-12	Ch'kd	WYC	

Scale 1:500 Horiz. 1:50 Vert.

References

Regional

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE

Reviewed For Compliance With Regional Standards Only.

Director

Manager

Field Notes REGION BOOK

Stamp

LICENSED PROFESSIONAL ENGINEER M. S. RUPRAI 03/17/14 PROVINCE OF ONTARIO

MMM GROUP

100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1 t: 905.882.1100 f: 905.882.0055 www.mmm.ca

Halton REGION

WATERMAIN INSTALLATION ON NEYAGAWA BLVD. & BURNHAMTHORPE ROAD

BURNHAMTHORPE ROAD

FROM 50m EAST OF NEYAGAWA BLVD. TO 320m EAST OF NEYAGAWA BLVD.

STA 2+290 TO STA 2+560

TOWN OF OAKVILLE

Consultant File NO 10-08093

Regic O-20022

CONTRACT NO W-2631-11

Drawing NO SHEET 9 OF 31

W-2631-11 9 of 31

Drawing: C:\USERS\CHANL\DOCUMENTS\ENGINEERING_2014\CD-PR2631_NEYA-WM\0809PROFILES 9-20.DWG Layout Tab: P9 Date: 01/21/2015 Time: 11:50:31 AM

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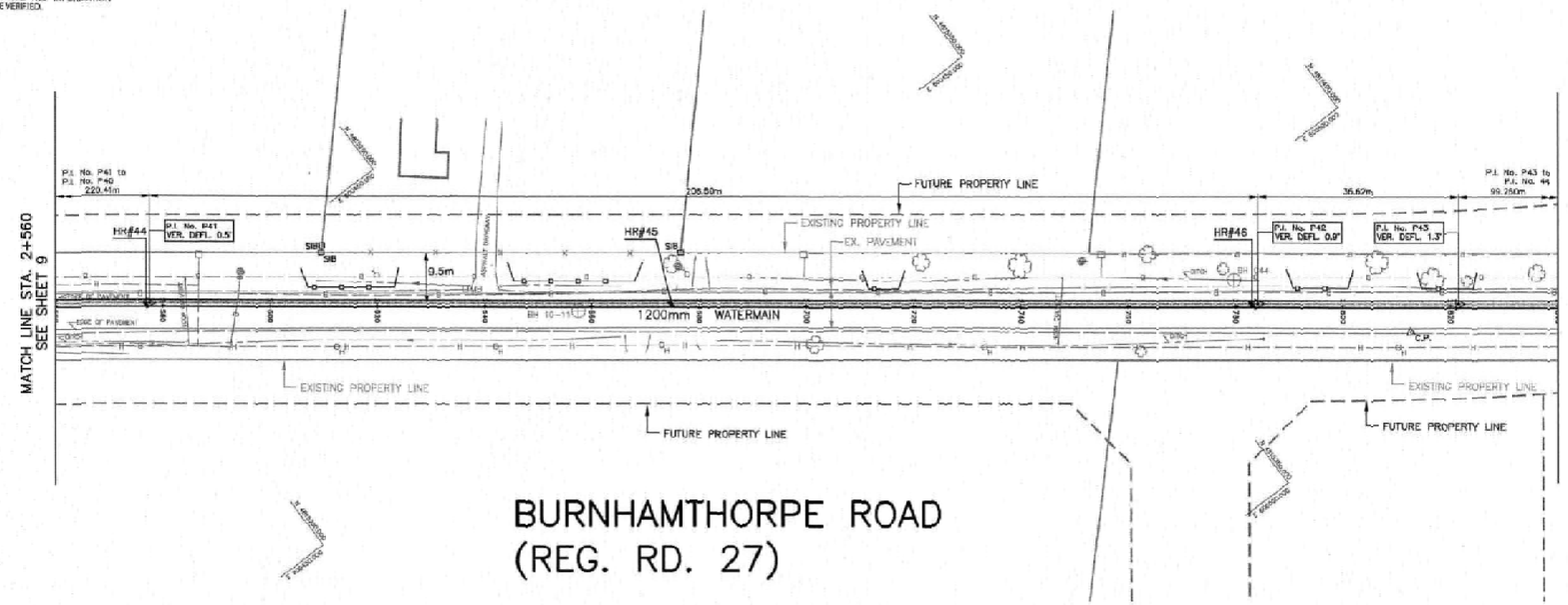
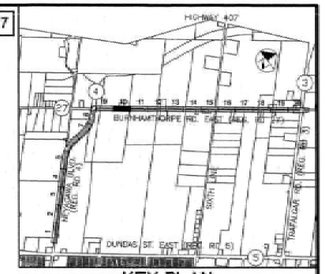
UTM NAD 83, ZONE 17





NOTE:

1. SEE INDEX SHEET FOR GENERAL NOTES.

AS CONSTRUCTED WATERMAIN DATA

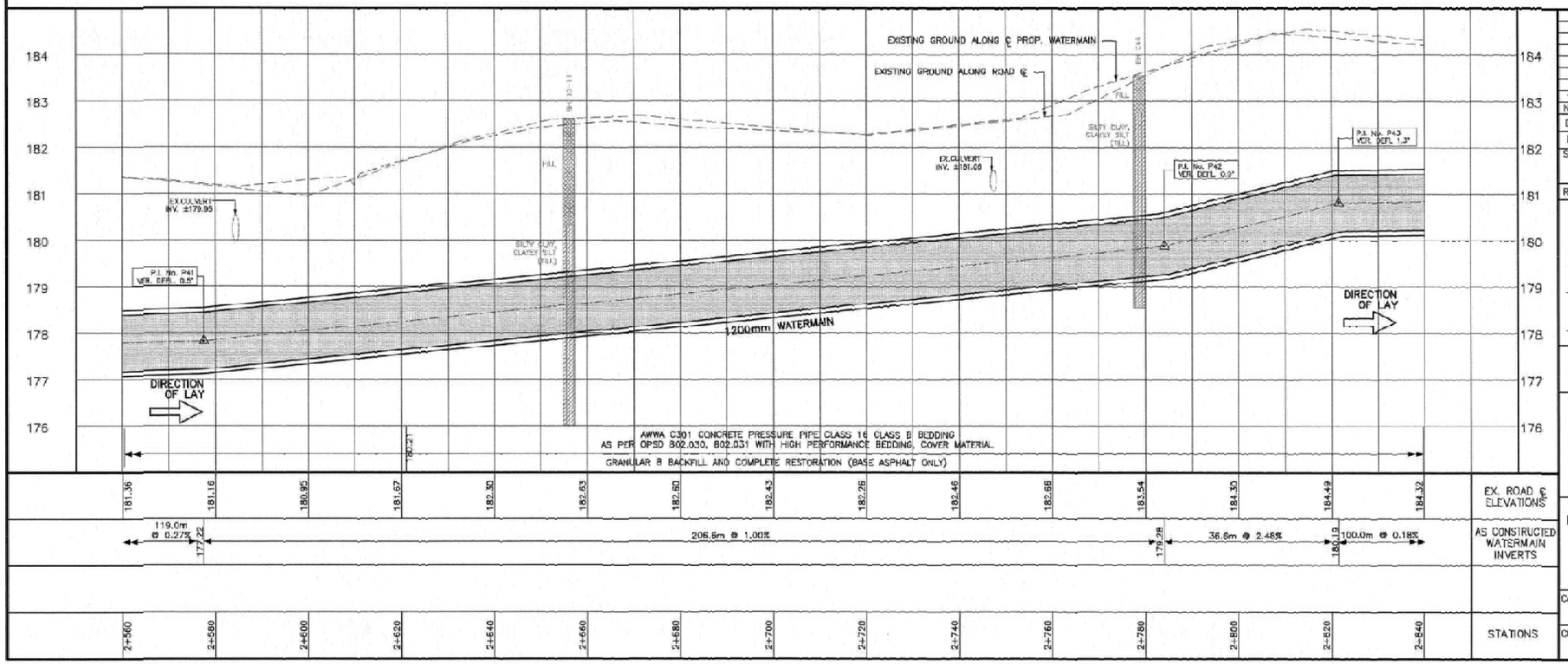
PI No.	EASTING	NORTHING	DESCRIPTION
P41	600394.57	4815201.66	VERT. DEFL. 0.5°
P42	600520.04	4815365.80	VERT. DEFL. 0.9°
P43	600542.77	4815395.50	VERT. DEFL. 1.3°

HORIZONTAL REFERENCE POINTS C/L WM

HR#	EASTING	NORTHING	DESCRIPTION
44	600394.16	4815201.11	TOP OF PIPE
45	600453.66	4815278.93	TOP OF PIPE
46	600519.36	4815364.92	TOP OF PIPE

ELEVATIONS AND DIMENSIONS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED PRIOR TO USE FOR DESIGN, LAY-OUT OR CONSTRUCTION PURPOSES.

AS CONSTRUCTED INFORMATION SUPPLIED BY CON-KER CONSTRUCTION CORPORATION DATED APRIL 24, 2012



NO	Date	By	REVISIONS	MANU CAD
1	MAR 2014	P.B.	AS CONSTRUCTED	

Design	WYC	Ch'kd	J.S.	Date FEBRUARY 2011
Drawn	10-12	Ch'kd	WYC	

Scale 1:500 Horiz. 10 5 0 10
1:50 Vert. 0.5 0 1

References

Regional

Field Notes REGION BOOK

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE

Reviewed For Compliance With Regional Standards Only.

Director

Manager

Stamp

LICENCE PROFESSIONAL ENGINEER M.S. BURAN PROVINCE OF ONTARIO

MMM GROUP

100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1

Halton REGION

WATERMAIN INSTALLATION ON NEYAGAWA BLVD. & BURNHAMTHORPE ROAD
BURNHAMTHORPE ROAD
FROM 320m EAST OF NEYAGAWA BLVD.
TO 600m EAST OF NEYAGAWA BLVD.
STA 2+560 TO STA 2+840
TOWN OF OAKVILLE

Consultant File NO 10-08093

Re O-20023

CONTRACT NO W-2631-11

Drawing NO SHEET 10 OF 31

W-2631-11 10 of 31

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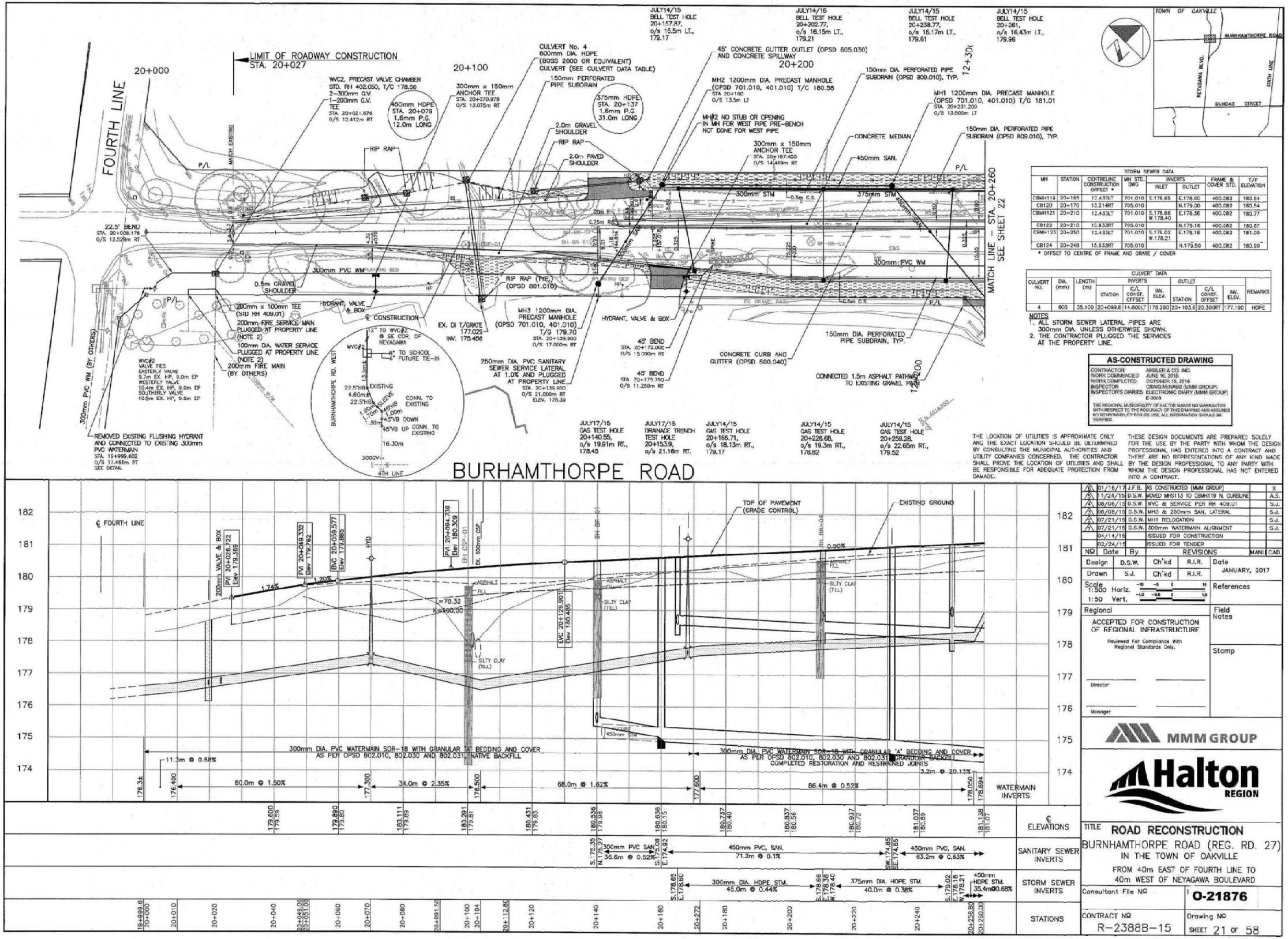

BURHAMTHORPE ROAD

STORM SEWER DATA								
MH	STATION	CENTRELINE CONSTRUCTION OFFSET *	MH STD. DWG	INVERTS		FRAME & COVER STD.	T/F ELEVATION
				INLET	OUTLET		
CBMH119	20+165	12.433LT	701.010	S.178.65	E.178.60	400.082	180.54
CB120	20+170	13.214RT	705.010		N.179.00	400.082	180.54
CBMH121	20+210	12.433LT	701.010	S.178.66 W.178.40	E.178.36	400.082	180.77
CB122	20+210	15.833RT	705.010		N.179.16	400.082	180.67
CBMH123	20+250	12.433LT	701.010	S.179.02 W.178.21	E.178.18	400.082	181.00
CB124	20+248	15.933RT	705.010		N.179.50	400.082	180.99

* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

CULVERT DATA									
CULVERT NO.	DIA. (mm)	LENGTH (m)	INVERTS			OUTLET			REMARKS
			STATION	C/L CONST. OFFSET	INV. ELEV.	STATION	C/L CONST. OFFSET	INV. ELEV.	
4	600	35.100	20+099.6	14.600LT	178.200	20+103.6	20.300RT	177.190	HDPE

NOTES
1. ALL STORM SEWER LATERAL PIPES ARE 300mm DIA. UNLESS OTHERWISE SHOWN.
2. THE CONTRACTOR PLUGGED THE SERVICES AT THE PROPERTY LINE.

AS-CONSTRUCTED DRAWING

CONTRACTOR	AMBLER & CO. INC.
WORK COMMENCED	JUNE 16, 2015
WORK COMPLETED	OCTOBER 15, 2016
INSPECTOR	CRAIG McNABB (MMM GROUP)
INSPECTOR'S DIARIES	ELECTRONIC DIARY (MMM GROUP) E-0003

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NO	Date	By	REVISIONS	MANUAL	CAD
A	01/16/17	J.F.B.	AS CONSTRUCTED (MMM GROUP)		X
A	11/24/15	D.S.W.	MOVED MHS113 TO CBMH119 N. CURBLINE		A.S.
A	08/05/15	D.S.W.	WVC & SERVICE PER RH 409.01		S.J.
A	08/05/15	D.S.W.	MH3 & 250mm SAN. LATERAL		S.J.
A	07/21/15	D.S.W.	MH1 RELOCATION		S.J.
A	07/21/15	D.S.W.	300mm WATERMAIN ALIGNMENT		S.J.
	04/14/15		ISSUED FOR CONSTRUCTION		
	02/24/15		ISSUED FOR TENDER		

Design	D.S.W.	Ch'kd	R.I.R.	Date	JANUARY, 2017
Drawn	S.J.	Ch'kd	R.I.R.		

Scale 1:500 Horiz. -10 -5 0 10
1:50 Vert. -1.0 -0.5 0 1.0

References

Regional

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE

Reviewed For Compliance With Regional Standards Only.

Director

Manager

Field Notes

Stamp

MMM GROUP

Halton REGION

TITLE **ROAD RECONSTRUCTION**

BURNHAMTHORPE ROAD (REG. RD. 27)
IN THE TOWN OF OAKVILLE
FROM 40m EAST OF FOURTH LINE TO
40m WEST OF NEYAGAWA BOULEVARD

Consultant File NO **O-21876**

CONTRACT NO R-2388B-15

Drawing NO SHEET 21 OF 58

R-2388B-15 21 of 58

DRAWING: S:\321200\LWORFILES\AS-BUILTS-30C-7-2016\MUNICIPAL\321200-400-12 TO 23-PLAN AND PROFILES.DWG
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REVISED BY:
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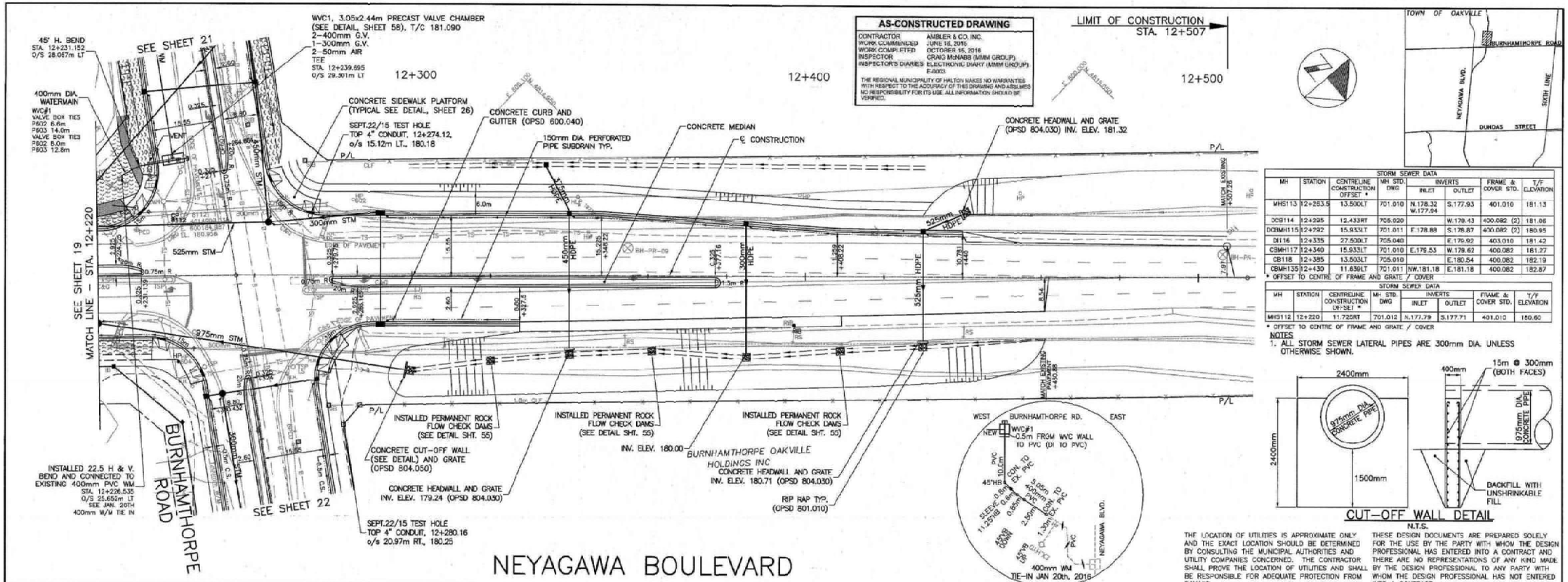

STORM SEWER DATA							
MH	STATION	CENTRELINE CONSTRUCTION OFFSET *	MH STD. DWG	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	T/F ELEVATION
MHS113	12+263.5	13.500LT	701.010	N.178.32 W.177.94	S.177.93	401.010	181.13
DCB114	12+295	12.433RT	705.020		W.179.43	400.082 (2)	181.06
DCBMH115	12+292	15.933LT	701.011	E.178.88	S.178.87	400.082 (2)	180.95
DI116	12+335	27.500LT	705.040		E.179.92	403.010	181.42
CBMH117	12+340	15.933LT	701.010	E.179.53	W.179.62	400.082	181.27
CB118	12+385	13.503LT	705.010		E.180.54	400.082	182.19
CBMH135	12+430	11.639LT	701.011	NW.181.18	E.181.18	400.082	182.87

* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

STORM SEWER DATA							
MH	STATION	CENTRELINE CONSTRUCTION OFFSET *	MH STD. DWG	INVERTS INLET	INVERTS OUTLET	FRAME & COVER STD.	T/F ELEVATION
MHS112	12+220	11.725RT	701.012	N.177.79	S.177.71	401.010	180.60

* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

NOTES
1. ALL STORM SEWER LATERAL PIPES ARE 300mm DIA. UNLESS OTHERWISE SHOWN.

CUT-OFF WALL DETAIL
N.T.S.

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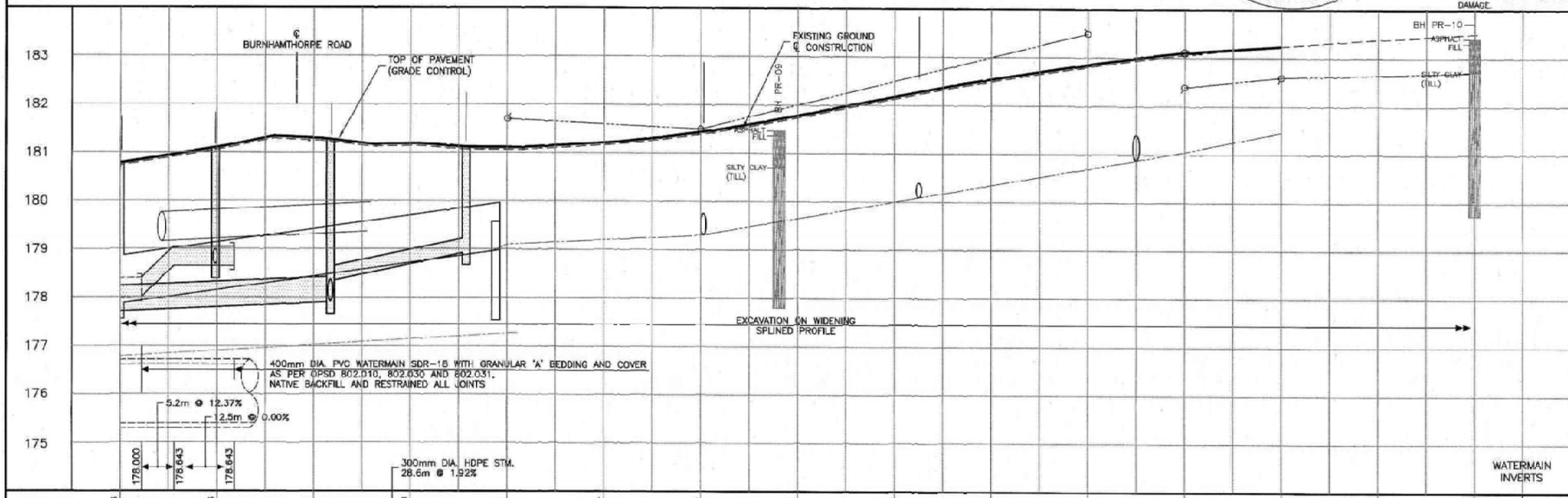

NO	Date	By	REVISIONS	MANU	CAD
1	01/16/17	J.F.B.	AS CONSTRUCTED (MMM GROUP)		X
2	11/24/15	D.S.W.	MOVED MHS113 TO CBMH119 N. CURBLINE		A.S.
1	07/21/15	D.S.W.	400mm WATERMAIN & WVC1		S.J.
	04/14/15		ISSUED FOR CONSTRUCTION		

Design	D.S.W.	Ch'kd	R.I.R.	Date JANUARY, 2017
Drawn	S.J.	Ch'kd	R.I.R.	

Scale 1:500 Horiz. -10 -5 0 10
1:50 Vert. -1.0 -0.5 0 1.0

References

Regional

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE
Reviewed For Compliance With Regional Standards Only.
Director,
Manager,

Field Notes

Stamp

MMM GROUP

Halton REGION

TITLE **ROAD RECONSTRUCTION**
NEYAGAWA BOULEVARD (REG. RD. 4)
FROM 40m SOUTH OF BURNHAMTHORPE ROAD
TO 240m NORTH OF BURNHAMTHORPE ROAD
IN THE TOWN OF OAKVILLE

Consultant File N2 R **O-21875**

CONTRACT N2 R-2388B-15

Drawing N2 SHEET 20 OF 58

R-2388B-15 20 of 58

DRAWING: S:\3212001\DWGFILES\AS-BUILTS-DEC-7-2016\MUNICIPAL\3212001-400-12 TO 23-PLAN AND PROFILES.DWG
LAYOUT TAB: SHT 20
DRAWN BY:
REVISED BY:
LAST SAVED: 05/01/2017 Time: 09:01:56 AM

AS-CONSTRUCTED DRAWING

CONTRACTOR	CON-KER
WORK COMMENCED	JULY 16, 2012
WORK COMPLETED	NOVEMBER 29, 2012
INSPECTOR	STEVEN MATHEWSON
INSPECTOR'S DIARIES	1131

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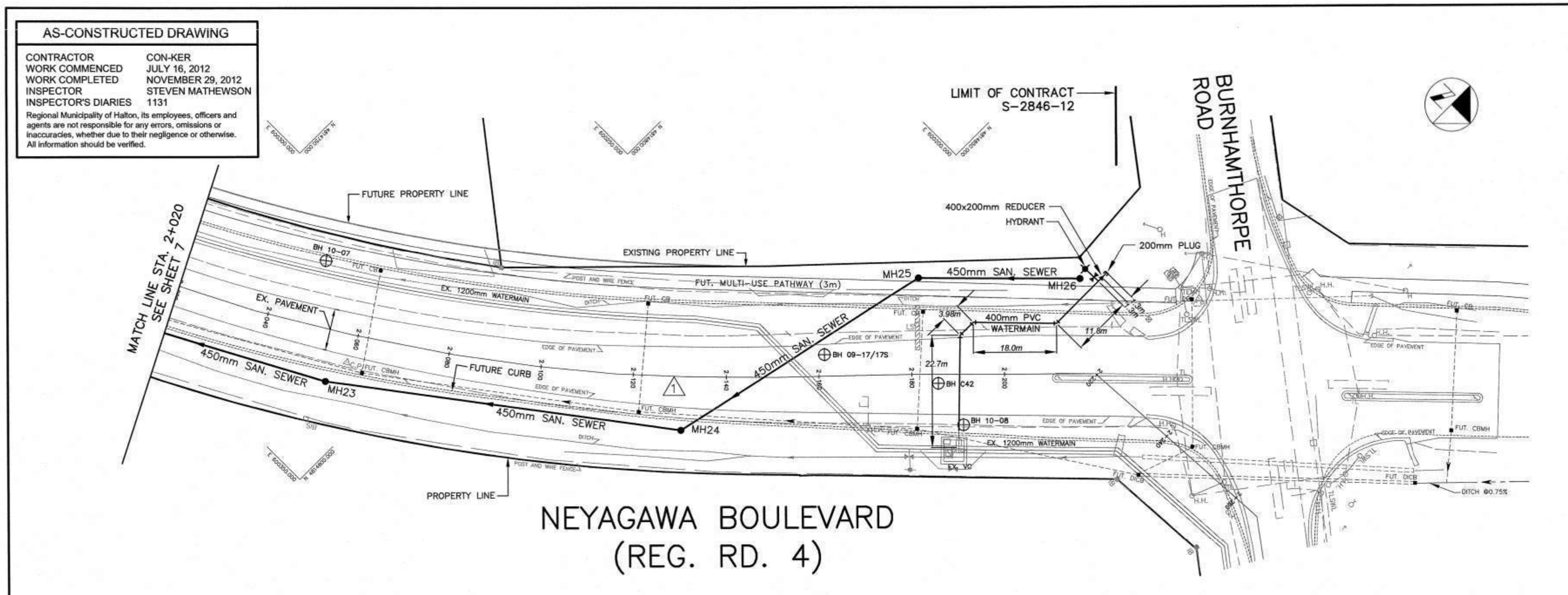
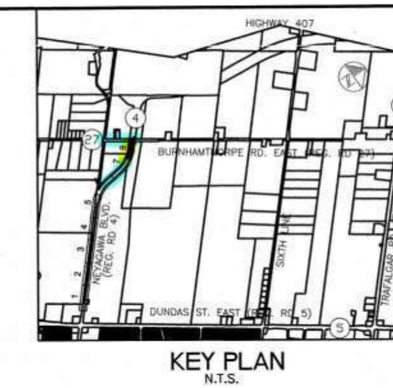
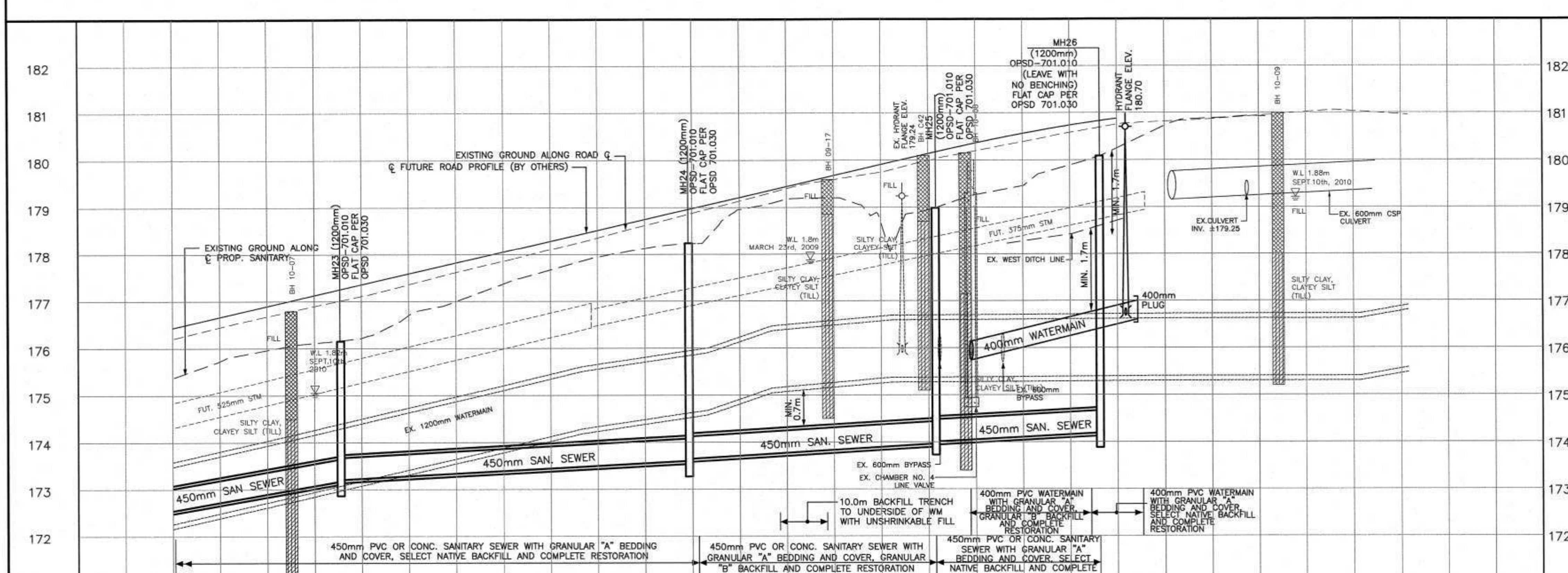




NOTE:

1. SEE INDEX SHEET FOR GENERAL NOTES.



EX. ROAD ℄ ELEVATIONS	176.20	176.68	177.11	177.62	178.11	178.62	179.14	179.59	179.99	180.38	180.76	180.87	181.01	180.95
PROPOSED WATERMAIN INVERT									175.74 ← 48.5m @ 1.3% → 176.37; 10.0m @ 16.1%		177.98 177.98; 3.5m @ 0.0%			
PROPOSED SANITARY SEWER INVERTS	57.1m @ 1.6%		S 173.16 N 173.21	77.4m @ 0.5%			S 173.60 NW 173.65	60.9m @ 0.5%	S 173.96 NW 174.01	36.1m @ 0.5%	SE 174.18			
STATIONS	2+020	2+040	2+060	2+080	2+100	2+120	2+140	2+160	2+180	2+200	2+220	2+240	2+260	2+280

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

Nº	Date	By	Revisions	MANU	CAD
2	JUN 12 2013	DMS	AS CONSTRUCTED		X
1	JUN 21/12	M.R.	ISSUED FOR CONSTRUCTION		

Design	WYC	Ch'kd	M.R.	Date: MARCH 2012
Drawn	10-12	Ch'kd	WYC	

Scale 1:500 Horiz. 1:50 Vert.

References

Regional: ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE
Reviewed For Compliance With Regional Standards Only.

Field Notes: REGION BOOK

Director of Wastewater Services

Manager of Wastewater Design & Construction

Stamp: LICENSED PROFESSIONAL ENGINEER M. S. RUPRAI PROVINCE OF ONTARIO

MMM GROUP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1 t: 905.882.1100 f: 905.882.0055 www.mmm.ca

Halton REGION

SANITARY SEWER INSTALLATION ON NEYAGAWA BOULEVARD TOWN OF OAKVILLE

0m TO 230m SOUTH OF BURNHAMTHORPE ROAD

Consultant File Nº 10-08093

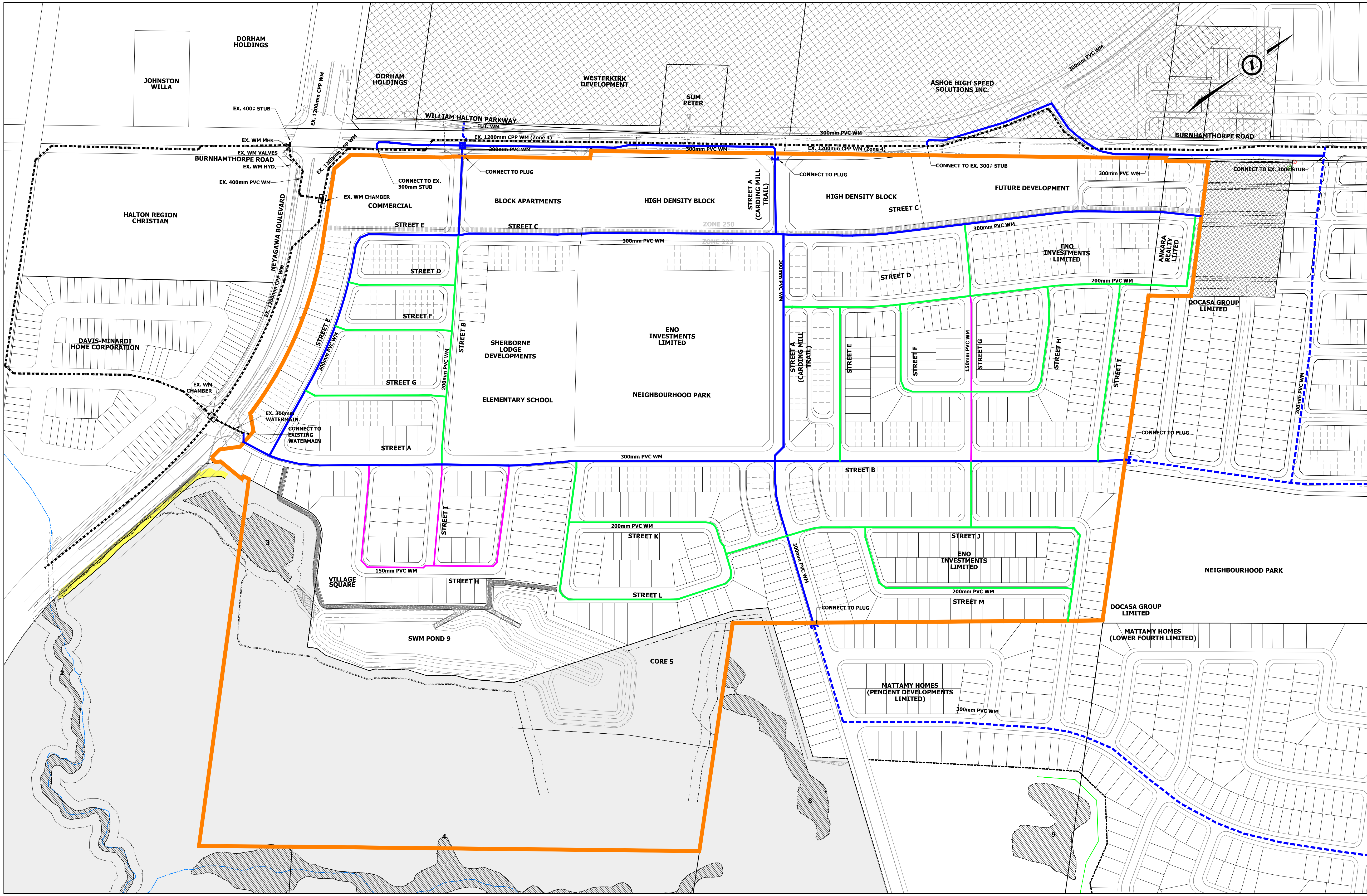
Regional Drawing Nº O-19049

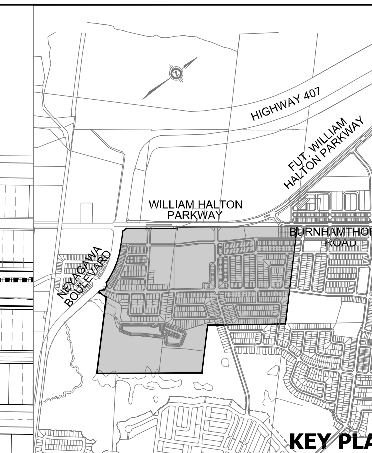
CONTRACT Nº S-2846-12

SHEET 8 OF 10

S-2846-12 8 of 10

Drawing: R:\DESIGN\PR2846 NEYAGAWA\AS CONSTRUCTED\PR-2846-AC.DWG
Layout Tab: P8
Date: 09/04/2013 Time: 08:58:23 AM





NOTES:

1. INTERNAL SUBDIVISION WATERMAIN SIZING TO BE CONFIRMED AT DETAILED DESIGN.
2. MINIMUM WATERMAIN SIZE IS 200mm.
3. LOCAL WATERMAINS ARE REQUIRED ALONG BURNHAMTHORPE ROAD TO SERVICE UNITS FRONTING.

Stonybrook Consulting Inc.
LGL Limited
Bird and Hale Limited
GEO Morphix Ltd.
R.J. Burnside & Associates Limited
Urbantech Consulting

LEGEND:

- SUBJECT LANDS
- CORE AREA
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- NON PARTICIPATING LANDOWNERS (FUTURE DEVELOPMENT)
- EXISTING WATERMAIN (ZONE 250)
- PROPOSED 300mm WATERMAIN
- PROPOSED 200mm WATERMAIN
- PROPOSED 150mm WATERMAIN
- FUTURE WATERMAIN BY OTHERS (ZONE 223)
- FUTURE WATERMAIN ZONE BOUNDARY

EAST 16 MILE CREEK
SUBCATCHMENT ES6 EAST EIR/FSS

DRAWING 9.3R

WATER SERVICING

PROJECT No.	DATE:	SCALE:
18-599	JUN. 2024	1:2000

REGIONAL MUNICIPALITY OF HALTON
Department of Public Works

SANITARY OPERATING MAPS

TOWN OF OAKVILLE

Sewer Types
- Treated Discharge Sewer
- Untreated Discharge Sewer
- ForceMain
- Proposed ForceMain
- Gravity Sewer (In Service)
- Gravity Sewer (Out of Service)
- Proposed Gravity Sewer

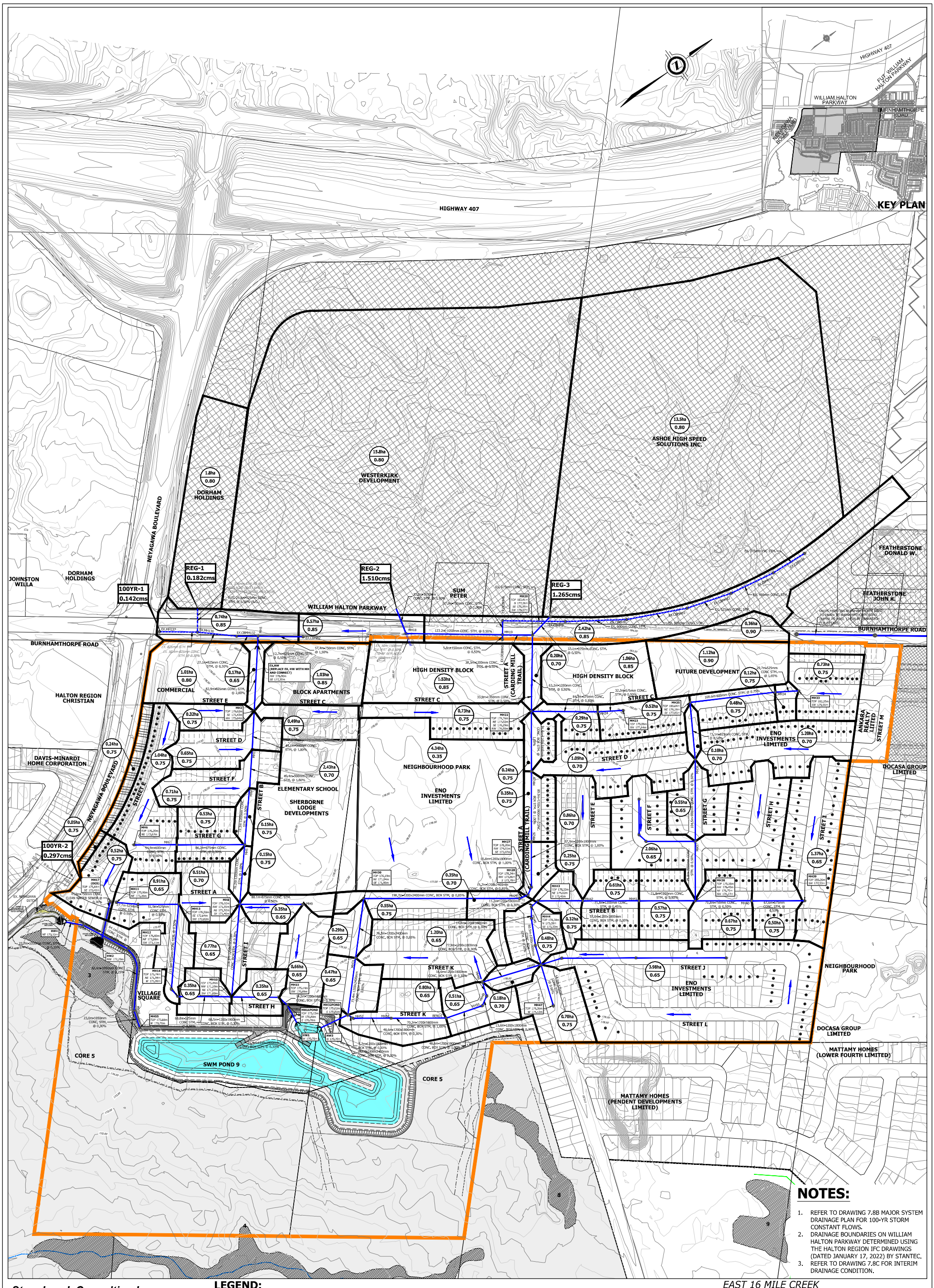
Maintenance Hole Types
- Maintenance Hole
- Chamber

Major System Facilities
- Wastewater Storage Tank
- Wastewater Treatment Plant
- Pumping Station
- Municipal Boundary

Meters
0 25 50 100 150 200

Map Index

Grid Number: 150C
Print Date: Dec 10, 2021



NOTES:

1. REFER TO DRAWING 7.8B MAJOR SYSTEM DRAINAGE PLAN FOR 100-YR STORM CONSTANT FLOWS.
2. DRAINAGE BOUNDARIES ON WILLIAM HALTON PARKWAY DETERMINED USING THE HALTON REGION IFC DRAWINGS (DATED JANUARY 17, 2022) BY STANTEC.
3. REFER TO DRAWING 7.8C FOR INTERIM DRAINAGE CONDITION.

Stonybrook Consulting Inc.
LGL Limited
Bird and Hale Limited
GEO Morphix Ltd.
R.J. Burnside & Associates Ltd.
Urbantech Consulting

LEGEND:

- SUBJECT LANDS
- EXISTING CONTOUR
- CORE AREA
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- NON PARTICIPATING LANDOWNERS (FUTURE DEVELOPMENT)
- MINOR SYSTEM STORM DRAINAGE AREA BOUNDARY
- 2.50ha / 0.65 — MINOR SYSTEM STORM DRAINAGE AREA (ha) / RUNOFF COEFFICIENT
- STORM SEWER, MANHOLE AND FLOW DIRECTION
- LOCAL STORM SEWER FLOW DIRECTION
- MH 23 / TOP 256.53m / SW 255.72m / NW 255.72m — STORM MH ID / PROPOSED GROUND ELEVATION / PROPOSED SEWER INVERTS
- 100YR-6 / 3.885cms — MAJOR SYSTEM CAPTURE LOCATION ID (REFER TO DRAWING 7.9) / CONSTANT FLOW (m^3/s) CAPTURED IN PIPE AT LOW POINT (Q100-Q5)
- UNCONTROLLED FLOWS TO NEYAGAWA BLVD.
- SUMP PUMP REQUIRED

EAST 16 MILE CREEK
SUBCATCHMENT ES6 EAST EIR/FSS

DRAWING 7.8A-R

MINOR SYSTEM DRAINAGE PLAN

PROJECT No.	DATE:	SCALE:
18-599	JUN. 2024	1:2000

Stonybrook Consulting Inc.
LGL Limited
Bird and Hale Limited
GEO Morphix Ltd.
R.J. Burnside & Associates Ltd.
Urbantech Consulting

LEGEND:

- SUBJECT LANDS
- CORE AREA
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- NON PARTICIPATING LANDOWNERS (FUTURE DEVELOPMENT)
- SANITARY DRAINAGE BOUNDARY
- DRAINAGE AREA (ha)
- POPULATION
- POPULATION PER Ha (P/Ha)
- PROPOSED SANITARY SEWER & DIRECTION
- SAN MH ID
- PROPOSED GROUND ELEVATION
- PROPOSED SEWER INVERT
- LOCAL SAN SEWER FLOW DIRECTION
- EXISTING SANITARY SEWER & DIRECTION
- FUTURE SANITARY SEWER & DIRECTION (BY OTHERS)
- LOT REQUIRING SAN SERVICE CROSSING BENEATH LARGE STORM SEWER
- AREA SERVICING PLAN (ASP) DRAINAGE BOUNDARY

EAST 16 MILE CREEK
SUBCATCHMENT ES6 EAST EIR/FSS

DRAWING 9.2R

WASTEWATER SERVICING

PROJECT No.	DATE:	SCALE:
18-599	JUN. 2024	1:2000

Appendix B – Existing Conditions Storm Runoff Calculations

PROJECT: **Neyagawa & Hwy 407**
PROJECT No: **ALL-23012713-A0**
CREATED: **5-Sep-25**
PRINTED: **5-Sep-25**

Pre-Development Runoff Coefficient and Peak Flows
Town of Oakville

Contributing Area	ID#	Runoff Coefficient	AREA (Ha)
Future Transitway & Controlled Access Highway	101A	0.35	0.58
North Drainage	101B	0.35	0.71
South Drainage	102A	0.35	1.06
Future Easement	102B	0.35	0.05
Total		**0.35**	**2.40**

Runoff Coefficients

High density (condo/high rise)	0.85
Parks	0.35

Future Transitway & Controlled Access Highway Drainage (101A) Pre-Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	64.4 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	91.4 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	113.2 l/s

North Drainage (101B) Pre-Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	78.8 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	111.9 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	138.6 l/s

South Drainage (102A) Pre-Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	117.7 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	167.1 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	206.9 l/s

Future Easement (102B) Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	5.6 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	7.9 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	9.8 l/s

Appendix C – Proposed Conditions SWM Calcs & Background Information

PROJECT: **Neyagawa & Hwy 407**
PROJECT No: **ALL-23012713-A0**
CREATED: **9-Sep-25**
PRINTED: **9-Sep-25**

Post-Development Runoff Coefficient and Peak Flows
Town of Oakville

Contributing Area	ID#	Runoff Coefficient	AREA (Ha)
Controlled Site	201A	0.85	0.62
Controlled Site	201B	0.85	0.92
Uncontrolled Site - North Catchment	301	0.35	0.17
Uncontrolled Site - South Catchment	302	0.90	0.06
Uncontrolled Site - Future Transitway & Controlled Access Highway	303	0.35	0.58
Uncontrolled Site - Future Easement	304	0.50	0.05
Total Controlled		**0.85**	**1.54**
Total Uncontrolled		**0.40**	**0.86**

Runoff Coefficients

High density (condo/high rise)	0.85
Parks/Grass	0.35
Asphalt/Concrete	0.90

ID #201A Controlled Post-Development Flows for the Site

Time of Concentration	10 minutes		
5 Year Intensity	114.21 mm/hr	$Q_{(5year)}$	167.2 l/s
25 Year Intensity	162.17 mm/hr	$Q_{(25year)}$	237.4 l/s
100 Year Intensity	200.80 mm/hr	$Q_{(100year)}$	294.0 l/s

ID #201B Controlled Post-Development Flows for the Site

Time of Concentration	10 minutes		
5 Year Intensity	114.21 mm/hr	$Q_{(5year)}$	248.1 l/s
25 Year Intensity	162.17 mm/hr	$Q_{(25year)}$	352.3 l/s
100 Year Intensity	200.80 mm/hr	$Q_{(100year)}$	436.2 l/s

ID #301 Uncontrolled Post-Development Flows for the Site

Time of Concentration	10 minutes		
5 Year Intensity	114.21 mm/hr	$Q_{(5year)}$	18.9 l/s
25 Year Intensity	162.17 mm/hr	$Q_{(25year)}$	26.8 l/s
100 Year Intensity	200.80 mm/hr	$Q_{(100year)}$	33.2 l/s

ID #302 Uncontrolled Post-Development Flows for the Site

Time of Concentration	10 minutes		
5 Year Intensity	114.21 mm/hr	$Q_{(5year)}$	17.1 l/s
25 Year Intensity	162.17 mm/hr	$Q_{(25year)}$	24.3 l/s

100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	30.1 l/s

ID #303 Uncontrolled Post-Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	64.4 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	91.4 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	113.2 l/s

ID #304 Uncontrolled Post-Development Flows for the Site

Time of Concentration	10	minutes		
5 Year Intensity	114.21	mm/hr	$Q_{(5year)}$	7.9 l/s
25 Year Intensity	162.17	mm/hr	$Q_{(25year)}$	11.3 l/s
100 Year Intensity	200.80	mm/hr	$Q_{(100year)}$	13.9 l/s

PROJECT: **Neyagawa & Hwy 407**
PROJECT No: **ALL-23012713-A0**
CREATED: **9-Sep-25**
PRINTED: **9-Sep-25**

Required Storage Volume - SWM Chamber #1

Town of Oakville

Control 100 Year Post Development to 5 Year Target Unit Flow Rate

Controlled Site Area - #201A	0.62	ha
Allowable Release From Site (5 Year)	49.6	l/s
Uncontrolled Runoff From Site (100 Year)	0.0	l/s
Net Allowable Release From Site	49.6	l/s
SWM Chamber #1 - Orifice Allowable Release From	**44.5**	l/s
Composite Runoff Coefficient (Controlled Area)	0.85	
Time of Concentration	10	minutes

100 Year Storm I = 2150/(t+5.7)^0.861

Storm Duration (minutes)	Rainfall Intensity (mm/hr)	Total Runoff Q (l/s)	Required Storage Volume (m^3)
5	279.344	408.9	109.3
10	200.802	294.0	149.7
15	158.266	231.7	168.5
20	131.367	192.3	177.4
25	112.723	165.0	**180.8**
30	98.990	144.9	180.7
35	88.426	129.4	178.4
40	80.030	117.2	174.4
45	73.186	107.1	169.1
50	67.493	98.8	162.9
55	62.678	91.8	155.9
60	58.548	85.7	148.3
65	54.965	80.5	140.3
70	51.825	75.9	131.7
75	49.048	71.8	122.9
80	46.574	68.2	113.7
85	44.355	64.9	104.2
90	42.352	62.0	94.5
181m^3 of Storage is required			

PROJECT: **Neyagawa & Hwy 407**
PROJECT No: **ALL-23012713-A0**
CREATED: **9-Sep-25**
PRINTED: **9-Sep-25**

Required Storage Volume - SWM Chamber #2

Town of Oakville

Control 100 Year Post Development to 5 Year Target Unit Flow Rate

Controlled Site Area - #201B	0.92	ha
Allowable Release From Site (5 Year)	73.7	l/s
Uncontrolled Runoff From Site (100 Year)	0.0	l/s
Net Allowable Release From Site	73.7	l/s
SWM Chamber #2 - Orifice Allowable Release From	**71.7**	l/s
Composite Runoff Coefficient (Controlled Area)	0.85	
Time of Concentration	10	minutes

100 Year Storm I = 2150/(t+5.7)^0.861

Storm Duration (minutes)	Rainfall Intensity (mm/hr)	Total Runoff Q (l/s)	Required Storage Volume (m^3)
10	200.802	480.7	245.4
20	131.367	329.9	309.8
30	98.990	259.5	338.1
40	80.030	218.3	351.9
50	67.493	191.1	358.2
60	58.548	171.7	**359.9**
70	51.825	157.1	358.6
80	46.574	145.7	355.0
90	42.352	136.5	349.9
100	38.879	129.0	343.5
110	35.967	122.6	336.1
120	33.490	117.2	327.9
130	31.354	112.6	319.1
140	29.492	108.6	309.6
150	27.853	105.0	299.7
160	26.400	101.8	289.4
170	25.101	99.0	278.7
180	23.933	96.5	267.7
360m^3 of Storage is required			

Neyagawa & Hwy 407, Oakville

Orifice #1 - SWM Chamber 1

INPUT

Required Discharge (l/s) =	49.60
Max. Water Surface Elev. (m) =	181.740
Discharge Pipe Invert (m) =	181.480
Discharge Pipe Diameter (mm) =	300
Orifice Diameter (mm) =	200
Orifice Flow Loss (C) =	0.8

OUTPUT

H =	0.16	m
g =	9.806	
V = (2*g*H)^0.5 =	1.771	m/s
A = X-section Area =	0.0314	m2

Orifice Flow = Q = C * A * V * 1000 =	44.5	l/s

Neyagawa & Hwy 407, Oakville

Orifice #2 - SWM Chamber 2

INPUT

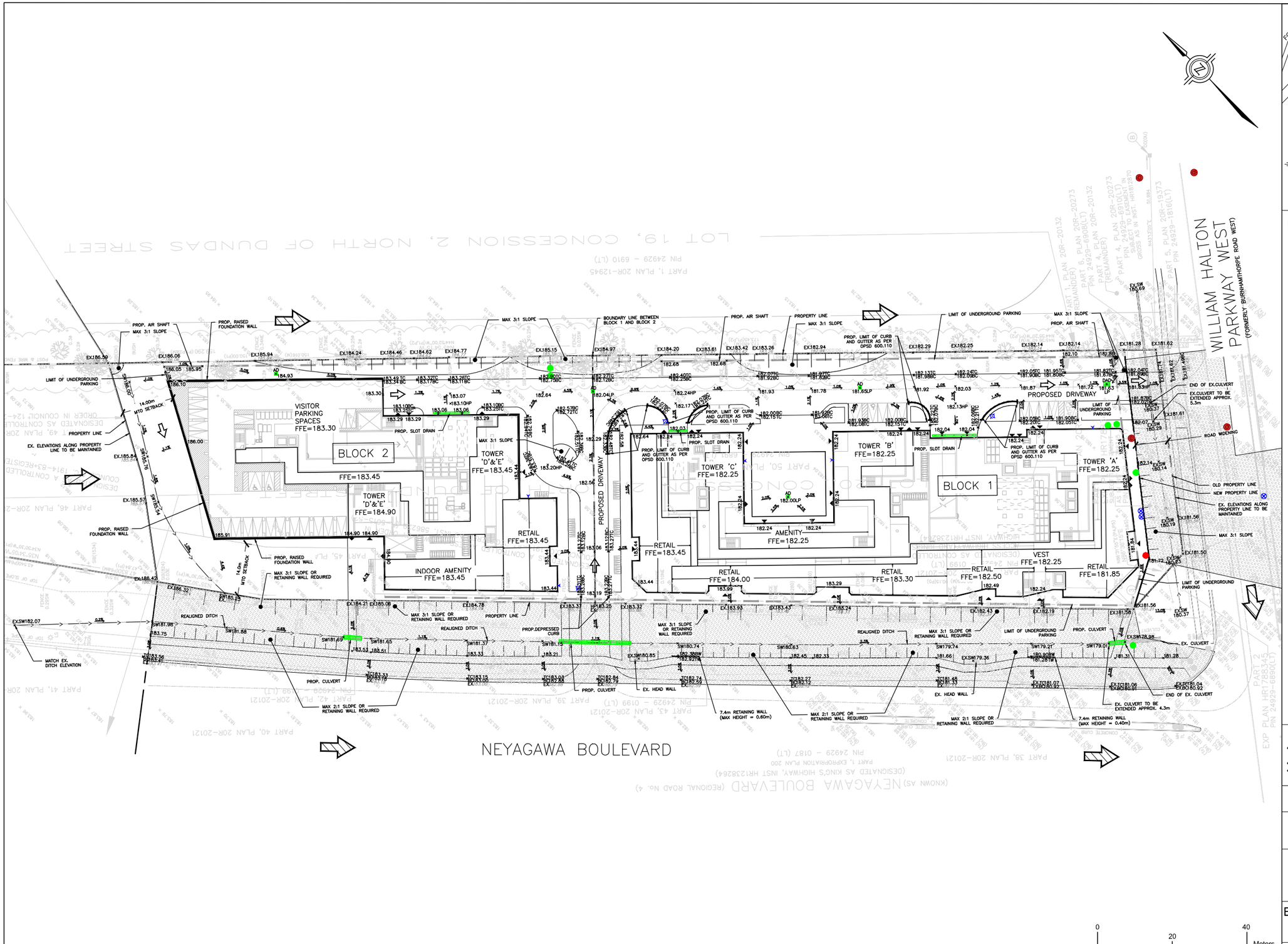
Required Discharge (l/s) =	**73.70**
Max. Water Surface Elev. (m) =	**181.330**
Discharge Pipe Invert (m) =	**180.670**
Discharge Pipe Diameter (mm) =	**375**
Orifice Diameter (mm) =	**185**
Orifice Flow Loss (C) =	**0.8**

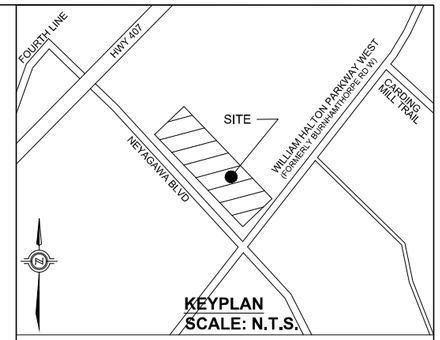
OUTPUT

H =	**0.5675**	**m**
g =	**9.806**	
V = (2*g*H)^0.5 =	**3.336**	**m/s**
A = X-section Area =	**0.0269**	**m2**

Orifice Flow = Q = C * A * V * 1000 =	**71.7**	**l/s**

Appendix D – Preliminary Site Grading, Servicing, & ESC Plans





LEGEND:

- PROPERTY LINE
- NEW / EXISTING WATER VALVE AND BOX
- PROPOSED HYDRANT
- 109.42 PROPOSED ELEVATION
- 109.42 EXISTING ELEVATION
- DRAINAGE ARROW / SLOPE (MAX 3:1)
- EMERGENCY OVERLAND FLOW (GREATER THAN 100-YEAR STORM)
- MAJOR OVERLAND FLOW
- DISTURBED AREA WITHIN CITY RIGHT-OF-WAY
- PROPOSED TRENCH DRAIN
- EX. STORM/SANITARY M.H.
- EX. CATCH BASIN
- LIMIT OF UNDERGROUND PARKING
- DAD PROP. DOUBLE AREA DRAIN
- AD PROP. AREA DRAIN
- CB PROP. CATCHBASIN
- PROP. STORM M.H.
- PROP. SANITARY M.H.
- FUT. SANITARY M.H.
- PROP. SIAMESE
- PROP. WATER VALVE
- SWALE DIRECTION
- PROP. RAISED FOUNDATION WALL
- EXISTING / PROPOSED CULVERT

SOURCE:

- BACKGROUND LEGAL AND TOPOGRAPHIC SURVEY PREPARED BY KRCMAR SURVEYORS LTD. DATED NOVEMBER 02, 2023
- SITE PLAN PREPARED BY KIRKOR ARCHITECTS AND PLANNERS
- LANDSCAPE DRAWINGS PREPARED BY LANDSCAPE PLANNING LIMITIED

SCALE: 1:1000

exp.	DRAWN BY	CHECKED BY
	W.K.	S.P.

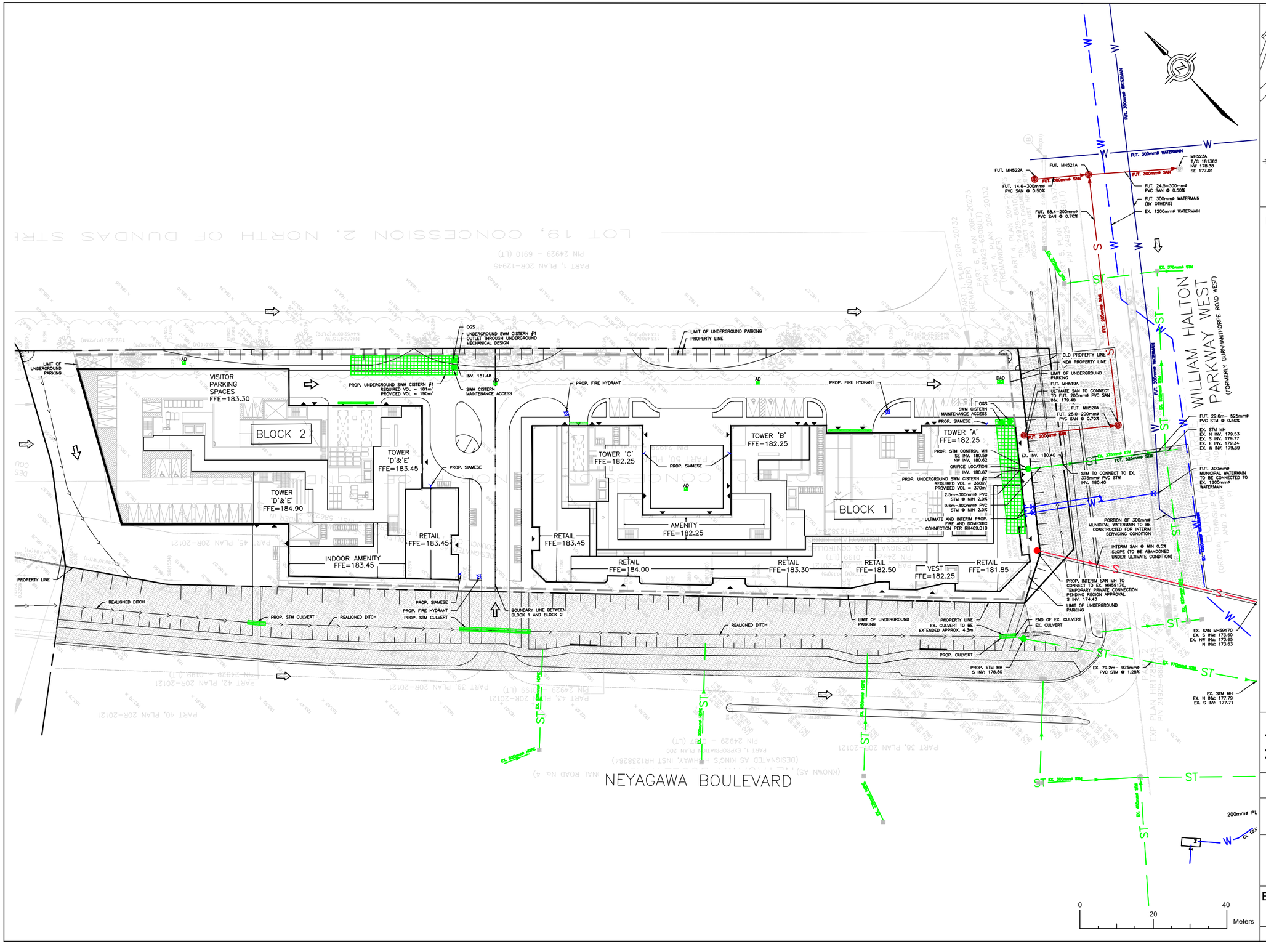
PRELIMINARY SITE GRADING PLAN

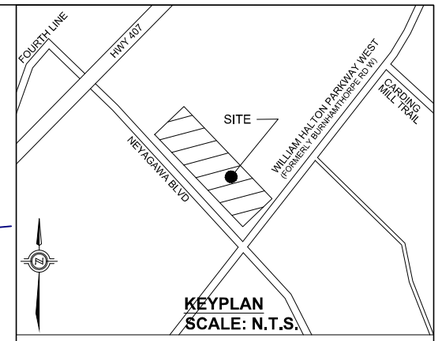
FIGURE 2

BURNHAMTHORPE/OAKVILLE HOLDINGS INC.
NEYAGAWA & HWY 407
TOWN OF OAKVILLE

PROJECT NUMBER: ALL-23012713-A0

DATE: SEPTEMBER 2025





LEGEND:

- PROPERTY LINE
- NEW / EXISTING WATER VALVE AND BOX
- PROPOSED HYDRANT
- 109.42 — PROPOSED ELEVATION
- 109.42 — EXISTING ELEVATION
- DRAINAGE ARROW / SLOPE (MAX 3:1)
- EMERGENCY OVERLAND FLOW (GREATER THAN 100-YEAR STORM)
- EXTERNAL FLOW DIRECTION
- DISTURBED AREA WITHIN CITY RIGHT-OF-WAY
- PROPOSED TRENCH DRAIN
- EXISTING / PROPOSED CULVERT
- EX. STORM/SANITARY M.H.
- EX. CATCH BASIN
- PROPOSED CURBS
- LIMIT OF UNDERGROUND PARKING
- ST — INTERIM STORM SEWER
- W — INTERIM WATERMAIN
- S — INTERIM SANITARY SEWER
- S — EX. SANITARY SEWER
- ST — EX. STORM SEWER
- W — EX. WATERMAIN
- ST — ULTIMATE STORM SEWER
- W — ULTIMATE WATERMAIN
- S — ULTIMATE SANITARY SEWER
- AD — PROP. AREA DRAIN
- DAD — PROP. DOUBLE AREA DRAIN
- PROP. SIAMESE
- PROP. WATER VALVE
- PROP. STORM M.H.
- PROP. SANTIARY M.H.
- FUT. SANITARY M.H.

SOURCE:

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- SITE PLAN PREPARED BY KIRKOR ARCHITECTS AND PLANNERS
- LANDSCAPE DRAWINGS PREPARED BY LANDSCAPE PLANNING LIMITIED

SCALE: 1:1000

exp.

DRAWN BY	CHECKED BY
W.K.	S.P.

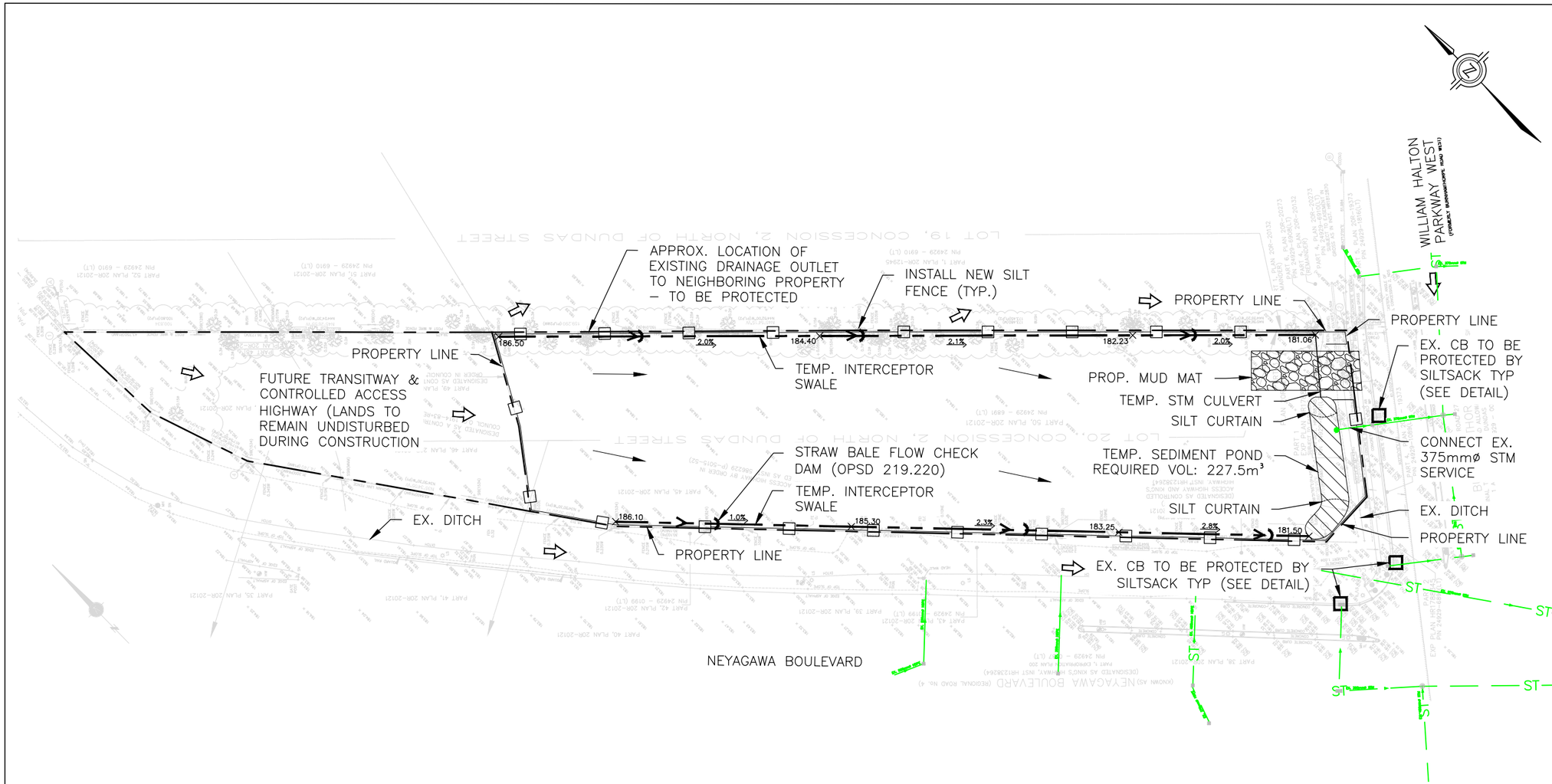
PRELIMINARY SITE SERVICING PLAN

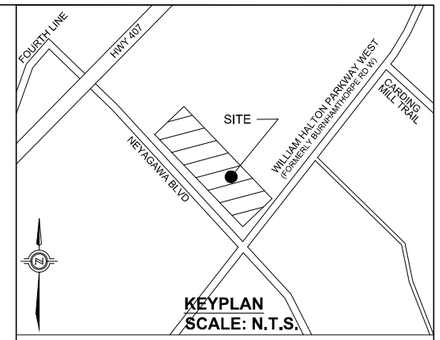
FIGURE 3

BURNHAMTHORPE/OAKVILLE HOLDINGS INC.
NEYAGAWA & HWY 407
TOWN OF OAKVILLE

PROJECT NUMBER: ALL-23012713-A0

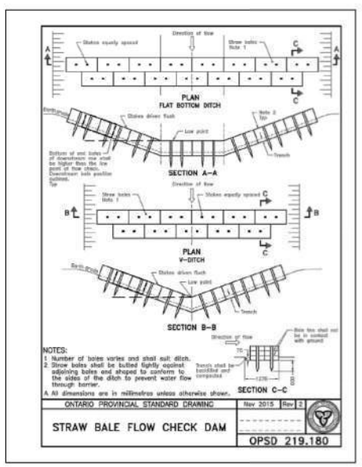
DATE: SEPTEMBER 2025

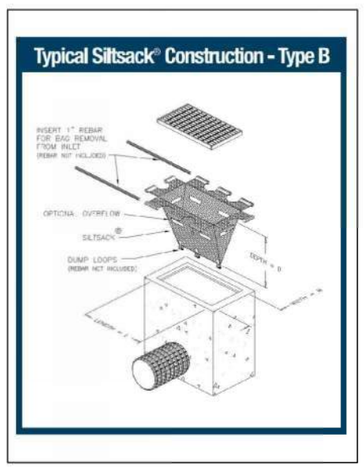


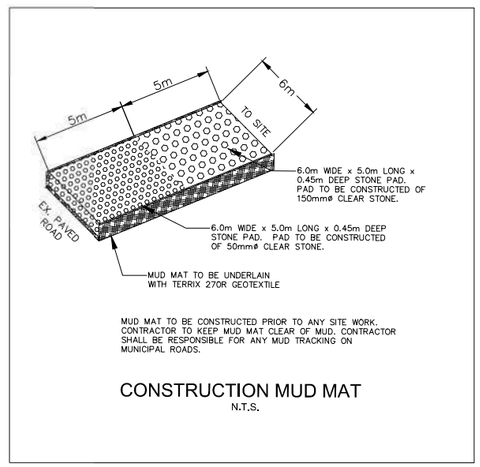


LEGEND:

- EXISTING WATER VALVE
- EXISTING HYDRO POLE
- EXISTING TREE
- EXISTING TREE DRIPLINE
- EXISTING OVERHEAD HYDRO WIRES
- EXISTING FENCELINE
- EXISTING CURBS
- EX. STORM M.H.
- EX. SANITARY M.H.
- EX. CATCH BASIN
- PROP. STORM M.H.
- EX. SANITARY SEWER
- EX. STORM SEWER
- EX. WATERMAIN
- EX. HIGH VOLTAGE CONDUIT
- EX. BELL AND FIBEROPTIC CONDUIT
- EX. GAS
- PROPERTY LINE
- 88.10 EXISTING GROUND ELEVATION
- (TC 88.10) EXISTING TOP OF CURB ELEVATION
- (BC 88.10) EXISTING GUTTER ELEVATION
- SEDIMENT CONTROL FENCE
- MUD MAT (SEE DETAIL THIS DWG)
- CATCHBASIN SEDIMENT CONTROL TERRAFIX SILTSACK (SEE DETAIL THIS DWG)
- TEMPORARY OVERLAND FLOW ROUTE
- TEMP SLOPE DIRECTION
- STRAW BALE FLOW CHECK DAM (SEE DETAIL THIS DWG)







MUD MAT TO BE CONSTRUCTED PRIOR TO ANY SITE WORK. CONTRACTOR TO KEEP MUD MAT CLEAR OF MUD. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MUD TRACKING ON MUNICIPAL ROADS.

CONSTRUCTION MUD MAT
N.T.S.

SOURCE:

- BACKGROUND LEGAL AND TOPOGRAPHIC SURVEY PREPARED BY KRCMAR SURVEYORS LTD. DATED NOVEMBER 02, 2023
- SITE PLAN PREPARED BY KIRKOR ARCHITECTS AND PLANNERS
- LANDSCAPE DRAWINGS PREPARED BY LANDSCAPE PLANNING LIMITIED

SCALE: 1:1500

	DRAWN BY	CHECKED BY
exp.	W.K.	S.P.

PRELIMINARY EROSION AND SEDIMENT CONTROL PLAN

FIGURE 4

BURNHAMTHORPE/OAKVILLE HOLDINGS INC.
NEYAGAWA & HWY 407
TOWN OF OAKVILLE

PROJECT NUMBER: ALL-23012713-A0 | DATE: SEPTEMBER 2025

Appendix E – Groundwater Documents

r_e = Equivalent perimeter (m)

a = Length of the excavation area (m)

b = Width of the excavation area (m)

It is expected that the initial dewatering rate will be higher to remove groundwater from within the overburden formation. The dewatering rates are expected to decrease once the target water level is achieved in the excavation footprint as groundwater will have been removed, primarily from storage, resulting in lower seepage rates into the excavation.

4.2 Cooper-Jacob's Radius of Influence

The radius of influence (Rcj) for the construction dewatering was calculated based on Cooper-Jacob's equation. This equation is used to predict the distance at which the drawdown resulting from pumping is negligible.

The estimated radius of influence due to pumping is based on Cooper-Jacob's formula as follows:

$$R_{cj} = \sqrt{2.25KDt/s}$$

Where:

Ro = Estimated radius of influence (m)

D = Aquifer thickness (original saturated thickness) (m)

K = Hydraulic conductivity (m/s)

S = Storage coefficient

t = Duration of pumping (s)

4.3 Stormwater

Additional pumping capacity may be required to maintain dry conditions within the excavation during and following significant precipitation events. Therefore, the dewatering rates at the Site should also include removing stormwater from the excavation.

A 25 mm precipitation event was utilized for estimating the stormwater volume. The calculation of the stormwater volume is included in Appendix E.

The estimate of the stormwater volume only accounts for direct precipitation into the excavation. The dimensions of the excavation are considered in the dewatering calculations. Runoff which originated outside of the excavation's footprint is excluded and it should be directed away from the excavation.

During precipitation events greater than 25 mm (ex: 100-year storm), measures should be taken by the contractor to retain stormwater onsite in a safe manner to not exceed the allowable water taking and discharge limits, as necessary. A two (2) and a one hundred (100) year storm event over a 24-hour period are 57.5 and 125.5 mm (refer to Appendix E).

4.4 Results of Dewatering Rate Estimates

4.4.1 Construction Dewatering Rate Estimate

For this assessment, it was assumed that the proposed construction plans include an excavation with shoring extending to the Site boundaries. EXP should be retained to review the assumptions outlined in this section, should the assumed shoring design change.

Short-term (construction) dewatering calculations are presented in Appendix E.

Pits (elevator, sump pits) are assumed to have the same excavation depth and dewatering target as the main excavation; deeper pits may require localized dewatering and revised dewatering estimates.

Based on the assumptions provided in this report, the results of the dewatering rate estimate can be summarized as follows:

Table 4-2 Summary of Construction Dewatering Rate

Peak Dewatering Flow Rate Including Rain Collection Volume	
Description	**With 3 Levels of Underground Parking (L/day)**
Total Volume (L/day) Short Term Discharge of Groundwater (Construction dewatering) with Safety Factor (including precipitation)	1,331,00

The peak dewatering flow rates does not account for flow from utility beddings and variations in hydrogeological properties beyond those encountered during this investigation.

There are artesian conditions observed in the southern portion of the site which may cause basal heave if not depressurized during excavation. As such, effective control of the groundwater utilizing a suitable positive dewatering system designed, installed and operated by an experienced dewatering contractor is required.

Local dewatering may be required for pits (elevator pits, sump pits), if these extend deeper than the dewatering target. Local dewatering is not considered to be part of this assessment. Dewatering estimates should be reviewed once the pit dimensions are available. In areas where artesian groundwater conditions are encountered, groundwater depressurization will be required to lower the groundwater levels to the dewatering target/s.

Local dewatering may be required for pits (elevator pits, sump pits, raft) and for localized areas with permeable, soft, or wet soil conditions. Local dewatering is not considered to be part of this assessment, but contractor should be ready to install additional system to manage such conditions. Dewatering estimates should be reviewed once the pit dimensions are available.

All grading around the perimeter of the excavation should be graded away from the shoring the systems and ramp/site access to redirect runoff away from excavation.

The dewatering assumptions are based on using shoring system without open cuts and sloped excavations.

The contractor is responsible for the design of the dewatering systems (depth of wells, screen length, number of wells, spacing sand pack around screens, prevent soil loss etc.) to ensure that dry conditions are always maintained within the excavation at all costs.

Dewatering should be monitored using dedicated monitoring wells within and around the perimeter of the excavation, and these wells should be monitored using manual measurements and with electronic data loggers; records should be maintained on site to track dewatering progress. Discharge rates should be monitored using calibrated flow meters and records of dewatering progress, and daily precipitation as per MECP requirements should be maintained.

4.4.2 Post-Construction Dewatering Rate Estimate

It is our understanding that the development plan includes a permanent foundation sub-drain system that will ultimately discharge to the municipal sewer system if conventional footings are installed.

The long-term dewatering was based on the same equations as construction dewatering shown in Section 4.1.

The calculation for the estimated flow to the future sub-drain system (with no cutoff walls) is provided in Appendix E. The dewatering target for the foundation drainage system is taken at 0.5 m below the lowest slab elevation.

The foundation drain analysis provides a flow rate estimate. Once the foundation drain is built, actual flow rate measurements of the sump discharge will be required to confirm the estimated flow rate.

Based on the assumptions provided in this report, the estimated sub-drain discharge volumes are summarized in Appendix E. Seasonal and daily fluctuations are expected. These estimates may be affected by hydrogeological conditions beyond those encountered at this time, fluctuations in groundwater regimes, surrounding Site alterations, and existing and future infrastructures.

Table 4-3: Summary of Long-Term Dewatering Rate

Long-Term Dewatering Flow Rate	With 3 Levels of Underground Parking (L/day)
Total Volume (L/day) Long-Term Drainage of groundwater (from foundation drainage, weeping tiles, sub slab drainage) with Safety Factor Included	237,000
Long-Term Dewatering Rate without Safety Factor	158,000

Intermittent cycling of sump pumps and seasonal fluctuation in groundwater regimes should be considered for pump specifications. A safety factor was applied to the flow rate to account for water level fluctuations due to seasonal changes.

These estimates assume that pits (elevator and/or sump pits) are made as watertight structures (without drainage), if their depths extend below the dewatering target, as previously stated. The dewatering assumptions are based on using shoring system without open cuts. Open cuts can act as preferential groundwater pathways in the long-term and cause foundation drainage volumes to increase.

The sub-drain rate estimate is based on the assumptions outlined in this report. Any variations in hydrogeological conditions beyond those encountered as part of this investigation may significantly influence the sub-drain discharge volumes.

Town of Oakville/Halton Region may not allow any long-term dewatering in which case the underground structures can be designed as watertight structures to avoid the long-term flow shown in Table 4-3 above.

4.5 MECP Water Taking Permits

4.5.1 Short-Term Discharge Rate (Construction Phase)

In accordance with the Ontario Water Resources Act, if the water taking for the construction dewatering is more than 50,000 L/day but less than 400,000 L/day, then an online registration in the Environmental Activity and Sector Registry (EASR) with the

Proposed Development

Sky Property Group Inc.

Type of Document:
Preliminary Geotechnical Investigation

Project Location:
Neyagawa Boulevard
between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Project Number:
BRM-23012833-D0

Prepared By:
Leo Chui, P. Eng.
Project Manager
Geotechnical Services

Date Submitted:
2023-12-12

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Table of Contents

1. Introduction

This report presents the findings of a preliminary geotechnical investigation conducted for the proposed development at a vacant lot located on the north side of Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West in Oakville, Ontario. The work was authorized by Mr. Marc J. Pourvahidi of Sky Property Group Inc.

The conceptual plan has not been developed at the time of this investigation. However, it is understood the proposed development will consist of four (4) high-rise towers averaging thirty (30) stories high with three (3) to four (4) levels of underground parking. The preliminary geotechnical investigation will address general site development.

The purpose of the preliminary geotechnical investigation was to determine the subsurface soil and groundwater conditions at the site by putting down a limited number of sampled boreholes and rock coring and, based on an assessment of the factual borehole and rock core data, to provide preliminary geotechnical engineering guidelines for the design and construction of proposed development.

Our Terms of Reference also included Phase One and Two Environmental Site Assessments (ESAs) and a preliminary hydrogeological investigation, the results of which will be presented under separate covers.

The comments and recommendations given in this report are based on the assumption that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these changes. The result of this review may be a modification of our recommendations or the requirement of additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description

The site is located at the east side of Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West in Oakville, Ontario. There is no municipal address for this site at the time of the investigation.

The site is irregular in shape and is currently a vacant parcel of land. An asphalt driveway provides access to the site at the southeast corner of the site. The site is bounded by Highway 407 to the north, Neyagawa Boulevard to the west, Burnhamthorpe Road West to the south and an agricultural land parcel to the east. The existing ground surface drops about 10 m from north to south.

3. Fieldwork

The fieldwork was carried out between November 6 and 10, 2023. Prior to drilling, the borehole locations were cleared of underground utilities by Ontario One Call contractors and a private locator. Five (5) sampled boreholes (designated Boreholes 1D, 2D, 3D, 4 and 5) and three (3) unsampled boreholes (Boreholes 1S, 2S and 3S) were advanced to depths of 7.8 to 18.3 m below existing grade at the approximate locations shown on the attached Borehole Location Plan (Drawing No. 1).

The boreholes were advanced using continuous flight solid stem augering and mud rotary drilling equipment owned and operated by a specialist drilling contractor. In each borehole, soil samples were recovered using conventional split spoon equipment following the standard penetration test method. To confirm bedrock and to determine its quality, Boreholes 1D, 2D and 3D were extended into the bedrock down to the termination depth of boreholes by coring in HQ size using diamond drilling equipment.

Water levels were observed in the boreholes during the course of the fieldwork and in monitoring wells installed in all completed boreholes to establish the short-term stabilized groundwater level at the site. The monitoring wells were installed in accordance with the Ontario Water Resources Act, R.R.O. 1990, Ontario Regulation (O. Reg.) 903 – Amended to O. Reg. 128/03.

The fieldwork was supervised by EXP geotechnical staff who monitored the drilling operations and logged the borings. The split spoon samples and recovered rock cores were transported to our laboratory for detailed examination.

The location and ground surface elevation of the boreholes were determined in the field by EXP Services Inc. Ground surface elevations at the borehole locations were determined from Can-Net Elevations with the use of a Trimble TSC3 Controller.

4. Laboratory Testing

The laboratory testing program comprised moisture content determination on all recovered soil samples, with results presented on the Log of Borehole sheets (Drawing Nos. 2 to 6).

5. Subsurface Conditions

5.1 Soil and Bedrock

The detailed soil and rock profile encountered in each borehole and the results of laboratory moisture content determinations are indicated on the attached borehole and rock core logs (Drawing Nos. 2 to 6). It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Descriptions" preceding the borehole and rock core logs form an integral part of and should be read in conjunction with this report.

The stratigraphy, as revealed in the boreholes, comprised surficial topsoil underlain by fill overlying native deposits of sandy silt till, clayey silt till and silt till over shale bedrock. A brief description of the stratigraphy in order of depth follows.

Topsoil

Surficial topsoil approximately 100 to 180 mm thick was encountered in all boreholes and comprised dark brown sandy silt with rootlets and organics.

Fill

Fill was encountered below the topsoil in all boreholes, extending to depths of about 0.6 to 1.1 m below existing grade. The composition of the fill is generally sandy silt with trace amounts of gravel. Occasional rootlets were noted within the fill. Moisture contents of the moist fill ranged from 10 to 24%.

Sandy Silt Till

Sandy silt till was encountered below the fill in all boreholes and extended to depths of about 3.8 to 6.5 m below existing grade. The sandy silt till deposit was brown/red in colour, contained a trace to some clay and a trace of gravel. Some cobbles and boulders are also present in the till. The till existed in a compact to very dense state of compactness. Moisture contents ranged from 9 to 13%, indicating a moist condition.

Clayey Silt Till

A clayey silt deposit was encountered below the sandy silt till in all boreholes except Borehole 5. This deposit extended to depths of about 7.0 to 10.4 m below existing grade. The clayey silt till was reddish grey in colour and contained a trace of sand and gravel. It was stiff to very stiff in consistency. Moisture contents were about 12 to 15%, indicating a moist condition.

Silt Till

Below the clayey silt till in Boreholes 1D to 4 and the sandy silt till in Borehole 5, a silt till deposit was encountered. The reddish brown silt till contained trace to some clay and a trace of sand and gravel. It also contains some cobbles and boulders. The lower portion of the silt till became a shale/till complex in Boreholes 1D and 2D. It is dense at the surface, but otherwise generally very dense. Moisture contents ranged between 5 and 12%, indicating moist conditions. Boreholes 4 and 5 were terminated within the silt till while it extended to the surface of the bedrock at depths of about 8.8 to 15.3 m below existing grade in Boreholes 1D, 2D and 3D.

Shale Bedrock

In Boreholes 1D, 2D and 3D, weathered shale bedrock was encountered at about 8.8 to 15.3 m below existing grade. The surface level of the shale bedrock varied from approximate Elevation 175.0 m in Borehole 1D at the northern portion of the site to about Elevation 172.8 m in Borehole 3D at the southern portion of the site. It should be noted that the upper zone of the bedrock is generally completely to highly weathered. The distinction between completely weathered shale and the overlying strata, particularly if the latter contains abundant shale fragments, is not always clear and consequently, some of the soils resting on the surface of the bedrock might be very weak or completely weathered rock. As such, the contact elevations should not be interpreted as exact planes of bedrock since the auger will frequently penetrate some distance into the weathered rock before noticeable resistance is encountered.

Coring of rock was carried out by HQ size diamond core drilling to determine the quality of the bedrock. Based on the rock core samples and knowledge of the site area, the bedrock at this site is the Queenston Formation which consists of red to maroon noncalcareous to calcareous shale with subordinate amounts of green shale, siltstone and limestone. Typically, the hard limestone layers comprise about 15 to 20 percent of the unit but may comprise as much as 70 to 90 percent of the bedrock. The hard layers are usually less than about 100 to 150 mm thick but some are much thicker. The thicker layers have been observed to be as much as 750 to 900 mm at other sites. The layers are actually lenses and they can vary significantly in thickness over short distances.

Stress relief features such as folds and faults may be encountered in the Queenston Formation. In these features the rock is heavily fractured and sheared. It can also contain layers of shale rubble and clay. Due to the fracturing, these features may also be groundwater conduits, which could result in excessive water flow into excavation. Weathering is much deeper than the surrounding rock in sound unweathered bedrock overlying fractured and weathered bedrock. The stress relief features are usually in the order of 4 to 6 m wide, but in depth can vary from 4 to 5 m to in excess of 10 m.

In the three boreholes where rock cores were taken, the total recovery was 100%, and the RQD (Rock Quality Designation) varied from 18 to 93%, indicating very poor quality rock at the surface, changing to fair to excellent quality at depths. The shale was moderately to highly weathered at the surface, and slightly weathered to fresh below. The thickness of the moderately to highly weathered rock was about 0.8 to 1.8 m at BH 1 to BH 3. The depths of the bedrock surface and of the slightly weathered rock are summarized in the table below.

Table 1: Rock Depth & Elevation

Borehole	Ground Elev	Rock Surface		Slightly Weathered Rock	
		Depth (m)	Elev (m)	Depth (m)	Elev (m)
1D	190.26	15.3	175.0	17.1	173.2
2D	184.30	10.6	173.7	11.4	172.9
3D	181.59	8.8	172.8	9.7	171.9

5.2 Groundwater

Groundwater conditions were observed in the boreholes during the course of the fieldwork and groundwater monitoring wells were installed in all boreholes for subsequent readings. Short-term groundwater measurements are recorded in the attached borehole logs.

Upon completion of drilling, groundwater level was unable to be observed in all boreholes due to the use of drilling mud, water for rock coring or flushing. The subsequent short-term groundwater level readings are presented in Table 1 below.

Table 2: Short Term Groundwater Levels in Boreholes

Borehole No.	Ground Surface Elevation (m)	Depth of Monitoring Well (m)	Groundwater Depth / Elevation in Well (m)		
			November 15, 2023	November 17, 2023	November 29, 2023
BH 1D	190.26	18.29	6.48 / ~179.6	N/A (No reading)	6.64 / ~183.6
BH 1S	190.26	8.22	7.77 / ~173.3	7.71 / ~173.4	6.31 / ~183.9
BH 2D	184.30	16.0	1.86 / ~188.4	N/A (No reading)	1.92 / ~182.4
BH 2S	184.30	8.8	0.86 / ~189.4	1.10 / ~189.2	1.02 / ~183.3
BH 3D	181.59	16.03	4.47 / ~179.8	N/A (No reading)	4.47 / ~177.1
BH 3S	181.59	8.66	0.55 / ~183.8	0.66 / ~183.6	0.67 / ~180.9
BH 4	186.12	8.97	2.73 / ~178.9	2.84 / ~178.8	2.89 / ~183.2

Borehole No.	Ground Surface Elevation (m)	Depth of Monitoring Well (m)	Groundwater Depth / Elevation in Well (m)		
			November 15, 2023	November 17, 2023	November 29, 2023
BH 5	181.06	7.84	-0.64 / ~182.2	-0.49 / ~182.1	-0.44 / ~181.5

Based on the measured groundwater levels, there appears to be multiple groundwater systems at the site. A shallow groundwater table is measured between about 2.89 below grade to 0.44 m above grade, corresponding to Elevations 181.5 to 183.3 m. The tills in BH5 were under artesian pressure. A deeper groundwater table was measured at about 4.47 to 6.64 m below existing grade, corresponding to Elevations 177.1 to 183.9 m below existing grade. The groundwater elevations reflect conditions at the time of the investigation. Seasonal fluctuation of the groundwater levels at the site should be anticipated.

Reference should be made to the hydrogeological investigation for details of the groundwater conditions at this site.

6. Engineering Discussion and Recommendations

6.1 General

A preliminary geotechnical investigation was conducted for the proposed development at a vacant lot located on the north side of Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West in Oakville, Ontario. The conceptual plan have not been developed at the time of this investigation. However, it is understood the proposed development will consist of four (4) high-rise towers averaging thirty (30) stories high with three (3) to four (4) levels of underground parking. The preliminary geotechnical investigation will address general site development.

Based on the information revealed in the limited number of boreholes drilled at the site, the site is considered generally suitable for the construction of the proposed structure with three (3) to four (4) levels of underground parking. However, some design and construction issues should be anticipated due to the relatively high groundwater level at the site.

The following subsections provide preliminary geotechnical engineering guidelines pertinent to the design and construction of proposed development. When the design has been finalized including building locations and number of underground parking, a more detailed investigation, including additional boreholes and rock coring, should be carried out to provide geotechnical parameters for final design and construction of the proposed development.

6.2 Site Grading

Considering the almost 10 m elevation difference between the north and the south ends of the site, some site grading works is expected. As artesian groundwater pressure was detected in BH 5, it is recommended that the finished grade at the south end of the site be raised, by 2 m or more if feasible. This will avoid encountering soft subgrades for internal roads and parking areas, and avoid the need to install deep subdrains under these areas.

6.3 Foundation Considerations

For the proposed structure with three (3) to four (4) levels of underground parking, it is anticipated the lowest basement floor will extend to depths of about 10 to 13 m below existing grade.

Based on the results of the investigation, two (2) foundation options were considered, namely:

1. Footing Foundations
2. Raft Foundations

The preferred foundation option will be based on design, construction and economics constraints.

6.3.1 Footings or Short Concrete Piers

Based on the results of the boreholes, the proposed structure may be supported on conventional spread and strip footings or concrete cast-in-place short piers founded on the native silt till or shale bedrock below all fill and loose soils. For preliminary design purposes, footings or short piers founded on the very dense silt till at the elevations given in ***Table 3*** or on the surface of the bedrock at the elevations shown in ***Table 1*** may be designed for a geotechnical reaction of 1,000 kPa at Serviceability Limit States (S.L.S.), subject to inspection during construction. The factored geotechnical resistance at Ultimate Limit States (U.L.S.) is 1,500 kPa. Footings or short piers founded on slightly weathered to fresh shale at the elevations given in ***Table 1***, may be designed for a geotechnical resistance of 2.5 MPa at U.L.S. The geotechnical reaction at S.L.S. for shale bedrock does not govern as it is an 'unyielding' soil. The depths (elevations) shown in ***Table 1*** must be confirmed by drilling more boreholes with rock coring.

Table 3: Highest Elevations Where 1,000 KPa (SLS) Is Available for Footings and Short Concrete Piers

Borehole No.	Approximate Ground Surface Elevation (m)	Highest Founding Elevation (m) (Depth below Existing Grade) (m)	Anticipated Founding Material
1D	190.26	~179.2 (11.0)	Very Dense Silt TIll
2D	184.30	~176.8 (7.5)	Very Dense Silt Till
3D	181.59	~173.5 (8.1)	Very Dense Silt Till

6.3.2 Raft Foundation

Consideration may also be given to supporting the structure on a raft slab foundation. The raft may be designed for a geotechnical reaction of 1,000 kPa at S.L.S or a factored geotechnical resistance of 2.5 MPa at U.L.S. at the founding elevations presented in the preceding section of this report. A modulus of subgrade reaction of 120 MPa/m may be used if a flexible design approach is considered. Once the loading contour is available, it is recommended a settlement analysis be carried out to determine the settlements of the raft foundation to verify they are within tolerable limits.

6.3.3 Foundation Subgrade Inspection

Prior to placement of concrete, all footings/short piers/raft bases should be inspected by geotechnical personnel from EXP Services Inc. to verify the competency of the founding material. It is recommended that following excavation to the footing foundation level, the subgrade should be covered with a 50 mm working mat of lean concrete following approval of the footing bases.

6.3.4 Foundations General

Footings, short piers or raft which are to be placed at different elevations on soils should be located such that the higher footing is set below a line drawn up at 10 horizontal to 7 vertical from the near edge of the lower footing.

All footings exposed to seasonal freezing conditions should be protected from frost action by at least 1.2 m of soil cover or equivalent insulation, depending on the final design requirements. However, for footings below 3 or 4 unheated levels of basement, unmonitored experience in recent years indicates shallow footing depths of 1.0 m for interior columns and 0.6 m for walls have been successful. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor surface level is required, or alternatively, insulation protection must be provided.

It should be noted the recommended bearing value has been calculated by EXP from the borehole information for the development stage only. The investigation and comments are necessarily ongoing as new information (i.e. concept design and number of underground parking levels) becomes available. For example, it should be appreciated modification to bearing levels may be required if unforeseen subsurface conditions are encountered or if design decisions differ from those assumed in this report. For this reason, this office should be retained to review final foundation drawings and to provide field inspections during the construction stage.

6.4 Shoring Requirements

Shoring will be required for the basement excavation where it is necessary to limit the horizontal and vertical movements of adjacent properties, buried utilities and roadways. A shoring system consisting of tied-back soldier piles and lagging is expected to provide suitable support in areas where some movements are acceptable. In areas where movements are to be minimized, a continuous caisson wall supported by tiebacks may be required.

The shoring systems should be designed in accordance with the latest edition of the Canadian Foundation Engineering Manual (CFEM). Based on the manual, the following earth-pressure coefficients are recommended.

0.25 Where minor movements can be tolerated.

0.35 Where utilities, roads, sidewalks must be protected from significant movement or where vibration from traffic is a factor.

0.45 Where movements are to be minimized such as near adjacent building footings or movement sensitive services (i.e. gas and watermains).

Natural Unit Weight = 22.0 kN/m^3 (native soils)

Unit Weight of Groundwater = 9.8 kN/m^3

Bond resistance in native soils and highly weathered shale

= 50 kPa (higher values can be obtained if re-groutable anchors are used)

The shoring system should be designed by a specialist shoring contractor. All soldier pile and tieback holes, and caisson drill holes, should be temporary cased to minimize the risk of caving. During winter months, the shoring should be covered with thermal blankets to prevent frost penetration behind the shoring system which may result in unacceptable movements.

For preliminary estimation purposes, the bond stress between tie backs and the native soils below any fill, can be assumed to be 50 kPa. Higher values may be available with pressure grouting. The actual bond stress should be confirmed by a sufficient number of full scale pull-out tests ("performance test") in accordance with the Post-Tensioning Institute (PTI) guidelines. The design for the production anchors should then be modified based on the test results, where necessary. All remaining anchors must be installed using similar procedures and proof tested to 1.33 times the design load.

EXP should be retained to review the shoring design, to monitor installation and testing of the system, and to monitor the shoring movements during all phases of the excavation. Inclinometers should be installed at locations where buildings or sensitive services lie close to the excavation. Careful monitoring is needed in any shored excavation, especially when buildings are located in close proximity. This is necessary not only to anticipate when and if additional support is needed, but also to provide data to meet claims from adjacent property owners. In this regard, it is essential that detailed precondition surveys be made on adjacent structures.

6.5 Excavation and Groundwater Control

Excavation through the overburden soils should be relatively straightforward using conventional equipment. Excavation into shale bedrock will require heavy excavators and dozers equipped with special ripping teeth. Where limestone layers are encountered, a hoe-ram will be required. Excavation must be carried out in accordance with the Occupational Health and Safety Act and local regulations.

It should be noted obstructions and cobbles and boulders may be present within the fill and native till deposits, respectively. Consequently, provisions should be made in the contract documents to cover any delays caused by obstructions and cobbles and boulders.

Based on the groundwater conditions encountered, groundwater seepage through perched water in the fill, and pervious seams and layers in the till, should be anticipated for construction of three (3) to four (4) levels of underground parking extending to a depth of about 10 or 13 m below existing grade. It is anticipated that the rate of seepage should be slow to moderate. As such, it is in our opinion that it should be feasible to control the seepage using conventional construction dewatering techniques, such as pumping from deep sumps, or closely spaced well points. If a continuous caisson wall is used for shoring support, the rate of seepage into the

basement excavation should be greatly reduced, and dewatering outside the excavation should not be needed.

It should be noted that any temporary construction dewatering that extracts more than 400,000 L per day would be subjected to a Permit To Take Water (PTTW), as regulated by the Ministry of Environment, Conservation and Parks (MECP). If the estimated rate will be more than 50,000 L per day but less than 400,000 L per day, the water taking can be regulated under the Environmental Activity and Sector Registry (EASR) as per MECP's new regulatory requirements.

For short and long-term groundwater control requirements, a Hydrogeological Study has been carried out to determine if a PTTW is required from the Ministry of the Environment, Conservation and Parks (MECP) and as part of the submission to the Town of Oakville.

6.6 Backfill Considerations

Backfill used to satisfy underfloor slab requirements, footings/grade beams and service trenches, etc., should be compactible fill, i.e., inorganic soil with its moisture content close to its optimum value determined in the standard Proctor maximum dry density test. The excavated materials will generally consist of fill and native sandy silt till, clayey silt till and silt till. Fill that is free of organics and otherwise deleterious materials are considered suitable for reuse as backfill. The native till deposits are also considered suitable for reuse as backfill material. However, portions of these material may require moisture adjustments (i.e. drying) for proper compaction. If the excavation is up to the property limits, there will be no room to stockpile soils within the excavation for backfilling purpose. As such, the use of imported granular B material is recommended.

The backfill should be placed in lifts not more than 300 mm thick in the loose state with each lift being compacted to at least 98% standard Proctor maximum dry density (SPMDD) before subsequent lifts are placed. The degree of compaction achieved in the field should be checked by in-place density tests.

The on-site soils are not free draining and therefore should not be used where this characteristic is required or in confined areas where smaller compaction equipment is required. Imported granular material such as OPSS Granular 'B' would also be suitable for these purposes.

6.7 Floor Slab Construction and Permanent Drainage

It is anticipated the lowest basement floor slab will be constructed on the very dense silt till or shale bedrock. Following excavation to the proposed basement subgrade level, the exposed subgrade should be thoroughly inspected by geotechnical personnel. Any soft or loose soil areas or highly weathered or loose rock areas identified during the inspection should be subexcavated

and replaced with approved material compacted in the manner described in the "Backfill Considerations" subsection of the report.

A moisture barrier, consisting of a 200 mm thick layer of 19 mm clear crushed stone should be placed directly under the floor slab.

Perimeter drainage is required to remove any water adjacent to the exterior foundation walls. In order to prevent the build-up of water adjacent to the basement walls, it would be prudent to incorporate an exterior vertical drainage sheet attached to the backside of the basement wall connected to frost free outlets inside the building. The exterior vertical drainage sheet may consist of a prefabricated system, such a SITEDRAIN HQ240 or equivalent, covering the entire basement wall in order to reduce the risk of water penetration. The wall drain panels should be outletted through the basement wall into the basement. A solid pipe should be installed to within 1 m of the exterior wall to collect seepage for the wall drains.

In addition, installation of an under-floor drain system is also recommended below the basement slab. For preliminary guidance, the underfloor drain system should consist of a 300 mm thick layer of clear stone, with 100 mm diameter perforated drain pipes installed at the base of the drainage stone, at 3 to 6 m intervals. The final spacing of the underground drains should be determined by a hydrological study. The pipes and the stone must be completely wrapped in a non-woven geotextile having a filtering opening size (FOS) of 60 microns. These drain pipes must be provided with a frost-free positive discharge (i.e. sump pits). Adequate clean-out ports should be installed for each line of drainage pipes to faciliate future cleaning of the pipes.

The perimeter and sub-floor drainage systems should be independent of any stormwater piping, such as rainwater leaders. Backflow prevention should be provided between the sumps and the drain headers.

The Town of Oakville requires a detailed Hydrogeological Study be carried out for each site to determine the short-term (during construction) and long-term (post construction) flow rates. The hydrogeological report will be reviewed by the Town to determine if the groundwater is allowed to be discharged into their sewer system based on the quantity and quality of the water. If the groundwater collected from perimeter and underfloor drainage system are not allowed to be discharged into the Town sewers, the basement and floor will need to be designed as a watertight structure. In this case, the walls and floor must be designed to resist the hydrostatic pressures exerted by the recorded groundwater levels.

6.8 Earth Pressure on Subsurface Walls

The lateral earth pressure acting on basement walls may be calculated from the following equation:

$$p = k(\gamma h + q)$$

where: p = the pressure in kPa acting against any subsurface wall at depth, h, below the ground surface;

k = the earth pressure coefficient considered to be appropriate for the subsurface walls, for this case, 0.4;

ɤ = the bulk unit weight of the retained soil; use 22 kN/m^3;

h = the depth in m below the ground surface at which the pressure, p, is to be computed; and

q = the value of any adjacent surcharge in kPa which may be acting close to the wall.

The above expression assumes an effective perimeter drainage system will be incorporated to prevent the build-up of hydrostatic pressure behind the subsurface wall. The subsurface walls should be properly waterproofed. If both the subsurface walls and floor are to be designed as a watertight structure, they should be designed to resist full hydrostatic pressures and uplift.

If water is retained, submerged unit weight can be used for the retained soil below the groundwater table and full hydrostatic pressure should be added to the above equation. Accordingly, for a waterproofed basement, the lateral earth pressures acting on basement walls below groundwater table may be calculated from the following expression:

$$P = K(\gamma h_1 + \gamma' h_2 + q) + \gamma_w h_2$$

Where:

p = lateral earth pressure in kPa acting at depth h

K = earth pressure coefficient, assumed to be (0.4) for vertical walls and horizontal backfill

γ = unit weight of soil, a value of 22 kN/m^3 may be assumed

h_1 = groundwater table depth, meters

γ' = effective unit weight of soil, a value of 12 kN/ m^3 may be assumed

γ_w = unit weight of water (10 kN/ m^3)

h_2 = depth in metres below the water table

q = equivalent value of surcharge on the ground surface in kPa

6.9 Earthquake Considerations

The recommendations for the geotechnical aspects to determine the earthquake loading are presented below.

6.9.1 Subsoil Conditions

The subsoil information at this site has been examined in relation to Section 4.1.8.4 of OBC 2012. The subsoil consisted of fill overlying native sandy silt till, clayey silt till and silt till. The proposed structure will be supported on footings, short piers or raft founded on the silt till or shale bedrock.

There have been no shear wave velocity measurements carried out at this site.

6.9.2 Depth of Boreholes

Table 4.1.8.4.A Site Classification for Seismic Site Response in OBC 2012 indicated that to determine the site classification, the average properties in the top 30 m are to be used. The boreholes were advanced to depths of about 7.8 to 18.3 m below existing grade. Bedrock was encountered at about 8.8 to 15.3 m below existing grade.

6.9.3 Site Classification

Based on the known soil conditions, the Site Class for this site is “C” as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012.

7. General Comments

A geotechnical engineer should be retained for a general review of the final design and specifications to verify the recommendations in this report address all relevant geotechnical parameters regarding the design and construction of the proposed development.

The comments given in this report are intended only for the guidance of design and structural engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations as well as their own interpretations of the factual borehole results so that they may draw their own conclusions as to how the subsurface conditions may affect them.

More specific information with respect to the conditions between samples or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, a geotechnical engineer should be contacted to assess the situation and additional testing and reporting may be required. EXP has qualified personnel to provide assistance in regard to future geotechnical issues related to this property.

We trust this report is satisfactory for your purposes. Should you have any questions or comments, please do not hesitate to contact this office.

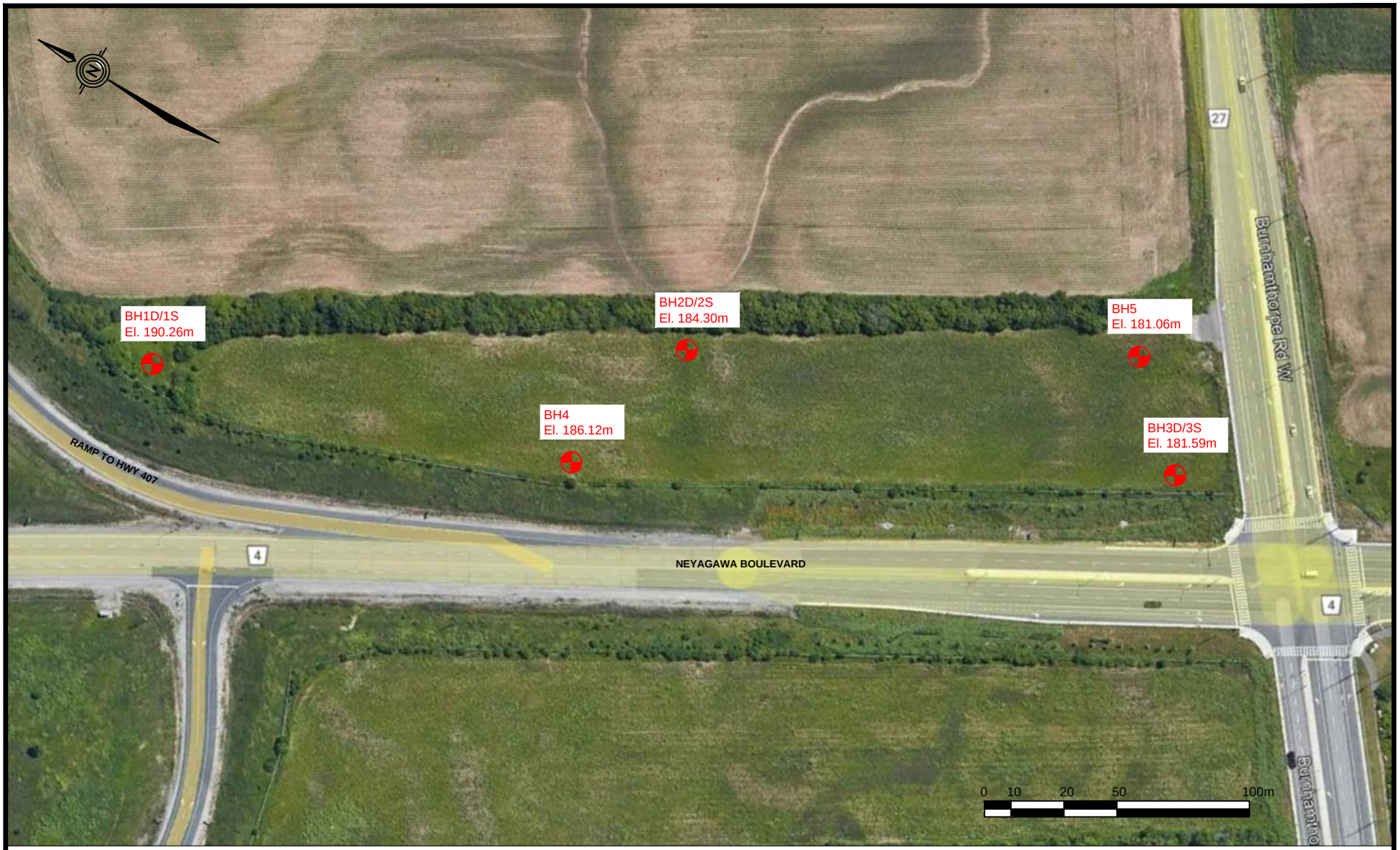
Yours truly,
EXP Services Inc.

Leo Chui, P. Eng.
Project Manager
Geotechnical Division

James Ng, P. Eng.
Geotechnical Manager
Infrastructure Projects
Geotechnical Division

Drawings

Borehole Location Plan
Borehole Logs



NOTES:

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR
2. SOIL AND ROCK SAMPLES WILL BE RETAINED IN STORAGE FOR 1 MONTH AND THEN DESTROYED UNLESS CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. BOREHOLE ELEVATIONS SHOULD NOT BE USED FOR BUILDING GRADES.

LEGEND:

BOREHOLE LOCATION

EXP Services Inc.
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220 COMMERCE VALLEY DR., SUITE 110
MARKHAM, ON L3T 0A8
Canada
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PROJECT TITLE AND LOCATION:
PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT
NEYAGAWA BOULEVARD BETWEEN HWY 407 AND BURNHAMTHORPE ROAD WEST
OAKVILLE, ONTARIO

DRAWING TITLE:
BOREHOLE LOCATION PLAN

PROJECT #: BRM-23012833-D0	DWN.: LC
SCALE: AS PER SCALE	CHKD.: PC
DATE: NOVEMBER 2023	DWG. No.: 1

Notes on Sample Descriptions

1. All sample descriptions included in this report follow the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), as outlined in the Canadian Foundation Engineering Manual. Note, however, that behavioral properties (i.e. plasticity, permeability) take precedence over particle gradation when classifying soil. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

UNIFIED SOIL CLASSIFICATION

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Notes On Soil Descriptions

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay and Silt	<0.060 mm	"trace" (e.g. Trace sand)	1% to 10%
Sand	0.060 to 2.0 mm	"some" (e.g. Some sand)	10% to 20%
Gravel	2.0 to 75 mm	adjective (e.g. sandy, silty)	20% to 35%
Cobbles	75 to 200 mm	"and" (e.g. and sand)	35% to 50%
Boulders	>200 mm		

The compactness of Cohesionless soils and the consistency of the cohesive soils are defined by the following:

Cohesionless Soil		Cohesive Soil		
Compactness	**Standard Penetration Resistance "N" Blows / 0.3 m**	**Consistency**	**Undrained Shear Strength (kPa)**	**Standard Penetration Resistance "N" Blows / 0.3 m**
Very Loose	0 to 4	Very soft	<12	<2
Loose	4 to 10	Soft	12 to 25	2 to 4
Compact	10 to 30	Firm	25 to 50	4 to 8
Dense	30 to 50	Stiff	50 to 100	8 to 15
Very Dense	Over 50	Very Stiff	100 to 200	15 to 30
		Hard	>200	>30

5. **ROCK CORING**

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundless of the rock mass. It is obtained from the rock cores by summing the length of the core covered, counting only those pieces of sound core that are 100 mm or more length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very Poor Quality	<25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

$$\text{Recovery Designation \% Recovery} = \frac{\text{Length of Core Per Run}}{\text{Total Length of Run}} \times 100$$

Explanatory Sheet To Core Log

Column No.	Description
1	Elevation of Geotechnical Boundary
2	Depth of Geotechnical Boundary in Borehole
3	Geological Symbol for Rock or Soil Material
4	General Description of Geotechnical Unit: Quantitative description including rock type (s), percentage of rock types, frequency and sizes of interbeds, colour, texture, weathering, strength and general joint spacing
5-11	Joint (Discontinuity) Characteristics
5	Number of Joints in Set: A rock mass can be intersected by a number of joint sets of varying orientations
6	Joint Type: B = Bedding Joint; F = Fault; C = Cross Joint; S = Shear Plane
7	Orientation: Only variations in dip can be identified in core; dip direction is obtained from field mapping or orientated core F = Flat = 0 - 20° D = Dipping = 20 - 50° V = Vertical = 50 - 90°
8	Joint Spacing: This is an approximate measure of spacing between joints in specific joint sets VW = Very Wide = >3 m W = Wide = 1 to 3 m M = Moderate = 30 cm to 1 m C = Close = 5 to 30 cm VC = Very Close = <5 cm
9	Roughness RU = Rough Undulating RP = Rough Planar SU = Smooth Undulating SP = Smooth Planar LU = Slickensided Undulating LP = Slickensided Planar
10	Filling:

	Approximate ϕ_r
T = Tight, hard, non softening	25° - 35°
O = Oxidation, surface staining only	25° - 30°
SA = Slightly altered; clay free	25° - 30°
S = Sandy particles; clay free	25° - 35°
Si = Sandy and silty' minor clay	20° - 25°
NC = Non softening clays (<5 mm)	16° - 24°
SO = Softening clays (<5 mm)	12° - 16°
SC = Swelling clay fillings (<5 mm)	6° - 12°

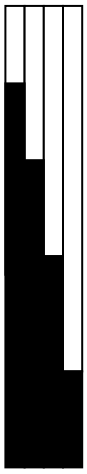
11	Aperture: Estimated size of joint opening
12	Degree of Weathering of Rock Material

Unweathered	= no signs of discolouration or oxidation
Slightly weathered	= partial discolouration; fractures (joints) typically oxidized
Moderately weathered	= total discolouration
Highly weathered	= total discolouration; typically friable & pitted
Completely weathered	= resembles soil; rock structure usually preserved

Explanatory Sheet To Core Log

Column No. **Description**

13 Strength of Rock Material



		Approx.Uniaxial Compressive Strength
Very High strength	= specimen can only be chipped by geological hammer	>200 MPa
High strength	= specimen requires a number of blows to fracture it: cannot be scrapped with a pocket knife	50 – 200 MPa
Medium strength	= specimen can be fractured by a single blow of geological hammer; can be scrapped with pocket knife, not peeled	15 – 50 MPa
Low strength	= shallow indentations made with a firm blow of geological hammer; can be peeled by pocket knife with difficulty	4 – 15 MPa
Very low strength	= crumbles under firm blow with point of geological hammer; can be peeled by pocket knife	1 – 4 MPa

14 Fracture Frequency: Number of natural joints occurring over a metre length of core. All natural joints are counted irrespective of the number of joint sets.

Fracture Frequency		Joint Spacing	
<0.3/m	=	Very wide	= 3 m
0.3 – 1/m	=	Wide	= 1 – 3 m
1 – 3/m	=	Moderate	= 30 cm – 1 m
3 – 20/m	=	Close	= 5 – 30 cm
>20/m	=	Very Close	= <5 cm

15 Run Number: Drill run number

16 Core Recovery: Core recovery is the total length of core pieces, irrespective of their individual lengths, obtained in a core run and expressed as a percentage of the length of that core run.

17 Rock Quality Designation (RQD): The total length of those pieces of sound core which are 10 cm or greater in length in a core run expressed as a percentage of the total length of that core run. Sound pieces of rack are those pieces separated by natural breaks and not machine breaks or subsequent artificial breaks.

RQD	Rock Mass Classification (After Deere)
0 - 25%	very poor
25 – 50%	poor
50 – 75%	fair
75 – 90%	good
90 – 100%	excellent

18 Water Recovery: The estimated water returning out of the casing

19 Water Colour: The colour of the water returning out of the casing

Log of Borehole 1D

Project No. BRM-23012833-D0 Drawing No. 2

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Date Drilled: November 7-8, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test S

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			190.26	0
		TOPSOIL - approximately 180 mm thick	190.1	
		FILL - sandy silt, trace gravel, trace rootlets; brown/red, moist	189.7	
		SANDY SILT TILL - trace to some clay, trace gravel; brown/red, moist, compact to dense		1
				2
				3
			186.5	
		CLAYEY SILT TILL - trace sand, trace gravel; reddish-grey, moist, stiff to very stiff		4
				5
				6
				7
				8
				9
			179.9	10
		SILT TILL - trace to some clay, trace sand, trace gravel; reddish grey, moist, very dense		11
				12
				13
				14
			175.0	15
		- becoming shale/till complex		
		WEATHERED SHALE - reddish brown, moist		16
			173.5	
		ROCK CORING COMMENCED. REFER TO ROCK CORE LOG FOR DETAILS.		17
			171.9	18
		END OF BOREHOLE		

NOTES:
1. Groundwater monitoring well installed to 18.29 m depth.

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa

17, 31, 37, 40, 30, 14, 12, 11, 17, 18, 50/125mm, 50/125mm, 50/140mm, 50/140mm

Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	6.48	Well
November 29, 2023	6.64	Well

ROCK CORE LOG

BH 1D

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Preliminary Geotechnical Investigation - Proposed Development	Vertical	190.3	Geodetic	BRM-23012833-D0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Neyagawa Blvd btwn Hwy 407 & Burnhamthorpe Rd W, Oakville	11/08/23	11/08/23	RY	2
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
Sky Property Group Inc.	3D Drilling	CME 75 Track	HQ	1 of 1

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
173.5			**QUEENSTON FORMATION** Brick red to maroon noncalcareous to calcareous shale with subordinate amounts of green shale, siltstone and limestone															
	17		**RUN 1 :** Moderately weathered (W3) to unweathered (W1), weak (R2) to medium strong (R3), reddish brown, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B C B	F V F		SP RU RP	T T T									
			Highly Weathered Zone (W1): 17.01 - 17.08 m (70mm)															
			Fracture Zones: 16.81 - 17.08 m (270mm) 17.48 - 17.53 m (50mm)		B	F		RU	S	1				1	100	65		
			Vertical Fracture: 17.08 - 17.18 m (100mm)		B	F		SP	S	1								
			Solid Core Recovery: 72%															
	18				B	F		SP	S	1								
					B	F		SP	Si	10								
171.9			End of Borehole at 18.3 m															
	19																	
	20																	

EXP_ROCKCORE ROCK CORE LOGS.GPJ CORE_LOG.GDT 12/6/23

exp.

Log of Borehole 1S

Project No. BRM-23012833-D0 Drawing No. 2A

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Date Drilled: November 8, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○⊣
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		NO SAMPLING. BOREHOLE DRILLED FOR THE PURPOSE OF GROUNDWATER MONITORING WELL INSTALLATION.	190.26	0
				1
				2
				3
				4
				5
				6
				7
			182.0	8
		END OF BOREHOLE		
		NOTES: 1. Groundwater monitoring well installed to 8.22 m depth.		

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	7.77	Well
November 17, 2023	7.71	Well
November 29, 2023	6.31	Well

Log of Borehole 2D

Project No. BRM-23012833-D0 Drawing No. 3

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

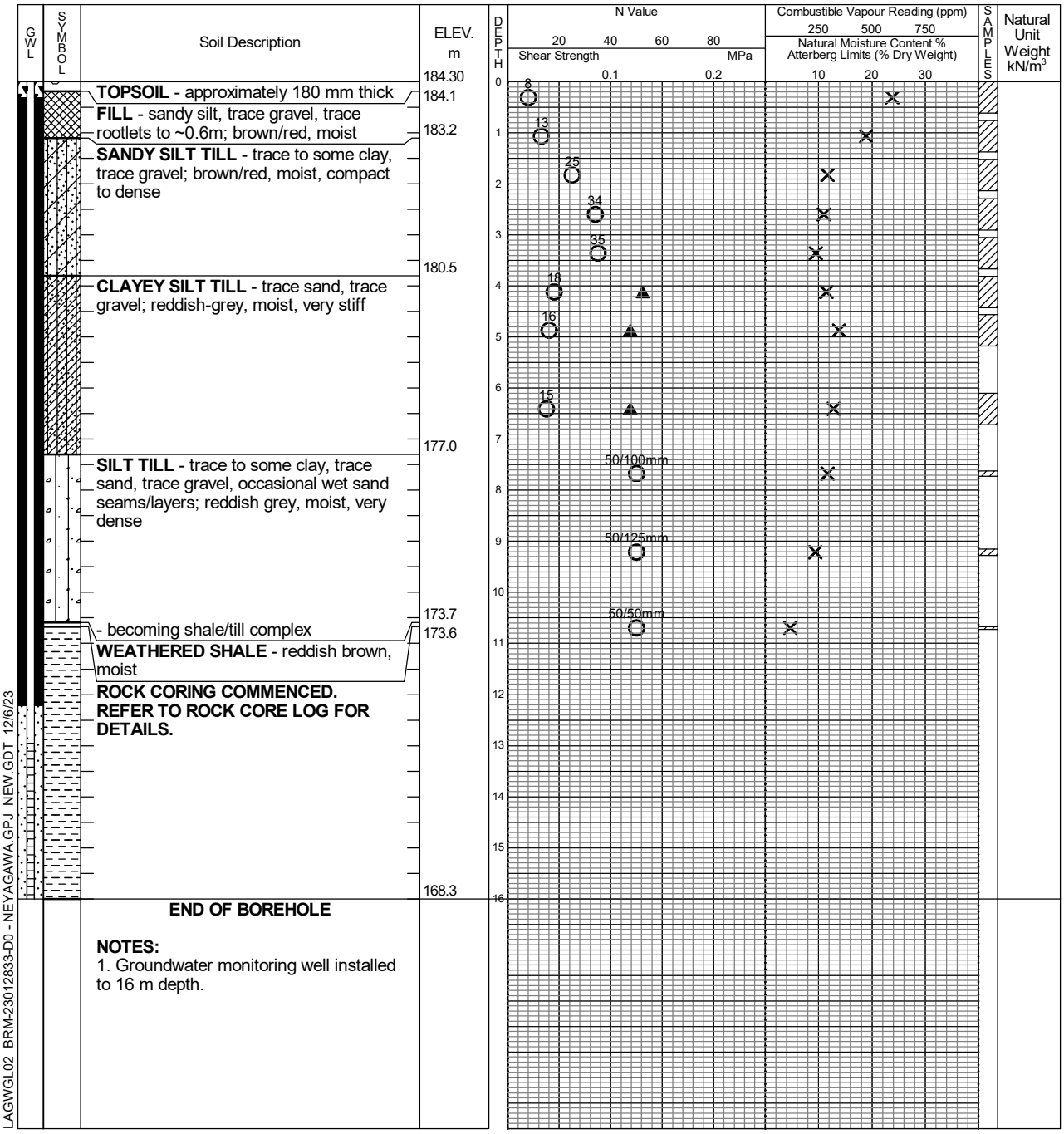
Date Drilled: November 8-9, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	1.86	Well
November 29, 2023	1.92	Well

ROCK CORE LOG

BH 2D

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Preliminary Geotechnical Investigation - Proposed Development	Vertical	184.3	Geodetic	BRM-23012833-D0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Neyagawa Blvd btwn Hwy 407 & Burnhamthorpe Rd W, Oakville	11/09/23	11/09/23	RY	3
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
Sky Property Group Inc.	3D Drilling	CME 75 Track	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
173.8			**GRAVEL**															
173.7			**QUEENSTON FORMATION** Brick red to maroon noncalcareous to calcareous shale with subordinate amounts of green shale, siltstone and limestone		B	F		SP	T									
			RUN 1 : Moderately weathered (W3) to slightly weathered (W2), weak (R2) to medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		SP	T					1	100	18		
	11		Fracture Zones: 10.59 - 10.79 m (200mm) 10.99 - 11.31 m (320mm)															
			Solid Core Recovery: 31% **RUN 2 :** Slightly Weathered (W2) to unweathered (W1), medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		RP	T									
					B	F		SP	T									
			Fracture Zones: 11.54 - 11.62 m (80mm)															
			Solid Core Recovery: 96%		B	F		SP	T									
	12																	
					B	F		RU	T					2	100	94		
					B	F		SP	T									
					B	F		RP	T									
	13		**RUN 3 :** Slightly Weathered (W2) to unweathered (W1), medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		SP	T									
					B	F		RP	T									
			Highly Weathered Zone (W4): 13.21 - 13.34 m (130mm)		B	F		RU	T									
			Fracture Zones: 13.07 - 13.13 m (60mm)															
			Solid Core Recovery: 96%											3	100	96		

EXP_ROCKCORE ROCK CORE LOGS.GPJ CORE_LOG.GDT 12/6/23

exp.

ROCK CORE LOG

BH 2D

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Preliminary Geotechnical Investigation - Proposed Development	Vertical	184.3	Geodetic	BRM-23012833-D0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Neyagawa Blvd btwn Hwy 407 & Burnhamthorpe Rd W, Oakville	11/09/23	11/09/23	RY	3
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
Sky Property Group Inc.	3D Drilling	CME 75 Track	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	14																	
			RUN 4 : Slightly Weathered (W2) to unweathered (W1), medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)															
			dissolution features: 15.18 - 15.31 m (130mm)		B	F		RP	S	1								
			Solid Core Recovery: 96%		B	F		RP	T									
	15				B	F		SP	T									
					B	F		SP	T					4	100	86		
					B	F		SP	T									
					B	F		SP	T									
					B	F		RP	T									
					B	F		SP	T									
168.3	16		End of Borehole at 16.0 m															
	17																	

Log of Borehole 2S

Project No. BRM-23012833-D0 Drawing No. 3A

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Date Drilled: November 9, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value 20 40 60 80 / Shear Strength 0.1 0.2 MPa	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	SAMPLES	Natural Unit Weight kN/m³
		NO SAMPLING. BOREHOLE DRILLED FOR THE PURPOSE OF GROUNDWATER MONITORING WELL INSTALLATION.	184.30	0				
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
			175.5					
		END OF BOREHOLE						

NOTES:
1. Groundwater monitoring well installed to 8.8 m depth.

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

exp.

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	0.86	Well
November 17, 2023	1.10	Well
November 29, 2023	1.02	Well

Log of Borehole 3D

Project No. BRM-23012833-D0 Drawing No. 4

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

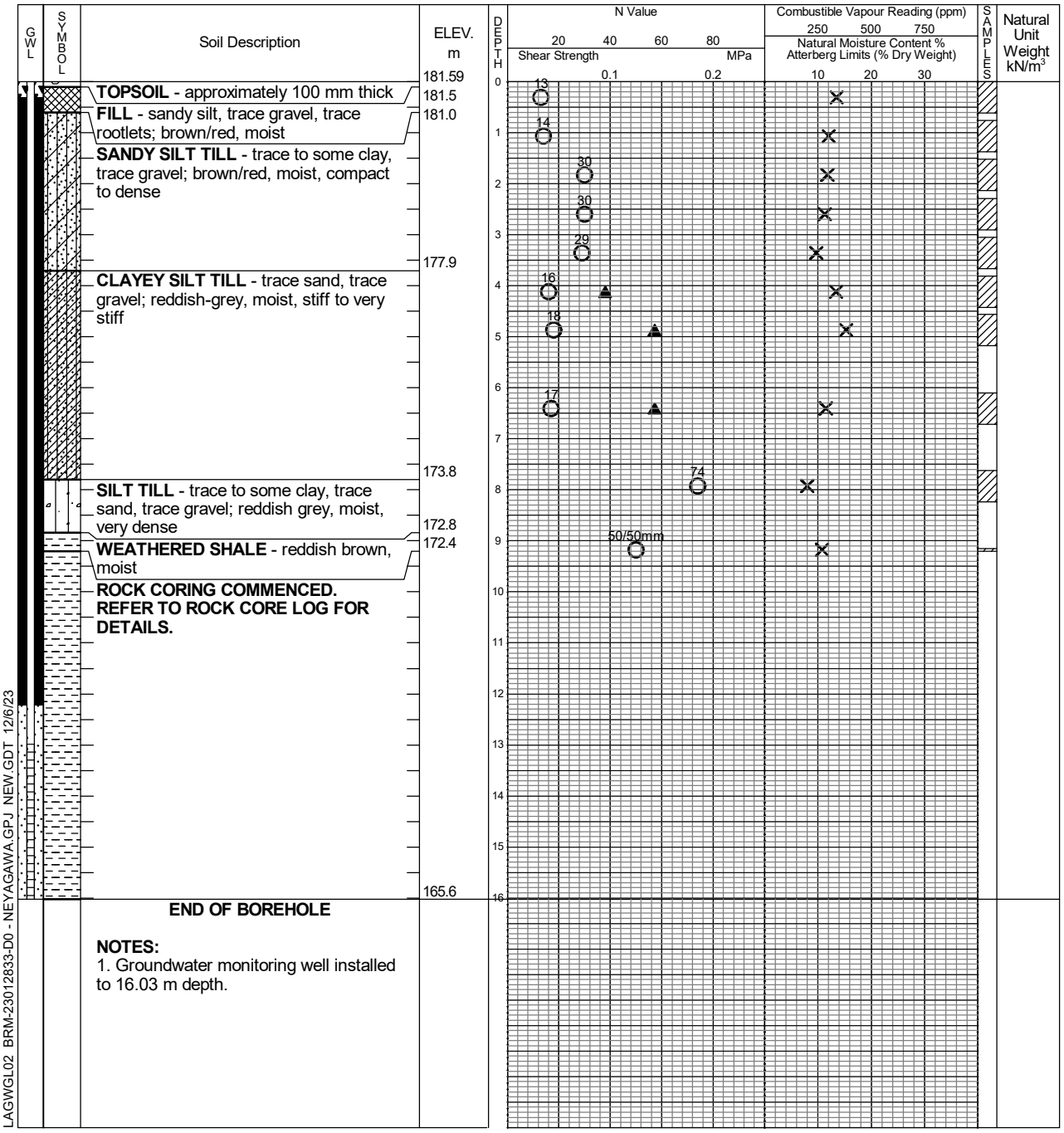
Date Drilled: November 6 and 10, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



END OF BOREHOLE

NOTES:
1. Groundwater monitoring well installed to 16.03 m depth.

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	4.47	Well
November 29, 2023	4.47	Well

ROCK CORE LOG

BH 3D

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Preliminary Geotechnical Investigation - Proposed Development	Vertical	181.6	Geodetic	BRM-23012833-D0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Neyagawa Blvd btwn Hwy 407 & Burnhamthorpe Rd W, Oakville	11/10/23	11/10/23	RY	4
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
Sky Property Group Inc.	3D Drilling	CME 75 Track	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
172.5			**QUEENSTON FORMATION** Brick red to maroon noncalcareous to calcareous shale with subordinate amounts of green shale, siltstone and limestone															
			RUN 1 : Moderately weathered (W3) to slightly weathered (W2), very weak (R1) to weak (R2), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)											1	100	28		
			Fracture Zones: 9.12 - 9.67 m (550mm)															
			Solid Core Recovery: 36%		B	F		RP	T									
					B	F		SP	T									
	10		**RUN 2 :** Moderately weathered (W3) to unweathered (W1), weak (R2) to medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		SP	T									
			Highly Weathered Zone (W4): 11.29 - 11.46 m (170mm)															
			Fracture Zones: 9.94 - 10.06 m (120mm) 10.15 - 10.2 m (50mm) 10.65 - 10.68 m (30mm) 10.93 - 10.99 m (50mm)		B	F		SP	T									
					B	F		RP	T									
			Solid Core Recovery: 81%											2	100	70		
					B	F		SP	O									
					B	F		SP	S	4								
	11				B	F		RU	S	4								
					B	F		RP	T									
			RUN 3 : Moderately weathered (W3) to slightly weathered (W2), weak (R2) to medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		RU	S	1								
			Solid Core Recovery: 96%															
					B	F		RU	S	1								
	12													3	100	92		

EXP_ROCKCORE_ROCK CORE LOGS.GPJ CORE_LOG.GDT 12/6/23

exp.

ROCK CORE LOG

BH 3D

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Preliminary Geotechnical Investigation - Proposed Development	Vertical	181.6	Geodetic	BRM-23012833-D0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Neyagawa Blvd btwn Hwy 407 & Burnhamthorpe Rd W, Oakville	11/10/23	11/10/23	RY	4
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
Sky Property Group Inc.	3D Drilling	CME 75 Track	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
					B	F		SP	T									
					B	F		RU	T									
					B	F		SP	T									
	13		**RUN 4 :**		B	F		SP	T									
			Unweathered (W1), medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		SU	S	1								
			Fracture Zones:															
			13.59 - 13.61 m (20mm)		B	F		SP	T									
					B	F		SP	T									
			Solid Core Recovery: 98%		B	F		SU	S	1								
					B	F		SP	T									
					B	F		RP	T									
					B	F		RP	T									
														4	100	93		
					B	F		SP	T									
	14																	
					B	F		SP	T									
			RUN 5 :		B	F		SU	T									
			Unweathered (W1), weak (R2) to medium strong (R3), reddish brown to greenish grey, hematitic, sandy, bedded / laminated, calcareous SHALE and SILTSTONE (100%)		B	F		RP	T									
					B	F		RP	T									
					B	F		RP	T									
			Solid Core Recovery: 99%															
					B	F		SP	Si	3								
					B	F		RP	T									
	15																	
					B	F		SP	Si	2				5	100	85		
					B	F		SP	T									
					B	F		SP	T									
	16																	
165.6			End of Borehole at 16.0 m															

EXP_ROCKCORE_ROCK CORE LOGS.GPJ CORE_LOG.GDT 12/6/23

exp.

Log of Borehole 3S

Project No. BRM-23012833-D0 Drawing No. 4A

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Date Drilled: November 6, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		NO SAMPLING. BOREHOLE DRILLED FOR THE PURPOSE OF GROUNDWATER MONITORING WELL INSTALLATION.	181.59	0
				1
				2
				3
				4
				5
				6
				7
			172.9	8
		END OF BOREHOLE		
		NOTES: 1. Groundwater monitoring well installed to 8.66 m depth.		

N Value: 20 40 60 80
Shear Strength: 0.1 MPa 0.2
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	0.55	Well
November 17, 2023	0.66	Well
November 29, 2023	0.67	Well

Log of Borehole 4

Project No. BRM-23012833-D0 Drawing No. 5

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

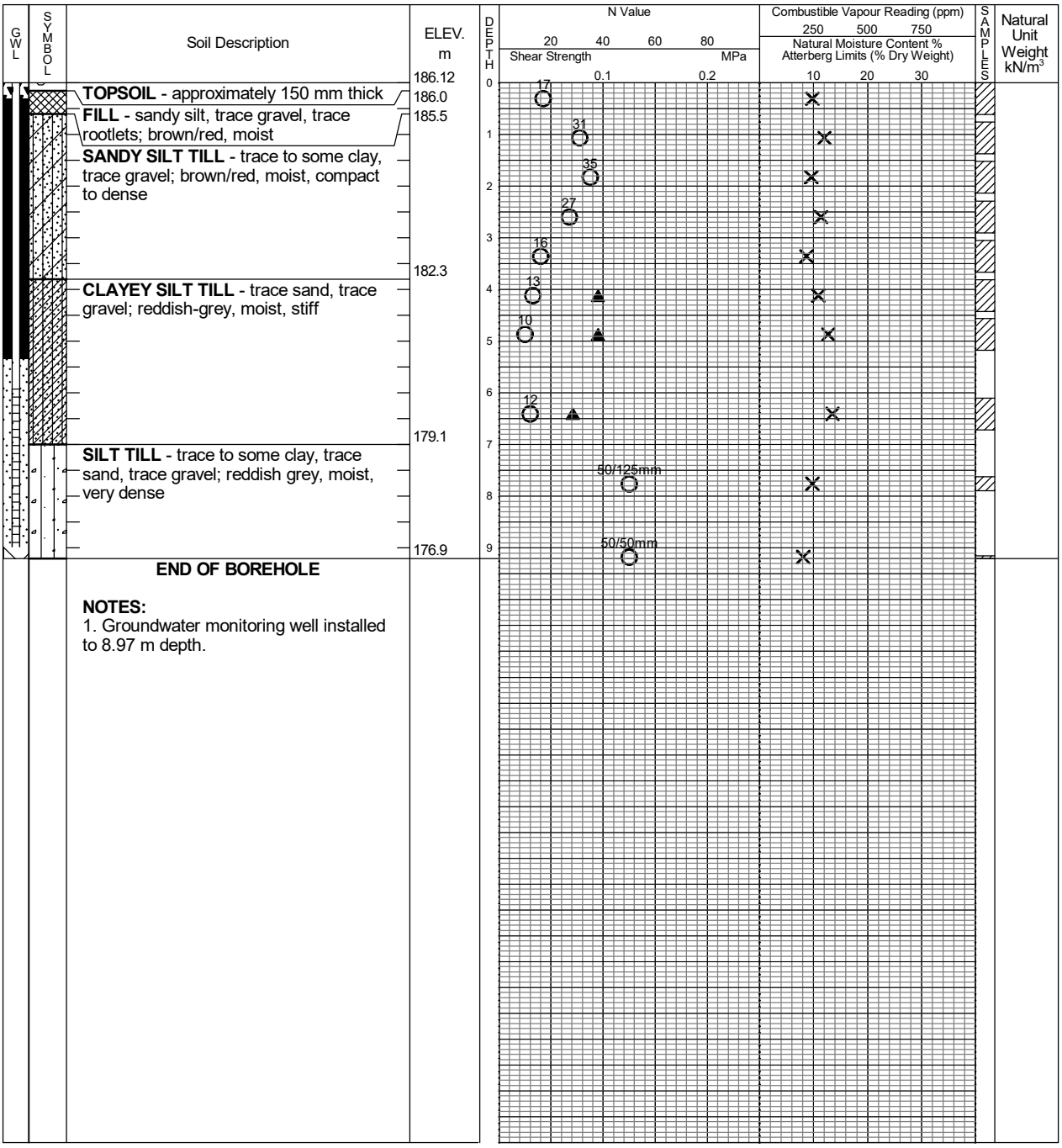
Date Drilled: November 7, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. Groundwater monitoring well installed to 8.97 m depth.

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	2.73	Well
November 17, 2023	2.84	Well
November 29, 2023	2.89	Well

Log of Borehole 5

Project No. BRM-23012833-D0 Drawing No. 6

Project: Preliminary Geotechnical Investigation - Proposed Development Sheet No. 1 of 1

Location: Neyagawa Boulevard between Hwy 407 & Burnhamthorpe Road West, Oakville, Ontario

Date Drilled: November 6, 2023

Drill Type: CME75 Track Mount

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			181.06	0
		TOPSOIL - approximately 150 mm thick	180.9	
		FILL - sandy silt, trace gravel, trace rootlets to ~0.6m; brown/red, moist	180.0	1
		SANDY SILT TILL - trace to some clay, trace gravel; brown/red, moist, compact to dense		2
				3
				4
				5
			174.5	6
		SILT TILL - trace to some clay, trace sand, trace gravel; reddish grey, moist, very dense		7
			173.2	
		END OF BOREHOLE		

NOTES:
1. Groundwater monitoring well installed to 7.84 m depth.

N Value: 20 40 60 80
Shear Strength: 0.1 0.2 MPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

12 15 34 51 45 24 28 29 50/70mm

Time	Water Level (m)	Depth to Cave (m)
On completion	N/A	Well
November 15, 2023	-0.64	Well
November 17, 2023	-0.49	Well
November 29, 2023	-0.44	Well

LAGWGL02 BRM-23012833-D0 - NEYAGAWA.GPJ NEW.GDT 12/6/23

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