FUNCTIONAL SERVICING REPORT

PROPOSED COLUMBIA SQUARE MIXED-USE DEVELOPMENT

14245 HIGHWAY 50
TOWN OF CALEDON, REGION OF PEEL

Project No.: 21-0012CA **March 2024**

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1.0 INTRODUCTION

1.1 Study Objectives and Location

This Functional Servicing Report has been prepared in support of a proposed Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) applications for lands located northeast of the Columbia Way and Highway 50 intersection, in the Town of Caledon, Regional Municipality of Peel. The civic address of the subject property is 14245 Highway 50. The site is proposed to be developed for residential and commercial uses.

The overall site can be legally described as Part 2 of Plan 43R-38843, Town of Caledon (Settlement Area of Bolton), Regional Municipality of Peel. The subject property is located within the boundaries of Castlederg Sideroad to the north, Highway 50 to the west, Mount Hope Road to the east and Columbia Way to the south. The site is within the jurisdiction of the Toronto and Region Conservation Authority (TRCA). A Site location plan is provided in Figure 1-1.

The following report provides information regarding site servicing and stormwater management for the subject development while ensuring compatibility with services already in place. The report will also address comments raised by regulatory agencies (i.e., Region of Peel, Town of Caledon and TRCA).

1.2 Existing Condition

The site is irregular in shape with an area of approximately 3.30 ha. Currently the site is vacant and appears to be used for agricultural purposes. To the east of the site is an existing school (St. Michael Catholic Secondary School). To the south is Kingsview Drive, and a residential development opposite Columbia Way, to the west is a Town Works Yard opposite Highway 50, and to the north is vacant/agricultural land. There appears to be four driveway entrances to the site: three along Columbia Way and one along Highway 50.

The subject site was included in the design of the infrastructure for the existing residential subdivision south of Columbia Way. Previous designs considered the site as part of a 5.3 ha commercial area. This suggests that for a 3.30 ha parcel of commercial land, the intended population for the site that was included in the design of existing infrastructure is approximately 165 people (50 people per hectare * 3.30 ha = 165 people).

1.3 Proposed Development

As mentioned previously, the site area is 3.30 ha. A portion of the site is being conveyed to the Town for the future extension of Kingsview Drive. The net development area is approximately 2.92 hectares.

The proposed development is subdivided into three phases (1, 2 and 3). Phase 1, located on the north portion of the site, is proposed to contain eleven townhouse blocks, with private laneways, on-grade parking, and the extension of Kingsview Drive. Kingsview Drive will be a public right-of-way (ROW).

Phases 2 and 3, located on the south portion of the site, is proposed to contain a residential building and a mixed-use building (ground floor commercial podium with residential on upper floors), amenity areas, and parking facilities (both on-grade and below ground). There are two levels of underground parking, P1 and P2. P1 is proposed to underlie the entire site. P2, which is beneath P1, is proposed within Phase 2/3 and a portion of P1.

Two private roadways are proposed through the subject site to provide vehicular access between blocks and phases. A primary vehicular access is proposed on Columbia Way via an extension of Kingsview Drive. A secondary vehicular access is proposed on Highway 50, approximately 125 m north of Columbia Way. The proposed site plan and parking garage layout is provided in Appendix A. The anticipated design population is as summarized in Table 1-1 and was determined using Region of Peel 2020 DC Background Study as per their request.

Table 1-1: Anticipated Design Population

Description	Units	Area (ha)	Population
Phase 1 – Townhouse Units	228	1.76	775
Phase 2 –Residential	393	0.93	1,179
Phase 3 – Residential/commercial	141	0.23	432
Sub-Total	**762**	**2.92**	**2,986**
Future ROW	0	0.38	0
Total	**762**	**3.30**	**2,386**

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LEGEND

SITE LOCATION

FIGURE 1-1

SITE LOCATION PLAN
COLOMBIA SQUARE
CALEDON, ON.

21-0012CA	MARCH 2024	SCALE: N.T.S.

1.4 References

The following material has been reviewed during the preparation of this report:

- **A & A environmental Consultants Inc.**, *Geotechnical Engineering Report, Residential property Located at 14245 Highway 50, Caledon, Ontario*, October 26, 2021.
- **A & A environmental Consultants Inc.**, *Small Scale Hydrogeological Assessment, Residential property Located at 14245 Highway 50, Caledon, Ontario*, November 4, 2021.
- **Aecom**, *Engineering Drawings*, dated June 2012.
- **Anton Kikas Limited**, *Engineering drawings*, dated February 1992.
- **KFA Architects and Planners**, Phase 1-3 *Columbia Square Combined Site Plan*, dated February 21, 2024.
- **MMM Group**, *Servicing Investigation Letter, Bolton secondary School, Town of Caledon, File No: 10-06629*, dated July 13, 2006.
- **MMM Group**, *Site Servicing Plan, St. Michael Secondary School*, dated November 2008.
- **R-PE Surveying Ltd.**, *Topographic Survey*, dated July 13, 2021.
- **Region of Peel – Public Works Water and Wastewater Program Planning**, *Bolton Residential Expansion, Analysis in Support of the Regional Official Plan Amendment*, dated June 8, 2016.
- **Region of Peel**, *Public Works Design, Specifications & Procedures Manual,* dated June 2019.
- **Region of Peel**, *Public Works Design, Specifications & Procedures Manual, Stormwater Management Report,* dated June 2019.
- **Town of Caledon**, *Site Plan Control Manual: Submission Package*, August 2019.
- **Town of Caledon**, *Development Standards Manual, Version 5.0*, 2019.
- **Toronto and Region Conservation Authority**, *Stormwater Management Criteria*, August 2012.
- **Toronto and Region Conservation Authority / Credit Valley Conservation**, *Low Impact Development Stormwater Management Planning and Design Guide*, 2010.

2.0 STORMWATER MANAGEMENT

2.1 Existing Conditions

2.1.1 Topography and Drainage

Review of existing site conditions was carried out using a topographical survey. The topographical information was obtained from a detailed survey completed by R-OE Surveying Ltd., in July 2021.

The subject site is located within the Humber River Watershed, as illustrated in the 2012 TRCA Stormwater Management Criteria. The site is located in an area where quantity flood control is not required. On-site controls may still be required however, depending on the available infrastructure.

The site generally drains in a southerly direction towards the intersection of Columbia Way and Highway 50. The elevation range on site varies from 269.5 at the northeast corner, to 259.9 at the southwest corner. This suggests a topographic range of approximately 9.6 m. Figure 2-1 provides an illustration of the existing drainage conditions.

Existing peak flows from the site were estimated using the Rational Method. The time of concentration was determined using the Bransby Williams Method. Table 2-1 provides a summary of the pre-development peak flows for the site. The flows are based on an area of 3.30 ha and runoff coefficient of 0.25. Calculations are provided in Appendix C.

Table 2-1: Pre-Development Peak Flow Summary (L/s)

Area ID	Area (ha)	Runoff Coeff.	Storm Event					
			2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Pre-A1	2.92	0.25	96	131	161	194	220	248
Pre-A2	0.38	0.25	12	17	20	25	29	32
Total	3.30	0.25	108	148	182	219	249	280

2.1.2 Existing Storm Drainage Infrastructure

Both Columbia Way and Highway 50 have rural cross-sections adjacent the site, meaning that runoff is conveyed via roadside ditches and culverts. The areas east, and south of Columbia Way have been developed, and therefore there is existing drainage infrastructure in the vicinity.

Existing infrastructure is shown schematically in Figure 2-1. Existing infrastructure includes:

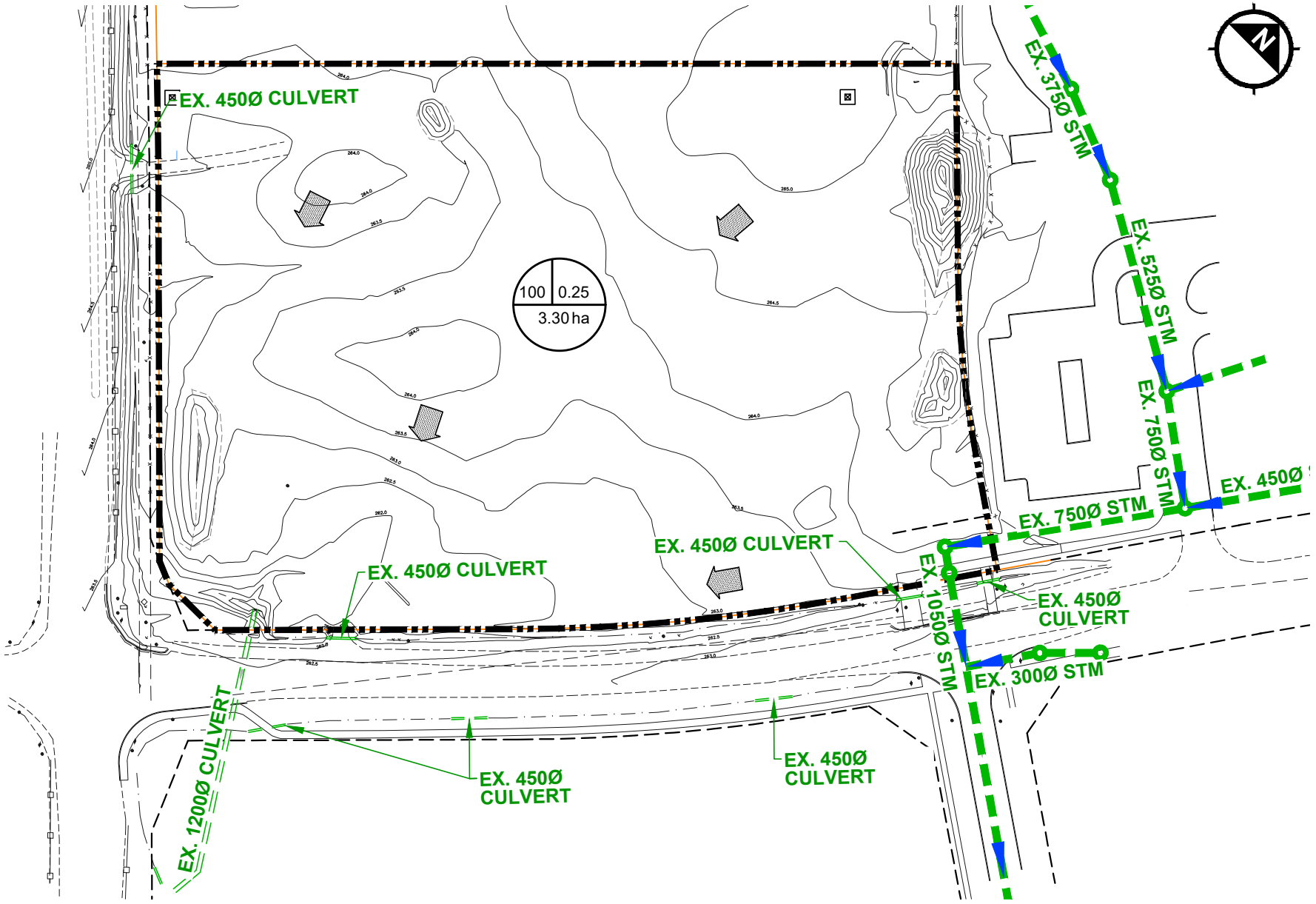
- Two existing 350 mm diameter culverts along the north side of Columbia Way to convey flow westerly, beneath driveways.
- An existing 400 mm diameter culvert along the north side of Columbia Way to convey flow westerly underneath a driveway.
- An existing 1200 mm diameter culvert at the southwest corner of the site that conveys flow southerly beneath Columbia Way.
- An existing 900 x 1000 mm box culvert beneath Highway 50.
- An existing 1050 mm diameter storm sewer along Kingsview Drive, east of the site, which extends 1.5 m north of Columbia Way street-line.
- There is an existing SWM Pond downstream of the site. The SWM Pond is located south of Columbia Way, between Taylorwood Avenue and St. Michael's Crescent. This pond provides water quantity and quality control for its respective catchment area.

Recent comments from the Town have indicated that the existing 1050 mm diameter sewer may not be used for the proposed development. Therefore, the only available outlet for the site is the existing 1200 mm diameter culvert. The existing 1200 m diameter culvert beneath Columbia Way, conveys flow to the existing 900 x 1000 mm box culvert that crosses Highway 50.

2.1.3 Soil Conditions

A geotechnical investigation of the subsurface conditions of the subject property was carried out by A & A Environmental Consultants Inc. and the results of the investigation are provided in the October 2021 report.

The results of the investigation indicate that the soil stratigraphy of the site consists of a 0.0 m to 0.1 m layer of topsoil. Native material consists of deposits of silt & clay with trace gravel and/or sand across the site from 0.1 m to 13.5 m below grade. A clayey silt layer with some sand and trace gravel was found at depths of 13.5 m to 17.9 m below grade. Groundwater elevations ranged from 260.7 to 262.6 masl. The A & A study results will be used at the final design stage.



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LEGEND

- EXISTING STORM SEWER
- EXISTING CULVERT
- EXISTING CONTOUR
- OVERLAND FLOW DIRECTION

AREA I.D. 100 | 0.50 | 1.00 ha — RUNOFF COEFF. / DRAINAGE AREA

FIGURE 2-1
EXISTING DRAINAGE PLAN
COLUMBIA SQUARE

21-0012CA	MARCH 2024	SCALE: NTS

2.3 Stormwater Design Criteria

Stormwater management design criteria for the proposed development were established through a review of regulatory agency design standards, along with background design information for the existing subdivision and stormwater management pond. The relevant stormwater management guidelines are listed below.

Town of Caledon Criteria:

- Local storm sewers shall be designed using the Rational Method and based on a 5-year storm return frequency:

$$Q = C\ i\ A\ /\ 360$$

Where: Q = Flow Rate (m^3/s)
C = Runoff Coefficient
i = Rainfall Intensity (mm/hr)
A = Drainage Area (ha)

- Rainfall Intensity calculations for storm sewer design will be based on the Town of Caledon/Region of Peel standard IDF relationships, and will be calculated as follows:

$$i = A\ /\ (t_C + B)^C$$

Where: A, B, C are constants per Table 2-1 below
t_C = Time of Concentration (min.), with a minimum time of 10 min.

Table 2-2: Rainfall Intensity Equation Coefficients

Storm Event	Coefficients		
	A	B	C
2-year	1070	7.85	0.8759
5-year	1593	11	0.8789
10-year	2221	12	0.9080
25-year	3158	15	0.9335
50-year	3886	16	0.9495
100-year	4688	17	0.9624

- Acceptable flow velocities within storm sewer shall be between 0.75m/s and 4.0m/s for pipes flowing full. Super-critical flows will not be accepted.

- Minimum pipe slope shall be 0.40% (unless adequate self-cleansing velocity is confirmed).
- Minimum pipe size for storm sewer main lines is 300 mm.

TRCA Criteria:

- Enhanced (Level 1) water quality protection (80% TSS removal).
- Minimum retention of the first 5 mm of rainfall for water balance and erosion control.

Region of Peel Criteria:

The following criteria is based on communications with the Region and their "Public Works Design, Specifications & Procedures Manual".

- Flows need to be controlled to the lower of 2-100 year post-to-pre peak flow or the residual capacity of the existing 900 mm culvert across Hwy 50.
- Storm sewers shall be designed using the Rational Method. Intensity of Rainfall coefficients are the same as shown in Table 2-2.
- In order to account for the increase in runoff due to saturation of the catchment surface that would occur for larger, less frequent storms, the adjustment factor below shall be used:

Table 2-3: Summary of Runoff Coefficient Adjustment Factors

Design Storm Frequency	Adjustment Factor
10-year	1.0
25-year	1.1
50-year	1.2
100-year	1.25

2.4 Proposed Stormwater Management

The proposed stormwater management system will be designed in accordance with Town of Caledon, Region of Peel and TRCA guidelines. The intent of the design is to ensure conformance with the overall stormwater management plan for the area and ensure no negative impacts to adjacent properties and infrastructure.

In general, it is proposed to discharge site runoff to the existing 1200 mm diameter culvert beneath Columbia Way. On-site controls are proposed to reduce peak flows and remove at least 80% of total suspended solids (TSS). Further details are provided in subsequent sections below.

Previous versions of this FSR had proposed discharging to the existing 1050 mm diameter storm sewer at the Kingsview Drive and Columbia Way intersection, and ultimately an existing SWM Pond. The SWM Pond however, recently underwent an Environmental Assessment (EA) to be retro fitted. Through the EA process the total drainage area to the pond was determined to be 42 ha and it did not include the site, as the existing drainage pattern for these lands is to the 1200 mm culvert at the southwest corner. Therefore, the site will be required to drain as per the existing drainage pattern.

It is noted that the site will be developed in phases. While this FSR demonstrates the serviceability of all phases, each phase will require a SWM Brief during the detailed design stages of the project.

2.4.1 Quantity control

The site is in a sub-watershed that does not require quantity controls; however, it is proposed to reduce peak flows to protect existing infrastructure from being overwhelmed. It is therefore proposed to control post-development peak flows to pre-development levels for storms up to, and including, the 100-year event.

The allowable release rate was determined to the the lesser of pre-development flows and/or the residual capacity within the existing box culvert beneath Hwy 50. The estimated capacity of the box culvert is 2.892 m^3/s. With an estimated drainage area of 7.75 ha and average runoff coefficient of 0.47, the estimate 100-year peak flow to the box culvert is 1.0075 m^3/s. This suggests that the residual capacity in the culvert is 1.82 m^3/s (2.892 m^3/s – 1.075 m^3/s = 1.82 m^3/s). Therefore the 100-yr pre-development peak flow from the site (0.25 m^3/s) is lower and will dictate the allowable release rate.

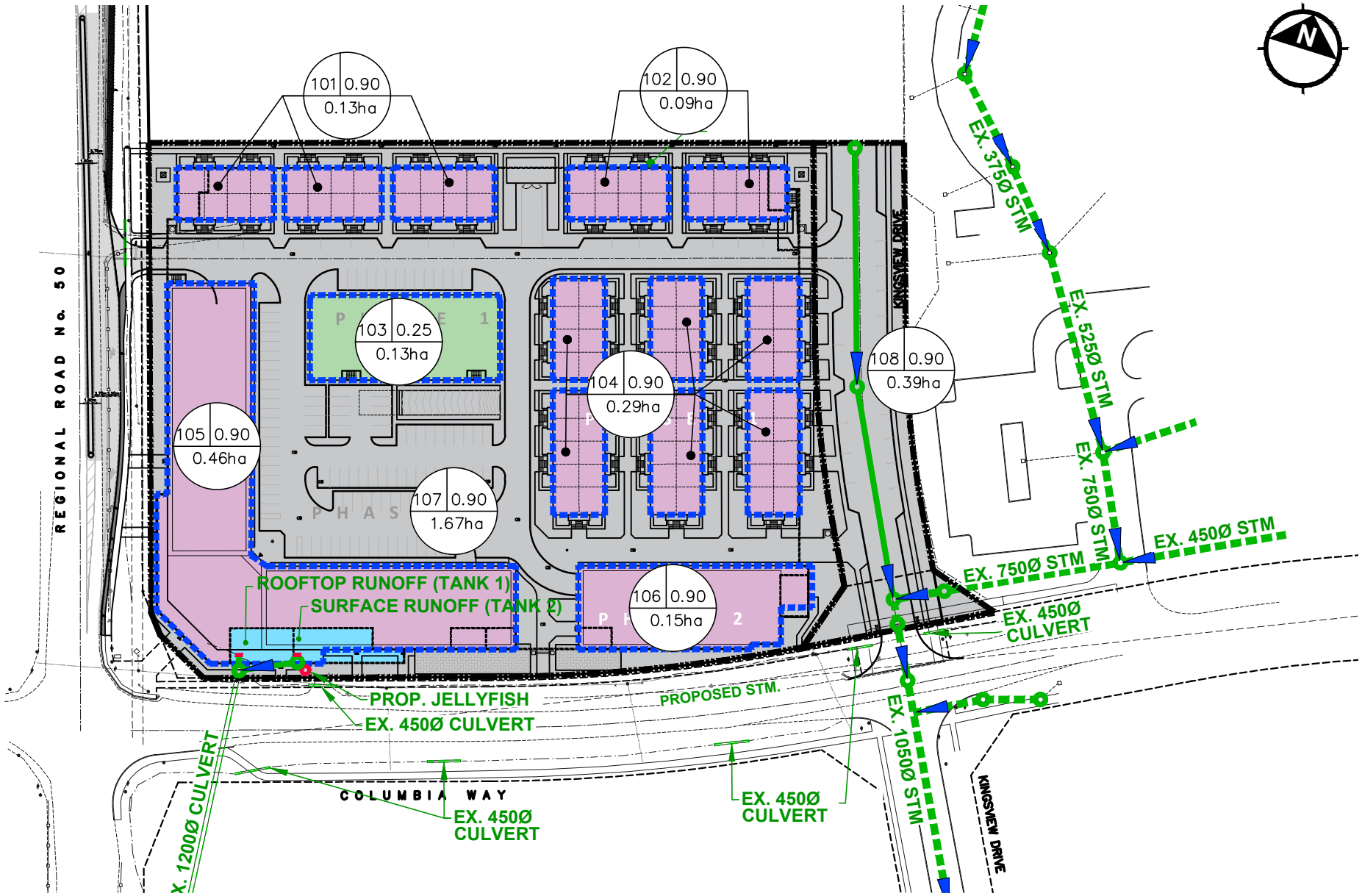
Although the site is proposed to be developed in phases, there will be a common underground parking structure. This will allow for a tank and outlet structure to service the entire site. It is proposed to provide two storage tanks. One storage tank (SWM Tank 1) will detain runoff from "clean" surfaces (i.e., rooftops and landscaped areas). The other (SWM Tank 2) will attenuate flows from paved surfaces; used for vehicular traffic. The clean water tank will also be used to capture runoff for recycling. The proposed 10-yr and 100-yr storage volumes were calculated for each tank using the Rational Method. Allowable release rates and storage requirements are summarized in Table 2-4 and Table 2-5, respectively. Orifice sizes were determined using the orifice equation. Calculations are provided in Appendix C.

Table 2-4: Summary of Allowable Release Rates

Area ID	Description	Area (ha)	10-yr Allowable Release Rate (L/s)	100-yr Allowable Release Rate (L/s)
Post-A1	Clean Area	1.25	65	101
Post-A2	Paved Area	1.67	95	146
Total	-	2.92	160	247

Table 2-5: Summary of Storage Requirements

Area ID	Description	10-Yr Required Storage (m^3)	100-Yr Required Storage (m^3)	Provided Storage (m^3)
Post-A1	Clean Area	271	421	
Post-A2	Paved Area	391	610	



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LEGEND

- EXISTING STORM SEWERS
- PROPOSED STORM SEWERS
- PROPOSED ORIFICE LOCATION
- OIL-GRIT SEPARATOR
- PAVED AREA
- AREA I.D. 100 | 0.50 | 1.00ha — RUNOFF COEFF. / DRAINAGE AREA
- LANDSCAPE AREA
- PROPOSED SWM TANK
- ROOFTOP AREA

FIGURE 2-2
PROPOSED DRAINAGE PLAN
COLUMBIA SQUARE

21-0012CA	MARCH 2024	SCALE: NTS

Anticipated SWM tank and orifice locations are shown schematically on Figure 2-2. Additional details are provided on the Functional Engineering Drawings in Appendix F. Preliminary outlet structure details are summarized in Table 2-6. Pipe and orifice sizes will be finalized during the detailed design stage.

Table 2-6: Outlet Structure Summary

Tank ID	10-Yr Orifice Invert (masl)	10-Yr Orifice Diameter (mm)	100-Yr Orifice Invert (masl)	100-Yr Orifice Diameter (mm)
1	260.81	155	262.36	95
2	260.50	188	262.06	110

2.4.2 Quality Control

TRCA criteria indicate 80 % total suspended solids (TSS) removal is required. A Jellyfish filter unit is proposed to provide the required TSS removal. A two-pipe system is proposed to reduce the Jellyfish size. One system will capture and convey clean water from rooftops and landscaped areas. The other pipe system will collect and convey war from paved areas with vehicular traffic. The filter location is shown on Figure 2-2. Jellyfish sizing will be provided during the detailed design stage.

2.4.3 Site Grading and Drainage

The grading design for the site was produced based on a topographic survey prepared by R-PE Surveying Ltd, dated July 2021. Existing elevations are proposed to be matched along all property lines, and in general the site will be graded for containment of runoff within the site boundaries. Proposed internal grades will be set to ensure that maximum surface ponding will not exceed 0.30 m at catchbasin low points in the event of total blockage of any storm inlet. Flows from storms up to the 100-year event are proposed to be contained within the site without overflow. For emergency situations (i.e., storms exceeding the 100-year event or failure of the internal drainage system), an over-land flow route has been established to ensure that surface flows will exit the site either directly, or indirectly via the Kingsview Drive extension, onto Columbia Way.

The proposed drainage scheme is illustrated in Figure 2-2. Preliminary grading plans are provided in Appendix F.

2.4.4 Water Balance

A water balance analysis was prepared by A & A Consultants Inc. and presented in a hydrogeological report. Based on this analysis, an infiltration deficit of 4,569.7 m^3 per year was estimated as a result of the proposed development.

In accordance with TRCA criteria for sites less than 5 ha, it is proposed to retain 5 mm of rainfall on-site for every event to mitigate the infiltration deficit. Mitigation is proposed via rainfall harvesting and recycling. As mentioned previously, the site is proposed to be developed in phases. A single tank, however, can still be used to collect clean water for recycling since all phases will utilize a common underground parking garage. Rainfall can be recycled for grey water uses or for irrigation. Retention volume requirements for the net developable area are provided in Table 2-7.

Table 2-7: Summary of Water Balance Mitigation Retention Requirements

Area (ha)	Runoff Coefficient	Volume Required (m^3)
2.92	0.83	121.2

2.4.5 Kingsview Drive Extension

As mentioned previously, a portion of the site is being conveyed to the Town of Caledon for the future extension of Kingsview Drive. Since this area is being conveyed to the Town, it has been excluded from the proposed SWM system for the site. Proposed storm sewers along the Kingsview Drive extension are shown on the preliminary drawings to demonstrate functionality. Storm sewer diameters will be provided during the detailed design stage for the road extension.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Infrastructure

The development of the existing subdivision south of Columbia Way included the construction of an existing sanitary sewer system. A 250 mm diameter sanitary sewer is located along Kingsview drive and extends 1.5 m north of the Columbia Way ROW. Based on available servicing reports, this sanitary sewer was designed to accommodate the site with a commercial land use. A 3.3 ha site with commercial land use would have a design population of 165 people (3.30 ha * 50 p/ha = 165 people).

3.2 Design Criteria

The sanitary sewer design and flow calculations are based on the following Region of Peel guidelines:

- Domestic sewage flow rate is 302.8 L/cap/day.
- Infiltration rate is 0.2 L/s/ha of gross area.
- Harmon Peaking Factor, K is $1 + 14/ (4 + P^{0.5})$, where P is population in thousands.
- Population density is based on Table 1-14 in the *Engineering Design Criteria & Standard Drawings*, dated 2013, which includes the following:
    - Apartments 475 persons/ha or 2.7 ppu
    - Commercial 75 persons/ha
    - Row Dwellings 175 persons/ha

3.3 Proposed Sanitary Servicing

It is proposed to collect wastewater from each phase of the development, via a network of gravity sewers, and convey it to a proposed sanitary sewer along the future Kingsview Drive extension. Ultimately, the sanitary sewer system will connect to the existing sewer at the north side of the Kingsview drive and Columbia Way intersection.

As mentioned previously, the existing system accounted for 3.30 ha of commercial area, with a design population of 165 people. Given that the proposed design population for the site is 2,386 people, an analysis will be required to confirm available capacity in the existing system to accommodate the additional population.

Anticipated flows from the site are provided in Table 3-1. Calculations are provided in Appendix D. Proposed sanitary servicing is shown in the Functional Servicing Plan provided in Appendix F.

Table 3-1: Summary of Anticipated Sanitary Flows

Phase	Description	Design population	Average Flow (L/s)	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)
1	Stacked Townhouses	775	3	10	0.4	10.4
2	Apartment	1,179	4	15	0.0	15.0
3	Apartment	423	2	6	0.0	6.0
3	Commercial	9	0	0	0.0	0.0
Total		2,386	8	31	0.4	31.4

3.3.1 Kingsview Drive Extension

As mentioned previously, a portion of the site is being conveyed to the Town for the future extension of Kingsview Drive. A sanitary sewer system is proposed along the Kingsview Drive extension. Connection from the subject development is proposed to the future Kingsview drive sanitary sewer at MH 3A. No additional sanitary connections to the Kingsview Drive sanitary sewer are anticipated at this time. Refer to Drawing #FS-01 in Appendix F for additional details. Sanitary sewer sizing will be finalized during the detailed design stage.

4.0 Water Supply Servicing

4.1 Existing Water Supply Infrastructure

The development of the existing subdivision south of Columbia Way included the construction of an existing watermain network. Existing watermains in the vicinity of the site include the following:

- 400 mm diameter PVC watermain along the south side of Columbia Way. This watermain extends from Highway 50 to an existing valve chamber east of Kingsview Drive.
- 400 mm diameter watermain along the east side of Kingsview Drive. This watermain extends 1.5 m north of the Columbia Way ROW.
- 400 mm diameter watermain along the east side of Highway 50 south of Columbia Way.

The existing water supply infrastructure is shown on the Functional Servicing Plan provided in Appendix F.

4.2 Design Criteria

The water demand used for watermain size selection should be equal to the Fire Flow Demand plus the Maximum Day Demand or the Maximum Hour Demand, whichever is greater. The following guidelines should be used in the design calculations for water supply as per Region of Peel's design criteria.

Typical Water Demand Criteria:

- Average Consumption Rate is:
    - 280 L/cap/day for residential areas
    - 300 L/cap/day for ICI areas
- Maximum Day Demand Factor is:
    - 2.0 for residential areas
    - 1.4 for ICI areas
- Peak Hour Demand Factor is 3.0

- Fire Protection demand calculated as per FUS

Pressure:

- Minimum pressure for Maximum Day and Fire Flow demand is 140 kPa (20 psi).
- Minimum pressure for Peak Hour demand is 275 kPa (40 psi).
- Maximum pressure under static loading is 690 kPa (100 psi).

4.3 Proposed Water Supply Servicing

The water distribution system for the proposed development will be designed in accordance with current Region of Peel standards. The proposed layout of the water distribution network for the development is shown on Drawing FS-01 – Functional Servicing Plan, included in Appendix F.

Drawing FS-01 illustrates the water distribution network together with other underground services, including proposed fire hydrant locations. The proposed internal network will generally consist of fire and domestic watermains. The sizes and locations of proposed watermains within the subject property will be verified at the time of detailed engineering design. The preliminary water and fire flow demand analysis is summarized in Table 4-1. Calculations are included in Appendix E.

Table 4-1: Preliminary Water Demands

Phase	Description	Population	Average Day Demand (L/s)	Max. Day Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow + Max. Day (L/s)
1	Stacked Townhouses	775	2.5	5.0	7.5	222.0
2	Apartment	1,179	3.8	7.6	11.4	224.6
3	Apartment	423	1.4	2.8	4.2	219.8
3	Commercial	9	0.0	0.0	0.0	217.0
Total		2,386	7.7	15.4	23.1	232.4

4.3.1 Hydrant Testing

Flow testing was conducted along the existing 400 mm watermain along Columbia Way. A hydrant test conducted on November 6, 2023, found that a flow rate of 273 L/s, is available at the minimum allowable operating pressure of 140 kPa (20 psi). Based on these results, it is expected that the existing watermain system will be sufficient to service the site's Max Day + Fire Flow demand, as presented in Table 4-1. Associated hydrant test results and analyses are provided in Appendix E.

4.3.2 Kingsview Drive Extension

As mentioned previously, a portion of the site will be conveyed to the Town for the extension of Kingsview Drive, north of Columbia Way. A watermain is proposed along the extension to facilitate the proposed development. The proposed connection to the future Kingsview Drive watermain will mean that a connection to the existing Columbia Way watermain will not be needed. The proposed watermain along the Kingsview Drive extension is shown on Drawing FS-01 in Appendix F. Watermain sizes will be provided during detailed design.

5.0 SUMMARY

This report outlines the proposed servicing and stormwater management scheme for the proposed mixed-use development located at 14245 Highway 50, north of Columbia Way, in the Town of Caledon. The following is a summary of the conclusions and recommendations of this report:

Stormwater Management

- Post-development peak flows for storms up to, and including, the 100-year event, are proposed to be controlled to pre-development levels. Flow control is proposed to be achieved using flow restrictors and underground storage tanks.
- Water quality control is proposed to be provided via a jellyfish filter unit.
- Retention of 5mm of rainfall for water balance mitigation is proposed to be achieved through rainwater harvesting and recycling. An underground storage tank collecting clean water is proposed to retain the required volume.

Sanitary Servicing

- Sanitary servicing is proposed via connection to the future system along the Kingsview Drive extension. The future system is proposed to connect to the existing sanitary manhole on the north end of the Kingsview Drive and Columbia Way intersection.
- The anticipated flow from the proposed development is 31.4 L/s. A capacity analysis may be required to determine if the existing system is capable of accommodating the anticipated flows.

Water Supply Servicing

- Water supply servicing is proposed via connection to the existing 400 mm diameter watermain along Columbia Way, via the future watermain along the Kingsview Drive extension.
- The anticipated Max Day + Fire Flow is 232.4 L/s. Based on a hydrant test, there is sufficient pressure and flow available to accommodate the proposed development.

Respectfully Submitted,

Urbanworks Engineering Corporation

Michael Paulo, P.Eng.
Principal

Appendix A: Proposed Site Plan

COLUMBIA SQUARE

BOLTON, ONTARIO

No.	Description	Date
1	ISSUED FOR OPA	2023/12/15
13	ISSUED FOR REVIEW	2024/02/21

PROPERTY LINE
PROPERTY LINE
34.70 m
28.25 m
EXTENSION OF KINGSVIEW DRIVE (26.m ROW)
TRANSFORMER
TRANSFORMER
LINE OF P1
LINE OF P1
LINE OF P1
7.5 SB
7.5 SB
7.0 SB
7.0 SB
7.0 SB
7.0 SB
7.5 SB
28.0
29.2
16.0
'A'
'B'
'C'
'D'
'E'
20
18
3.0
3.2
4.9
42.0 m
42.4 m
43.2 m
LOADING AREA 6.0M X 18.0M
13.0 m
5.5
2.7
MAIL
DRIVEWAY
PRIVATE ROAD 'B'
PARKING 31
PHASE 1
PHASE 2
6.0
4.7 SB
4.1
4.3 SB
2.8
20.75 m ROAD WIDENING
LOADING AREA 6.0M X 18.0M
PARK 1309 m²
57.7
2.5
RAMP TO U/G PARKING
7.0
2.9
19.0
1.0
18.0
24.0
78.4
PARKING 98
18.0
1.1
PRIVATE ROAD 'A'
19.0
2.5
30.5 m
15.0
13.0
6.7
'F'
'G'
'H'
'I'
'J'
'K'
24
22
35.8
41.5 m
6.7
1.0
7.0
FIRE ROUTE
FOLDING BOLLARD
FOLDING BOLLARD
KINGSVIEW DR
PROPERTY LINE
ROAD CENTERLINE
HIGHWAY 50
PROPERTY LINE
PROPERTY LINE
PROPERTY LINE
10 STOREY MIXED USE (393 UNITS)
27.0
73.2
24.0
1.2 SB
9 STOREY RESIDENTIAL APARTMENT (141 UNITS)
66.3
LOADING AREA 6.0M X 18.0M
LOADING AREA 6.0M X 18.0M
2.4 SB
2.0 SB
2.0 SB
4.2 SB
7.9 SB
OUTDOOR PATIO
OUTDOOR PATIO
LINE OF P1
PEDESTRIAN ENTRANCE
PROPERTY LINE
PROPERTY LINE
12.0 m
PHASE 2
PHASE 3
PHASE 1
PHASE 3
COLUMBIA WAY

Context Plan

Project North

Stamp

Clients

Columbia Square Inc.

KFA architects + planners inc.
197 SPADINA AVE - SUITE 500
TORONTO - ON - M5T 2C8
416.633.6226 - telephone
www.kfarchitecture.com

Project No.:	20065
Scale:	1 : 300
Issue Date:	12/15/2023
Drawn By:	

Title

SITE PLAN PHASES 1, 2, 3

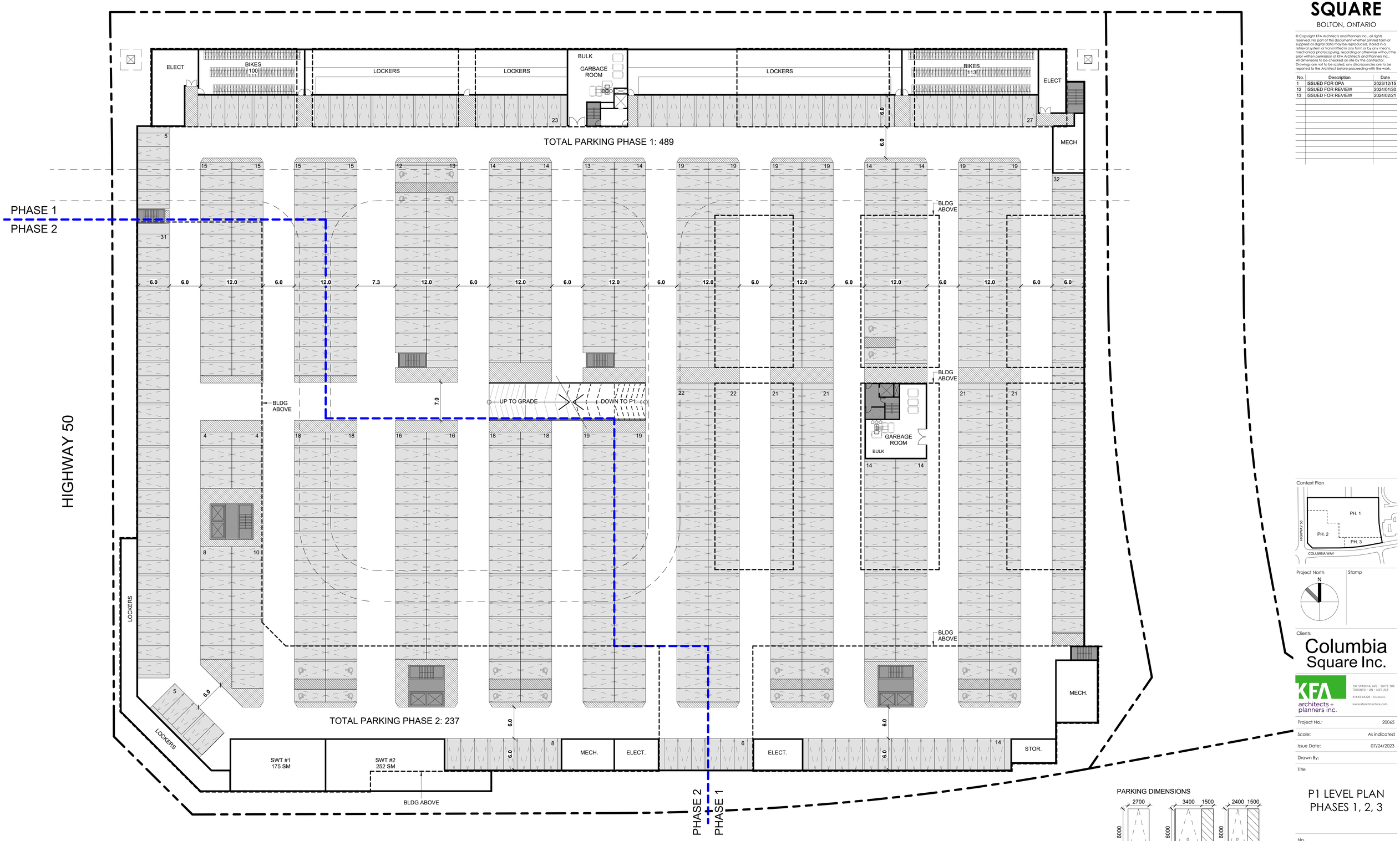
No.

A100

COLUMBIA SQUARE

BOLTON, ONTARIO

No.	Description	Date
1	ISSUED FOR OPA	2023/12/15
12	ISSUED FOR REVIEW	2024/01/30
13	ISSUED FOR REVIEW	2024/02/21



Context Plan

Project North

Stamp

Clients

Columbia Square Inc.

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197 SPADINA AVE - SUITE 500
TORONTO - ON - M5T 2C8
416.633.6226 - telephone
www.kfarchitecture.com

Project No.:	20065
Scale:	As indicated
Issue Date:	07/24/2023
Drawn By:	

Title

P1 LEVEL PLAN
PHASES 1, 2, 3

No.

A102

PARKING DIMENSIONS

Appendix B: Background Information

DUFFERIN-PEEL CATHOLIC DISTRICT SCHOOL BOARD

40 Matheson Boulevard West, Mississauga Ontario L5R 1C5 • Tel: (905) 890-1221 • Fax: (905) 890-1557

DATE: **November 8, 2006**

TO: Alan Young, Weston Consulting Group Inc.

FROM: Beth Bjarnason, Manager of Planning

RE: **Servicing Investigation for Columbia Way**

Please find attached a copy of the Servicing Investigation undertaken for the Board related to St. Michael Secondary School.

Marshall Macklin Monaghan
PROJECT MANAGERS · ENGINEERS · SURVEYORS · PLANNERS

MARSHALL MACKLIN MONAGHAN LIMITED
701 Rossland Road East, Suite 201, Whitby, ON, Canada L1N 8Y9
Telephone: 905-668-3022 Facsimile: 905-668-9443
Web: www.mmm.ca

July 13, 2006
File: 10-06629

Mr Ken MacSporran
Moffet and Duncan Architects Inc
5052 Dundas Street West
Islington, Ontario M9A 1B9

Dear Mr. MacSporran

Subject: Servicing Investigation
Bolton Secondary School
Town of Caledon

As requested we have undertaken a Servicing Investigation for a potential school site in the Town of Caledon The Dufferin-Peel Catholic District School Board is considering a new secondary school site in Bolton. The school site is located on the north side of Columbia Way, east of Kingsview Drive (which is the first street east of Highway 50). Currently, there is no development on the north side of Columbia Way The proposed school site is 6.1 ha in size (roughly 200m x 300m). The attached figure shows the location of the proposed school block and other potential development north of Columbia Way.

This investigation has been conducted for the sole purpose of determining the location and capacity of existing municipal services and utilities adjacent to the site This investigation does not consider any of the planning issues related to this site as this is beyond the scope of work.

The following services/utilities have been reviewed in this investigation:

- Watermain
- Sanitary Sewers
- Storm sewers
- Gas
- Hydro
- Bell
- Cable TV
- Sidewalks

We have discussed each of these services with the various utilities and approval agencies and have been advised of the following:

Watermain

The Region of Peel has provided a copy of an engineering drawing (Project No. 350E-86, Drawing No. 24311-D) which was prepared for the subdivision located on the south side of

Columbia Way. A copy of this drawing is attached for information purposes. This drawing shows that a 400mm concrete watermain, located on the east side of Kingsview Drive, has been constructed across Columbia Way to the north side. This watermain is plugged 1.5m north of the north streetline and is intended to be extended when development proceeds north of Columbia Way. A 400mm diameter watermain is of sufficient size to service the lands north of Columbia Way, including the school site

Sanitary Sewer

As part of the development of the subdivision located south of Columbia Way, the sanitary sewer was extended across Columbia Way to the north boulevard. A sanitary manhole has been constructed 1.5m north of the north streetline. The sanitary sewer is a 250mm diameter pipe constructed at 0.57%. This sewer has a capacity of 46.8 l/s.

For a high school site of 6.1ha, the expected peak flow would be approximately 8 l/s. Including the 5.3 ha commercial area and the 3.1 ha residential area, the total expected peak flow for the lands north of Columbia Way would be approximately 29 l/s. To be conservative we have assumed the residential block would be developed as medium density. If it is developed as low density the total expected peak flow from the lands north of Columbia Way would be reduced to about 21.51 l/s. Therefore it would appear that this sewer has the necessary capacity to accommodate the school site. We have requested additional information from the Region on the existing system located south of Columbia Way in order to confirm that available capacity exists in the downstream sewers. The Region has indicated that they will be able to provide this information to us in one to two weeks

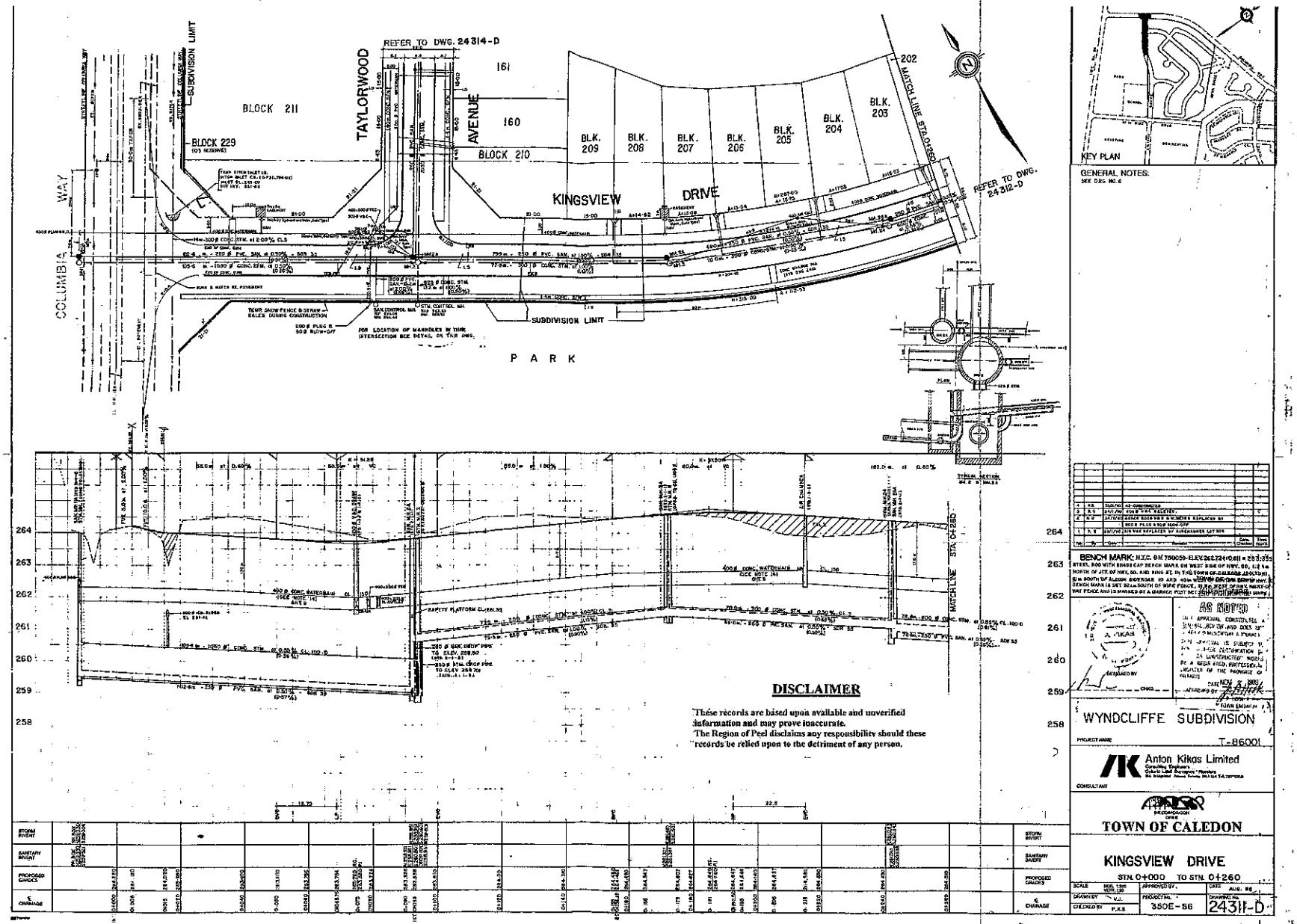
Storm Sewer

Similar to sanitary, when the development south of Columbia Way was designed, it included the extension of a storm sewer across Columbia Way to the north side of the road. A storm manhole has been constructed 1.5m north of the north streetline of Columbia Way. The storm sewer is a 1050mm diameter sewer constructed at 0.36% (designed at 0.50%). This sewer has a capacity of 1,709 l/s. The Town of Caledon has indicated that the Stormwater Management Report includes an external drainage area north of Columbia Way of 9.70 ha. However the boundaries of this area were not identified

The Town has advised that they will require on-site SWM controls consisting of:

- Roof top controls with a maximum release rate of 42 l/s/ha.
- 100 year maximum release rate for site is 180 l/s/ha.

To achieve these maximum release rates it will be necessary to design the parking lot grading to provide surface storage. The required amount of storage will be determined at detailed design.



KEY PLAN

GENERAL NOTES:
SEE DRG. NO. 0

BENCH MARK: M.T.C. BM 750059-ELEV 262.724 (CGH) = 263.135
STEEL ROD WITH BRASS CAP BENCH MARK ON WEST SIDE OF HWY. 50, 1.2 m NORTH OF JCT. OF HWY. 50, KING ST. IN THE TOWN OF CALEDON (BOLTON).
0.9 m SOUTH OF ALDEN AVENUE, 10 AND 40 m NORTH OF DRIVEWAY ENTRANCE AND 5 m EAST OF HWY. 50. BENCH MARK IS SET 82 m SOUTH OF WIRE FENCE, 10.5 m WEST OF SIGN, WEST OF WAY FENCE AND IS MARKED BY A MARKER POST SET 250 mm ABOVE GROUND.

AS NOTED

DISCLAIMER

These records are based upon available and unverified information and may prove inaccurate.
The Region of Peel disclaims any responsibility should these records be relied upon to the detriment of any person.

WYNDCLIFFE SUBDIVISION
PROJECT NAME
T-86001

Anton Kikas Limited
CONSULTANT

TOWN OF CALEDON

KINGSVIEW DRIVE
STN. 0+000 TO STN. 0+260

SCALE	APPROVED BY	DATE
HOR. 1:300 VERT. 1:60		AUG. 86
DRAWN BY: M.J.	PROJECT No. 350E-86	Drawing No. 24311-D
CHECKED BY: P.K.S		

Gas

We spoke with Mr. Jim Arnott and Ms. Beverly Poersch of Enbridge. There is an existing 4" (100mm) gas main located in the north boulevard of Columbia Way. They have indicated that they have no concerns with providing service to the school site.

Hydro

We spoke with Mr. Bob Harper of Hydro One. There is an existing overhead hydro line located on the north side of Columbia Way across the frontage of the proposed school site. The existing line is a 3 phase 27.6 kV line. Hydro One advised that they can provide for a peak load of 1000 KVA from the school. A pole mounted transformer can be provided to reduce the hydro flow to 500 KVA. If greater transformation is required then a pad mount transformer located on the school property will be required.

Bell Canada

We spoke with Mr. Ron Blair of Bell Canada. Currently they do not have any service within the north boulevard of Columbia Way. All of their facility is located within the subdivision on the south side. They also have an existing line on the east side of Highway 50. They indicated that they could provide service to the school by either installing a road crossing at Kingsview Drive or by installing a new line on the hydro poles along the north side of Columbia Way from Highway 50. Therefore, Bell service can be made to this site.

Cable TV

We spoke with Mr. Carston Schunelle of Rogers. There is an existing fibre optic node located at the southwest corner of Kingsview Avenue and Columbia Way. In addition, a conduit has been pre-installed across Columbia Way to the north side. This will facilitate the northward extension of a fibre optic line to the lands north of Columbia Way. Therefore, there are no issues with servicing the school site with Cable TV.

Sidewalks

There are currently no sidewalks constructed on Columbia Way. There is a sidewalk constructed on the west side of Kingsview Avenue which extends to Columbia Way. This provides pedestrian access to Columbia Way for the existing subdivision located to the south. In the future, there will be sidewalks constructed on both sides of Columbia Way. The Town currently has no plans for constructing any sidewalks on Columbia Way. This will occur in due course as development advances in this area.

The location of the above services are illustrated on Figure No. 1.

Site Topography

Based on the draft copy of the topographic survey prepared by Young & Young Surveying Inc. the west half of the site is relatively flat and the east half of the site slopes off toward the environmentally protected lands and ultimately to an eastern tributary of the Humber River.

The as-built storm and sanitary sewer inverts are both noted as 259.33m on the attached engineering drawing. There appears to be a 0.611m adjustment noted in the benchmark description on that drawing. In comparing the centerline road elevation at Columbia Way and Kingsview Drive there also appears to be a difference of about 0.60m to 0.70m between the topo survey and the engineering drawing. The draft topo survey shows a lower elevation at this intersection which means the as-built inverts relative to the current topo survey may be closer to 258.70m

It is assumed that the school building will be located on the western portion of the site adjacent to Kingsview Drive. The average ground elevation on the western half of the site is about 264.50m. Assuming the first floor elevation will also be around 264.50m, there will not be any issue with providing sanitary and storm connections to this building (i.e. FFE will be more than 5.0m higher than existing invert elevations)

It is expected that the east half of the site will be developed as the track and field. Storm drainage from this area will need to sheet drain to the east as the elevations are too low to be picked up by the storm sewer. It is not expected that any quantity or quality controls will be required for this area as it will be predominantly a grassed area.

Summary

All of the necessary services for the proposed school in Bolton are located at the intersection of Kingsview Drive and Columbia Way and/or within the north boulevard of Columbia Way across the frontage of the school block.

Since all of the services are located in close proximity to the site it will not be necessary to extend services very far. We have queried the Municipality on whether or not they will require the services to be extended north along the future extension of Kingsview Drive (north of Columbia Way) to the centre of the school block. They have indicated that it is too premature to say whether this will be required or not. They will not respond until they see a site plan submission.

Therefore, in terms of external servicing costs we would suggest an allowance be carried to extend the storm, sanitary and water services a short distance north (say 20m) and then into the site. We suggest the following allowances be carried for external municipal servicing.

- Storm - $50,000
- Sanitary - $25,000
- Water - $10,000

A temporary easement across the land owners property will be required for these services.

We trust this servicing investigation provides the information needed at this time. Please call if you have any questions

Yours very truly

MARSHALL MACKLIN MONAGHAN LIMITED

Craig A. Rose, C.E.T.
Design Manager
Durham Region Office

CAR:sg
Encl

L:\V4\2006\06629\lets\client\k MacSporran Serv Invst School Site July 13 06 doc

QUEEN STREET NORTH/HIGHWAY 50

TRCA REGULATION LIMIT

MATCH LINE STA. 2+420 SEE DWG. 45133-D

MATCH LINE STA. 2+640 SEE DWG. 45135-D

EDGE OF PAVEMENT
EDGE OF SHOULDER

400mm DIA PVC WATERMAIN

2-45° HOR.BENDS

CHAMBER No. 4 DRAIN/ISOLATION VALVE REGION STD. DWG. 1-3-26

HYDRANT V&B C/W 4.0m WIDE GRANULAR 'A' ACCESS RAMP AS PER OPSD 217.050. 8m-650mm DIA. GALVANIZED CSP CULVERT (38x6.5mm CORRUGATION, 2mm WALL THICKNESS, SLOPED END TREATMENTS, MATCH EXISTING DITCH INVERTS), AND 100mm HI60 INSULATION AS PER STD. DWG. 1-5-8 (4m LENGTH) ABOVE HYD LEAD. PLACE 100mm TOPSOIL AND SOD ON SIDE SLOPES. COORDINATE WITH SW DRAWINGS FOR HYDRANT ELEV. INSTALL HYD. 0.75m WEST OF PROP. SW. SUPPORT BELL DUCT STRUCTURE IN PLACE.

HYDRANT V&B COORDINATE WITH SW DRAWINGS FOR HYDRANT ELEV. INSTALL HYD. 0.75m EAST OF PROP. SW.

WATERMAIN IN STEEL CASING (OPEN CUT) 10m - 762mm DIA. SEE DRAWING 45141-D

OPEN CUT DITCH CROSSING COMPLETE DURING DRY WEATHER ONLY FLOW ONLY OCCURS DURING RAIN/SNOW EVENTS SEE SIDEWALK DRAWINGS FOR PROPOSED GRADING AND CONNECTION OF BOX CULVERT AND CSP CULVERT

HYDRANT V&B COORDINATE WITH SW DRAWINGS FOR HYDRANT ELEV. INSTALL HYD. 0.75m EAST OF PROP. SW.

1200 CSP

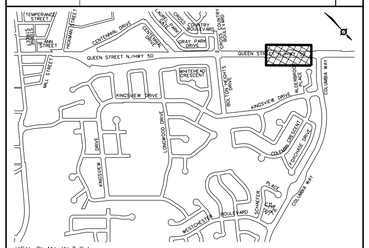
WATERMAIN
VALVES - AVK SERIES 25 GATE VALVE
HYDRANTS - AVK DRY BARREL MODEL 2700
WATERMAIN - 400 DIA PVC DR 18 PR 235

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.
JUN.13/2012	ISSUED FOR CONSTRUCTION	B.G.G.
APR.29/2013	AS-BUILT SUBMISSION	B.G.G.



KEY PLAN (N.T.S.)

LEGEND

W/S — 20mm DIA. or 25mm DIA. COPPER AS STATED ON THE DRAWING.

35 — HOUSE NUMBER

25mmC — W/S SIZE AND TYPE

Disclaimer

As-constructed dimensions, measurements and other details contained in this record drawing have been obtained by AECOM CANADA LTD. ("AECOM") from various sources. Such information represents the best information available to AECOM at the time of preparation of this record drawing. AECOM does not in any way represent or warrant that such information is accurate and assumes no responsibility for any errors or omissions contained therein.

AECOM

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

Region of Peel BM NO.73: On The North Face, West Corner Of A Red Brick House, No.166 King Street West Bolton. Elev. 226.567

B.M. No. 73 Elev. 226.567m

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

ORIGINAL DESIGN STAMPED BY B.G.GRATRIX, P.ENG. JUNE 13, 2012

Designed by ____ Chkd. ____

Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m — HORIZONTAL SCALE

1m 0 1 2 3m — VERTICAL SCALE

Region of Peel
Working for you

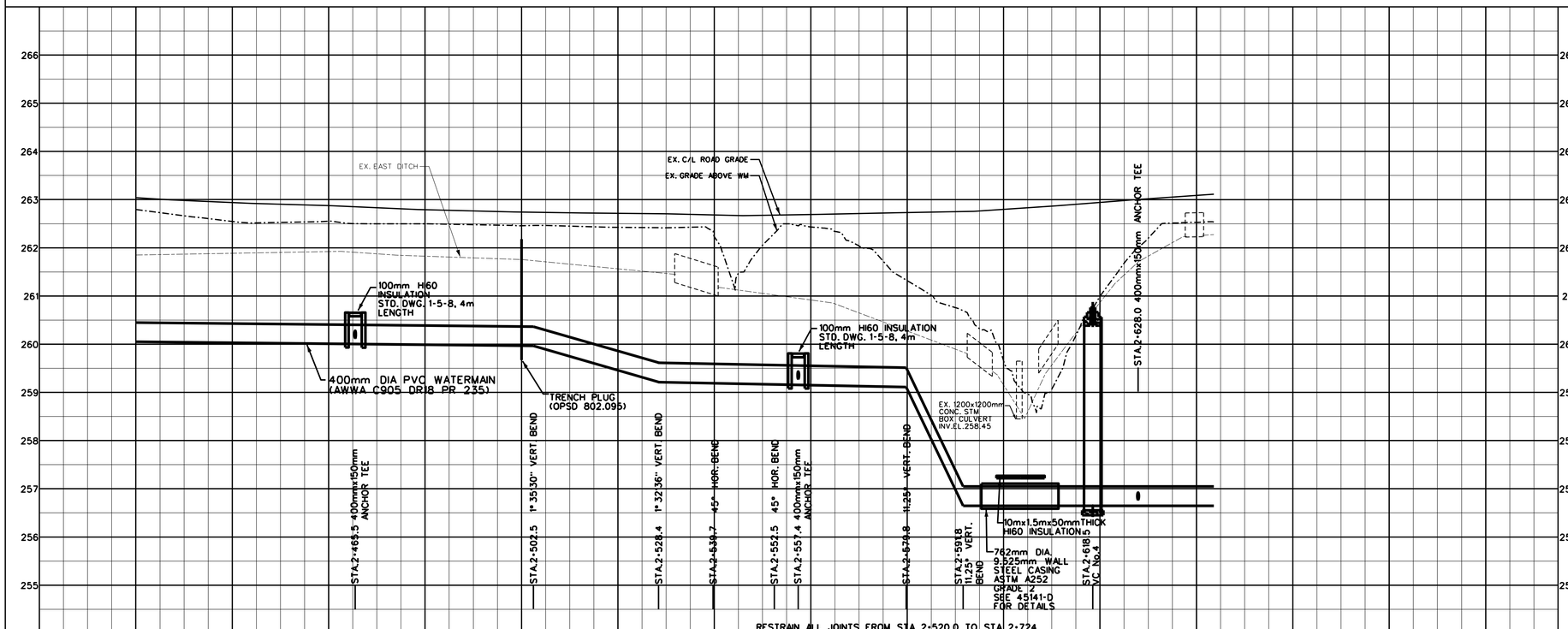
QUEEN ST. N/HIGHWAY 50

(FROM HUMBER RIVER TO COLUMBIA WAY)

400mm WATERMAIN

PLAN AND PROFILE

STA. 2+420 TO STA. 2+640



260.05	260.02	260.00	259.98	259.96	259.46	259.19	259.15	259.07	256.64	256.64	256.64	BOT.EL. OF WM.
263.04	262.94	262.87	262.79	262.74	262.72	262.68	262.69	262.73	262.80	262.94	263.09	EX. ROAD ELEV.
2+420	2+440	2+460	2+480	2+500	2+520	2+540	2+560	2+580	2+600	2+ 620	2+640	ROAD CHAINAGE

CAD Area		Area	C-22
Checked by	B.G.G.	Drawn by	A.L.G.
Date	JUN. 13, 2012	Sheet	14 of 45

Project No. 09-1970 09-1115

Plan No. 45134-D

Appendix C: Stormwater Management Calculations

urbanworks ENGINEERING CORPORATION

Prepared By: M.P.

Rational Method
Pre-Development Flow Calculation

Columbia Square
File No.: 21-0012CA
Date: February 2024

Time of Concentration Calculation (Bransby Williams)

Area Number	Area (ha)	C	Flow Length (m)	ΔH (m)	Slope (%)	Time of Concentration (minutes)
Total	3.30	0.25	233	3.5	1.5%	**27.3**

Rational Method Calculation

Event 2 yr
IDF Data Set Town of Caledon
A = 1070.00
B = 7.850
C = 0.8759

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	47.4	0.096	96
Pre-A2	0.38	0.25	0.095	27	47.4	0.012	12
Total	3.30	0.25	0.83	27	47.4	0.108	108

Event 5yr
IDF Data Set Town of Caledon
A = 1593.00
B = 11.000
C = 0.8789

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	64.7	0.131	131
Pre-A2	0.38	0.25	0.095	27	64.7	0.017	17
Total	3.30	0.25	0.83	27	64.7	0.148	148

Event 10yr
IDF Data Set City of Brampton
A = 2221.00
B = 12.000
C = 0.9080

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	79.2	0.161	161
Pre-A2	0.38	0.25	0.095	27	79.2	0.021	21
Total	3.30	0.25	0.83	27	79.2	0.182	182

urbanworks ENGINEERING CORPORATION

Prepared By: M.P.

Rational Method
Pre-Development Flow Calculation

Columbia Square
File No.: 21-0012CA
Date: February 2024

Time of Concentration Calculation (Bransby Williams)

Area Number	Area (ha)	C	Flow Length (m)	ΔH (m)	Slope (%)	Time of Concentration (minutes)
Total	3.30	0.25	233	3.5	1.5%	**27.3**

Rational Method Calculation

Event 25 yr
IDF Data Set Town of Caledon
A = 3158.00
B = 15.000
C = 0.9335

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	95.8	0.194	194
Pre-A2	0.38	0.25	0.095	27	95.8	0.025	25
Total	3.30	0.25	0.83	27	95.8	0.219	219

Event 50yr
IDF Data Set 15
A = 3886.00
B = 16.000
C = 0.9495

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	108.6	0.220	220
Pre-A2	0.38	0.25	0.095	27	108.6	0.029	29
Total	3.30	0.25	0.83	27	108.6	0.249	249

Event 100yr
IDF Data Set City of Brampton
A = 4688.00
B = 17.000
C = 0.9624

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
Pre-A1	2.92	0.25	0.73	27	122.1	0.248	248
Pre-A2	0.38	0.25	0.095	27	122.1	0.032	32
Total	3.30	0.25	0.83	27	122.1	0.280	280

Imperviousness Calculation
Drainage Area to External Culvert

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: Feb 2024
PREPARED BY: MP

Draining to Conlin Rd

Area ID	Total Area (ha)	Pervious Area (ha)	C	Impervious Area (ha)	C	Weighted C
100	7.75	5.11	0.25	2.64	0.90	0.47
Total	7.75	5.11	0.00	2.64	0.00	0.00

urbanworks
ENGINEERING CORPORATION

Prepared By: M.P.

Rational Method
Culvert Flow Calculation

Columbia Square
File No.: 21-0012CA
Date: November 2023

Time of Concentration Calculation (Bransby Williams)

Area Number	Area (ha)	C	Flow Length (m)	ΔH (m)	Slope (%)	Time of Concentration (minutes)
Total	7.75	0.47	330	6	1.8%	**34.2**

Rational Method Calculation

Event 2 yr
IDF Data Set Town of Caledon
A = 1070.00
B = 7.850
C = 0.8759

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	40.5	0.410	410
Total	7.75	0.47	3.64	34	40.5	0.410	410

Event 5yr
IDF Data Set Town of Caledon
A = 1593.00
B = 11.000
C = 0.8789

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	56.0	0.566	566
Total	7.75	0.47	3.64	34	56.0	0.566	566

Event 10yr
IDF Data Set City of Brampton
A = 2221.00
B = 12.000
C = 0.9080

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	68.5	0.693	693
Total	7.75	0.47	3.64	34	68.5	0.693	693

urbanworks
ENGINEERING CORPORATION

Prepared By: M.P.

Rational Method
Culvert Flow Calculation

Columbia Square
File No.: 21-0012CA
Date: Feb 2024

Time of Concentration Calculation (Bransby Williams)

Area Number	Area (ha)	C	Flow Length (m)	ΔH (m)	Slope (%)	Time of Concentration (minutes)
Total	7.75	0.47	330	6	1.8%	**34.2**

Rational Method Calculation

Event 25 yr
IDF Data Set Town of Caledon
A = 3158.00
B = 15.000
C = 0.9335

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	83.2	0.842	842
Total	7.75	0.47	3.64	34	83.2	0.842	842

Event 50yr
IDF Data Set 15
A = 3886.00
B = 16.000
C = 0.9495

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	94.4	0.955	955
Total	7.75	0.47	3.64	34	94.4	0.955	955

Event 100yr
IDF Data Set City of Brampton
A = 4688.00
B = 17.000
C = 0.9624

Area Number	A (ha)	C	AC	Tc (min)	I (mm/h)	Q (m3/s)	Q (L/s)
100	7.75	0.47	3.6425	34	106.2	1.075	1075
Total	7.75	0.47	3.64	34	106.2	1.075	1075

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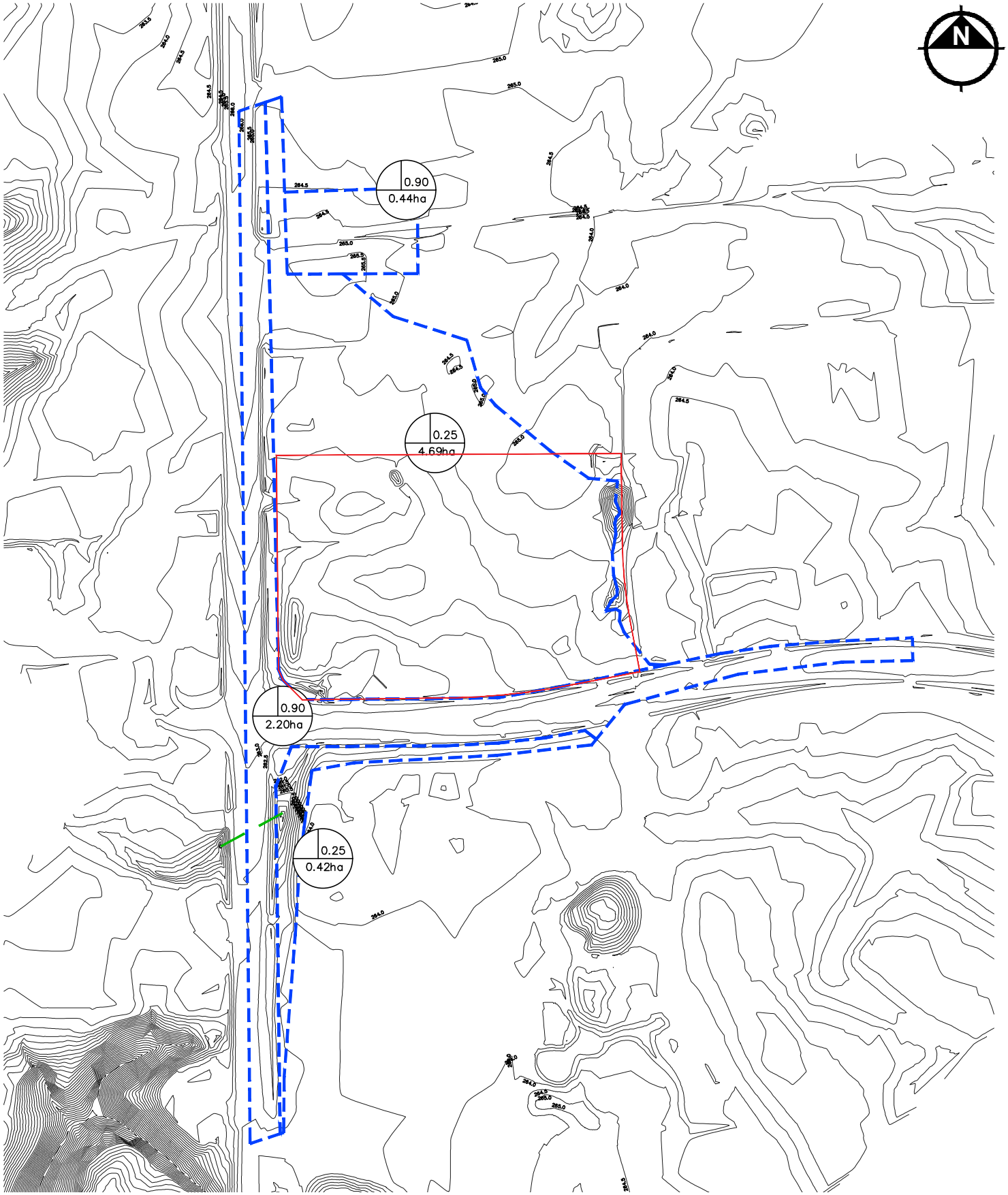
Prepared By: M.P.

Box Culvert Capacity
Mannings Equation

Columbia Square
File No.: 21-0012CA
Date: Feb 2024

TYPE	WIDTH (mm)	HEIGHT (mm)	LENGTH (m)	ΔH (m)	SLOPE (m/m)	n	Q_{FULL} (m^3/s)	V_{FULL} (m/s)
Box	900.00	1000	42	0.5	0.0119048	0.013	2.892	3.213

Culvert Capacity	2.892	(m^3/s)
Estimated 100-yr Flow	1.075	(m^3/s)
Residual Flow	1.817	(m^3/s)



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LEGEND

SITE LOCATION

AREA I.D. 100 | 0.50 | 1.00ha — RUNOFF COEFF. / DRAINAGE AREA

EXISTING CULVERT

APENDIX C

CULVERT DRAINAGE PLAN

21-0012CA	MARCH 2024	SCALE: N.T.S.

STORMWATER STORAGE & RELEASE CALCULATION

100-YEAR STORM
Clean Areas

urbanworks ENGINEERING CORPORATION

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: February 2024
PREPARED BY: MP

DRAINAGE AREA I.D.	101 to 106	
DRAINAGE AREA (ha)	1.25	
RUNOFF COEFF. (C)	0.83	
A x C	1.038	
TOTAL A x C	1.038	
TIME OF CONCENTRATION	10.0	min.
TIME STEP	5.0	min.
CONTROLLED RELEASE RATE (Q_C)	0.065	m^3/s
MAX. STORAGE REQUIRED	271	m^3

IDF DATA SET:	Town of Caledon		
STORM	**COEFFICIENTS**		
EVENT	**A**	**B**	**C**
100 YR.	2221	12	-0.9080

T	*I = A·(T + B)^C*	*Q_R=(C·I·A)/360*	*$V_R = Q_R \cdot T \cdot 60$*	*$V_C = Q_C \cdot T \cdot 60$*	*$V = V_R - V_C$*
TIME (min.)	**RAINFALL INTENSITY (mm/hr)**	**RUNOFF (m^3/s)**	**RUNOFF VOL. (m^3)**	**CONTROLLED RELEASE VOL. (m^3)**	**STORAGE VOL. (m^3)**
10.0	134.2	0.387	231.99	39.00	192.99
15.0	111.4	0.321	288.93	58.50	230.43
20.0	95.5	0.275	330.17	78.00	252.17
25.0	83.7	0.241	361.74	97.50	264.24
30.0	74.6	0.215	386.90	117.00	269.90
35.0	67.3	0.194	407.56	136.50	271.06
40.0	61.4	0.177	424.93	156.00	268.93
45.0	56.5	0.163	439.81	175.50	264.31
50.0	52.4	0.151	452.76	195.00	257.76
55.0	48.8	0.141	464.16	214.50	249.66
60.0	45.7	0.132	474.33	234.00	240.33
65.0	43.0	0.124	483.47	253.50	229.97
70.0	40.6	0.117	491.75	273.00	218.75
75.0	38.5	0.111	499.30	292.50	206.80
80.0	36.6	0.105	506.24	312.00	194.24
85.0	34.9	0.101	512.64	331.50	181.14
90.0	33.3	0.096	518.58	351.00	167.58
95.0	31.9	0.092	524.12	370.50	153.62
100.0	30.6	0.088	529.29	390.00	139.29
105.0	29.4	0.085	534.15	409.50	124.65
110.0	28.3	0.082	538.72	429.00	109.72
115.0	27.3	0.079	543.04	448.50	94.54
120.0	26.4	0.076	547.12	468.00	79.12
125.0	25.5	0.073	551.00	487.50	63.50
130.0	24.7	0.071	554.69	507.00	47.69
135.0	23.9	0.069	558.21	526.50	31.71
140.0	23.2	0.067	561.56	546.00	15.56
145.0	22.5	0.065	564.78	565.50	0.00
150.0	21.9	0.063	567.85	585.00	0.00
155.0	21.3	0.061	570.81	604.50	0.00
160.0	20.7	0.060	573.65	624.00	0.00
165.0	20.2	0.058	576.38	643.50	0.00

STORMWATER STORAGE & RELEASE CALCULATION

100-YEAR STORM

Clean Areas

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: February 2024
PREPARED BY: MP

DRAINAGE AREA I.D.	101 to 106	
DRAINAGE AREA (ha)	1.25	
RUNOFF COEFF. (C)	0.83	
A x C	1.038	
TOTAL A x C	1.038	
TIME OF CONCENTRATION	10.0	min.
TIME STEP	5.0	min.
CONTROLLED RELEASE RATE (Q_C)	0.101	m^3/s
MAX. STORAGE REQUIRED	421	m^3

IDF DATA SET:	Town of Caledon		
STORM	**COEFFICIENTS**		
EVENT	**A**	**B**	**C**
100 YR.	4688	17	-0.9624

T	$I = A \cdot (T + B)^C$	$Q_R = (C \cdot I \cdot A)/360$	$V_R = Q_R \cdot T \cdot 60$	$V_C = Q_C \cdot T \cdot 60$	$V = V_R - V_C$
TIME (min.)	**RAINFALL INTENSITY (mm/hr)**	**RUNOFF (m^3/s)**	**RUNOFF VOL. (m^3)**	**CONTROLLED RELEASE VOL. (m^3)**	**STORAGE VOL. (m^3)**
10.0	196.5	0.566	339.84	60.60	279.24
15.0	166.9	0.481	432.87	90.90	341.97
20.0	145.1	0.418	501.90	121.20	380.70
25.0	128.5	0.370	555.33	151.50	403.83
30.0	115.3	0.332	598.02	181.80	416.22
35.0	104.6	0.301	633.01	212.10	420.91
40.0	95.7	0.276	662.26	242.40	419.86
45.0	88.3	0.254	687.13	272.70	414.43
50.0	82.0	0.236	708.57	303.00	405.57
55.0	76.5	0.220	727.26	333.30	393.96
60.0	71.7	0.207	743.73	363.60	380.13
65.0	67.5	0.194	758.37	393.90	364.47
70.0	63.7	0.184	771.49	424.20	347.29
75.0	60.4	0.174	783.31	454.50	328.81
80.0	57.4	0.165	794.05	484.80	309.25
85.0	54.7	0.158	803.83	515.10	288.73
90.0	52.2	0.151	812.81	545.40	267.41
95.0	50.0	0.144	821.07	575.70	245.37
100.0	47.9	0.138	828.71	606.00	222.71
105.0	46.0	0.133	835.80	636.30	199.50
110.0	44.3	0.128	842.40	666.60	175.80
115.0	42.7	0.123	848.56	696.90	151.66
120.0	41.2	0.119	854.33	727.20	127.13
125.0	39.8	0.115	859.75	757.50	102.25
130.0	38.5	0.111	864.85	787.80	77.05
135.0	37.3	0.107	869.66	818.10	51.56
140.0	36.1	0.104	874.22	848.40	25.82
145.0	35.0	0.101	878.53	878.70	0.00
150.0	34.0	0.098	882.62	909.00	0.00
155.0	33.1	0.095	886.51	939.30	0.00
160.0	32.2	0.093	890.22	969.60	0.00
165.0	31.3	0.090	893.75	999.90	0.00

STORMWATER STORAGE & RELEASE CALCULATION

100-YEAR STORM

Paved Areas

urbanworks ENGINEERING CORPORATION

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: February 2024
PREPARED BY: MP

DRAINAGE AREA I.D.	107	
DRAINAGE AREA (ha)	1.67	
RUNOFF COEFF. (C)	0.9	
A x C	1.503	
TOTAL A x C	1.503	
TIME OF CONCENTRATION	10.0	min.
TIME STEP	5.0	min.
CONTROLLED RELEASE RATE (Q_C)	0.095	m^3/s
MAX. STORAGE REQUIRED	391	m^3

IDF DATA SET:	Town of Caledon		
STORM EVENT	**COEFFICIENTS**		
	A	**B**	**C**
100 YR.	2221	12	-0.9080

T	$I = A \cdot (T + B)^C$	$Q_R = (C \cdot I \cdot A)/36$	$V_R = Q_R \cdot T \cdot 60$	$V_C = Q_C \cdot T \cdot 60$	$V = V_R - V_C$
TIME (min.)	**RAINFALL INTENSITY (mm/hr)**	**RUNOFF (m^3/s)**	**RUNOFF VOL. (m^3)**	**CONTROLLED RELEASE VOL. (m^3)**	**STORAGE VOL. (m^3)**
10.0	134.2	0.560	336.08	57.00	279.08
15.0	111.4	0.465	418.57	85.50	333.07
20.0	95.5	0.399	478.31	114.00	364.31
25.0	83.7	0.349	524.05	142.50	381.55
30.0	74.6	0.311	560.49	171.00	389.49
35.0	67.3	0.281	590.42	199.50	390.92
40.0	61.4	0.256	615.58	228.00	387.58
45.0	56.5	0.236	637.14	256.50	380.64
50.0	52.4	0.219	655.90	285.00	370.90
55.0	48.8	0.204	672.42	313.50	358.92
60.0	45.7	0.191	687.15	342.00	345.15
65.0	43.0	0.180	700.38	370.50	329.88
70.0	40.6	0.170	712.38	399.00	313.38
75.0	38.5	0.161	723.33	427.50	295.83
80.0	36.6	0.153	733.38	456.00	277.38
85.0	34.9	0.146	742.65	484.50	258.15
90.0	33.3	0.139	751.26	513.00	238.26
95.0	31.9	0.133	759.28	541.50	217.78
100.0	30.6	0.128	766.77	570.00	196.77
105.0	29.4	0.123	773.81	598.50	175.31
110.0	28.3	0.118	780.43	627.00	153.43
115.0	27.3	0.114	786.68	655.50	131.18
120.0	26.4	0.110	792.60	684.00	108.60
125.0	25.5	0.106	798.22	712.50	85.72
130.0	24.7	0.103	803.57	741.00	62.57
135.0	23.9	0.100	808.66	769.50	39.16
140.0	23.2	0.097	813.52	798.00	15.52
145.0	22.5	0.094	818.18	826.50	0.00
150.0	21.9	0.091	822.64	855.00	0.00
155.0	21.3	0.089	826.92	883.50	0.00
160.0	20.7	0.087	831.03	912.00	0.00
165.0	20.2	0.084	834.99	940.50	0.00

STORMWATER STORAGE & RELEASE CALCULATION

100-YEAR STORM

Paved Areas

urbanworks ENGINEERING CORPORATION

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: February 2024
PREPARED BY: MP

DRAINAGE AREA I.D.	107	
DRAINAGE AREA (ha)	1.67	
RUNOFF COEFF. (C)	0.9	
A x C	1.503	
TOTAL A x C	1.503	
TIME OF CONCENTRATION	10.0	min.
TIME STEP	5.0	min.
CONTROLLED RELEASE RATE (Q_C)	0.146	m^3/s
MAX. STORAGE REQUIRED	610	m^3

IDF DATA SET:	Town of Caledon		
STORM EVENT	**COEFFICIENTS**		
	A	**B**	**C**
100 YR.	4688	17	-0.9624

T	$I = A \cdot (T + B)^C$	$Q_R = (C \cdot I \cdot A)/36$	$V_R = Q_R \cdot T \cdot 60$	$V_C = Q_C \cdot T \cdot 60$	$V = V_R - V_C$
TIME (min.)	**RAINFALL INTENSITY (mm/hr)**	**RUNOFF (m^3/s)**	**RUNOFF VOL. (m^3)**	**CONTROLLED RELEASE VOL. (m^3)**	**STORAGE VOL. (m^3)**
10.0	196.5	0.821	492.32	87.60	404.72
15.0	166.9	0.697	627.09	131.40	495.69
20.0	145.1	0.606	727.09	175.20	551.89
25.0	128.5	0.536	804.49	219.00	585.49
30.0	115.3	0.481	866.34	262.80	603.54
35.0	104.6	0.437	917.03	306.60	610.43
40.0	95.7	0.400	959.40	350.40	609.00
45.0	88.3	0.369	995.43	394.20	601.23
50.0	82.0	0.342	1026.48	438.00	588.48
55.0	76.5	0.319	1053.56	481.80	571.76
60.0	71.7	0.299	1077.43	525.60	551.83
65.0	67.5	0.282	1098.64	569.40	529.24
70.0	63.7	0.266	1117.64	613.20	504.44
75.0	60.4	0.252	1134.77	657.00	477.77
80.0	57.4	0.240	1150.31	700.80	449.51
85.0	54.7	0.228	1164.49	744.60	419.89
90.0	52.2	0.218	1177.49	788.40	389.09
95.0	50.0	0.209	1189.46	832.20	357.26
100.0	47.9	0.200	1200.53	876.00	324.53
105.0	46.0	0.192	1210.80	919.80	291.00
110.0	44.3	0.185	1220.36	963.60	256.76
115.0	42.7	0.178	1229.29	1007.40	221.89
120.0	41.2	0.172	1237.65	1051.20	186.45
125.0	39.8	0.166	1245.50	1095.00	150.50
130.0	38.5	0.161	1252.89	1138.80	114.09
135.0	37.3	0.156	1259.86	1182.60	77.26
140.0	36.1	0.151	1266.45	1226.40	40.05
145.0	35.0	0.146	1272.70	1270.20	2.50
150.0	34.0	0.142	1278.63	1314.00	0.00
155.0	33.1	0.138	1284.26	1357.80	0.00
160.0	32.2	0.134	1289.63	1401.60	0.00
165.0	31.3	0.131	1294.75	1445.40	0.00

COLUMBIA SQUARE
MULTIPLE ORIFICE OUTLET CONTROL
CLEAN WATER TANK

	10-Yr Control	Outlet 100-Yr
Invert Elevation / Lip Elevation	260.81	262.36
Diameter (mm) / Length (m)	155	95
Max Area (m^2)	0.019	0.007
Coefficient.	0.62	0.62
Starting Flow Elevation.(m)	260.81	262.36
Top Elevation (m)	263.30	263.30

Stage-Storage-Discharge:

Stage		10-Yr Control		Outlet 100-Yr		Chamber Storage	Total Flow	Target Flow	
Water Elevation (m)	Water Elevation Above Bottom (m)	Head (m)	Q (m^3/s)	Head (m)	Q (m^3/s)	(m^3)	(m^3/s)	(m^3/s)	
260.81	0.00	0.00	0.000	na	na	*0*	0.000		
260.86	0.05	0.05	0.007	na	na	9	0.007		
260.91	0.10	0.10	0.013	na	na	18	0.013		
260.96	0.15	0.15	0.020	na	na	26	0.020		
261.01	0.20	0.20	0.023	na	na	35	0.023		
261.06	0.25	0.25	0.026	na	na	44	0.026		
261.11	0.30	0.30	0.028	na	na	53	0.028		
261.16	0.35	0.35	0.031	na	na	61	0.031		
261.21	0.40	0.40	0.033	na	na	70	0.033		
261.26	0.45	0.45	0.035	na	na	79	0.035		
261.31	0.50	0.50	0.037	na	na	88	0.037		
261.36	0.55	0.55	0.038	na	na	96	0.038		
261.41	0.60	0.60	0.040	na	na	105	0.040		
261.46	0.65	0.65	0.042	na	na	114	0.042		
261.51	0.70	0.70	0.043	na	na	123	0.043		
261.56	0.75	0.75	0.045	na	na	131	0.045		
261.61	0.80	0.80	0.046	na	na	140	0.046		
261.66	0.85	0.85	0.048	na	na	149	0.048		
261.71	0.90	0.90	0.049	na	na	158	0.049		
261.76	0.95	0.95	0.051	na	na	166	0.051		
261.81	1.00	1.00	0.052	na	na	175	0.052		
261.86	1.05	1.05	0.053	na	na	184	0.053		
261.91	1.10	1.10	0.054	na	na	193	0.054		
261.96	1.15	1.15	0.056	na	na	201	0.056		
262.01	1.20	1.20	0.057	na	na	210	0.057		
262.06	1.25	1.25	0.058	na	na	219	0.058		
262.11	1.30	1.30	0.059	na	na	228	0.059		
262.16	1.35	1.35	0.060	na	na	236	0.060		
262.21	1.40	1.40	0.061	na	na	245	0.061		
262.26	1.45	1.45	0.062	na	na	254	0.062		
262.31	1.50	1.50	0.063	na	na	263	0.063		
262.36	**1.55**	**1.55**	**0.065**	**0.00**	**na**	**271**	**0.065**		**10-year**
262.41	1.60	1.60	0.066	0.05	0.003	280	0.066		
262.46	1.65	1.65	0.067	0.10	0.006	289	0.067		
262.51	1.70	1.70	0.068	0.15	0.008	298	0.068		
262.56	1.75	1.75	0.069	0.20	0.009	306	0.069		
262.61	1.80	1.80	0.070	0.25	0.010	315	0.070		
262.66	1.85	1.85	0.070	0.30	0.011	324	0.070		
262.71	1.90	1.90	0.071	0.35	0.012	333	0.071		
262.76	1.95	1.95	0.072	0.40	0.012	341	0.072		
262.81	2.00	2.00	0.073	0.45	0.013	350	0.073		
262.86	2.05	2.05	0.074	0.50	0.014	359	0.074		
262.91	2.10	2.10	0.075	0.55	0.014	368	0.075		
262.96	2.15	2.15	0.076	0.60	0.015	376	0.076		
263.01	2.20	2.20	0.077	0.65	0.016	385	0.077		
263.06	2.25	2.25	0.078	0.70	0.016	394	0.094		
263.11	2.30	2.30	0.079	0.75	0.017	403	0.095		
263.16	2.35	2.35	0.079	0.80	0.017	411	0.097		
263.21	2.40	2.40	0.080	0.85	0.018	420	0.098		
263.26	2.45	2.45	0.081	0.90	0.018	429	0.100		

COLUMBIA SQUARE
MULTIPLE ORIFICE OUTLET CONTROL
PAVED AREA WATER TANK

	10-Yr Control	Outlet 100-Yr
Invert Elevation / Lip Elevation	260.50	262.06
Diameter (mm) / Length (m)	188	110
Max Area (m^2)	0.028	0.010
Coefficient.	0.62	0.62
Starting Flow Elevation.(m)	260.50	262.06
Top Elevation (m)	263.00	263.00

Stage-Storage-Discharge:

Stage		10-Yr Control		Outlet 100-Yr		Chamber Storage	Total Flow	Target Flow	
Water Elevation (m)	Water Elevation Above Bottom (m)	Head (m)	Q (m^3/s)	Head (m)	Q (m^3/s)	(m^3)	(m^3/s)	(m^3/s)	
260.50	0.00	0.00	0.000	na	na	*0*	0.000		
260.55	0.05	0.05	0.009	na	na	13	0.009		
260.60	0.10	0.10	0.018	na	na	25	0.018		
260.65	0.15	0.15	0.026	na	na	38	0.026		
260.70	0.20	0.20	0.034	na	na	50	0.034		
260.75	0.25	0.25	0.038	na	na	63	0.038		
260.80	0.30	0.30	0.042	na	na	76	0.042		
260.85	0.35	0.35	0.045	na	na	88	0.045		
260.90	0.40	0.40	0.048	na	na	101	0.048		
260.95	0.45	0.45	0.051	na	na	113	0.051		
261.00	0.50	0.50	0.054	na	na	126	0.054		
261.05	0.55	0.55	0.057	na	na	139	0.057		
261.10	0.60	0.60	0.059	na	na	151	0.059		
261.15	0.65	0.65	0.061	na	na	164	0.061		
261.20	0.70	0.70	0.064	na	na	176	0.064		
261.25	0.75	0.75	0.066	na	na	189	0.066		
261.30	0.80	0.80	0.068	na	na	202	0.068		
261.35	0.85	0.85	0.070	na	na	214	0.070		
261.40	0.90	0.90	0.072	na	na	227	0.072		
261.45	0.95	0.95	0.074	na	na	239	0.074		
261.50	1.00	1.00	0.076	na	na	252	0.076		
261.55	1.05	1.05	0.078	na	na	265	0.078		
261.60	1.10	1.10	0.080	na	na	277	0.080		
261.65	1.15	1.15	0.082	na	na	290	0.082		
261.70	1.20	1.20	0.084	na	na	302	0.084		
261.75	1.25	1.25	0.085	na	na	315	0.085		
261.80	1.30	1.30	0.087	na	na	328	0.087		
261.85	1.35	1.35	0.089	na	na	340	0.089		
261.90	1.40	1.40	0.090	na	na	353	0.090		
261.95	1.45	1.45	0.092	na	na	365	0.092		
262.00	1.50	1.50	0.093	na	na	378	0.093		
262.06	**1.55**	**1.56**	**0.095**	**0.00**	**na**	**393**	**0.095**		**10-Year**
262.10	1.60	1.60	0.096	0.04	0.003	403	0.096		
262.15	1.65	1.65	0.098	0.09	0.007	416	0.098		
262.20	1.70	1.70	0.099	0.14	0.010	428	0.099		
262.25	1.75	1.75	0.101	0.19	0.011	441	0.101		
262.30	1.80	1.80	0.102	0.24	0.013	454	0.102		
262.35	1.85	1.85	0.104	0.29	0.014	466	0.118		
262.40	1.90	1.90	0.105	0.34	0.015	479	0.120		
262.45	1.95	1.95	0.106	0.39	0.016	491	0.123		
262.50	2.00	2.00	0.108	0.44	0.017	504	0.125		
262.55	2.05	2.05	0.109	0.49	0.018	517	0.127		
262.60	2.10	2.10	0.110	0.54	0.019	529	0.130		
262.65	2.15	2.15	0.112	0.59	0.020	542	0.132		
262.70	2.20	2.20	0.113	0.64	0.021	554	0.134		
262.75	2.25	2.25	0.114	0.69	0.022	567	0.136		
262.80	2.30	2.30	0.116	0.74	0.022	580	0.138		
262.85	2.35	2.35	0.117	0.79	0.023	592	0.140		
262.90	2.40	2.40	0.118	0.84	0.024	605	0.142		
262.95	2.45	2.45	0.119	0.89	0.025	617	0.144		

Appendix D: Sanitary Calculations

Connection Demand Table

WATER CONNECTION

Connection point [3]			
400mm dia. waterman along Columbia Way, between Hwy 50 and Kingsview Drive.			
Pressure zone of connection point		6	
Total equivalent population to be serviced [1]		2,386	
Total lands to be serviced		2.96ha	
Hydrant flow test			
Hydrant flow test location	Hyd #349659	Columbia Way, west of Kingsview Dr.	
	Pressure (kPa)	Flow (in l/s)	Time
Minimum water pressure	265	86.4	
Maximum water pressure	282	0	

No.	Water demands		
	Demand type	**Demand**	**Units**
1	Average day flow	7.7	l/s
2	Maximum day flow	15.4	l/s
3	Peak hour flow	23.1	l/s
4	Fire flow [2]	217	l/s
Analysis			
5	Maximum day plus fire flow	283	l/s

WASTEWATER CONNECTION

Connection point [4] Kingsview Drive	MH 1A	
Total equivalent population to be serviced [1]	2,386	
Total lands to be serviced	2.92ha	
6 Wastewater sewer effluent (in l/s)	31.4	(includes infiltration)

[1] Please refer to design criteria for population equivencies

[2] Please reference the Fire Underwriters Survey Document

[3] Please specify the connection point ID

[4] Please specify the connection point (wastewater line or manhole ID)
Also, the "total equivalent popopulation to be serviced" and the "total lands to be serviced" should reference the connection point. (The FSR should contain one copy of Site Servicing Plan)

Please include the graphs associated with the hydrant flow test information table
Please provide Professional Engineer's signature and stamp on the demand table
All required calculations must be submitted with the demand table submission.

SANITARY FLOW CALCULATION
ESTIMATED SITE DISCHARGE

PROJECT: Columbia Square, Caledon
FILE No.: 21-0012CA
DATE: March 2024
PREPARED BY: MP

Site Area	2.92	ha
Infiltration Rate	0.20	L/s/ha *
Sewage Generation Rate	302.8	L/cap/day *

* Per Region of Peel Criteria

PROPOSED CONDITION

Land Use	Units	Area (ha)	Density (ppu or p/ha)	Population	Avg. Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infilt. (L/s)	Total Flow (L/s)
Ph. 1 Stacked TH	228	1.76	3.4 p/unit	775	3	3.87	10	0.4	10.4
Ph. 2 Apartment	393	0.93	3 p/unit	1179	4	3.75	15	0.0	15.0
Ph. 3 Apartment	141	0.23	3 p/unit	423	2	4.01	6	0.0	6.0
Ph. 3 Commercial	-	0.169*	50 p/ha	9	0	4.42	0	0.0	0.0
Total	762	2.92	NA	2386	8		31.0	0.4	31.4

* Not included in total area calculation

Appendix E: Water Supply Calculations

WATER SUPPLY CALCULATION

PROJECT: Columbia Square, Caledon
FILE No.: 21-0012CA
DATE: March 2024
PREPARED BY: MP

Fire Flow (residential)	217 L/s[1]
Demand (residential)	280 L/cap/day [2]
Demand (Commercial)	300 L/cap/day [2]

AVERAGE-DAY DEMAND

Land Use	Units	Area (ha)	Density (ppu or p/ha)	Population	Demand (L/s)
Ph. 1 - Stacked Townhouse	228	1.76	3.4 ppu	775	2.5
Ph. 2 - Apartment	393	0.93	3 ppu	1179	3.8
Ph. 3 - Apartment	141	0.23	3 ppu	423	1.4
Ph. 3 - Commercial	-	0.17*	50 p/ha	9	0.0
Total	762	2.92	NA	2386	7.7

* Not included in total area calculation

MAXIMUM-DAY DEMAND + FIRE FLOW

Land Use	Avg. Day Demand (L/s)	Peak Hour Demand Factor[2]	Peak Hour Demand (L/s)	Max. Day Demand Factor[2]	Max. Day Demand (L/s)	Max. Day Demand + Fire Flow (L/s)
Ph. 1 Townhouse	2.5	3.0	7.5	2.0	5.0	**222.0**
Ph. 2 Apartment	3.8	3.0	11.4	2.0	7.6	**224.6**
Ph. 3 Apartment	1.4	3.0	4.2	2.0	2.8	**219.8**
Ph. 3 Commercial	0.0	3.0	0.0	1.4	0.0	**217.0**
Total	7.7	3.0	23.1	2.0	15.4	**232.4**

[1] Denotes as per FUS Calculation

[2] denotes as per Region of Peel criteria

FIRE FLOW CALCULATION

PROJECT: Columbia Square
FILE No.: 21-0012CA
DATE: March 2024
PREPARED BY: MP

Calculation of required fire flow is based on the Fire Underwriters Survey (FUS), Water Supply for Fire Protection publication, 1999.

$$F = 220C\sqrt{A}$$

Where: F = Requied fire flow (L/min.)

C = Coefficient related to the type of construction

- 1.5 for wood frame construction (combustible)
- 1.0 for ordinary construction (brick/masonry walls, with combustible floor & interior)
- 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
- 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = Total floor area (m^2)

Includes all storeys, but excluding basements at least 50% below grade.

For fire-resistive buildings, consider the 2 largest adjoining floors plus 50% of each of any floors immediately above up to 8, when vertical openings are inadequately protected.

If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the 2 immediately adjoining floors.

Adjustments to the calculated fire flow can be made based on occupancy, sprinkler protection and exposure to other structures. The table below summarizes the adjustments made to the basic fire flow demand.

			1		2		3		4		Final Adjusted		
Building	Area "A"	C	Base Fire Flow		Occupancy		Sprinkler		Exposure		Fire Flow		
	(m2)		(L/min)	(L/s)	%	Fire Flow Adjustment (L/min)	%	Fire Flow Adjustment (L/min)	%	Fire Flow Adjustment (L/min)	Final Fire Flow (L/min)	Rounded Fire Flow (L/min)	(L/s)
PHASE 1													
Building A	1260	1	7809	130.2	-15	-1171	0	0	35%	2733	9371	9000	150
Building B	1260	1	7809	130.2	-15	-1171	0	0	40%	3124	9762	10000	167
Building C	1314	1	7975	132.9	-15	-1196	0	0	40%	3190	9969	10000	167
Building D	1314	1	7975	132.9	-15	-1196	0	0	55%	4386	11165	11000	183
Building E	1314	1	7975	132.9	-15	-1196	0	0	35%	2791	9570	10000	167
Building F	1314	1	7975	132.9	-15	-1196	0	0	50%	3987	10766	11000	183
Building G	1314	1	7975	132.9	-15	-1196	0	0	65%	5184	11962	12000	200
Building H	1314	1	7975	132.9	-15	-1196	0	0	50%	3987	10766	11000	183
Building I	1611	1	8830	147.2	-15	-1325	0	0	50%	4415	11921	12000	200
Building J	1611	1	8830	147.2	-15	-1325	0	0	65%	5740	13245	13000	217
Building K	1611	1	8830	147.2	-15	-1325	0	0	50%	4415	11921	12000	200
PHASE 2													
Building 1	2937	1	11923	198.7	-15	-1788	-30	-3577	35%	4173	10730	11000	183
Building 2	2632.5	1	11288	188.1	-15	-1693	-30	-3386	35%	3951	10159	10000	167
PHASE 3													
Building	2311.5	1	10577	176.3	-15	-1587	-30	-3173	30%	3173	8991	9000	150

GFA for townhouse blocks estimated based on site plan prepared by MBTW WAI dated March 4, 2021

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	**-15%**
Combustible	no change
Free Burning	15%
Rapid Burning	25%

(3) Spinkler

It is assumed Phases 2 and 3 will have a sprinkler system

(4) Exposure

0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%
> 45 m	0%

Calculate for all sides and all buildings.

Fire Flow Testing Report

FLOWMETRIX
INDU-TECH
PROCESS

Residual Hydrant #	**349659**
NFPA Colour Code	**BLUE**

DATE	Monday November 6, 2023	
TIME	12:00 PM	
ADDRESS	480 Kingsview Dr	
	Caledon, ON	
SIZE-inches/mm	16	400
MATERIAL	CPP	

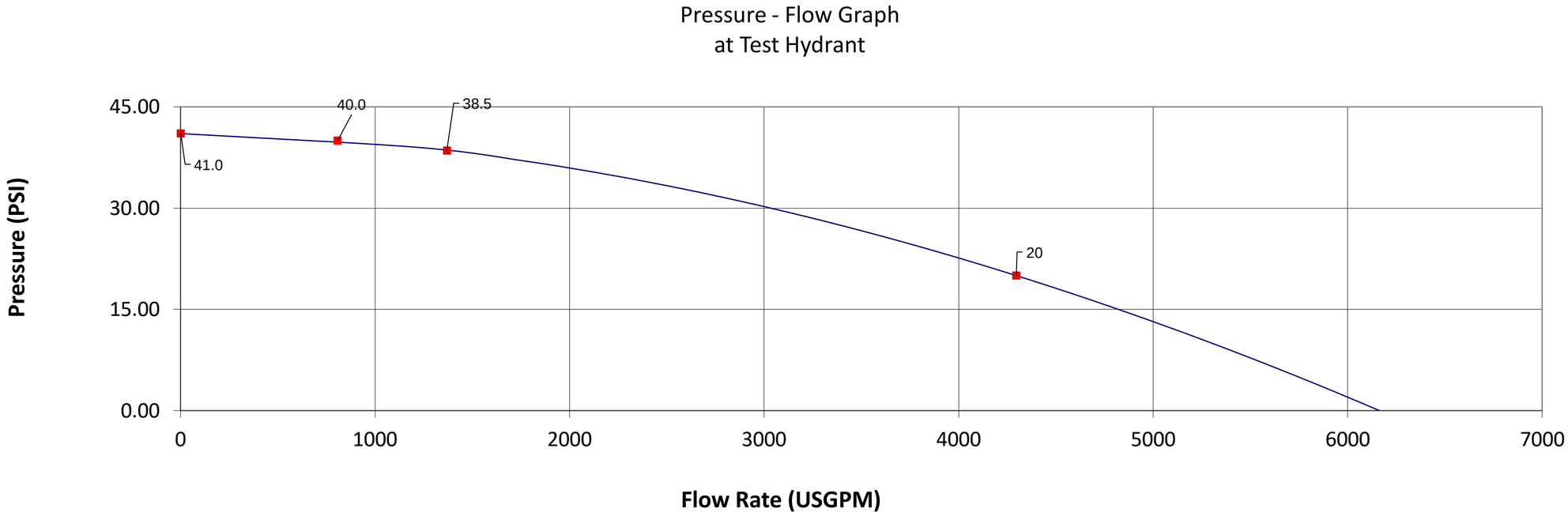
RESIDUAL HYDRANT INFO.

HYDRANT #	349659	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	41.0	psi
RESIDUAL PRESSURE - ONE PORT OPEN	40.0	psi
RESIDUAL PRESSURE - TWO PORTS OPEN	38.5	psi
PRESSURE DROP	2.5	psi
% PRESSURE DROP	6.2	% psi
Flow on Water Main at Test Hydrant at 20 psi	4297	USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)
6563625	1	2.5	Round	Swivel	0.90	**28.5**	807
6563625	2	2.5	Round	Swivel	0.90	**21.7**	1369
		2.5	Round	Swivel	0.90	**19.4**	

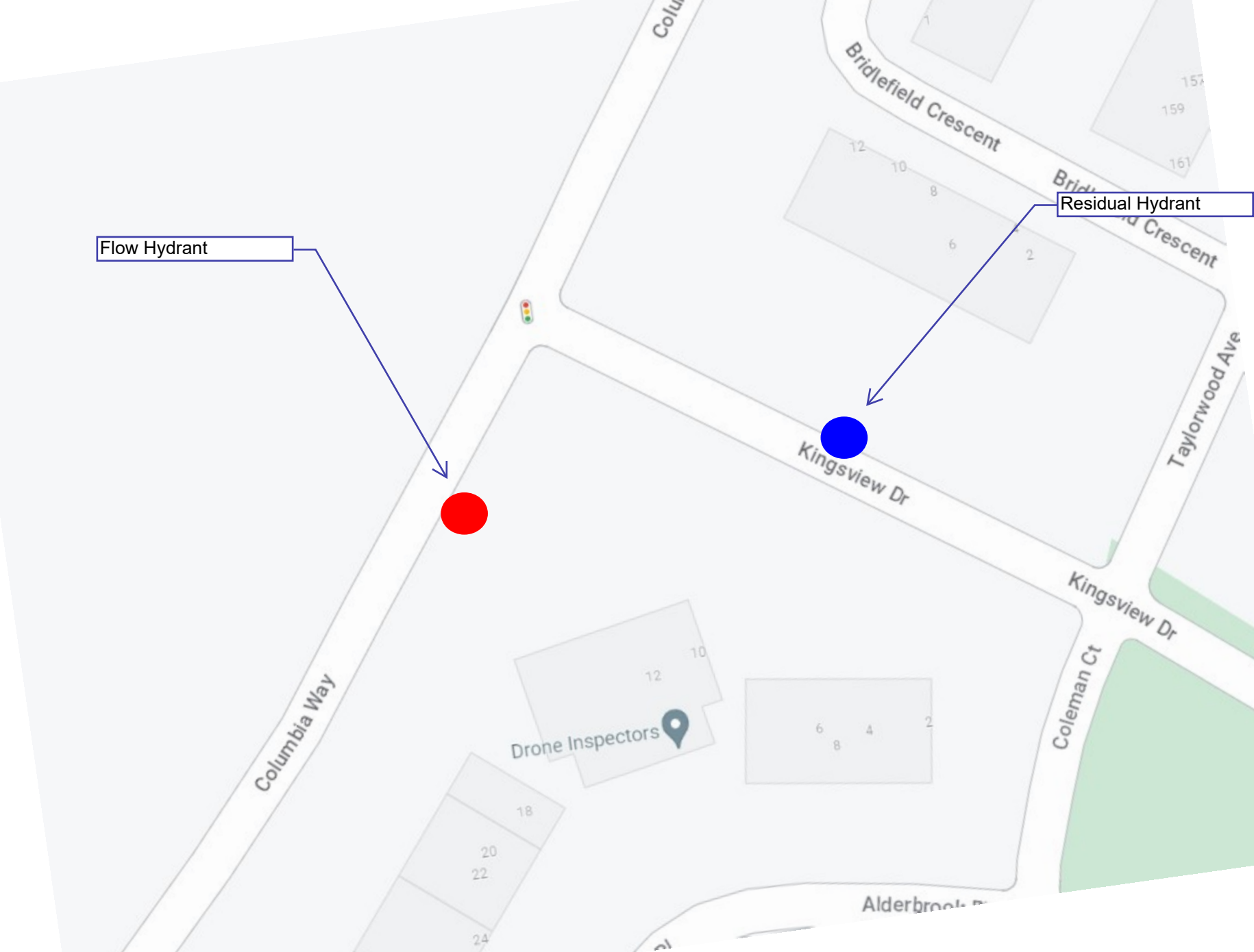
FIRE FLOW CHART



COMMENTS

OPERATOR	FMX	Andrew Cheung
OPERATOR	FMX	
OPERATOR		Region of Peel

"If we don't measure it, how do you manage it?"


Flow Hydrant
Residual Hydrant
Columbia Way
Kingsview Dr
Kingsview Dr
Bridlefield Crescent
Taylorwood Ave
Coleman Ct
Drone Inspectors

WATERMAIN FLOW CAPACITY CALCULATION

Test on Dunlop Street E - Hydrant #HY4340

urbanworks ENGINEERING CORPORATION

PROJECT: 50 Columbia Way
FILE No.: 21-0012CA
DATE: March 2024
PREPARED BY: MP

$$Q_R = Q_T \left(\frac{P_S - P_R}{(P_S - P_T)} \right)^{0.54}$$

Where: Q_R = Flow Rate at Desired Residual Pressure (GPM)
Q_T = Flow Rate Measured During Test (GPM)
P_S = Static Pressure (PSI)
P_R = Desired Residual Pressure (PSI)
P_T = Residual Pressure During Test (PSI)

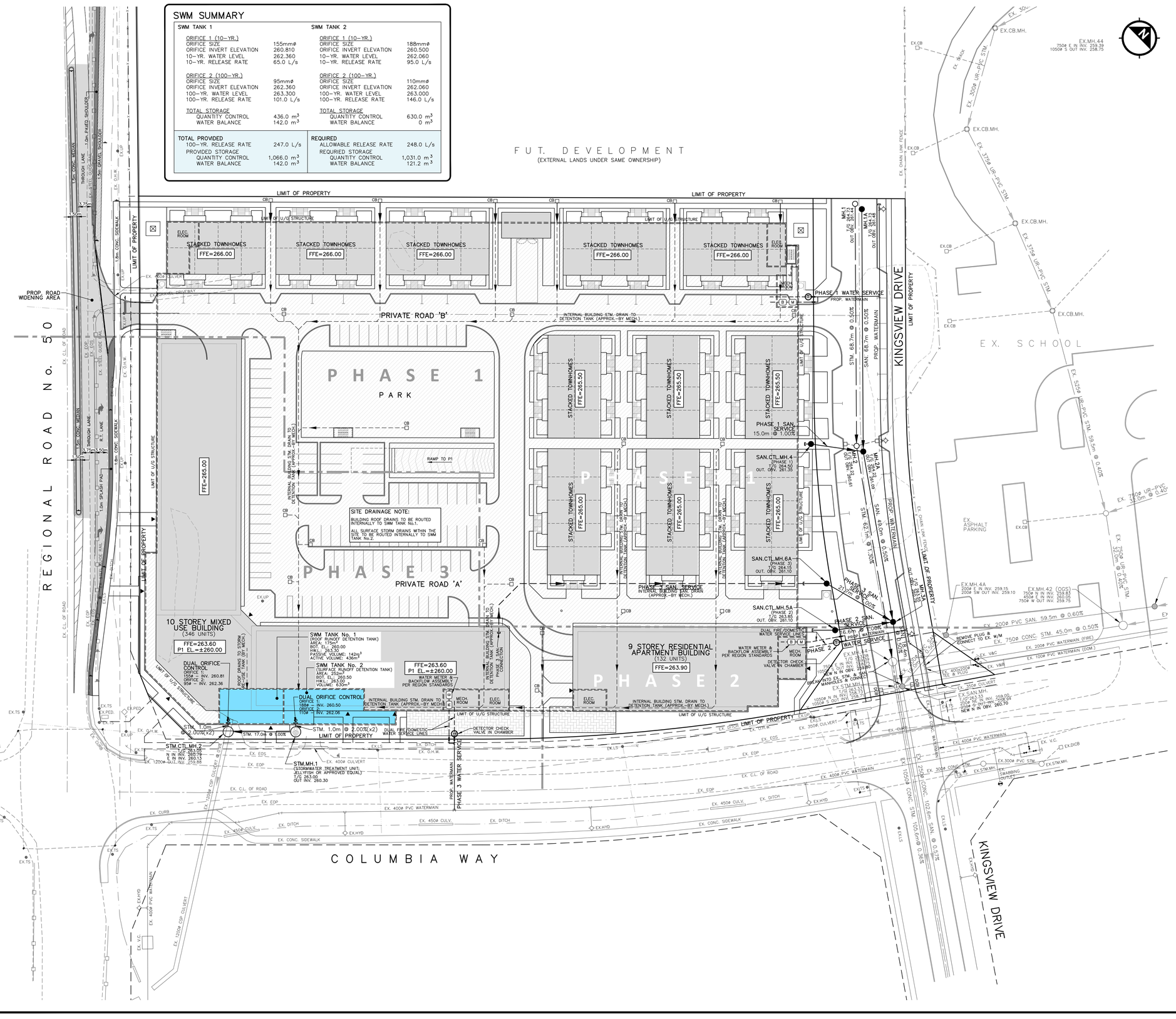
Static Pressure (P_S)	41	PSI
Actual Residual Pressure (P_T)	38.5	PSI
Actual Flow (Q_T)	1369	GPM
Desired Pressure (P_R)	20	PSI
Flow Rate (Q_R)	4320	GPM
	273	**L/s**

Appendix F: Functional Engineering Drawings

SWM SUMMARY

SWM TANK 1		SWM TANK 2	
ORIFICE 1 (10-YR.)		ORIFICE 1 (10-YR.)	
ORIFICE SIZE	155mmø	ORIFICE SIZE	188mmø
ORIFICE INVERT ELEVATION	260.810	ORIFICE INVERT ELEVATION	260.500
10-YR. WATER LEVEL	262.360	10-YR. WATER LEVEL	262.060
10-YR. RELEASE RATE	65.0 L/s	10-YR. RELEASE RATE	95.0 L/s
ORIFICE 2 (100-YR.)		ORIFICE 2 (100-YR.)	
ORIFICE SIZE	95mmø	ORIFICE SIZE	110mmø
ORIFICE INVERT ELEVATION	262.360	ORIFICE INVERT ELEVATION	262.060
100-YR. WATER LEVEL	263.300	100-YR. WATER LEVEL	263.000
100-YR. RELEASE RATE	101.0 L/s	100-YR. RELEASE RATE	146.0 L/s
TOTAL STORAGE		TOTAL STORAGE	
QUANTITY CONTROL	436.0 m^3	QUANTITY CONTROL	630.0 m^3
WATER BALANCE	142.0 m^3	WATER BALANCE	0 m^3

TOTAL PROVIDED		REQUIRED	
100-YR. RELEASE RATE	247.0 L/s	ALLOWABLE RELEASE RATE	248.0 L/s
PROVIDED STORAGE		REQURIED STORAGE	
QUANTITY CONTROL	1,066.0 m^3	QUANTITY CONTROL	1,031.0 m^3
WATER BALANCE	142.0 m^3	WATER BALANCE	121.2 m^3



LEGEND

- DENOTES VALVE AND CHAMBER
- DENOTES VALVE AND BOX
- DENOTES HYDRANT
- AD □ DENOTES AREA DRAIN
- CB □ DENOTES SINGLE CATCHBASIN
- DCB □ DENOTES DOUBLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- DENOTES EXTERIOR ENTRANCE
- DENOTES PIPE CROSSING
- DENOTES PROPOSED BUILDING
- DENOTES PROPOSED BUILDING STRUCTURE BELOW GRADE
- DENOTES STORMWATER STORAGE TANK

NOT FOR CONSTRUCTION

THE DESIGN PRESENTED ON THIS DRAWING IS PRELIMINARY, AND HAS BEEN PREPARED IN SUPPORT OF A FUNCTIONAL SERVICING STUDY FOR THE SUBJECT SITE. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION

DRAWING LIST

FS-01	FUNCTIONAL SERVICING PLAN
FG-01	FUNCTIONAL GRADING PLAN

SUBMISSION HISTORY

No.	ISSUED FOR	DATE
1.	ISSUED FOR ZBA 1ST SUBMISSION	JAN.10,2022
2.	ISSUED FOR ZBA 2ND SUBMISSION	MAR.7,2024

REVISIONS

No.	DESCRIPTION	BY	DATE
1.	REVISED PER UPDATED SITE PLAN	TD	FEB.17,2024

BENCHMARK NOTE:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE VERTICAL BENCH MARK NUMBER 00819758060 HAVING AN ORTHOMETRIC ELEVATION OF 269.667 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

TABLET IS SET HORIZONTALLY IN THE NORTHWEST FACE OF A CONCRETE SILO, BELOW STEEL RING LADDER, 49cm ABOVE GRADE. SILO LOCATED ON THE EAST SIDE OF HWY. 50, 3.3km NORTH OF JCT OF HWY.50 AND KING STREET IN THE TOWN OF CALEDON (BOLTON), 1.0km SOUTH OF ALBION SIDEROAD 15 AND 68m EAST OF CENTERLINE OF HWY.50.

CONSULTANT

LICENSED PROFESSIONAL ENGINEER
T. DUMYN
100072175
MAR.7,2024
PROVINCE OF ONTARIO

MUNICIPAL APPROVAL

urbanworks
ENGINEERING CORPORATION
Toronto, Ontario, CANADA | tel. 416-503-4500
e. general@urbanworkseng.com | w. www.urbanworkseng.com

COLUMBIA SQUARE

14245 HIGHWAY 50, BOLTON, ON.

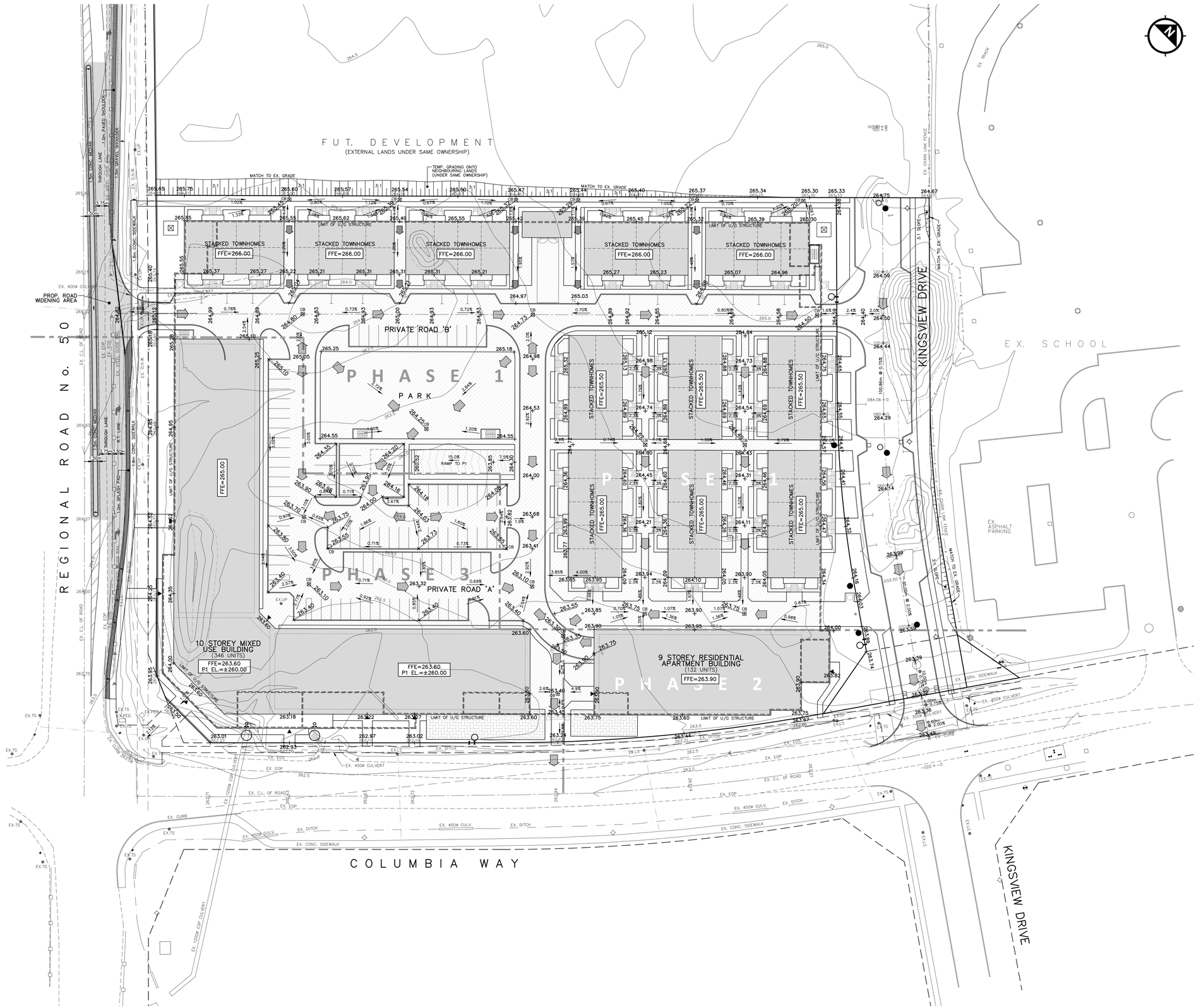
Region of Peel working with you

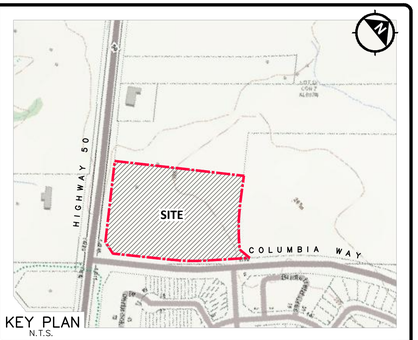
TOWN OF CALEDON

SCALE 0 5 10 15 20 25 30 35 40 45 50m

FUNCTIONAL SERVICING PLAN

TOWN FILE:	POPA 2022-0002 RZ 2022-0001	PROJECT No.	21-0012CA
REGION FILE:	OZ-22-002C		
DATE:	MAR. 7, 2024	DESIGNED BY:	T.D.
SCALE:	1:500	DRAWN BY:	T.D.
		CHECKED BY:	M.M.
		DWG. No.	FS-01





KEY PLAN
N.T.S.

LEGEND

- DENOTES VALVE AND CHAMBER
- DENOTES VALVE AND BOX
- DENOTES HYDRANT
- AD DENOTES AREA DRAIN
- CB DENOTES SINGLE CATCHBASIN
- DCB DENOTES DOUBLE CATCHBASIN
- DENOTES SANITARY MANHOLE
- DENOTES STORM MANHOLE
- DENOTES EXTERIOR ENTRANCE
- DENOTES PROPOSED BUILDING
- DENOTES PROPOSED BUILDING STRUCTURE BELOW GRADE
- 189.52 DENOTES PROPOSED ELEVATION
- 190.14 DENOTES EXISTING ELEVATION
- [189.52] DENOTES FUTURE ELEVATION
- 264.0 DENOTES EXISTING CONTOUR
- DENOTES OVERLAND FLOW ROUTE

NOT FOR CONSTRUCTION

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Region of Peel working with you

TOWN OF CALEDON

SCALE 0 5 10 15 20 25 30 35 40 45 50m

FUNCTIONAL GRADING PLAN

TOWN FILE:	POPA 2022-0002 RZ 2022-0001	PROJECT No.	21-0012CA
REGION FILE:	OZ-22-002C		
DATE:	MAR. 7, 2024	DESIGNED BY:	T.D.
SCALE:	1:500	DRAWN BY:	T.D.
		CHECKED BY:	M.M.
		DWG. No.	FG-01