

**FUNCTIONAL SERVICING &
STORMWATER MANAGEMENT REPORT**

GEORGIAN BOWL ADDITON

**TOWN OF COLLINGWOOD
COUNTY OF SIMCOE**

PREPARED FOR:

GEORGIAN BOWL

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
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COLLINGWOOD, ON L9Y 4L4**

JUNE 2025

CFCA FILE NO. 2841-7365

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Revision Number	Date	Comments
Rev.0	June 27, 2025	Issued for First Submission

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Georgian Bowl to prepare a Functional Servicing & Stormwater Management Report in support of the Site Plan Application for a building addition within the Town of Collingwood (Town). The proposed building addition will herein be referred to as the Subject Site/Subject Development.

The 1.2 ha subject property, located in the Town of Collingwood, is bounded by Stanley Street to the north, Hurontario Street to the east, Hamilton Drain Trail to the south, and residential dwellings to the west. The site currently consists of one (1) commercial/recreational building (bowling alley) and associated parking lot. Refer to **Figure 1** for the site location key plan.

The building addition for the Subject Site will consist of an 11,389 ft² (1,078 m²) addition to the existing bowling alley and a 363 ft² (34 m²) covered patio addition to accommodate a larger arcade area, play area, and four (4) more bowling lanes. The Subject Site will also include a new parking lot with 66 parking stalls and existing landscaped areas. The Development Site Plan prepared by Crozier is included as **Figure 2**. The Architectural Plan (Jasper Group, March 2025) has been included as **Figure 3**.

This report has been prepared to provide information concerning the servicing (water, sewer, and utilities) and stormwater management to support the Site Plan Approval for the Subject Development.

2.0 Site Description

The Subject Lands are currently zoned as C5 (highway commercial). As noted in Section 1.0, the Subject Lands consist of an existing bowling alley and parking area. The land use of the Subject Lands will not change over the course of development. The municipal address for the Subject Lands is 832 Hurontario Street.

The southern portion of the Subject Site is within NVCA regulated area due to the Hamilton Drain Trail Drainage ditch. When consulting the NVCA natural hazard mapping, the southern portion of the Subject Site is under a meander erosion hazard. As the Hamilton Drain is a channelized watercourse through Collingwood meander belt hazards are not applicable.

A Topographical survey was completed for the Subject Development by SMC Geomatics Inc. on March 19, 2024. This topographical survey is referenced within the provided drawings. There is approximately a 5 m difference in elevation across the Subject Site, with the high point located at the existing building of the Subject Lands and the low point located in the southern boundary of the Subject Lands.

3.0 Site Grading

Site grading is influenced by the existing and proposed drainage systems within the Subject Development. It is constrained by the existing elevations along the property limits, matching pre-development overland stormwater flow patterns where possible (including suitable outlets), providing sufficient cover for servicing, and safe access for pedestrians and vehicles. All grading within the parking lot limits will direct surface flow to the proposed drainage ditches at Hamilton Drain Trail and Stanley Street. Refer to **Drawing C401** for details regarding site grading.

4.0 Sanitary Servicing

4.1 Existing Sanitary Servicing Infrastructure

Sanitary Servicing for the Subject Development is provided through the Town of Collingwood. The site is currently being serviced through a 200mm diameter sanitary service that extends to the existing building. This sanitary service is used for the existing bowling alley and has a depth of approximately 1.5m at the property line of the Subject Site.

The sanitary service is connected directly to a 1200mm diameter sanitary manhole on Hurontario street. This manhole contains two 250mm diameter gravity sewers at the north and south inverts. Flow from these sewers ultimately conveys flow to the Collingwood Wastewater Treatment Plant.

4.2 Proposed Sanitary Servicing Strategy

Sanitary flows for the Subject Development were calculated according to Town Standards. Applicable design criteria have been summarized in **Table 1**.

Table 1: Sanitary Design Criteria

Criteria	Standard
Average Flow Rate (L/s/ha)	0.32
Infiltration (L/s/ha)	0.23
Peaking Factor (Harmon Formula)	4.0
Commercial Density (person/ha)	80

Based on the above criteria and the developed site area, the peak sanitary flows for the existing building and the buildout of the Subject Development can be estimated. The peak sanitary flows for each have been summarized in **Table 2** below.

Table 2: Existing and Proposed Sanitary Flows

Criteria	Existing Building	Proposed Building w Addition
Building Size (m ²)	1110.45	2188.63
Average Daily Commercial Flow (L/s)	0.04	0.07
Peak Daily Flow (L/s)	0.43	0.57

Based on the above table, it is concluded that the peak sanitary flow for the Subject Development is 0.57L/s. This flow is assumed to be small enough to be conveyed using the existing infrastructure but will be confirmed with the Town prior to construction. Refer to **Appendix A** for sanitary flow calculation and **Drawing C501** for the proposed sanitary servicing strategy.

4.3 Sanitary Service Capacity

Sanitary service demands for the Subject Development have been calculated based on the proposed Architectural Plan and the Ontario Building Code. A summary of the proposed fixtures within the proposed building are summarized in **Table 3** below.

Table 3: Summary of Fixtures in the Proposed Building

Fixture Type	Fixture Quantity
Urinals	3
Water Closets	8
Lavatory	10
Staff Kitchen Sink	1
Bar Sink	1
Commercial Kitchen Sink	1

Based on the quantities in **Table 3** above and OBC Table 7.6.3.2.A, there is a total demand of 51 sanitary fixture units. The OBC standard states that the existing 200mm sanitary service has a capacity of 1600 fixture units.

The proposed sanitary servicing strategy for the Subject Development will be to utilize the existing 200mm diameter sanitary service lateral that extends from the 250 mm diameter PVC sanitary sewer on Hurontario Street. Based on the Ontario Building code the sanitary lateral will be sufficient in conveying flows from the Subject Development. The peak flow rate from the proposed development is expected to increase by 0.14 L/s, and it is expected that the existing sewer on Hurontario Street can accommodate the increase in flows.

5.0 Water Servicing

5.1 Existing Water Servicing Infrastructure

Potable water for the Subject Development is provided through the Town of Collingwood system. Chlorinated surface water is provided to the Town using the Raymond A. Barker Water Treatment plant and a network of pressurized pipes. Based on the As-Constructed information provided by the Town, the site is currently being serviced through a 25mm diameter water service complete with a curb and main stop. Through consultation with the Property owner, it is understood that the water service has been upgraded to a diameter of 50mm. The water service has an approximate depth of 1.6m at the property line of the Subject Site.

The water service is connected to a 500mm diameter watermain following the road alignment on Hurontario street. There are two existing hydrants on Hurontario street north and south of the Subject Development and one existing hydrant on Mary street southwest of the Subject Development. Refer to **Appendix A** for Hurontario Street As-Constructed information surrounding the Subject Lands.

5.2 Proposed Water Servicing Strategy

The proposed water servicing strategy for the Subject Development will be to connect to the existing water service lateral that extends from the 50 mm diameter water service and curb stop on Hurontario Street, which as discussed in the previous section, services existing bowling alley. Flow from the proposed development is low, and as such, it is expected that the existing water service on Hurontario Street and the Collingwood water system can accommodate proposed flow.

Water demand for the Subject Development has been calculated in conjunction with Town Standards that concur with Table 3-1 of the Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems. Applicable design criteria have been summarized in **Table 4**.

Table 4: Watermain Design Criteria

Criteria	Standard
Average Flow Rate (L/s/ha)	0.32
Maximum Day/Peak Hour	1.77/2.7
Commercial Density (person/ha)	80

Based on the above criteria and the developed site area, the peak water demands for the existing building and the buildout of the Subject Development can be estimated. The water flows for each have been summarized in **Table 5** below.

Table 5: Existing and Proposed Water Flows

Criteria	Existing Building	Proposed Building w Addition
Building Size (m ²)	1110.45	2188.63
Average Daily Commercial Flow (L/s)	0.04	0.07
Max Day Demand Flow (L/S)	0.06	0.13
Max Hourly Flow (L/s)	0.10	0.19

Based on the above table, it is concluded that the peak hourly water demands for the Subject Development is 0.19L/s, or an increase on 0.09L/s. The water demand is assumed to be small enough to be accommodated using the existing infrastructure, but the Town's water model will be updated to confirm this.

Fire flow will be provided to the Subject Development with connection to the existing fire hydrants located on the north and south side of Hurontario Street across from the Subject Development. Fire flows for the Subject Development have been estimated using the Fire Underwriters Study (2020). Based on this criterion, the required fire flow for the Subject Development is 183L/s for a duration of 2.5 hours. Available fire and domestic flows will need to be confirmed with the Town. Refer to **Appendix B** for the water demand and fire flow calculations.

5.3 Water Service Capacity

The proposed water servicing strategy for the Subject Development will be to connect to the existing 500mm diameter watermain on Hurontario Street.

Water service demands for the Subject Development have been calculated based on the proposed Architectural Plan and the Ontario Building Code. A summary of the proposed fixtures within the proposed building are summarized in **Table 6** below.

Table 6: Summary of Fixtures in the Proposed Building

Fixture Type	Fixture Quantity
Urinals	3
Water Closets	8
Lavatory	10
Staff Kitch Sink	1
Bar Sink	1
Commercial Kitchen Sink	1

Based on the quantities in **Table 6** above and OBC Table 7.6.3.2.A, there is a total demand of 65 water fixture units. The OBC standard states that the existing water capacity for the 50mm service is 80 fixture units.

Since the existing 50mm diameter service shown can service the proposed building addition, the size of the existing service will be confirmed during construction and used if 50mm. The fixture loading on the service should be evaluated by a Mechanical Engineer at the building permit stage to confirm the required size of the water service. The proposed service will include a main and curb stops, and will be installed at the at a minimum cover of 1.7m. Refer to **Drawing C501** regarding the proposed servicing strategy and layout.

6.0 Stormwater Management

6.1 Stormwater Management Criteria

The stormwater management and drainage conditions for the Subject Development must comply with the policies and standards of:

- The Town of Collingwood
- The Nottawasaga Valley Conservation Authority (NVCA)
- The Ministry of the Environment, Conservation and Parks (MECP)

A SWM strategy and accompanying recommendations regarding the proposed development have been included below:

- Water Quantity Control
 - Control of the post development peak flows to existing condition flows for all storms up to and including the 100-year storm event at the selected point of interest.
- Water Quality Control
 - "Enhanced Protection" per MECP.

6.2 Existing Drainage Conditions

The Subject Lands are currently characterized by paved areas, an existing commercial building, and open space. The Subject Development drains to existing drainage channels to the north and south of the Subject Lands. The Hamilton Drain Trail to the south contains a 300mm diameter culvert crossing Hurontario Street downstream of the Subject Development, while the drainage channel along Stanley Street contains no culverts along the flow of drainage.

The existing drainage conditions for the Subject Lands have been split into the following two (2) drainage areas:

- **Catchment PRE-1:** This catchment is approximately 0.88 ha and represents the portion of the Subject Lands draining directly to Stanley Street to the north. It consists of open space, paved areas, and an existing commercial building. The topographic survey (SMC Geomatics Inc, March 2024) suggests that significant ponding areas are present within this catchment.
- **Catchment PRE-2:** This catchment is approximately 0.35 ha and represents the portion of the Subject Lands draining to the Hamilton Drain Trail. It consists of open space, paved areas, and an existing commercial building.

Refer to **Drawing C301** for the pre-development drainage plan.

6.3 Proposed Drainage Conditions

The SWM controls for the Subject Development will be provided by an enhanced grass swale and bioretention planter located within the Subject Development. The Subject Development will utilize overland flow routes, drainage swales, and curb and gutters to convey stormwater flows to their respective outlets. Flows will be controlled and contained using a bioretention planter and ditch inlet system. The grading plan detailing these conveyance and treatment systems is presented in **Drawing C401**.

The proposed drainage conditions for the Subject Lands have been split into the following three (3) drainage areas, similar to pre-development conditions

- **Drainage Catchment POST-1:** This catchment is approximately 0.48 ha and consists of open space, paved areas, rooftop areas, and the bioretention filter. Stormwater from this area is conveyed to the bioretention filter for water quality and quantity control before discharging to the Hamilton Drain Trail ditch.
- **Drainage Catchment POST-2:** This catchment is approximately 0.68 ha and consists of the portion of the Subject Development draining to Stanley Street to the north. It consists of open space, paved areas, the relocated horseshoe pit, and rooftop areas. Drainage swales have been included in this catchment to convey flows to the drainage ditch along Stanley Street.
- **Drainage Catchment POST-3:** This catchment is approximately 0.08 ha and consists of open space. Stormwater from this area will be conveyed uncontrolled to the Hamilton Drain Trail ditch.

Refer to **Drawing C302** for the post-development drainage plan.

6.4 Water Quantity Analysis

Modified rational method calculations have been completed and parameterized depending on whether outflows are conveyed to Stanley Street (North outlet) or the Hamilton Drain Trail (South outlet).

6.4.1 North Outlet – Stanley Street

Rational method calculations were completed to determine the uncontrolled flow rates across development and whether stormwater quantity controls are required. IDF values were determined through the MTO IDF Lookup Tool. The modified rational method calculations shown in **Table 7** below summarize the change in flow rates for the north property boundary across development.

Table 7: Stanley Street Outlet Pre and Post Development Flow Rates

Storm	Pre-Development (PRE-1) Flow Rate (L/s)	Post-Development (POST-2) Flow Rate (L/s)
2yr	77.6	57
5yr	102	75
10yr	118	87
25yr	153	113
50yr	186	137
100yr	213	157

As shown in **Table 7** above, the Subject Development meets water quantity requirements for the north outlet without controlling flows. Uncontrolled post-development flow rates are smaller than pre-development flow rates, so no water quantity control is required for the north outlet. Refer to **Appendix C** for the modified rational method calculations for the north outlet.

6.4.2 South Outlet – Hamilton Drain Trail

The catchment area PRE-2 in the pre-development condition and the catchment areas POST-1 and POST-3 in the post-development condition outlet to the Hamilton Drain outlet. The post-development catchment POST-3 drains directly into the Hamilton Drain Trail but consists only of pervious area. Catchment POST-1 drains to the bioretention planter and ditch inlet control before discharging to the Hamilton Drain Trail ditch.

Modified rational method calculations were completed to determine the storage volumes required to contain the flows up to the 100y-yr storm event in the bioretention planter and surrounding ponding area. IDF values were determined through the MTO IDF Lookup Tool.

Modified rational method calculations for the Subject Development show approximately 89.9 m³ of storage is required for quantity control for the south outlet. POST-3 uncontrolled flow rates have also been calculated individually since the bioretention planter will not treat them prior to discharge. The modified rational method calculations for the south property boundary and POST-3 have been included in **Appendix C**.

The bioretention planter has been designed to contain flows within the filter media up to and including the 10yr design storm storage volume. Design storms above the 10yr storm utilize the enhanced grass swale and surrounding ponding areas to contain stormwater flows within the Subject Development and away from parking areas.

A 115mm orifice has been to control flows prior to discharge to the Hamilton Drain Trail. The orifice is located within the ditch inlet control and outlets to the Hamilton Drain Trail at an elevation of 193.00. Stormwater flows must pass through the entire filter media volume before moving upstream to the orifice. Storms above the 10yr return period will utilize the ditch inlet grate to bypass the filter media and convey flows.

Refer to **Table 8** below for the total discharge from the Subject Development to the south outlet and the corresponding water level elevation for each storm return period. Refer to **Appendix D** for further details regarding bioretention planter existing flow rate and stage storage discharge.

Table 8: Water Surface Elevation and Total Discharge to South Outlet

Storm	Existing Flow Rate (L/s)	Storage Volume Utilized	POST-3 Uncontrolled Flow Rate (L/s)	Bioretention Controlled Discharge (L/s)	Total Discharge to South Outlet	Water Surface Elevation
2yr	30.3	32.6	3.3	27.0	30.3	193.66
5yr	40.1	43.1	4.3	31.7	36.0	193.87
10yr	46.5	50.0	5.0	34.8	39.8	194.02
25yr	60.3	64.8	6.5	38.0	44.5	194.19
50yr	73.2	78.6	7.9	38.9	46.8	194.24
100yr	83.7	89.9	9	39.7	48.7	194.29

As shown in **Table 8** above, the proposed bioretention planter and ditch inlet system meets the storage and discharge requirements for the Subject Development.

6.5 Water Quality Analysis

Quality control for POST 1 will be provided by the bioretention filter to treat runoff from the impervious areas of the Subject Development. Based on calculations provided in **Appendix D**, it is estimated that the total water quality required for the 25mm storm event is 85.2m³. The bioretention filter has been designed to allow for 89m³ of water to be filtered through the filter media volume for settling of suspended solids and thus meet water quality requirements.

Flows entering the bioretention planter from the enhanced grass swale must pass through the entirety of the filter media volume before discharge to the Hamilton Drain Trail. The bioretention planter contains a sand layer, mulch layer, choker layer, and clear stone layer that will provide filtration of suspended solids. The placement of the ditch inlet at the water quality volume storage elevation and forcing of all flows through the filtration layer means that discharge will be given adequate suspended solids removal.

Water quality control for POST 2 and POST 3 is not warranted as the catchments consists of grassed and root areas. Runoff from these surfaces is generally considered clean and do not require quality control.

7.0 Erosion & Sediment Controls

Erosion and sediment controls will be installed and maintained along the site boundary prior to the commencement of construction activities. All erosion and sediment controls will be maintained throughout until the site is stabilized or as directed by the Engineer, NVCA and/or Town. Controls are to be inspected regularly, after each significant rainfall, and maintained in proper working condition. Refer to **Drawing C201** for the locations of the proposed erosion and sediment control measures.

- Silt Fencing

Silt fence will be constructed along the perimeter of the site in accordance with NVCA's Typical Detail of Silt/Sediment Fence (BSD-23 Draft). It should be noted that additional silt fence may be added based on field decisions by the Engineer and Developer prior to, during and following the earth works.

- Rock Mud Mat

A Rock mud mat will be installed at the entrance to the construction zone on Hurontario Street to prevent mud tracking from the site onto the surrounding lands and perimeter roadway network.

- Dust Suppression

During construction activities, the Contractor is responsible for ensuring that measures for dust suppression are provided as required, such as the application of water or lime.

8.0 Conclusions & Recommendations

Based on the foregoing we conclude that the proposed development can be fully serviced by way of gravity sanitary service, and watermain. Furthermore, stormwater quantity and quality control can be met via an onsite bioretention planter.

As such, we support the Site Plan Approval for the subject site from the perspective of site servicing, grading, and stormwater management requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Brendan Hummelen, P.Eng.
Project Engineer

bh/jc

C.F. CROZIER & ASSOCIATES INC.

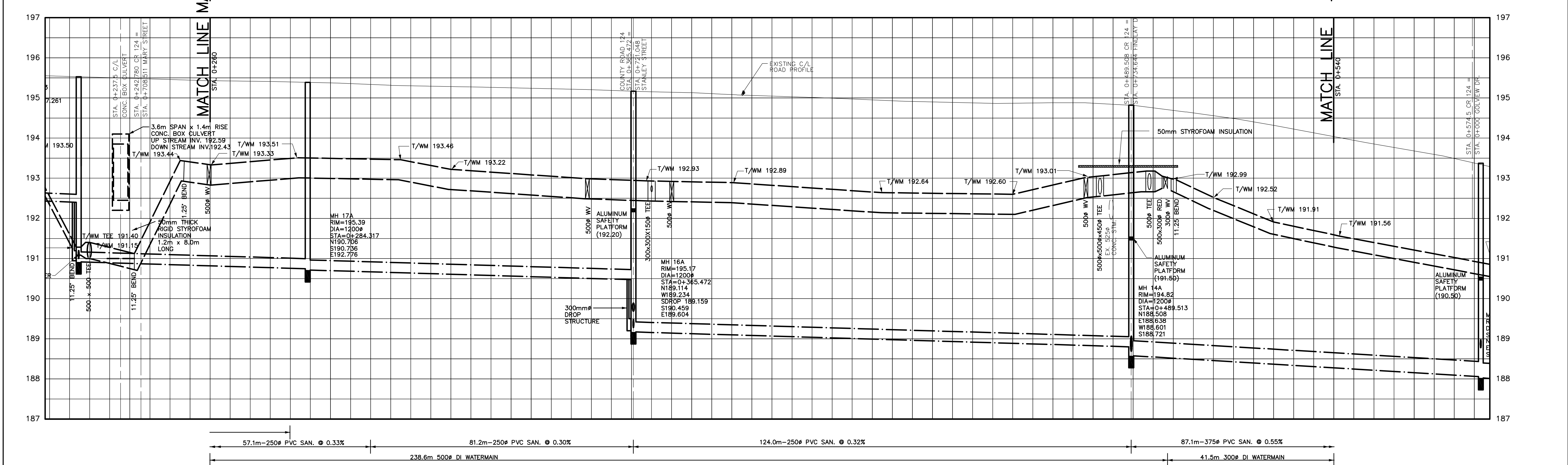
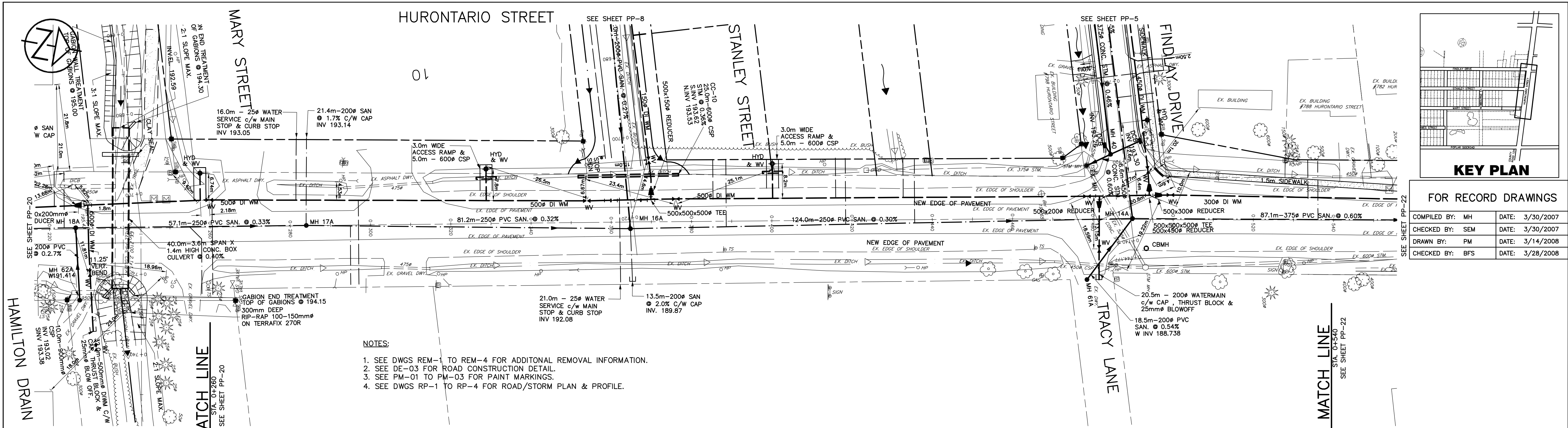


Jeremy Chowen
Engineering Intern

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APPENDIX A

Hurontario Street As-Constructed Drawings



CHANGING	EXISTING C/L ELEV	PROPOSED C/L ELEV	CHANGING	EXISTING C/L ELEV	PROPOSED C/L ELEV
0+260	195.43		0+540	194.04	
0+280	195.40				
0+300	195.33				
0+320	195.28				
0+340	195.24				
0+360	195.19				
0+365.5	195.16				
0+380	195.13				
0+400	195.05				
0+420	194.97				
0+440	194.90				
0+460	194.87				
0+480	194.87				
0+489.5	194.82				
0+500	194.69				
0+520	194.40				
0+540	194.04				

LEGEND

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

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BM ELEVATION 188.485

HUME STREET CONCRETE BRIDGE OVER PRETTY RIVER, 1.3km NORTHEAST OF JUNCTION OF HIGHWAYS NO.124 AND NO.26 IN TOWN, IMMEDIATELY EAST OF RAGLAN STREET, TABLET IN CORNER OF BRIDGE AT NORTHWEST END, 1.25m BELOW TOP OF CONCRETE END POST AND 48cm EAST OF WEST END OF BRIDGE.

BM #1 ELEVATION 195.956

MARKER 'X' ON DS OF EAST ENTRANCE TO WALKER'S SMALL MOTORS

BM #2 ELEVATION 196.421

MARKER 'X' ON DS OF EAST ENTRANCE TO ST. MARY'S SCHOOL.

4.	FOR RECORD INFORMATION	MAR/08	BFS
3.	ISSUED FOR TENDER	MAR/06	RS
2.	REVISED LEVEL OF SERVICE	DEC/05	RS
1.	TENDER CONTRACT 102081-1	OCT/04	RS
NO.	REVISIONS	DATE	INITIAL

APPROVED

ORIGINAL STAMPED BY

B. F. STANTON
MAR 30/06

SOUTH COLLINGWOOD SERVICING

RESIDENTIAL SUBDIVISION
TOWN OF COLLINGWOOD

PLAN AND PROFILE

HURONTARIO STREET
STA. 0+260 TO 0+540

C.C. TATHAM & ASSOCIATES LTD.

CONSULTING ENGINEERS

Collingwood Bracebridge Orillia Barrie

SCALE: HORIZ. 1:500 VERT. 1:50	JOB NO. 102081
DESIGN: RJF	CHECKED: RS
DRAWN: MCA/WJV	DATE: MARCH 2006

DWG. PP-21

APPENDIX B

Sanitary and Water Servicing Calculations



Project Number: 2841-7365
 Project Name: Georgian Bowl
 Date: June 27, 2025
 Prepared By: J.Chowen
 Checked By: B. Hummelen

Preliminary Sanitary Flow - Pre - Georgian Bowl

Developed Site Area

1.23
Total Area: 1.23 ha

Number of Commercial Units

Commercial	0.110 ha
Institutional	- ha
Business Park/Employment	- ha
Total Commercial, Institutional and Business Park/Employment:	0.110 ha

Person Per Unit

Commercial	80 persons/ha
Institutional	80 persons/ha
Business Park/Employment	80 persons/ha

Population

Residential Population	- persons
Commercial Population	9 persons
Total Population:	9 persons

Unit Sewage Flows

Residential (Per Town of Collingwood Standard 4.3.3.1)	260 L/C-day
Commercial (PerMECp Sewage Design Guidelines 5.5.2.2)	0.32 L/s/ha
Peak Infiltration (Per Town of Collingwood Standard 4.3.3.1)	0.23 L/sec/ha

Total Design Sewage Flows

Infiltration/Inflow	0.28 L/sec
Average Daily Commercial Flow	0.04 L/sec
Commercial Peak Factor (Harmon Formula)	4.00
Total Peak Daily Flow	0.43 L/sec



Project Number: 2841-7365
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Checked By: B. Hummelen

Preliminary Water Demand - Pre

Georgian Bowl

Developed Site Area

Total Area: 1.23 ha
1.23 ha

Number of Commercial Units

Commercial 0.110 ha
Institutional - ha
Business Park/Employment - ha
Total Commercial, Institutional and Business Park/Employment: 0.110 ha

Person Per Residential Unit

Commercial 80 persons/ha
Institutional 80 persons/ha
Business Park/Employment 80 persons/ha

Population

Commercial Population 9 persons
Total Population: 9 persons

Unit Water Flows

Residential (Per Town of Collingwood Standard 4.4.3.2) 260 L/C-day
Commercial (MECP design guidelines for drinking water systems 3.4.2) 0.32 L/s/ha

Total Design Water Flows

Average Daily Commercial Flow 0.04 L/sec
Total Average Flow 0.04 L/sec

Max Day Peak Factor (Per Town of Collingwood Standard 4.4.3.2) 1.77
Max Day Demand Flow 0.06 L/sec

Peak Hour Factor (Per Town of Collingwood Standard 4.4.3.2) 2.70
Peak Hour Flow 0.10 L/sec



Project Number: 2841-7365
Project Name: Georgian Bowl
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Checked By: B. Hummelen

Preliminary Sanitary Flow - Post
-
Georgian Bowl

Developed Site Area

Total Area: 1.23
1.23 ha

Number of Commercial Units

Commercial	0.219 ha
Institutional	- ha
Business Park/Employment	- ha
Total Commercial, Institutional and Business Park/Employment:	0.219 ha

Person Per Unit

Commercial	80 persons/ha
Institutional	80 persons/ha
Business Park/Employment	80 persons/ha

Population

Residential Population	- persons
Commercial Population	18 persons
Total Population:	18 persons

Unit Sewage Flows

Residential (Per Town of Collingwood Standard 4.3.3.1)	260 L/C-day
Commercial (PerMECp Sewage Design Guidelines 5.5.2.2)	0.32 L/s/ha
Peak Infiltration (Per Town of Collingwood Standard 4.3.3.1)	0.23 L/sec/ha

Total Design Sewage Flows

Infiltration/Inflow	0.28 L/sec
Average Daily Commercial Flow	0.07 L/sec
Commercial Peak Factor (Harmon Formula)	4.00
Total Peak Daily Flow	0.57 L/sec



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Date: June 27, 2025
Prepared By: J.Chowen
Checked By: B. Hummelen

Preliminary Water Demand - Post

Georgian Bowl

Developed Site Area

Total Area: 1.23 ha
1.23 ha

Number of Commercial Units

Commercial 0.219 ha
Institutional - ha
Business Park/Employment - ha
Total Commercial, Institutional and Business Park/Employment: 0.219 ha

Person Per Residential Unit

Commercial 80 persons/ha
Institutional 80 persons/ha
Business Park/Employment 80 persons/ha

Population

Commercial Population 18 persons
Total Population: 18 persons

Unit Water Flows

Residential (Per Town of Collingwood Standard 4.4.3.2) 260 L/C-day
Commercial (MECP design guidelines for drinking water systems 3.4.2) 0.32 L/s/ha

Total Design Water Flows

Average Daily Commercial Flow 0.07 L/sec
Total Average Flow 0.07 L/sec

Max Day Peak Factor (Per Town of Collingwood Standard 4.4.3.2) 1.77
Max Day Demand Flow 0.13 L/sec

Peak Hour Factor (Per Town of Collingwood Standard 4.4.3.2) 2.70
Peak Hour Flow 0.19 L/sec

Fire Flow Determination Per Fire Underwriters Survey (2020)

Water Supply for Public Fire Protection - 2020

Fire Underwriters Survey

Part II - Guide for Determination of Fire Flows for Public Fire Protection in Canada

An estimate of fire flow required for a given area may be determined by the formula:

$$RFF = 220 * C * \sqrt{A}$$

where:

RFF = the required fire flow in litres per minute (L/min)

C = the construction coefficient is related to the type of construction of the building

= 1.5 for Type V Wood Frame Construction

= 0.8 for Type IV-A Mass Timber Construction

= 0.9 for Type IV-B Mass Timber Construction

= 1.0 for Type IV-C Mass Timber Construction

= 1.5 for Type IV-D Mass Timber Construction

= 1.0 for Type III Ordinary Construction

= 0.8 for Type II Non-combustible Construction

= 0.6 for Type I Fire Resistive Construction

A = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

STEP A: Construction Coefficient (C)

1

Type III Ordinary Construction Assumed

STEP B: Total Effective Floor Area Proposed Building

Bowling Alley and Building Addition

Yes/No/Unknown

Is basement at least 50% below grade?

Yes

If yes, basement floor area excluded

Vertical openings protected?

No

*For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell

-C value from 1.0 to 1.5: 100% of all floor areas are used

-C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight

-C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

*A building may be subdivided if there is a vertical firewall with a fire-resistance rating greater than 2 hours, and meets the requirements of the National Building Code.

Floors Above Grade	Total Floor Area (m ²)	% of Area Considered	Effective Floor Area (m ²)
Basement	0	0%	0.0
Ground Floor	2189	100%	2189.1
Level 2			0.0
Level 3			0.0
Level 4			0.0
Level 5			0.0
Level 6			0.0
Level 7			0.0
Level 8			0.0
Total	63465		2189.1

Total Effective Floor Area **2189 m²**

STEP C:

Therefore RFF = **10,000 L/min (rounded to nearest 1000 L/min)**

STEP D: Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Occupancy and Contents Adjustment Factor

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

*Refer to Table 3 for recommended Occupancy and Contents Charges by major occupancy examples.

Type of Occupancy	Adjustment Factor
Residential Occupancy	Combustible 0%

Total Reduction % **0 L/min surcharge**

RFF = **10,000 L/min (not rounded)**

Note: The RFF flow 10000 L/min is used in Step E and F.

Fire Flow Determination Per Fire Underwriters Survey (2020)

STEP E: Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	Yes	-10%	-10%
Fully supervised system?	No	-10%	0%

*Reduction available assumes complete building coverage

*30% reduction typical for building requiring sprinkler system

Total Reduction % 0% (reduction)

Total Reduced Flow 0 L/min (reduction, not rounded)

STEP F: Exposure Adjustment Charge

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge

*The maximum exposure adjustment charge to be applied to a subject building is 75%

*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings	Distance	Surcharge Factor	Surcharge (L/min)
North	Adjacent Dwelling 50	0%	0
East	Adjacent Dwelling 50	0%	0
South	Adjacent Dwelling 50	0%	0
West	Adjacent Dwelling 28	10%	1000

Total Reduced Flow 1,000 L/min Surcharge (not rounded)

STEP G: Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	10,000 L/min
Step E - Sprinkler (Reduction)	0 L/min
Step F - Exposure Charge	1,000 L/min

Final Fire Flow: 11,000 L/min
11,000 L/min (rounded to nearest 1000L/min)

or

or

183 L/s
2,906 USGPM

Required duration: 2.50 hours

*Refer to Table 1 for Duration

Table 1 - FUS 2020

Required Duration of Fire Flow	
Flow Required (L/min)	Duration (hours)
2,000 or less	1.00
3,000	1.25
4,000	1.50
5,000	1.75
6,000	2.00
8,000	2.00
10,000	2.00
12,000	2.50
14,000	3.00
16,000	3.50
18,000	4.00
20,000	4.50
22,000	5.00
24,000	5.50
26,000	6.00
28,000	6.50
30,000	7.00
32,000	7.50
34,000	8.00
36,000	8.50
38,000	9.00
40,000 and over	9.50

*Interpolate for intermediate figures

APPENDIX C

Rational Method Calculations



Project: 2841-7365

Georgian Bowl

Project No.: Addition

Created By: JC

Checked By: BH

Date: 2025.06.27

Rational Method Calculation - PRE-1/POST-2

Storm Return	IDF Curve	
	Coef. A	Coef. B
2 Year	20.8	-0.699
5 Year	27.5	-0.699
10 Year	31.9	-0.699
25 Year	37.6	-0.699
50 Year	41.8	-0.699
100 Year	45.9	-0.699

IDF curve Town of Collingwood

Rational Method

$$Q = 0.0028 * C * i * A \quad (\text{cms})$$

Intensity

$$i = A * (T_c)^b \quad (\text{mm/hr})$$

Equations from MTO Drainage Management Manual

Existing Condition Peak Flow Rates						
Storm Return	Area A (ha)	Runoff Coef. C	Adjustment to C	Time of Concentration T_c (min)	Intensity i (mm/hr)	Q (cms)
2 Year	0.88	0.43	1	10	72.8	0.077
5 Year	0.88	0.43	1	10	96.2	0.102
10 Year	0.88	0.43	1	10	111.6	0.118
25 Year	0.88	0.47	1.1	10	131.6	0.153
50 Year	0.88	0.52	1.2	10	146.3	0.186
100 Year	0.88	0.54	1.25	10	160.6	0.213

Adjustment Factor to RC per [Town/City] Standards

Proposed Condition Peak Flow Rates						
Storm Return	Area A (ha)	Runoff Coef. C	Adjustment to C	Time of Concentration T_c (min)	Intensity i (mm/hr)	Q (cms)
2 Year	0.68	0.41	1	10	72.8	0.057
5 Year	0.68	0.41	1	10	96.2	0.075
10 Year	0.68	0.41	1	10	111.6	0.087
25 Year	0.68	0.45	1.1	10	131.6	0.113
50 Year	0.68	0.49	1.2	10	146.3	0.137
100 Year	0.68	0.51	1.25	10	160.6	0.157

Adjustment Factor to RC per [Town/City] Standards



Catchments NORTH (PRE-2, POST-1, POST-3)

Input Parameters

IDF Curve Parameters		
Storm Event	A	B
2	20.8	-0.699
5	27.5	-0.699
10	31.9	-0.699
25	37.6	-0.699
50	41.8	-0.699
100	45.9	-0.699

Runoff Coefficient Adjustment Factors	
Return Period	Adjustment Factor
2	1.00
5	1.00
10	1.00
25	1.10
50	1.20
100	1.25

Total Site Area = 1.23 ha

Determination of Runoff Coefficients

Surface	Pre-Development		Post-Development	
	Area (ha)	Runoff Coefficient	Area (ha)	Runoff Coefficient
Sod/Grass	0.24	0.20	0.18	0.20
Impervious	0.11	0.95	0.38	0.95
Total	0.35	0.43	0.56	0.71

Storage Summary

Storm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Target Flow (L/s)	30.3	40.1	46.5	60.3	73.2	83.7
Storage (m ³)	32.6	43.1	50.0	64.8	78.6	89.9

Modified Rational Method Storage Sizing

Peak Flow

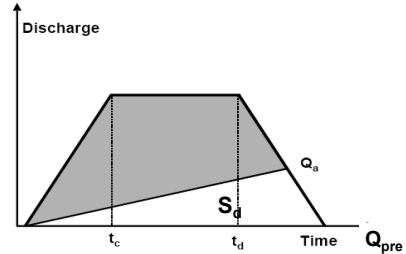
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	72.78
Return Period (yr)	2	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	20.8		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.03
Runoff Coefficient (Adjusted)	0.43		
Area (ha)	0.35		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	72.78
Return Period (yr)	2	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	20.8		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.08
Runoff Coefficient (Adjusted)	0.71		
Area (ha)	0.56		

Target Flow (m³/s) 0.03

REQUIRED STORAGE VOLUME: 32.6

Storage Volume Determination (Detailed)				
T _d min	i mm/hr	T _d sec	Q _{Uncont} m³/s	S _d m³
1.00	363.91	60.00	0.41	14.3
2.00	224.17	120.00	0.25	19.0
3.00	168.84	180.00	0.19	22.0
4.00	138.09	240.00	0.15	24.2
5.00	118.14	300.00	0.13	25.8
10.00	72.78	600.00	0.08	30.4
15.00	54.82	900.00	0.06	32.2
20.00	44.83	1200.00	0.05	32.6
25.00	38.36	1500.00	0.04	32.2
30.00	33.77	1800.00	0.04	31.3
35.00	30.32	2100.00	0.03	29.9

Modified Rational Method Storage Sizing

Peak Flow

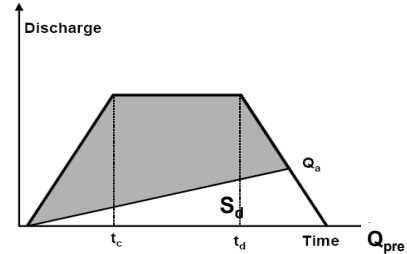
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	96.22
Return Period (yr)	5	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	27.5		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.04
Runoff Coefficient (Adjusted)	0.43		
Area (ha)	0.35		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	96.22
Return Period (yr)	5	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	27.5		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.11
Runoff Coefficient (Adjusted)	0.71		
Area (ha)	0.56		

Target Flow (m³/s)	0.04
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REQUIRED STORAGE VOLUME:	43.1
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Storage Volume Determination (Detailed)				
T _d min	i mm/hr	T _d sec	Q _{Uncont} m³/s	S _d m³
1.00	481.13	60.00	0.54	18.9
2.00	296.37	120.00	0.33	25.2
3.00	223.23	180.00	0.25	29.1
4.00	182.57	240.00	0.20	31.9
5.00	156.20	300.00	0.17	34.1
10.00	96.22	600.00	0.11	40.2
15.00	72.47	900.00	0.08	42.5
20.00	59.27	1200.00	0.07	43.1
25.00	50.71	1500.00	0.06	42.6
30.00	44.64	1800.00	0.05	41.3
35.00	40.08	2100.00	0.04	39.6

Modified Rational Method Storage Sizing

Peak Flow

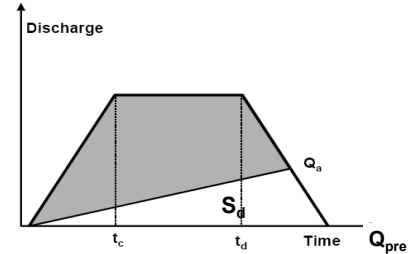
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	111.61
Return Period (yr)	10		
Time of Concentration (min)	10.0		
Coeff A	31.9		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.05
Runoff Coefficient (Adjusted)	0.43		
Area (ha)	0.35		

(Bransby-Williams formula)

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	111.61
Return Period (yr)	10		
Time of Concentration (min)	10.0		
Coeff A	31.9		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.12
Runoff Coefficient (Adjusted)	0.71		
Area (ha)	0.56		

(Bransby-Williams formula)

Target Flow (m³/s)	0.05
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REQUIRED STORAGE VOLUME:	50.0
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
1.00	558.11	60.00	0.62	21.9
2.00	343.79	120.00	0.38	29.2
3.00	258.95	180.00	0.29	33.8
4.00	211.78	240.00	0.24	37.1
5.00	181.19	300.00	0.20	39.6
10.00	111.61	600.00	0.12	46.6
15.00	84.07	900.00	0.09	49.3
20.00	68.75	1200.00	0.08	50.0
25.00	58.82	1500.00	0.07	49.4
30.00	51.79	1800.00	0.06	48.0
35.00	46.50	2100.00	0.05	45.9

Modified Rational Method Storage Sizing

Peak Flow

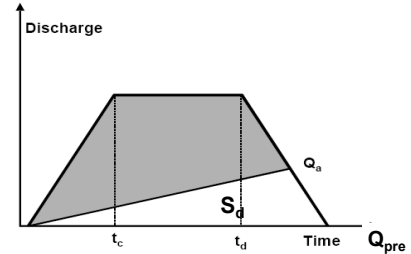
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	131.56
Return Period (yr)	25		
Time of Concentration (min)	10.0		
Coeff A	37.6		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.06
Runoff Coefficient (Adjusted)	0.47		
Area (ha)	0.35		

(Bransby-Williams formula)

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	131.56
Return Period (yr)	25		
Time of Concentration (min)	10.0		
Coeff A	37.6		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.16
Runoff Coefficient (Adjusted)	0.78		
Area (ha)	0.56		

(Bransby-Williams formula)

Target Flow (m³/s)	0.06
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REQUIRED STORAGE VOLUME:	64.8
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Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
1.00	657.83	60.00	0.81	28.4
2.00	405.22	120.00	0.50	37.8
3.00	305.22	180.00	0.37	43.8
4.00	249.62	240.00	0.31	48.0
5.00	213.57	300.00	0.26	51.3
10.00	131.56	600.00	0.16	60.5
15.00	99.09	900.00	0.12	64.0
20.00	81.04	1200.00	0.10	64.8
25.00	69.34	1500.00	0.08	64.0
30.00	61.04	1800.00	0.07	62.2
35.00	54.80	2100.00	0.07	59.5

Modified Rational Method Storage Sizing

Peak Flow

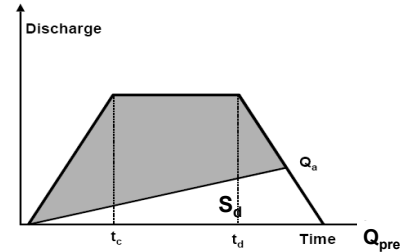
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	146.25
Return Period (yr)	50	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	41.8		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.07
Runoff Coefficient (Adjusted)	0.51		
Area (ha)	0.35		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	146.25
Return Period (yr)	50	(Bransby-Williams formula)	
Time of Concentration (min)	10.0		
Coeff A	41.8		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.20
Runoff Coefficient (Adjusted)	0.85		
Area (ha)	0.56		

Target Flow (m³/s) 0.07

REQUIRED STORAGE VOLUME: 78.6

Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
1.00	731.31	60.00	0.98	34.5
2.00	450.49	120.00	0.60	45.9
3.00	339.31	180.00	0.45	53.1
4.00	277.50	240.00	0.37	58.3
5.00	237.42	300.00	0.32	62.2
10.00	146.25	600.00	0.20	73.4
15.00	110.16	900.00	0.15	77.6
20.00	90.09	1200.00	0.12	78.6
25.00	77.08	1500.00	0.10	77.7
30.00	67.86	1800.00	0.09	75.4
35.00	60.93	2100.00	0.08	72.2

Modified Rational Method Storage Sizing

Peak Flow

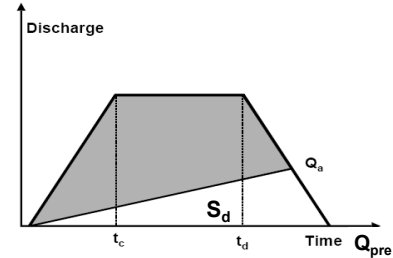
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A (T_d)^B$$

Storage

$$S_d = Q_{\text{post}} \cdot T_d - Q_{\text{pre}} (T_d + T_c) / 2$$



Pre-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	160.60
Return Period (yr)	100		
Time of Concentration (min)	10.0		
Coeff A	45.9		
Coeff B	-0.699		
Runoff Coeff (Unadjusted)	0.43	Flow (m³/s)	0.08
Runoff Coefficient (Adjusted)	0.53		
Area (ha)	0.35		

(Bransby-Williams formula)

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Georgian Bowl	Intensity (mm/hr):	160.60
Return Period (yr)	100		
Time of Concentration (min)	10.0		
Coeff A	45.9		
Coeff B	-0.699		
Runoff Coeff (unadjusted)	0.71	Uncont. Flow (m³/s)	0.22
Runoff Coefficient (Adjusted)	0.89		
Area (ha)	0.56		

(Bransby-Williams formula)

Target Flow (m³/s)	0.08
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REQUIRED STORAGE VOLUME:	89.9
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Storage Volume Determination (Detailed)				
T_d min	i mm/hr	T_d sec	Q_{Uncont} m³/s	S_d m³
1.00	803.05	60.00	1.12	39.4
2.00	494.68	120.00	0.69	52.5
3.00	372.59	180.00	0.52	60.7
4.00	304.72	240.00	0.42	66.6
5.00	260.71	300.00	0.36	71.2
10.00	160.60	600.00	0.22	83.9
15.00	120.96	900.00	0.17	88.8
20.00	98.93	1200.00	0.14	89.9
25.00	84.64	1500.00	0.12	88.8
30.00	74.51	1800.00	0.10	86.2
35.00	66.90	2100.00	0.09	82.6



Project: 2841-7365

Georgian Bowl

Project No.: Addition

Created By: JC

Checked By: BH

Date: 2025.06.27

Rational Method Calculation - POST-3

Storm Return	IDF Curve	
	Coef. A	Coef. B
2 Year	20.8	-0.699
5 Year	27.5	-0.699
10 Year	31.9	-0.699
25 Year	37.6	-0.699
50 Year	41.8	-0.699
100 Year	45.9	-0.699

IDF curve Town of Collingwood

Rational Method

$$Q=0.0028 \cdot C \cdot i \cdot A \quad (\text{cms})$$

Intensity

$$i=A \cdot (T_c)^b \quad (\text{mm/hr})$$

Equations from MTO Drainage Management Manual

Existing Condition Peak Flow Rates						
Storm Return	Area A (ha)	Runoff Coef. C	Adjustment to C	Time of Concentration T_c (min)	Intensity i (mm/hr)	Q (cms)
2 Year	0.08	0.20	1	10	72.8	0.003
5 Year	0.08	0.20	1	10	96.2	0.004
10 Year	0.08	0.20	1	10	111.6	0.005
25 Year	0.08	0.22	1.1	10	131.6	0.006
50 Year	0.08	0.24	1.2	10	146.3	0.008
100 Year	0.08	0.25	1.25	10	160.6	0.009

Adjustment Factor to RC per [Town/City] Standards

Proposed Condition Peak Flow Rates						
Storm Return	Area A (ha)	Runoff Coef. C	Adjustment to C	Time of Concentration T_c (min)	Intensity i (mm/hr)	Q (cms)
2 Year	0.08	0.20	1	10	72.8	0.003
5 Year	0.08	0.20	1	10	96.2	0.004
10 Year	0.08	0.20	1	10	111.6	0.005
25 Year	0.08	0.22	1.1	10	131.6	0.006
50 Year	0.08	0.24	1.2	10	146.3	0.008
100 Year	0.08	0.25	1.25	10	160.6	0.009

Adjustment Factor to RC per [Town/City] Standards

APPENDIX D

Bioretention Planter Details & Calculations

Target Volumes: 100yr Storm

Required Quantity Storage Volume **89.9 m³** (from hydrologic modelling)

Required Quality Volume

C = Runoff Coefficient **0.71**
A = Drainage Area **4800 m²**
P_T = Precipitation Depth (25mm) **25 mm**
WCV = Water Quality Volume **85.2 m³**

$$WQV = C * P_T * A / 1000$$

Where:
WQV = Water quality volume (m³)
C = Runoff Coefficient (Assume 0.9)
A = Drainage area (m²)
P_T = Precipitation Depth (25mm)

Maximum Reservoir Depth

Native Soil Infiltration Rate **30 mm/hr**
Required Drawdown Time **24 hrs**
Maximum Reservoir Depth **1.80 m**
(from Geotechnical Report or MOE Soil Percolation Rates)

Properties of Layers

Layer	Typical Depth (mm)	Depth (mm)	Porosity
Ponding	150	250	1.00
Wood Based Mulch	50-100	75	0.70
Filter Media	*	600	0.30
Choker Layer	100	100	0.40
Clear Stone	300	300	0.40

* Plant Type	Min. Media Depth
Trees and large shrubs	1.0 m
Smaller shrubs and perennials	0.6 m
Mown turf grass (roof runoff only)	0.3 m

Required System Footprints

Required Total Footprint (Quantity)

Total System Depth	1.325 m	
Equivalent Storage		
Depth (Media Only)	0.393 m	
Ponding Storage	0.25 m	
Required Total Footprint	139.92 m²	
	Provided Media Area:	150 m²
	Total Available Area:	334 m²

STOUFFVILLE MEADOWS SALES CENTRE - SEDIMENT TRAP
Stage Storage Discharge Table
Outlet Structure

Orifice Diameter:	0.115 m
Orifice Invert Elevation:	193.065 m

	Pond Dimensions				Outlet Structure	SSD		
	Elev. (m)	Depth Above Bottom (m)	Area (sqm)	Storage Volume (cu.m)	Orifice Discharge (L/s)	Total Discharge (L/s)	Storage (cu-m)	
Bottom	193.065	0.00	150	0	0.00	0.00	0.000	
	193.12	0.05	150	3	0.00	0.00	3	
	193.17	0.10	150	5	7.59	7.59	5	
	193.22	0.15	150	8	11.19	11.19	8	
	193.27	0.20	150	11	13.89	13.89	11	
	193.32	0.25	150	14	16.15	16.15	14	
	193.37	0.30	150	16	18.13	18.13	16	
	193.42	0.35	150	19	19.91	19.91	19	
	193.47	0.40	150	22	21.54	21.54	22	
	193.52	0.45	150	25	23.06	23.06	25	
	193.57	0.50	150	27	24.48	24.48	27	
	193.62	0.55	150	30	25.83	25.83	30	
	193.66	0.60	150	33	26.98	26.98	33	2yr
	193.72	0.65	150	36	28.33	28.33	36	
	193.77	0.70	150	38	29.50	29.50	38	
	193.82	0.75	150	41	30.63	30.63	41	
	193.87	0.80	150	44	31.72	31.72	44	5yr
	193.92	0.85	150	47	32.77	32.77	47	
	193.97	0.90	150	49	33.78	33.78	49	
	194.02	0.95	150	52	34.77	34.77	52	10yr
	194.07	1.00	150	55	35.73	35.73	55	
	194.12	1.05	150	58	36.67	36.67	58	
Top of Media	194.14	1.075	150	59	37.13	37.13	59	
	194.19	1.13	182	67	38.03	38.03	67	25yr
	194.24	1.18	220	77	38.91	38.91	77	50yr
Ditch Inlet TG	194.29	1.23	256	89	39.77	39.77	89	100yr
	194.34	1.28	290	103	40.61	40.61	103	
Top of Ponding Limits	194.39	1.33	334	118	41.44	41.44	118	

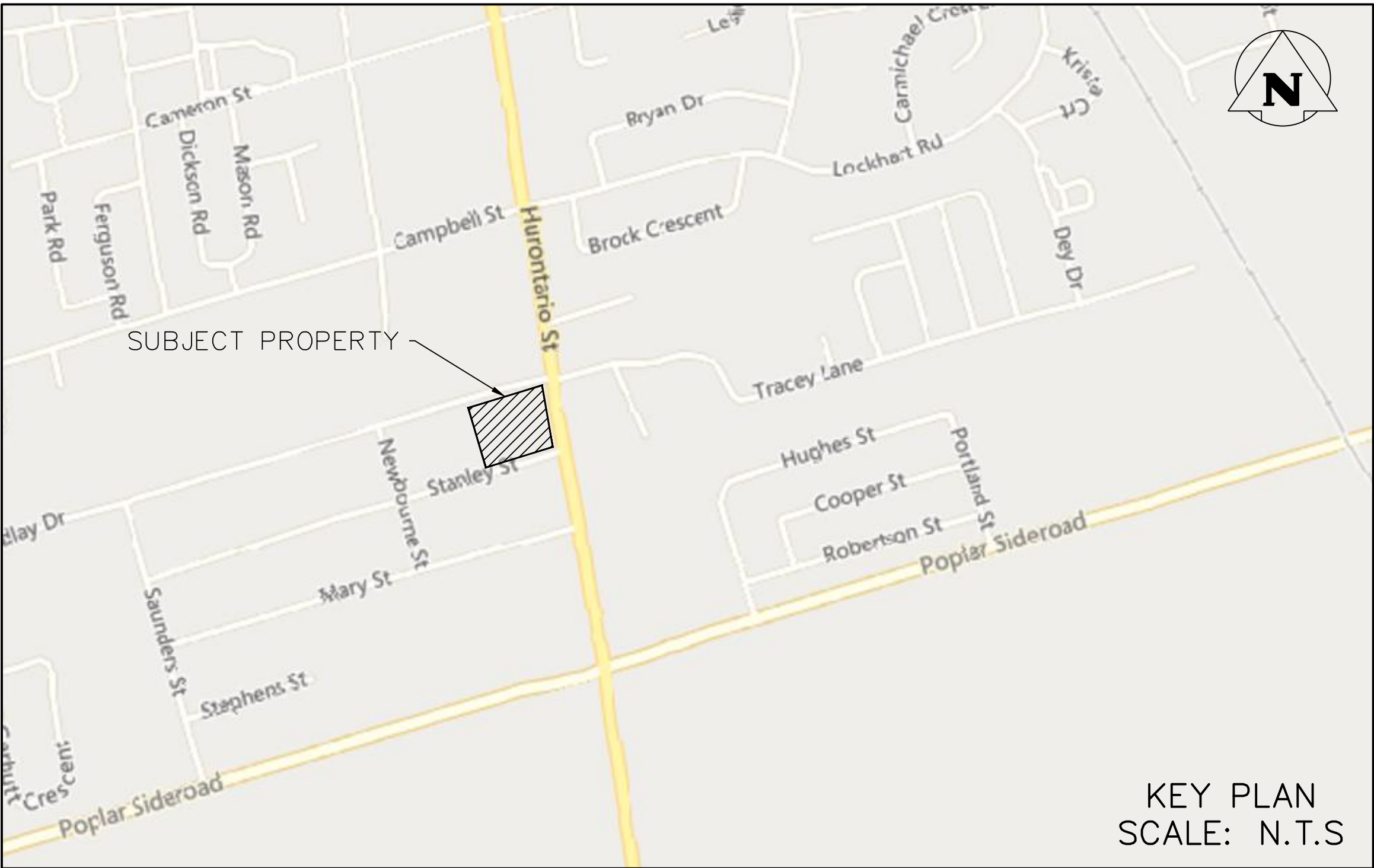
DRAWINGS & FIGURES

Drawing C101:	Cover Page
Drawing C201:	Erosion and Sediment Control & Removals Plan
Drawing C301:	Pre Development Storm Drainage Plan
Drawing C302:	Post Development Storm Drainage Plan
Drawing C401:	Overall Site Grading Plan
Drawing C501:	General Site Servicing Plan
Drawing C901:	Construction Notes & Standards Details
Figure 1:	Site Location Plan
Figure 2:	Site Plan
Figure 3:	Architectural Plan

GEORGIAN BOWL ADDITION

TOWN OF COLLINGWOOD

COUNTY OF SIMCOE



KEY PLAN
SCALE: N.T.S

MUNICIPALITY

TOWN OF COLLINGWOOD
97 HURONTARIO STREET
COLLINGWOOD, ONTARIO, L9Y 2L8

DEVELOPER

GEORGIAN BOWL
832 HURONTARIO STREET
COLLINGWOOD, ONTARIO, L9Y 0G7

DEVELOPER’S ENGINEER

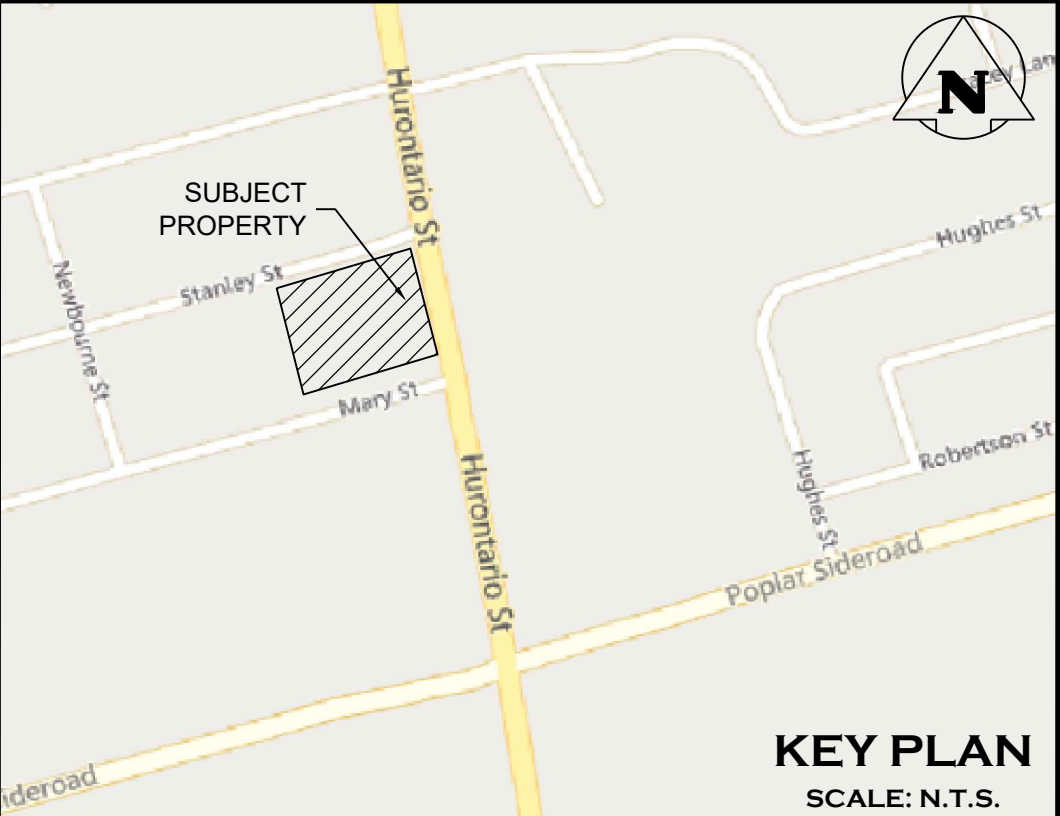
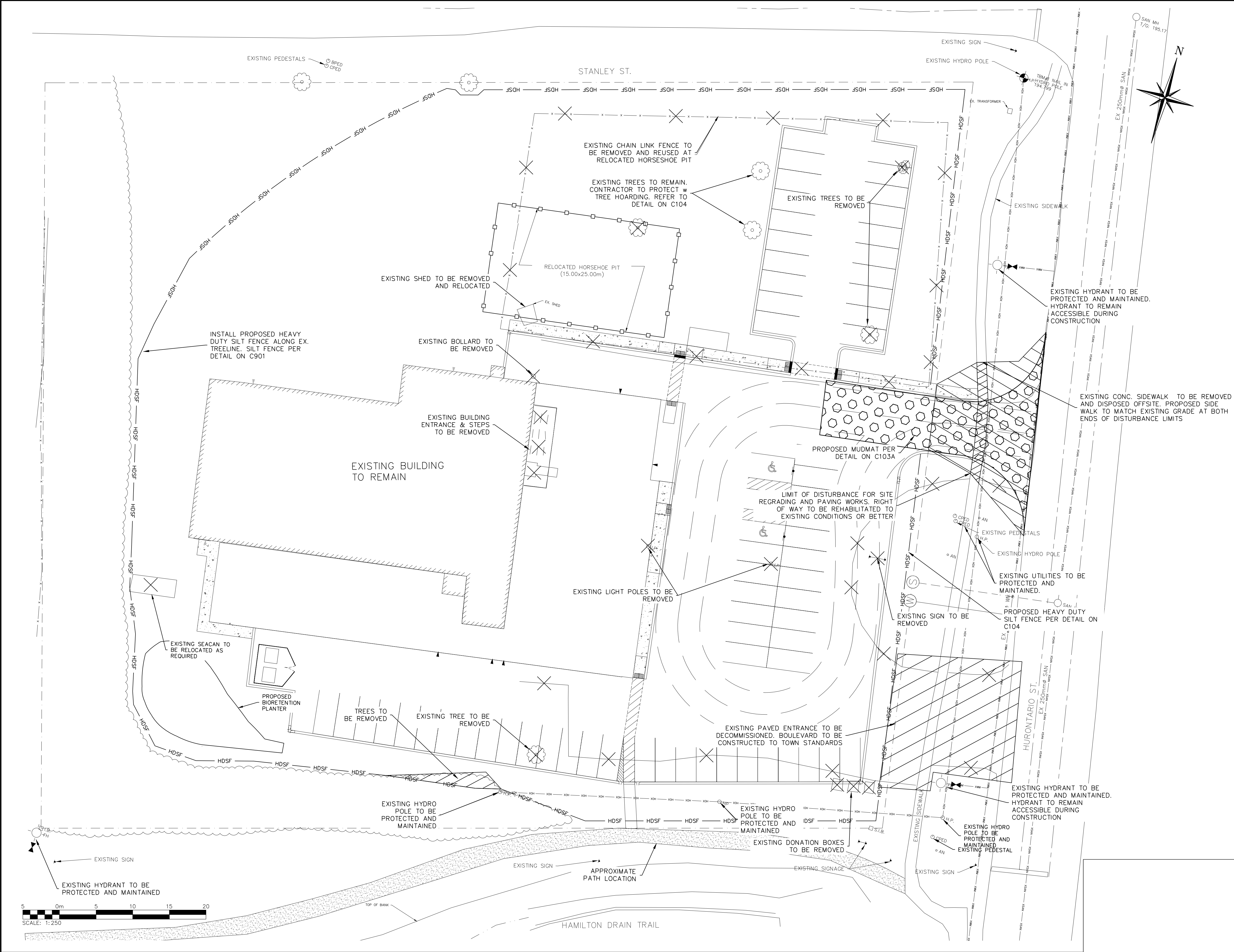


70 HURON STREET, SUITE 100
COLLINGWOOD, ON, L9Y 4L4
705-446-3510
WWW.CFCROZIER.CA

DRAWING	TITLE
C101	COVER PAGE
C201	EROSION AND SEDIMENT CONTROL & REMOVALS PLAN
C301	PRE DEVELOPMENT STORM DRAINAGE PLAN
C302	POST DEVELOPMENT STORM DRAINAGE PLAN
C401	OVERALL SITE GRADING PLAN
C501	GENERAL SITE SERVICING PLAN
C901	CONSTRUCTION NOTES & STANDARD DETAILS

MASTER LEGEND	
EXISTING FEATURES (EX.)	
	EX. CONTOUR
	EX. GRADE
	EX. TREELINE
	EX. DITCH
	EX. WATERMAIN
	EX. WATER SERVICE
	EX. FIRE HYDRANT & VALVE
	EX. SANITARY SEWER & MANHOLE
	EX. SANITARY FORCEMAIN
	EX. SANITARY SERVICE
	EX. TREE
	EX. ANCHOR
	EX. BELL PEDESTAL
	EX. CABLE TELEVISION PEDESTAL
	EX. HYDRO POLE
	EX. LIGHT STANDARD
	EX. SIGN
	EX. BUILDING
	EX. BENCHMARK NUMBER & LOCATION
	EX. STORM DRAINAGE CATCHMENT
PROPOSED FEATURES (PR.)	
	PR. PROPERTY LIMITS
	PR. ELEVATION
	PR. ELEVATION (MATCH EX. ELEVATION)
	PR. SWALE & SLOPE
	PR. DITCH DRAINAGE
	PR. STORM SEWER & MANHOLE
	CATCHMENT AREA ID
	PERCENT IMPERVIOUS
	DRAINAGE AREA (ha)
	OVERLAND FLOW DIRECTION
	PR. STORM DRAINAGE CATCHMENT
	PR. BUILDING ENVELOPE
	REQUIRED PARKING SETBACK
	PR. TRUCK TURNING PATH
	PR. CURB CUT
	PR. FENCE
	PR. BUILDING ENVELOPE
	PR. 100YR PONDING LIMIT
	PR. HEAVY DUTY SILT FENCE
	PR. MUD MAT
	PR. SLOPE (3:1 MAX.)
	CROSS SECTION LOCATION
	PR. SNOW STORAGE LOCATION
	PR. WATER SERVICE
	PR. SANITARY SERVICE

PROJECT No.: 2841-7365
1ST SUBMISSION



NOTES

1. PUBLIC ACCESS TO EXISTING BUILDING WILL BE DISCONTINUED FOR THE DURATION OF SITE WORKS. PUBLIC ACCESS TO GEORGIAN BOWL WILL RESUME FOLLOWING COMPLETION OF CONSTRUCTION.

TEMPORARY BENCHMARKS

TBM#1-NAIL IN HYDRO POLE ON HURONTARIO ST. ELEV=194.799

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No.	ISSUE	DATE: YYYY/MM/DD
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Engineer

Engineer

PRELIMINARY

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Project

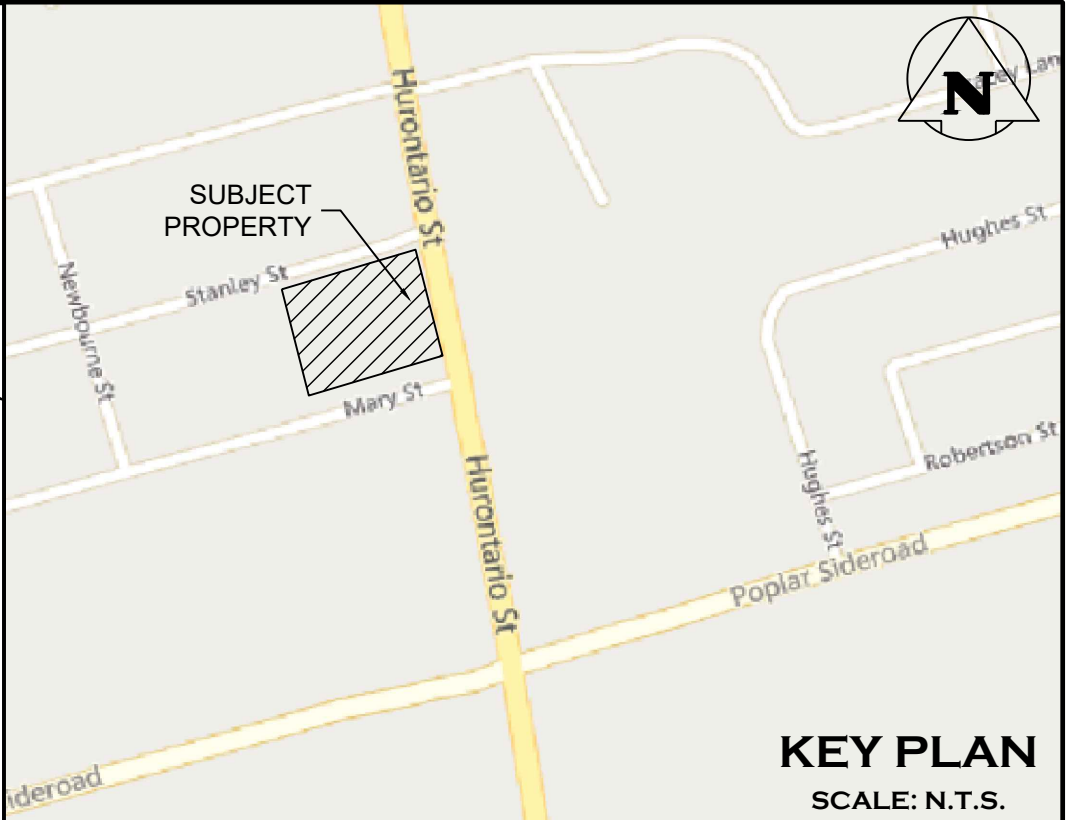
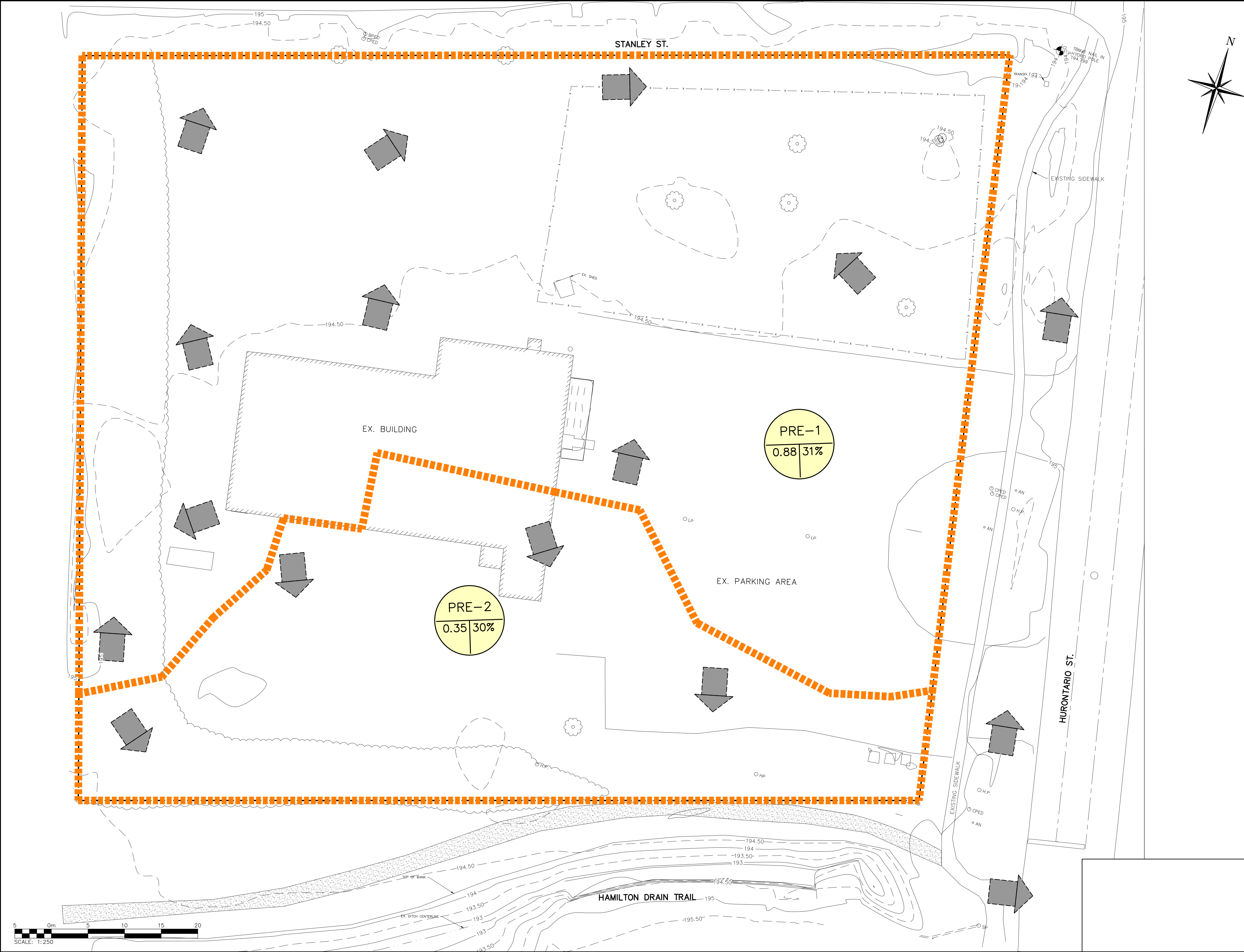
GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD

Drawing

EROSION AND SEDIMENT CONTROL &
REMOVALS PLAN

Drawn By J.C. Design By J.C./B.H. Project 2841-7365

Check By J.E. Check By B.H. Drawing C201



TEMPORARY BENCHMARKS
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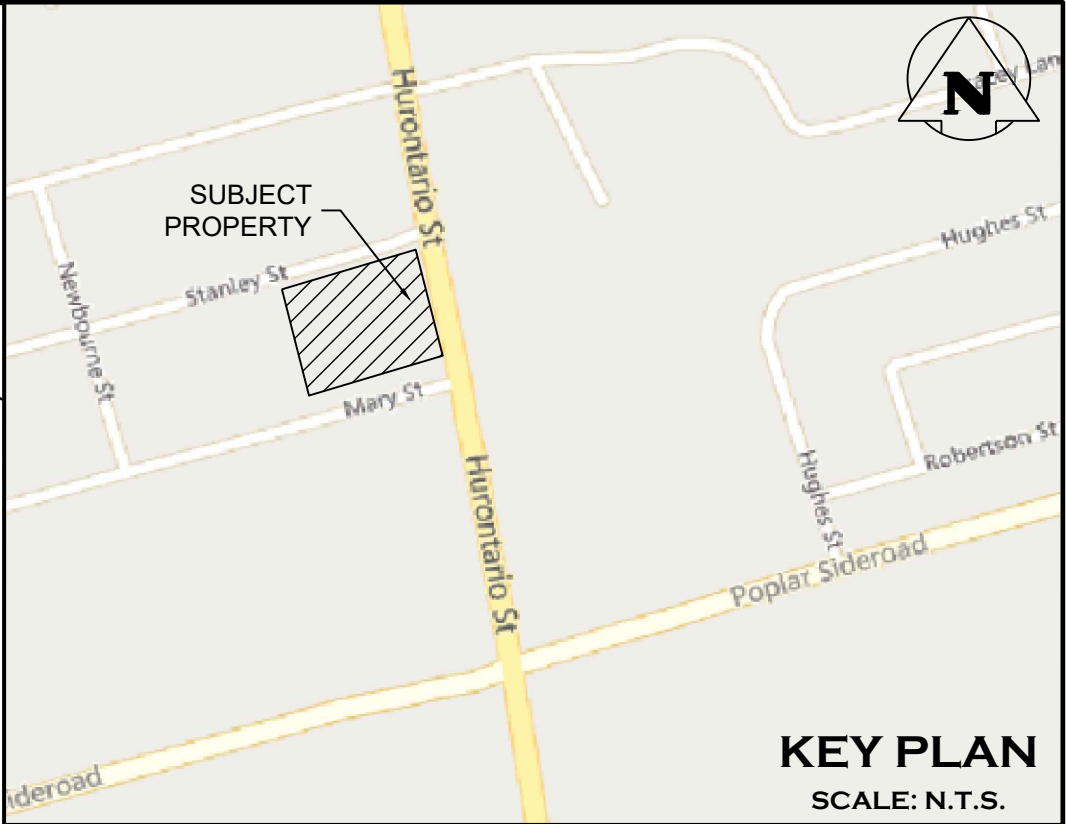
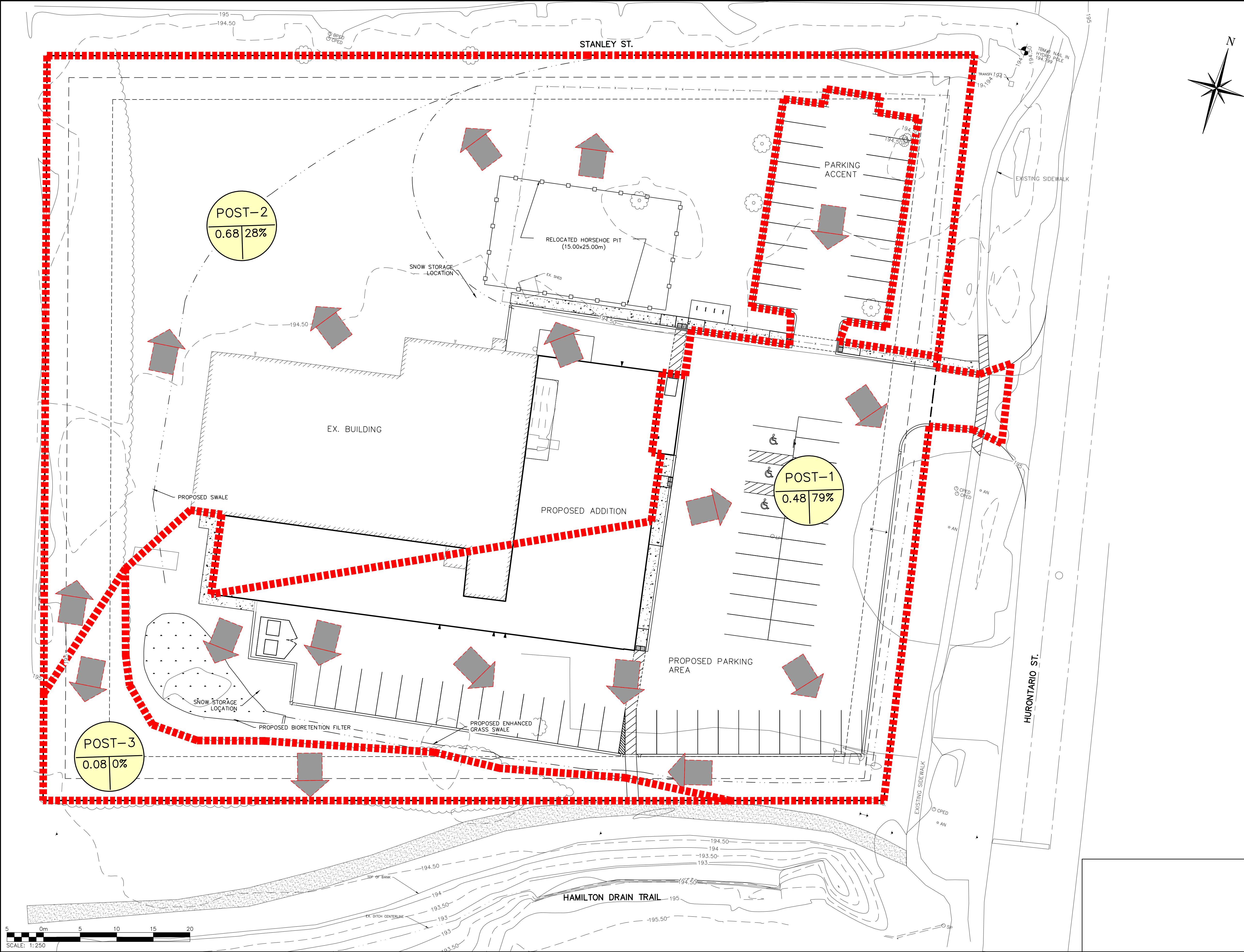
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Project
**GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD**

Drawing
**PRE DEVELOPMENT
STORM DRAINAGE PLAN**

**CROZIER**
CONSULTING ENGINEERS

Drawn By	J.C.	Design By	J.C./B.H.	Project	2841-7365
Check By	J.E.	Check By	B.H.	Drawing	C301



TEMPORARY BENCHMARKS
TBM#1-NAIL IN HYDRO POLE ON HURONTARIO ST.
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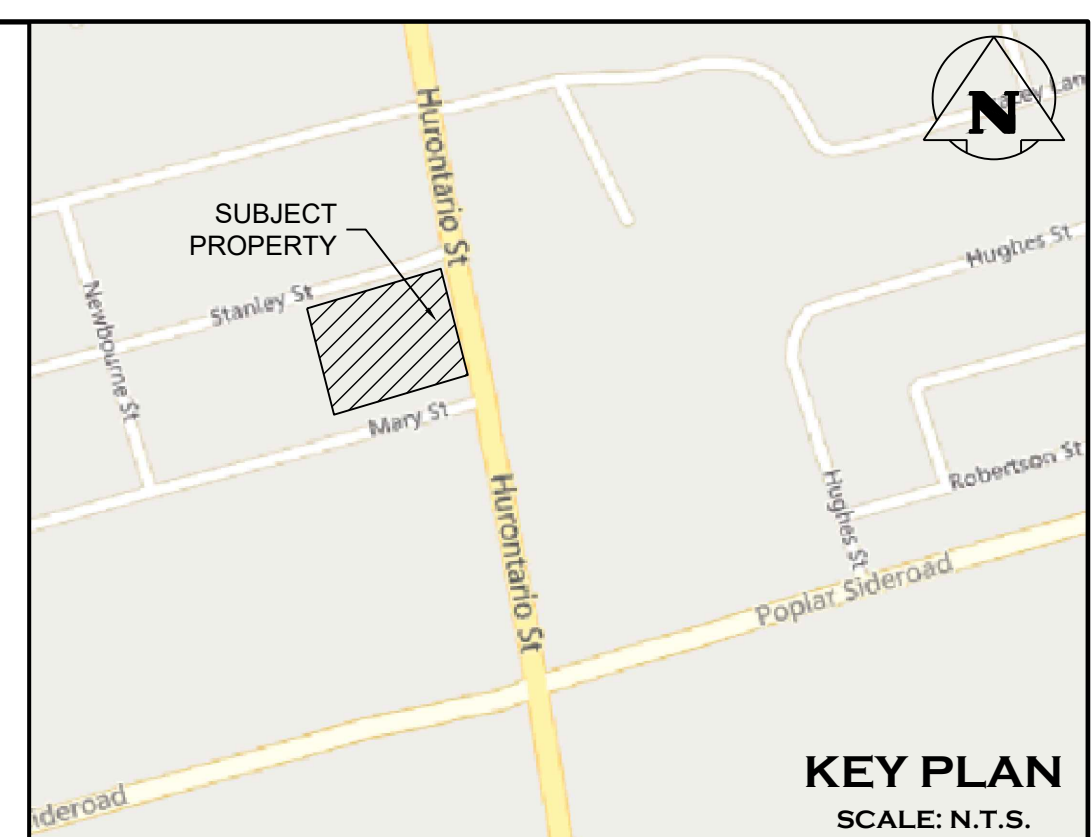
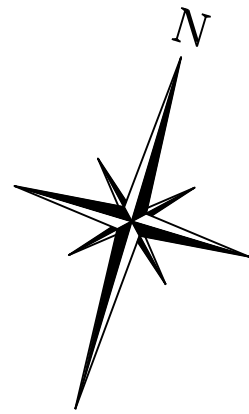
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Project
GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD

Drawing
POST DEVELOPMENT
STORM DRAINAGE PLAN

**CROZIER**
CONSULTING ENGINEERS

Drawn By	J.C.	Design By	J.C./B.H.	Project	2841-7365
Check By	J.E.	Check By	B.H.	Drawing	C302



1. ALL GRADE ELEVATIONS ARE EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
TOP OF CURB GRADES ARE 0.15m ABOVE BOTTOM OF CURB GRADES

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[illegible]

Engineer	Engineer
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PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project	
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GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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Drawing

OVERALL SITE GRADING PLAN

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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ADOZIER

15 FERTILIZER

GRÖTZER

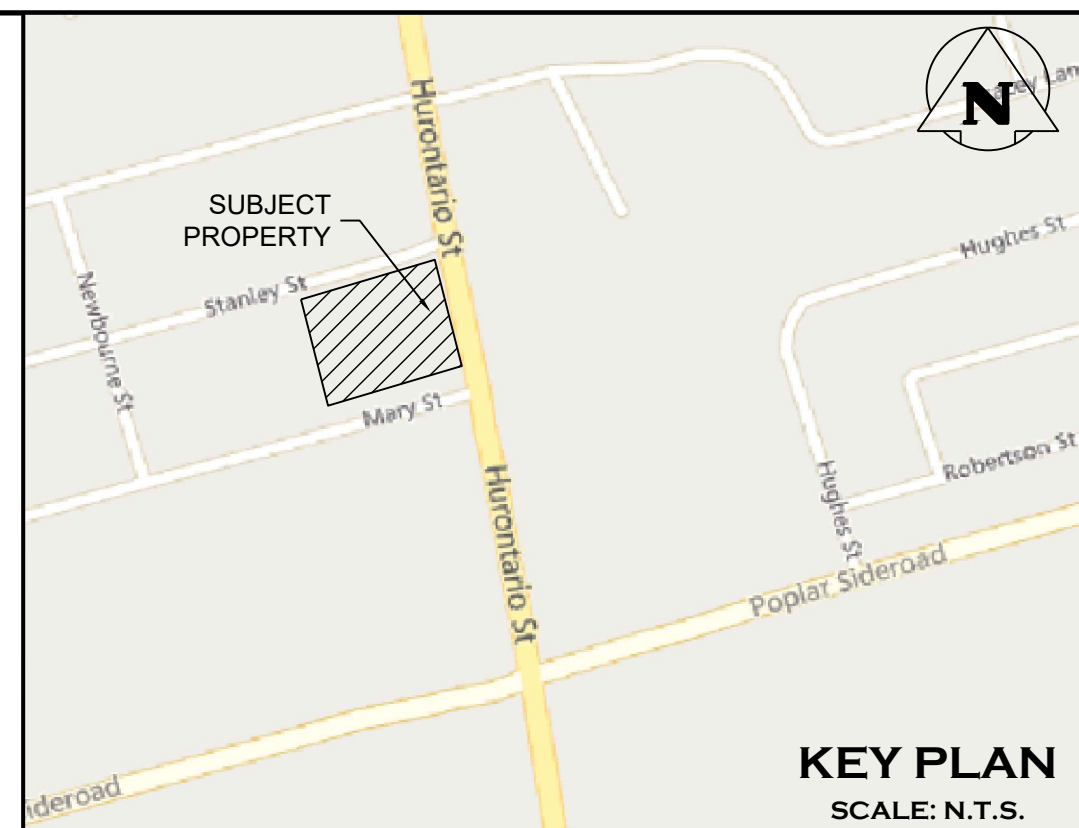
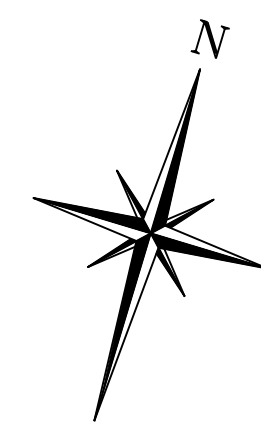
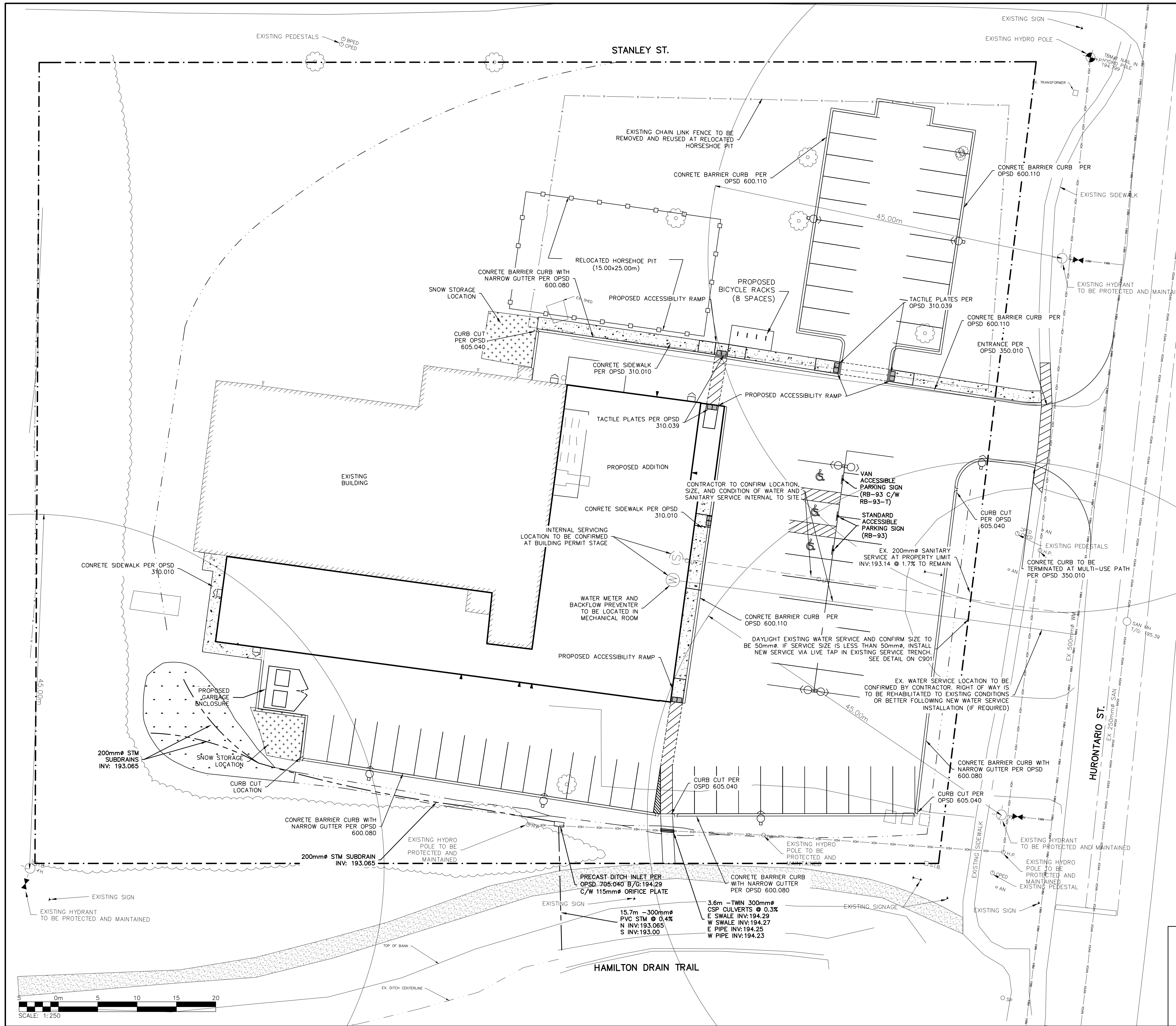
CONSULTING ENGINEERS

Drawn By	Design By	Project
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Drawn by	J.C.	Design by	J.C./B.H.	Project	2841-7365
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Check By	J.E.	Check By	B.H.	Drawing	C401
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- TEMPORARY BENCHMARKS**
TBM#1-NAIL IN HYDRO POLE ON HURONTARIO ST.
ELEV=194.799
- TOPOGRAPHIC SURVEY COMPLETED BY SMC GEOMATICS INC.
ON MARCH 19, 2024. VERTICAL AND HORIZONTAL CONTROL
ESTABLISHED USING LEICA SMARTNET RTK.
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Engineer

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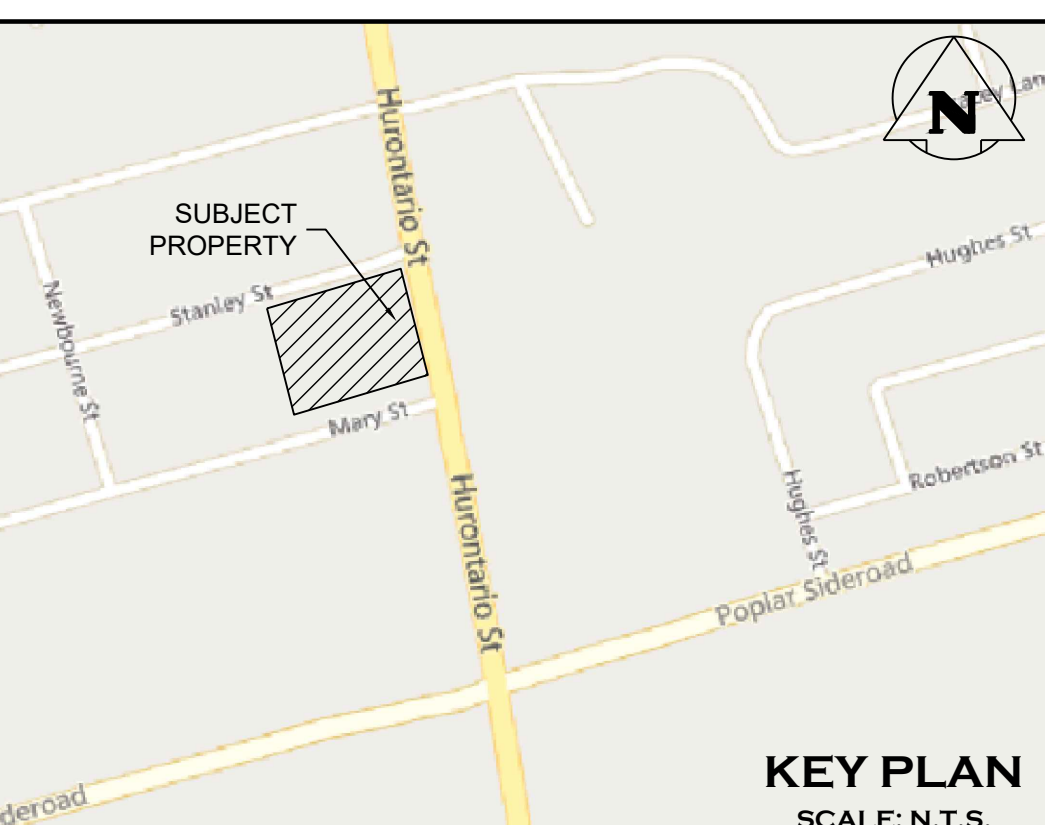
Engineer

Project
**GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD**

Drawing
GENERAL SITE SERVICING PLAN

**CROZIER**
CONSULTING ENGINEERS

Drawn By	J.C.	Design By	J.C./B.H.	Project	2841-7365
Check By	J.E.	Check By	B.H.	Drawing	C501



TEMPORARY BENCHMARKS

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PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE
CONTRACTOR PRIOR TO CONSTRUCTION.

6. DO NOT SCALE DRAWINGS.

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Project

GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD

Drawing

GENERAL SITE SERVICING PLAN



CROZIER
CONSULTING ENGINEERS

2841-7365

C501

Drawn By	J.C.	Design By	J.C./B.H.	Project	
Check By	J.E.	Check By	B.H.	Drawing	

CONSTRUCTION NOTES:

A) GENERAL – CONSTRUCTION

- ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH TOWN OF COLLINGWOOD STANDARDS (2007), OPSS AND OPSS WHERE CONFLICT OCCURS, TOWN OF COLLINGWOOD STANDARDS (2007) TO GOVERN.
- PIPE EMBEDMENT & BACKFILL (OPSD 802.010, 802.013 & 802.033) TO BE SELECT NATIVE MATERIAL OR IMPORTED SELECT SUBGRADE TO OPSS 1010. BACKFILL TO BE PLACED IN MAXIMUM 200mm THICK LIFTS AND COMPACTED TO 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMD).
- PIPE BEDDING TO BE GRANULAR 'A' PIPE COVER TO BE GRANULAR 'B' MAX. AGGREGATE SIZE 25 mm FOR RIGID PIPE AND GRANULAR 'A' FOR FLEXIBLE PIPE. (MINIMUM BEDDING DEPTH 150mm, MINIMUM COVER 300mm, COMPACTED TO A MINIMUM 95% SPMD).
- CLEAR STONE WRAPPED IN FILTER FABRIC CAN BE SUBSTITUTED FOR BEDDING MATERIAL IF APPROVED BY THE ENGINEER.
- ALL TOPSOIL AND EARTH EXCAVATION TO BE STOCK PILED OR REMOVED TO AN APPROVED SITE AS DIRECTED BY ENGINEER.
- THE OWNER'S ENGINEER SHALL PROVIDE BENCH MARK ELEVATIONS AND HORIZONTAL ALIGNMENT REFERENCE FOR THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK.
- ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY O.L.S. AT CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
- THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER AND POWER.
- DEWATERING TO BE CARRIED OUT IN ACCORDANCE WITH OPSS-517 AND 518 TO MAINTAIN ALL TRENCHES IN A DRY CONDITION. CONTRACTOR RESPONSIBLE FOR OBTAINING M.E.C.P. PERMIT IF REQUIRED.
- ALL ENGINE DRIVEN PUMPS TO BE ADEQUATELY SILENCED, SUITABLE FOR OPERATION IN A RESIDENTIAL DISTRICT.
- DISTURBED AREAS OUTSIDE THE DEVELOPED LANDS TO BE REINSTATED TO PREVIOUS CONDITION OR BETTER.
- THE CONTRACTOR IS RESPONSIBLE FOR PRESERVATION OF ALL EXISTING UTILITIES AND TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK AND CO-ORDINATE CONSTRUCTION ACCORDINGLY.
- IMPORTED ENGINEERED FILL MATERIAL APPROVED BY THE GEOTECHNICAL ENGINEER TO BE COMPACTED TO 98% SPMD TO BE USED FOR FILL PADS ON ALL LOTS TO 1.0m ABOVE UNDERSIDE OF FOOTING ELEVATION. REFER TO GEOTECHNICAL REPORT.

B) PARKING LOT

- SUBGRADE AND BOULEVARD MATERIAL TO BE COMPACTED TO A MINIMUM DRY DENSITY OF AT LEAST 95% SPMD. SUBGRADE TO BE PROOF ROLLED AND CERTIFIED BY GEOTECHNICAL ENGINEER PRIOR TO PLACING GRANULAR 'B'.
- GRANULAR 'A' AND 'B' ROAD BASE TO BE COMPACTED TO 100% OF THE MATERIAL'S RESPECTIVE SPMD AND PLACED IN MAX. 150mm LIFTS. REFER TO GEOTECHNICAL REPORT FOR FURTHER DETAILS.
- ROADWAY TO BE CONSTRUCTED WITH MINIMUM 300mm GRANULAR 'B' TYPE 1, 150mm GRANULAR 'A', 50mm HLB BASE COURSE ASPHALT, & 40mm HL3 SURFACE COURSE ASPHALT.
- SELECT SUBGRADE MATERIAL, OR IMPORTED GRANULAR MATERIAL APPROVED BY THE ENGINEER, TO BE USED AS FILL IN ALL AREAS WHERE PROPOSED PIPE INVERTS ARE HIGHER THAN EXISTING GRADE OR AS INSTRUCTED BY THE ENGINEER.
- ALL GRANULARS AND ASPHALT MATERIALS AND PLACEMENT TO BE IN ACCORDANCE WITH OPSS 314 AND OPSS 310.
- JOINTS WITH EXISTING ASPHALT TO BE SAW CUT STRAIGHT WITH MIN. 1.0m LAP JOINT PRIOR TO PLACING NEW ASPHALT AND TACK COAT APPLIED TO EXISTING ASPHALT.
- REINSTATEMENT OF ALL DISTURBED BOULEVARDS TO INCLUDE REGRADING, 150mm TOPSOIL AND SOD TO OPSS 802 AND 803.
- CONCRETE SIDEWALK TO BE CONSTRUCTED PER OPSD 310.010 WITH MINIMUM 150mm GRANULAR 'A' BASE.
- TACTILE WALKING SURFACE INDICATORS AT WALKWAY CROSSINGS AND ACCESSIBLE PARKING STALL AISLES AS PER OPSD 310.039 AND OPSD 310.033.
- ALL CROSSWALKS TO BE DEFINED WITH PAINT LINES ALONG THE CROSSINGS.

C) STORM SEWERS

- MH TO OPSD 701.010 AND DCBMH TO OPSD – 701.011, C/W SUMP UNLESS NOTED OTHERWISE.
- STEPS TO OPSD 405.010.
- MH FRAMES AND GRATES TO OPSD – 401.01 OPEN COVER.
- PROTECTION DURING CONSTRUCTION TO OPSD – 808.010.
- BEDDING AND COVER TO OPSD – 802.010. (FLEXIBLE PIPE) CLASS 'B', GRANULAR 'A' EMBEDMENT OR OPSD – 802.030, 802.031 AND 802.032. (RIGID PIPE) GRANULAR 'A' BEDDING AND GRANULAR 'B' COVER (MAXIMUM AGGREGATE SIZE 25mm).
- EMBEDMENT IN ROCK EXCAVATION TO OPSD 802.013 & 802.033.
- TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
- BACKFILL AND BEDDING MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMD.
- FROST STRAPS PER OPSD 701.100.
- MINIMUM COVER ON STORM SEWER AND SERVICE TO BE 1.5m AS PER TOWN OF COLLINGWOOD STANDARDS. PIPE INSULATION TO BE PROVIDED WHERE MINIMUM COVER IS NOT MET.
- WHERE SWALES ARE LESS THAN 2.0%, 100mm ϕ SUBDRAINS IN FABRIC SOCK AND CLEARSTONE ARE REQUIRED.

D) WATERMANS

- BACKFILL AND EMBEDMENT TO OPSD – 802.010, GRANULAR 'A' EMBEDMENT.
- TRENCH BACKFILL TO BE SELECT NATIVE MATERIAL AS APPROVED BY ENGINEER OR IMPORTED GRANULAR MATERIAL.
- THRUST BLOCKS TO OPSD – 1103.010 AND 1103.020 WHERE SUITABLE SOILS ARE ENCOUNTERED.
- SERVICE CONNECTIONS TO OPSD – 1104.010, 100mm GRANULAR 'A' EMBEDMENT AND COVER OVER PIPE.
- MINIMUM COVER ON WATERMAIN AND SERVICES TO BE 1.7m.
- CLEARANCE BETWEEN WATERMANS AND SEWERS TO BE A MINIMUM OF 0.5m VERTICAL (CLEAR) C/W RIGID INSULATION AND 2.5m MINIMUM (CLEAR) HORIZONTAL SEPARATION.
- FOLLOWING TESTING, CONTRACTOR SHALL OPERATE THE WATER SERVICE TO VERIFY FULL FLOW AND PRESSURE AT THE CURB STOP TO THE SATISFACTION OF THE ENGINEER.
- GENERAL INSTALLATION AND TESTING OF WATERMAIN AND APPURTENANCES TO BE IN ACCORDANCE WITH OPSS 701 AND ALL SPECIFICATIONS REFERENCED WITHIN THESE SECTIONS. WORK MUST BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE, ONTARIO FIRE CODE AND LOCAL CODES. WATER LINES ARE TO BE TESTED TO THE SATISFACTION OF THE LOCAL PLUMBING INSPECTOR. COMPLETE WATER SYSTEM SHALL BE DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF AWWA STANDARD C651-99. ALL WATERMAIN TESTING & CHLORINATION WILL BE CONDUCTED BY TOWN OF COLLINGWOOD WATER DEPARTMENT AT CONTRACTORS COST. WATERMANS ARE NOT TO BE CONNECTED TO EXISTING WATERMANS UNTIL BACTERIOLOGICAL TESTING HAS BEEN SUCCESSFULLY COMPLETED & CERTIFIED BY TOWN OF COLLINGWOOD WATER DEPARTMENT.
- COMPLETE WATER SERVICE SHALL BE DISINFECTED IN ACCORDANCE WITH REQUIREMENTS OF O. REG. 459/00 & SATISFACTION OF TOWN OF COLLINGWOOD WATER DEPARTMENT.
- WATERMAIN – CLASS 52 OR PRESSURE CLASS 350 CEMENT LINED DUCTILE IRON. CONDUCTIVITY CONNECTORS TO BE USED ON ALL JOINTS.
- WATERMAIN SERVICE – 50mm ϕ TYPE 'K' SOFT COPPER PIPE AS NOTED.
- ALL SERVICES SHALL BE METERED. METERS TO BE COMPLETE WITH REMOTE READOUT OR RADIO READ AS DETERMINED BY THE TOWN OF COLLINGWOOD WATER DEPARTMENT. WATER METER TO BILL FOR ENTIRE PROPERTY. ADDITIONAL METERS CAN BE ADDED INTERNALLY FOR EACH APARTMENT IF REQUIRED.
- MECHANICAL JOINT DUCTILE FITTINGS – AWWA/ANSI C153/A21.53.
- ALL WATERMAIN FITTINGS TO BE LEAD FREE.
- MECHANICAL JOINT RESTRAINTS TO BE USED DURING TRANSITION OF WATERMAIN INSTALLATION IN NATIVE SOILS TO ENGINEERED FILL. MECHANICAL JOINT RESTRAINTS TO BE MEGA-LUG OR APPROVED EQUAL.
- ALL CONNECTIONS TO EXISTING MUNICIPAL WATERMANS MUST BE INSPECTED BY TOWN OF COLLINGWOOD WATER DEPARTMENT REPRESENTATIVE AND GIVING 48 HOURS NOTICE PRIOR TO BACKFILLING OPERATIONS.
- EACH BUILDING TO INSTALL MEASURES FOR BACKFLOW PROTECTION SUITABLE TO TOWN OF COLLINGWOOD WATER DEPARTMENT IN ACCORDANCE WITH ONTARIO BUILDING CODE & C.S.A. B64 AND THE TOWN WATER BY-LAW.
- BACKFLOW PREVENTORS AT EACH BUILDING & BE TESTABLE & CERTIFIED ANNUALLY, WITH ALL ASSOCIATED COSTS THE RESPONSIBILITY OF THE OWNER.

EROSION & SEDIMENT CONTROL CONSTRUCTION NOTES:

GENERAL

- ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED. SEDIMENT AND EROSION CONTROL MEASURES THAT ARE DESIGNED TO CONTROL RUNOFF FROM SPECIFIC AREAS MUST BE INSTALLED PRIOR TO ANY DISTURBANCE TO SITE.
- THE CONTRACTOR SHALL HAVE MATERIALS AVAILABLE ON-SITE TO REPAIR SEDIMENT AND EROSION CONTROL MEASURES IN THE EVENT OF UNFORESEEN CONDITIONS: HIGHWATER, EXTREME RAINFALL EVENTS, ETC.
- MUD MATS TO BE CONSTRUCTED AT SITE ACCESS POINT FROM HURONTARIO STREET.
- TEMPORARY TOPSOIL STOCKPILES ARE TO BE A MAXIMUM OF 5m HIGH WITH MAXIMUM 3:1 SIDE SLOPE AND BE PROVIDED WITH THE NECESSARY SEDIMENT AND EROSION CONTROL FEATURES PRIOR TO CONSTRUCTION. IF THE TOPSOIL STOCK PILES ARE TO REMAIN FOR A PERIOD LONGER THAN 30 DAYS, STOCKPILES SHALL BE SEEDED.
- CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGH SITE SUCH THAT NO UPSTREAM OR DOWNSTREAM IMPACT OCCURS DURING CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR WILL BE RESPONSIBLE TO CLEAN ALL ADJACENT ROADWAYS AS REQUIRED OR AS DIRECTED BY SITE ENGINEER OR TOWN.

MAINTENANCE & OPERATION OF SEDIMENT CONTROLS

A) SILT FENCE

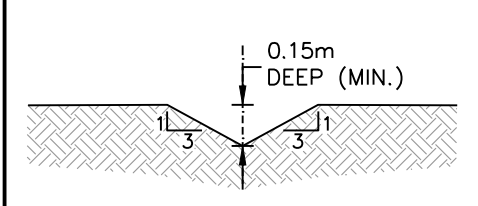
- SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
- SILT FENCE MUST BE INSPECTED IMMEDIATELY AFTER EVERY RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
- SEDIMENT DEPOSITS MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
- ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.
- SILT FENCE TO BE INSTALLED ALONG PROPERTY LINE AND ALONG LIMITS OF PROTECTED AREAS.

C) MUD MAT

- GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.
- INSPECT MUD MAT WEEKLY TO ASSESS CONDITION AND TO ENSURE OPERATION EFFICIENCY.
- SUPPLY AND PLACE ADDITIONAL STONE TO PREVENT MUD TRACKING AS DIRECTED BY SITE ENGINEER.
- MUD MAT TO REMAIN IN PLACE UNTIL SITE IS STABILIZED OR AS DIRECTED BY SITE ENGINEER.

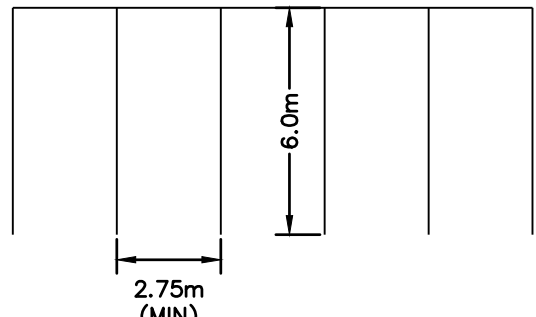
TYPICAL SWALE

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TYPICAL PARKING STALL DETAIL

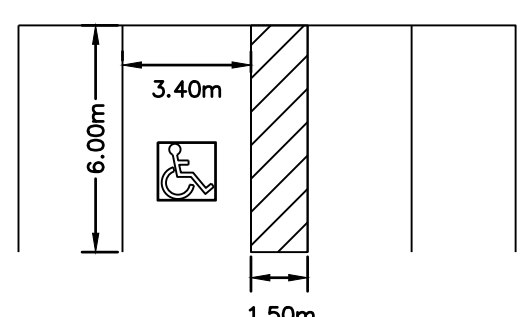
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PARKING LINES TO BE PAINTED WHITE, 100mm THICK.

TYPICAL TYPE 'A' BARRIER FREE PARKING STALL DETAIL

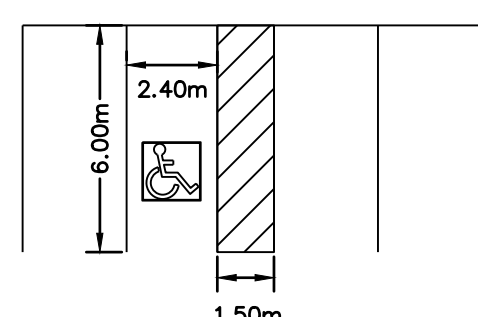
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PARKING LINES TO BE PAINTED WHITE, 100mm THICK.

TYPICAL TYPE 'B' BARRIER FREE PARKING STALL DETAIL

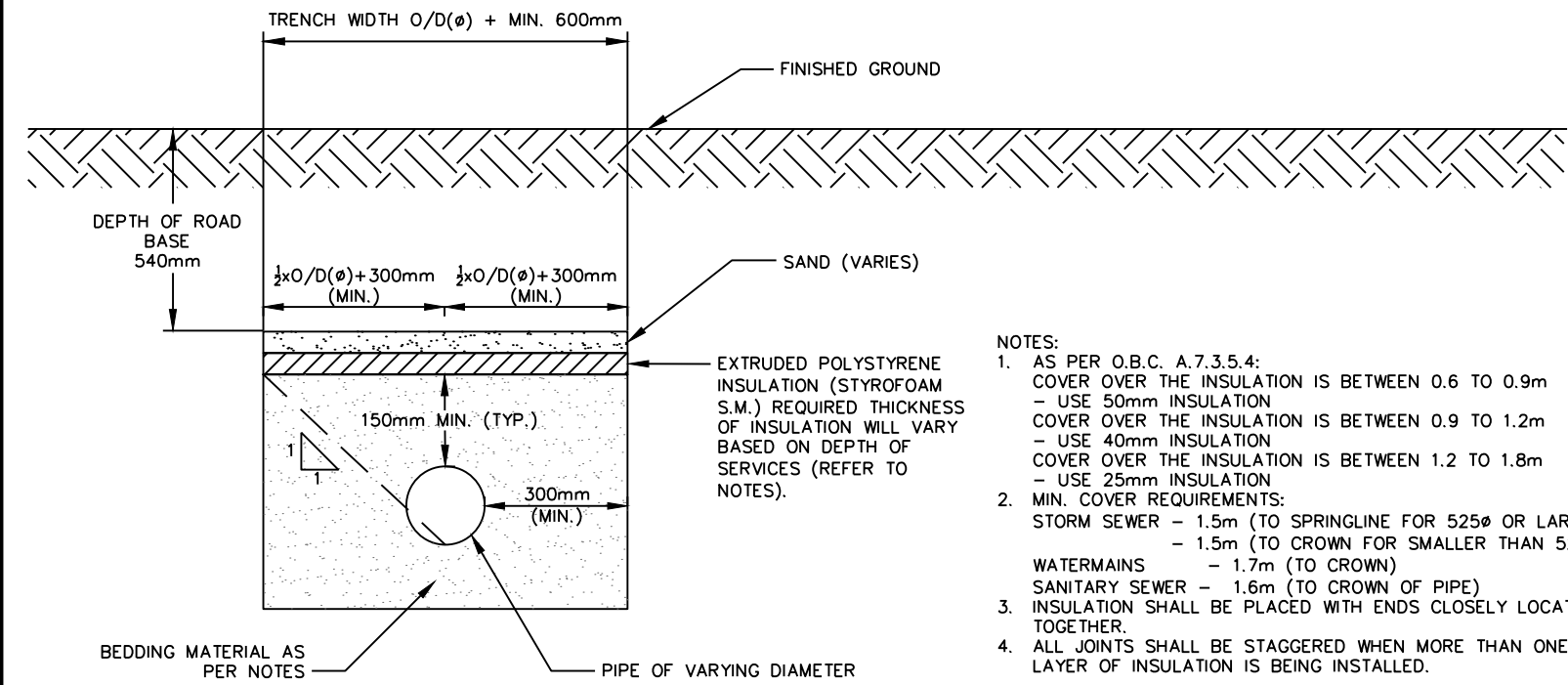
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PARKING LINES TO BE PAINTED WHITE, 100mm THICK.

INSULATION FOR VARIOUS INFRASTRUCTURE

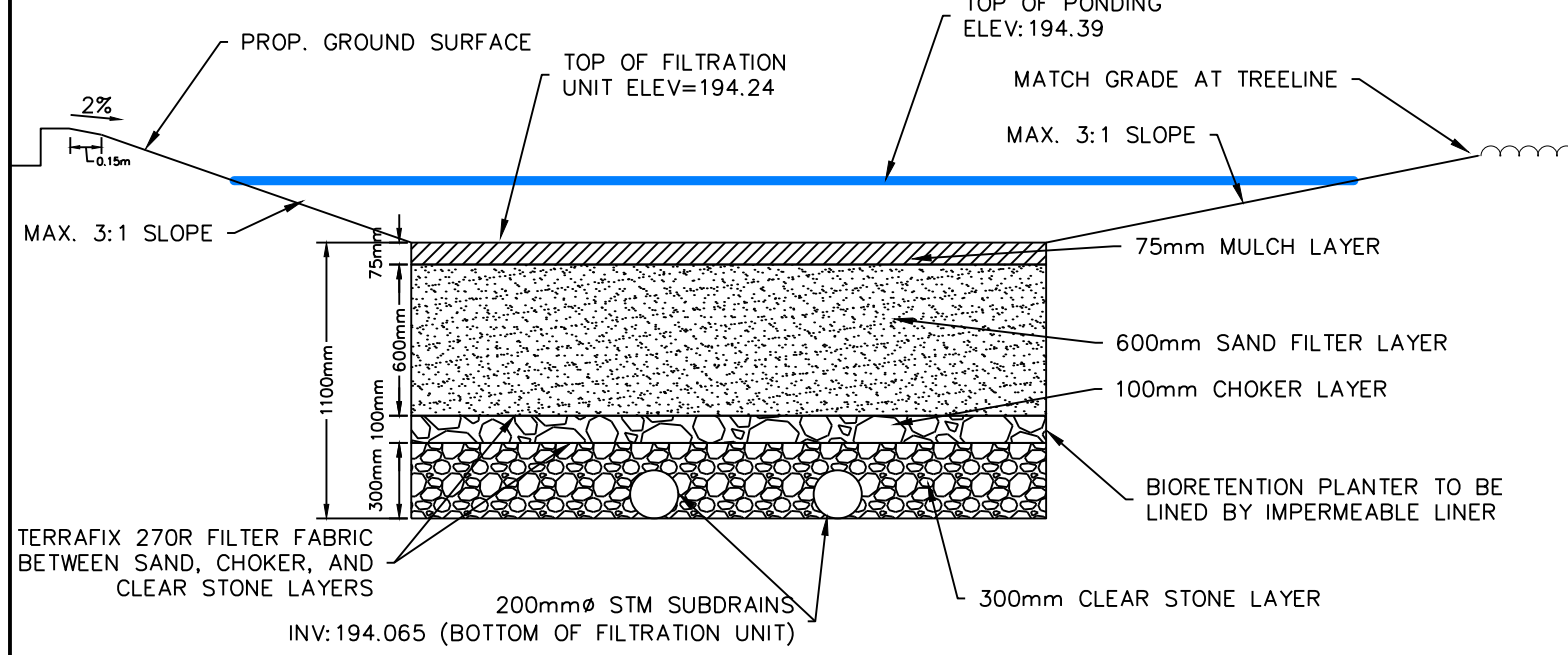
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- NOTES:
- AS PER O.B.C. A.7.3.5.4:
 - COVER OVER THE INSULATION IS BETWEEN 0.6 TO 0.9m
 - USE 50mm INSULATION
 - COVER OVER THE INSULATION IS BETWEEN 0.9 TO 1.2m
 - USE 40mm INSULATION
 - COVER OVER THE INSULATION IS BETWEEN 1.2 TO 1.8m
 - USE 25mm INSULATION
 - MIN. COVER REQUIREMENTS:
 - STORM SEWER – 1.5m (TO SPRINGLINE FOR 525 ϕ OR LARGER)
 - WATERMANS – 1.7m (TO CROWN FOR SMALLER THAN 525 ϕ)
 - SANITARY SEWER – 1.6m (TO CROWN OF PIPE)
 - INSULATION SHALL BE PLACED WITH ENDS CLOSELY LOCATED TOGETHER.
 - ALL JOINTS SHALL BE STAGGERED WHEN MORE THAN ONE LAYER OF INSULATION IS BEING INSTALLED.

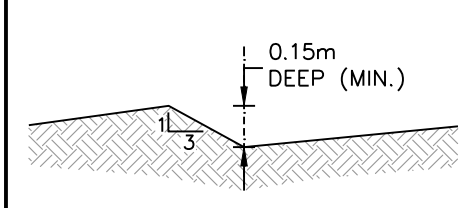
SECTION A-A DETAIL

SCALE: N.T.S.



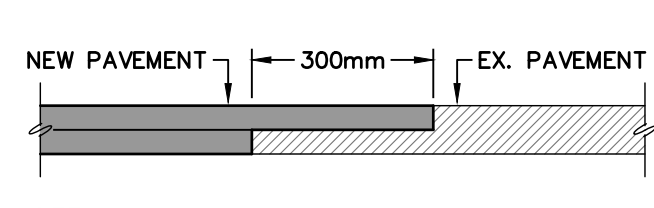
SECTION B-B SWALE

SCALE: N.T.S.



LAP JOINT DETAIL

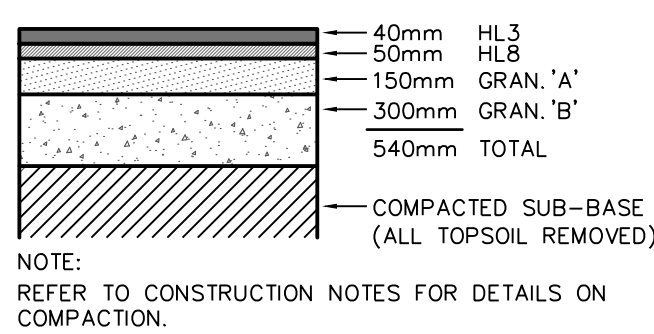
SCALE: N.T.S.



NOTE:
SAWCUT & COLD PLANE 300mm WIDE & 40mm DEEP WHERE NEW PAVEMENT MEETS EXISTING PAVEMENT, ROUTE & SEAL WITH HOT RUBBERIZED ASPHALT.

PAVEMENT STRUCTURE

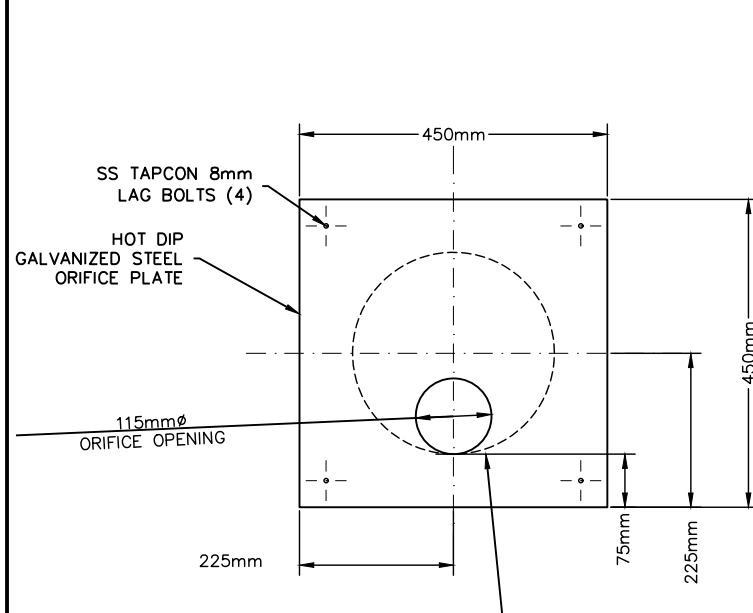
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NOTE:
REFER TO CONSTRUCTION NOTES FOR DETAILS ON COMPACTION.

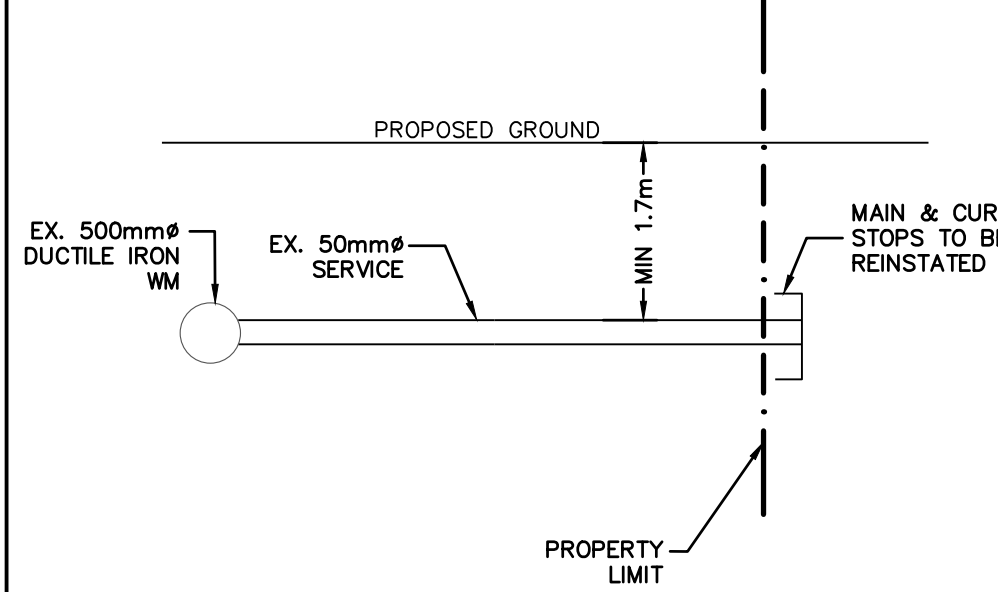
ORIFICE PLATE

SCALE N.T.S.



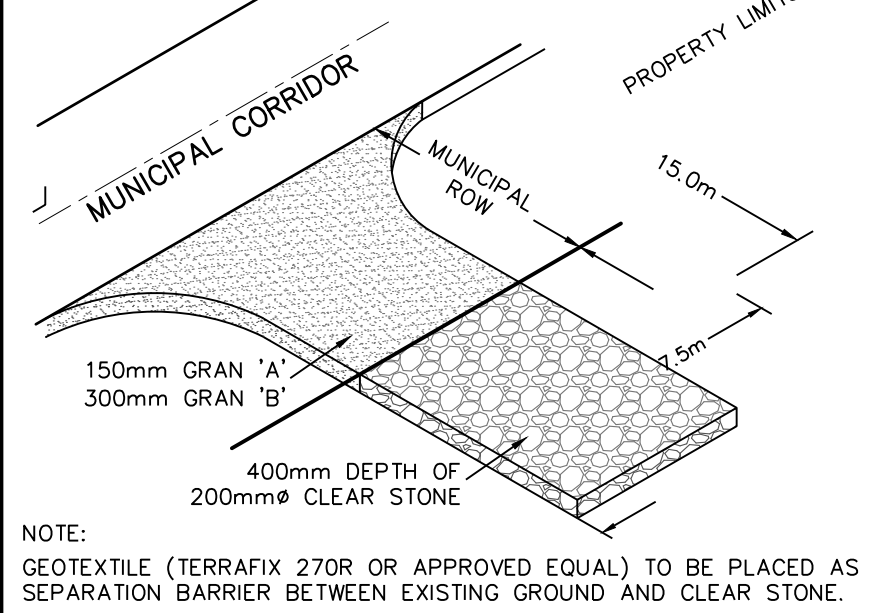
WATER SERVICE PROFILE DETAIL

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MUD MAT DETAIL

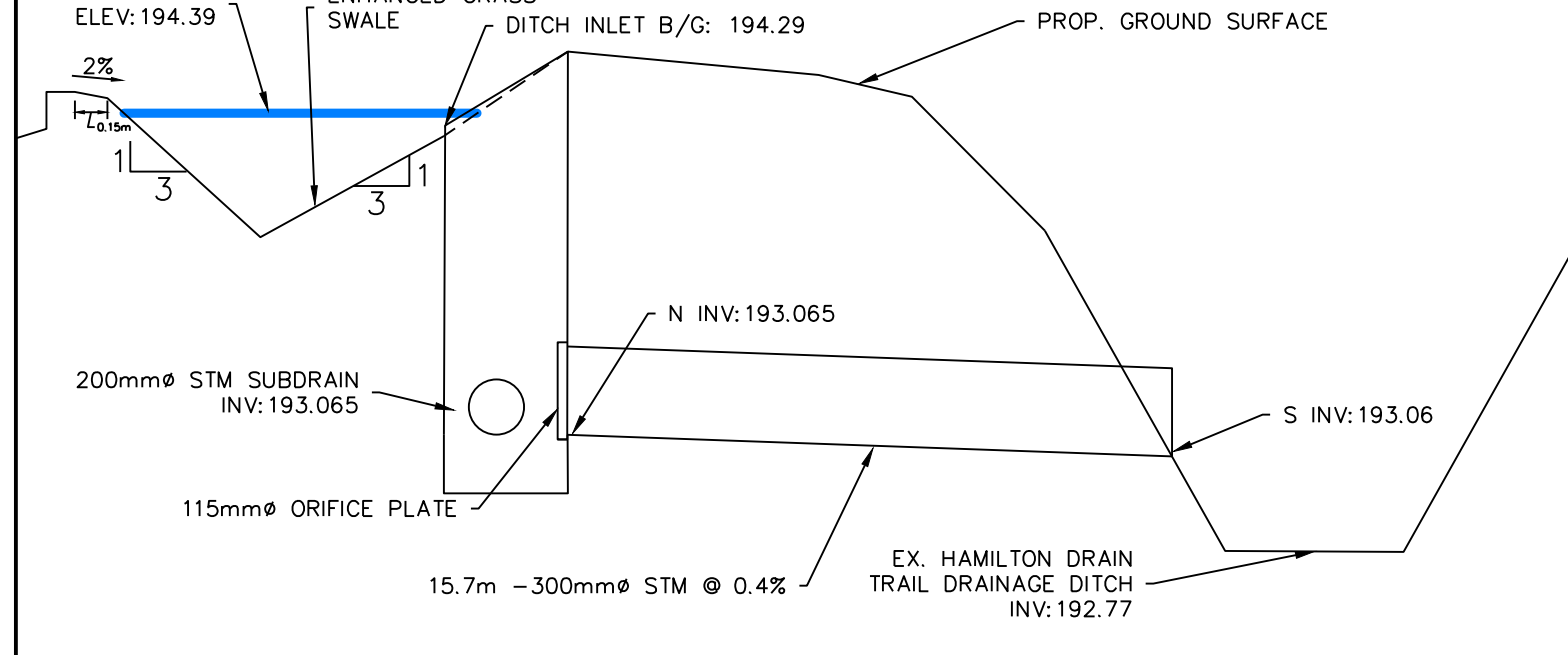
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NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

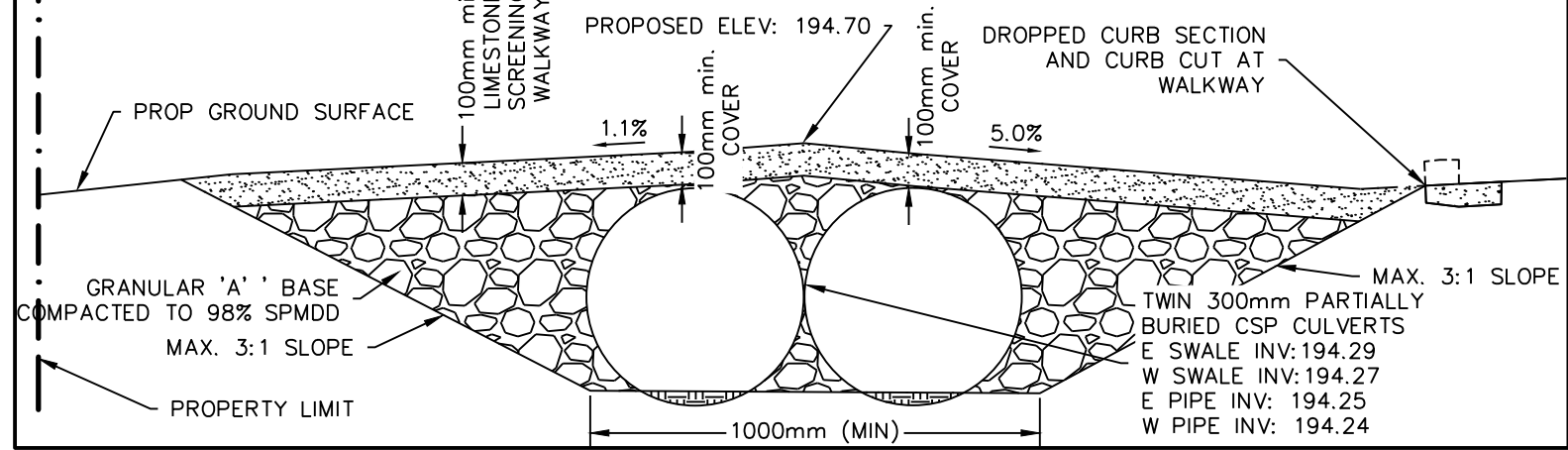
SECTION C-C DETAIL

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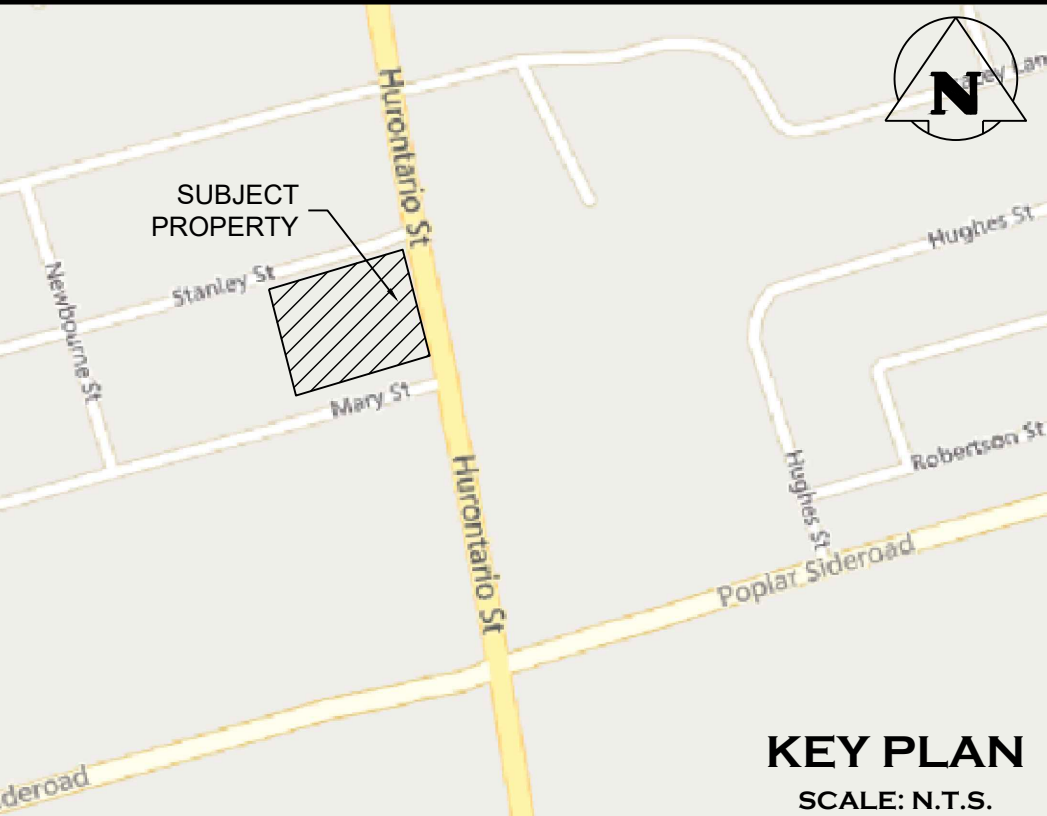
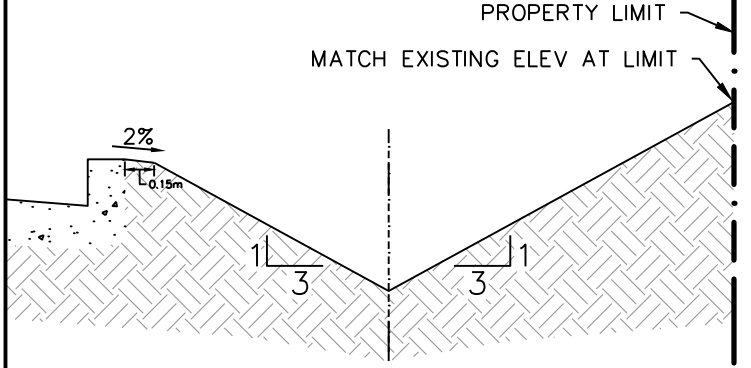
SECTION D-D DETAIL

SCALE: N.T.S.



SECTION E-E DETAIL

SCALE: N.T.S.



KEY PLAN

SCALE: N.T.S.

TEMPORARY BENCHMARKS

TBM#1-NAIL IN HYDRO POLE ON HURONTARIO ST.
ELEV=194.799

TOPOGRAPHIC SURVEY COMPLETED BY SMC GEOMATICS INC.
ON MARCH 19, 2024. VERTICAL AND HORIZONTAL CONTROL
ESTABLISHED USING LEICA SMARTNET RTK.

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No.	ISSUE	DATE: YYYY/MM/DD
0	ISSUED FOR 1ST SUBMISSION SPA	2025/06/27

Engineer

Engineer

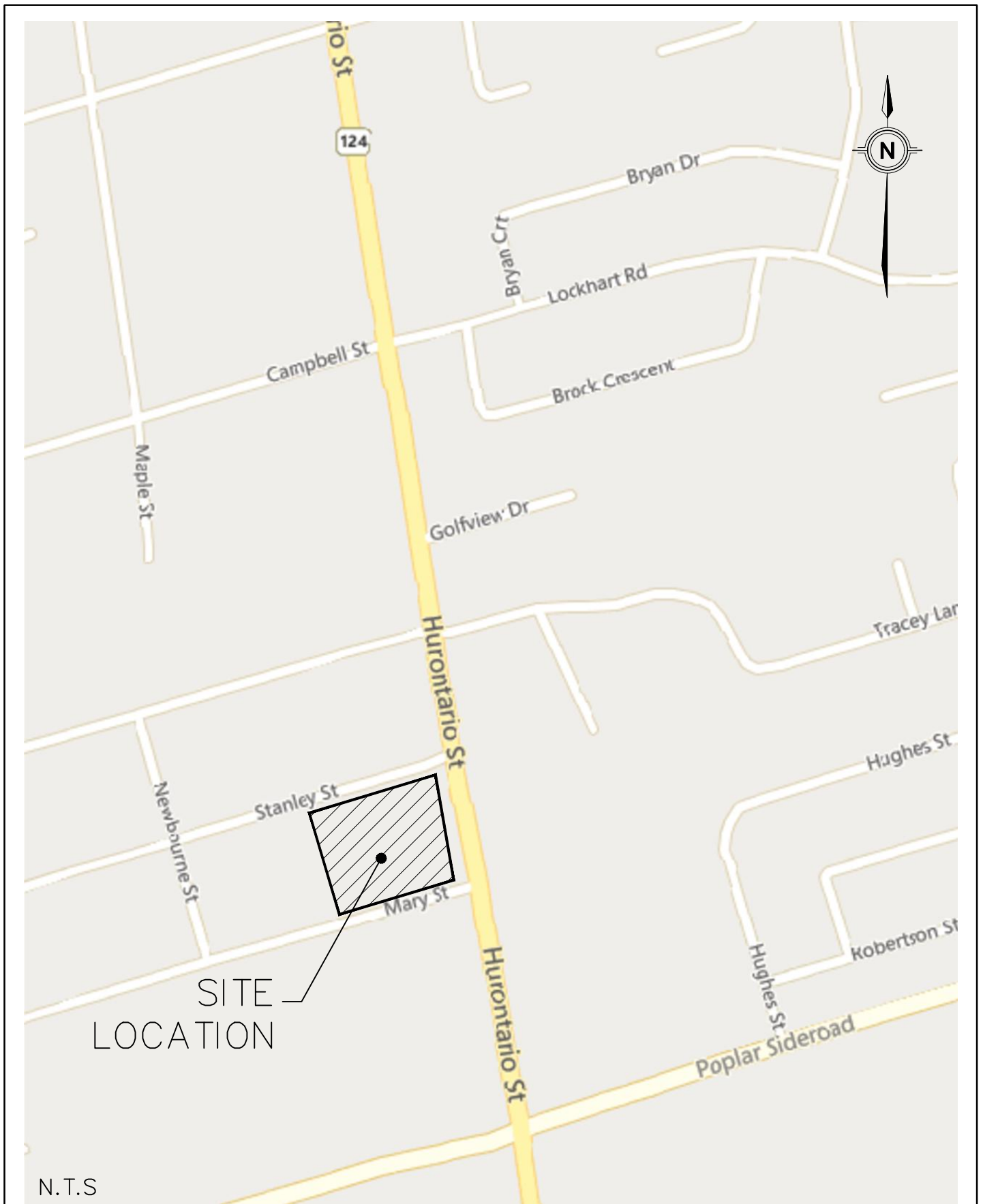
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD

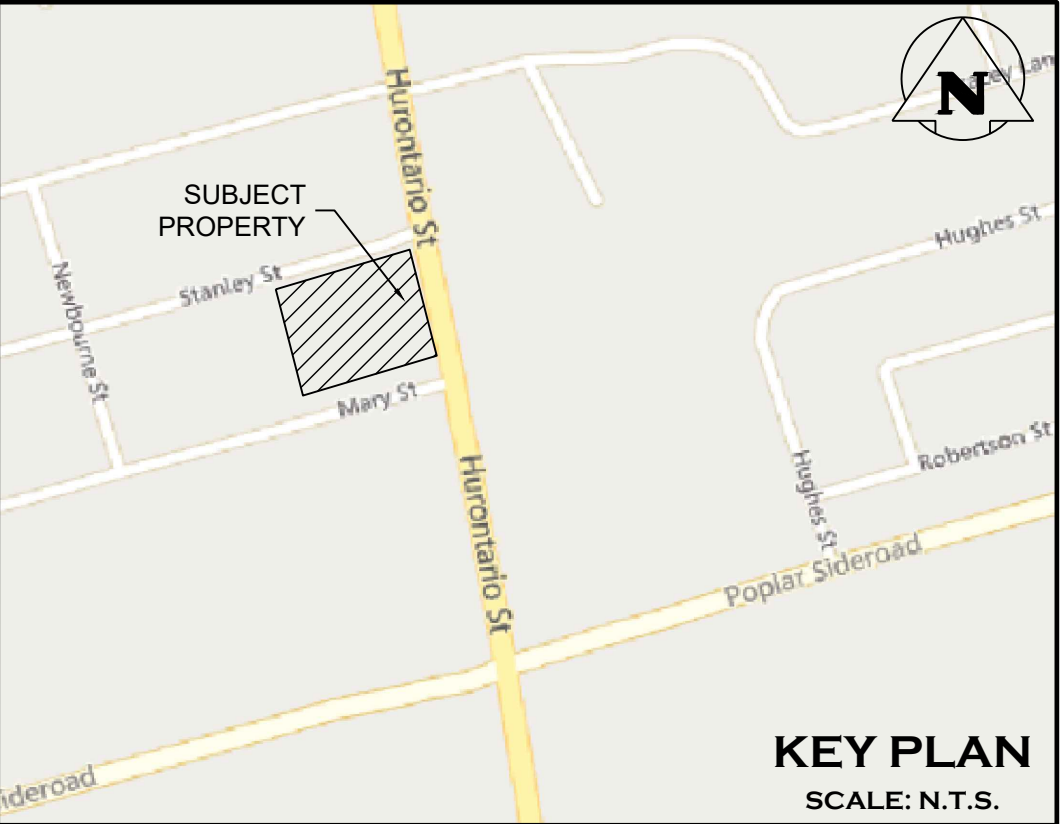
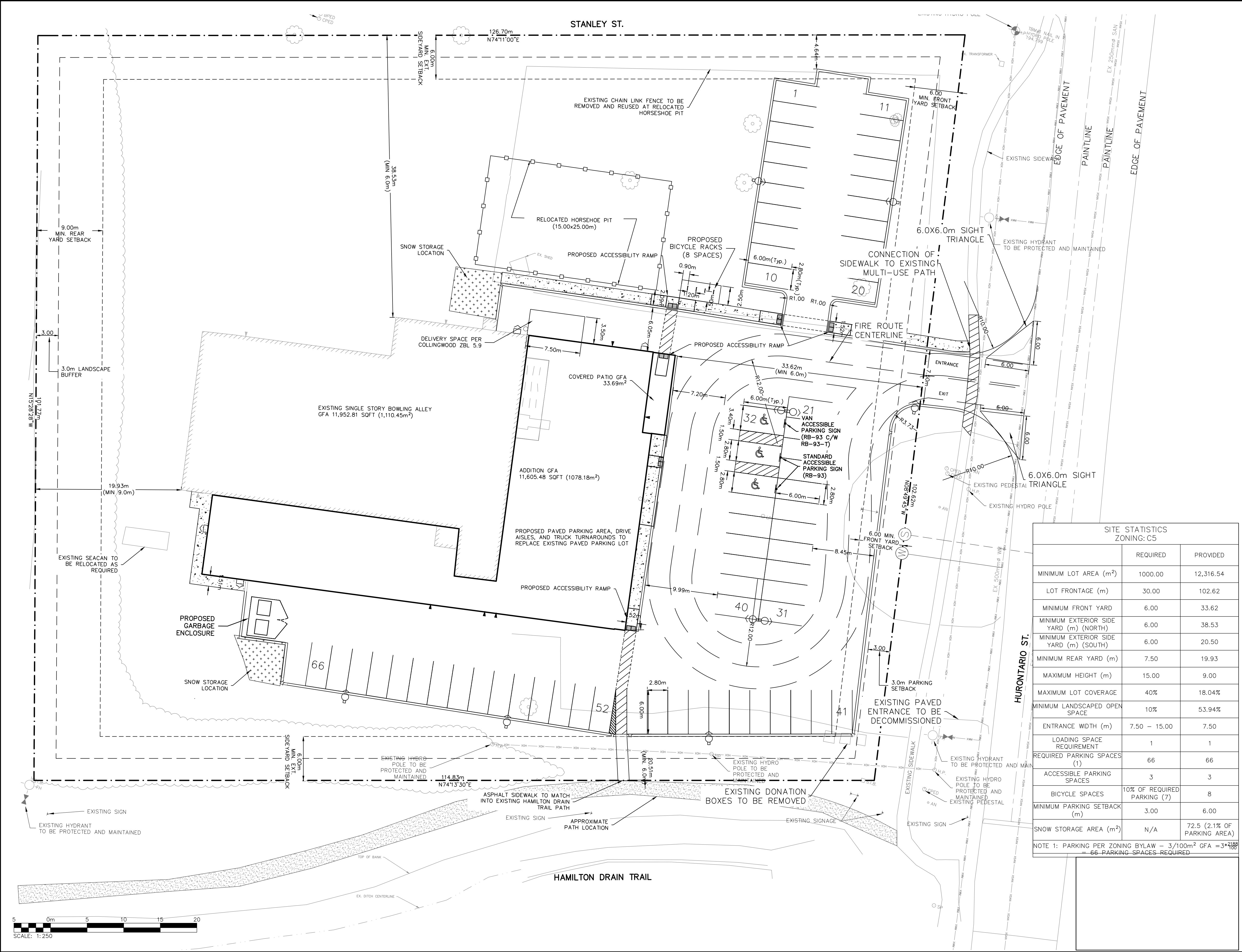
CONSTRUCTION NOTES
& STANDARD DETAILS



Drawn By	J.C.	Design By	J.C./B.H.	Project	2841-7365
Check By	J.E.	Check By	B.H.	Drawing	C901



Legend = SUBJECT LANDS	Project GEORGIAN BOWL ADDITION TOWN OF COLLINGWOOD	C CROZIER CONSULTING ENGINEERS			
	Drawing SITE LOCATION	Drawn By J.C. Design By J.C./B.H. Project 2841-7365			
		Scale N.T.S. Date 06/27/2025 Check By A.W./B.H. Drawing FIG. 1			



TEMPORARY BENCHMARKS
TBM#1-NAIL IN HYDRO POLE ON HURONTARIO ST.
ELEV=194.799
TOPOGRAPHIC SURVEY COMPLETED BY SMC GEOMATICS INC.
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6. DO NOT SCALE DRAWINGS.

No.	ISSUE	DATE: YYYY/MM/DD
0	ISSUED FOR 1ST SUBMISSION SPA	2025/06/27

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project
**GEORGIAN BOWL ADDITION
TOWN OF COLLINGWOOD**

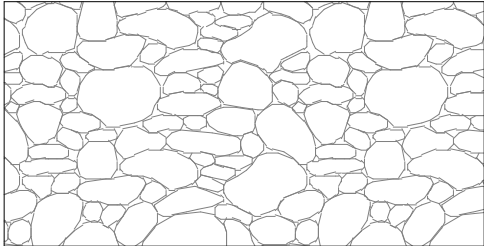
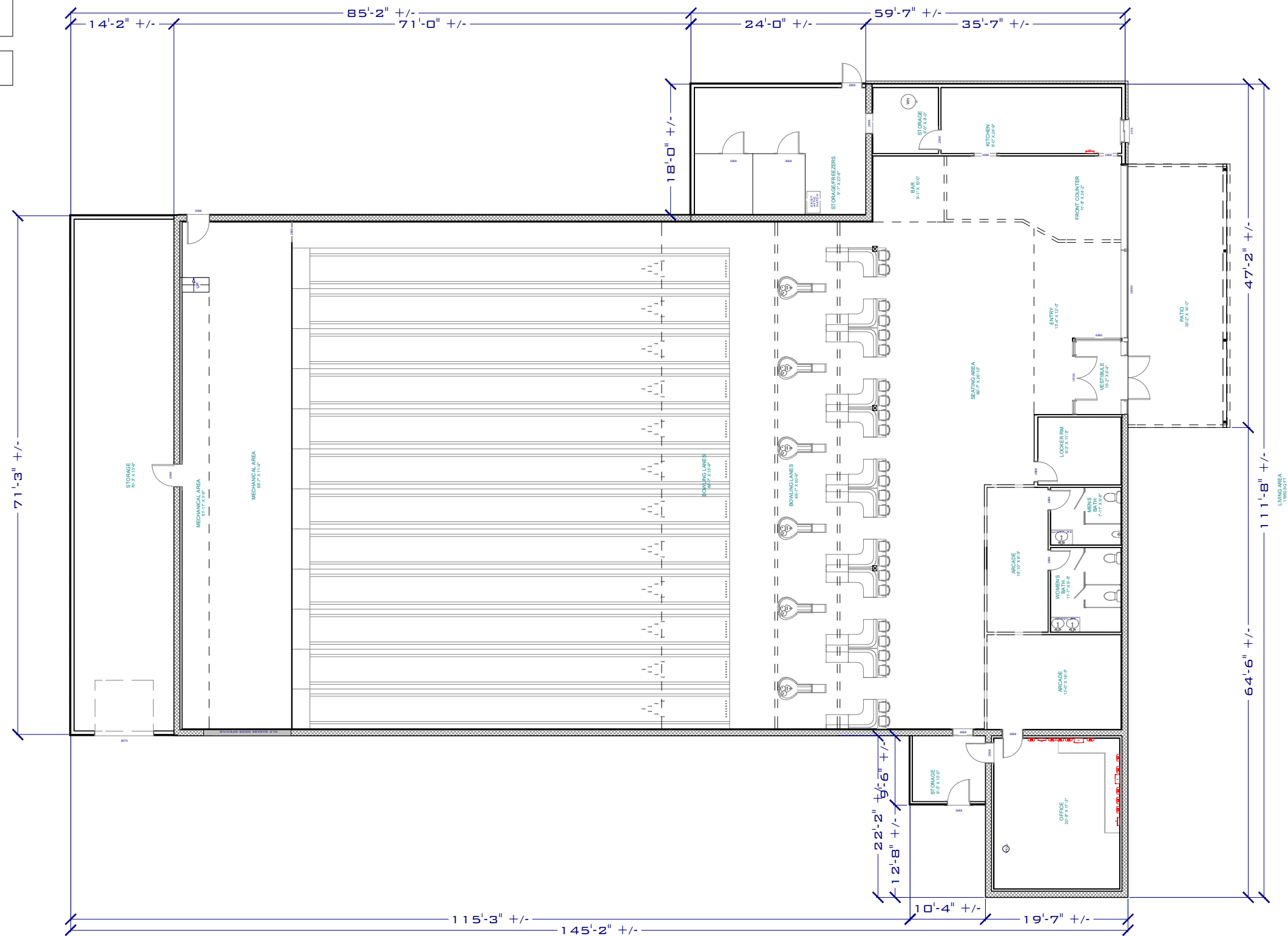
Drawing
SITE PLAN

**CROZIER**
CONSULTING ENGINEERS

Drawn By	J.C.	Design By	J.C./B.H.	Project	2841-7365
Check By	J.E.	Check By	B.H.	Drawing	FIG 2

MAIN LEVEL
FLOOR PLAN

AS-BUILT



PROJECT:

GEORGIAN BOWL
ADDITION

DATE:

JULY 1, 2025

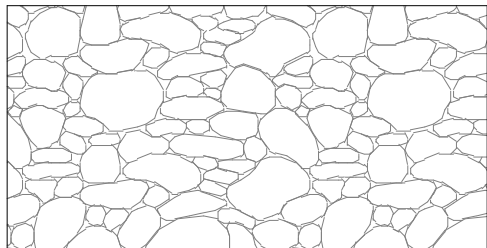
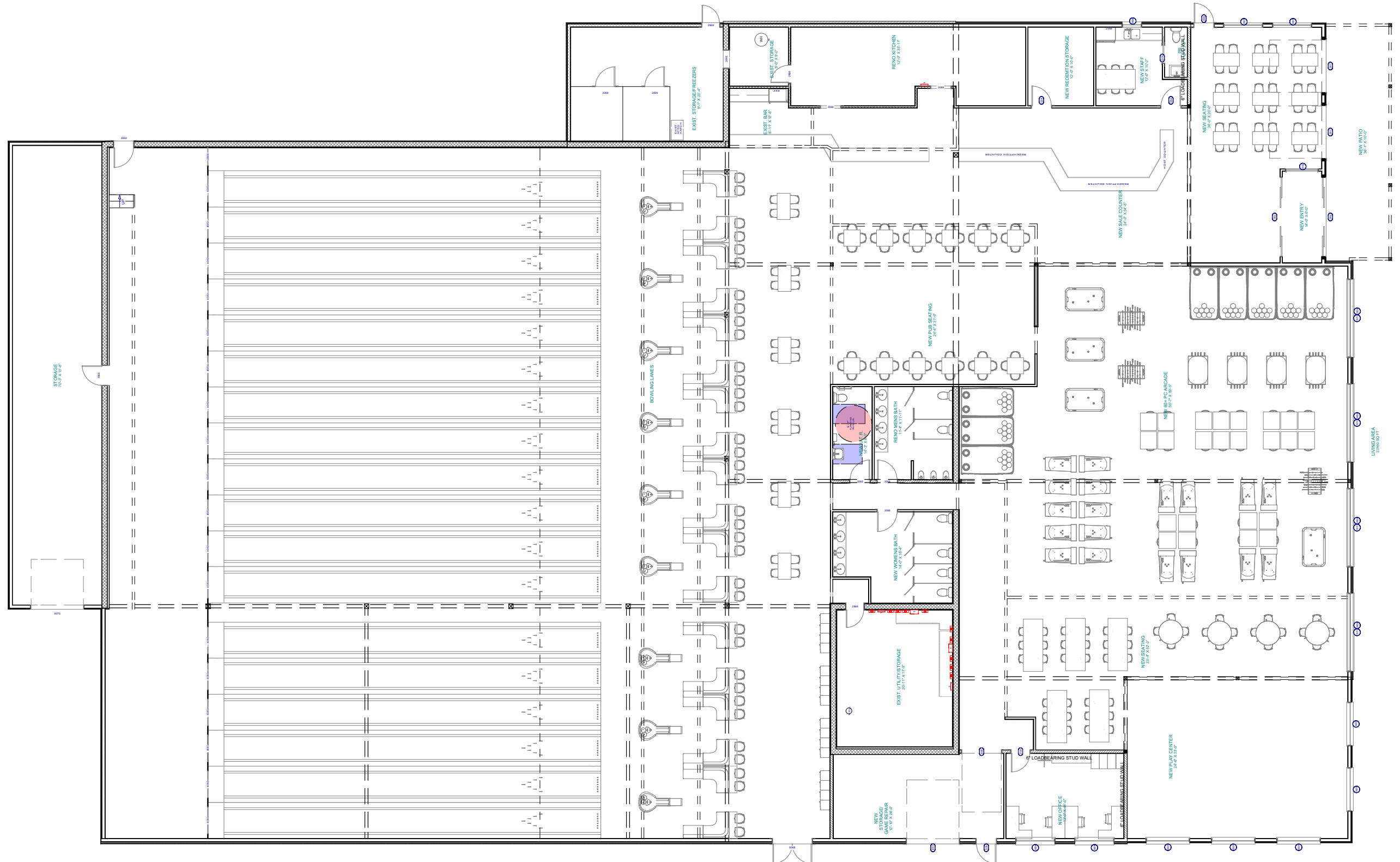
A-1

MAIN LEVEL FLOOR PLAN

CONCEPT A

PRELIMINARY

GREY HATCH
WALLS
DENOTES EXIST.
TO REMAIN



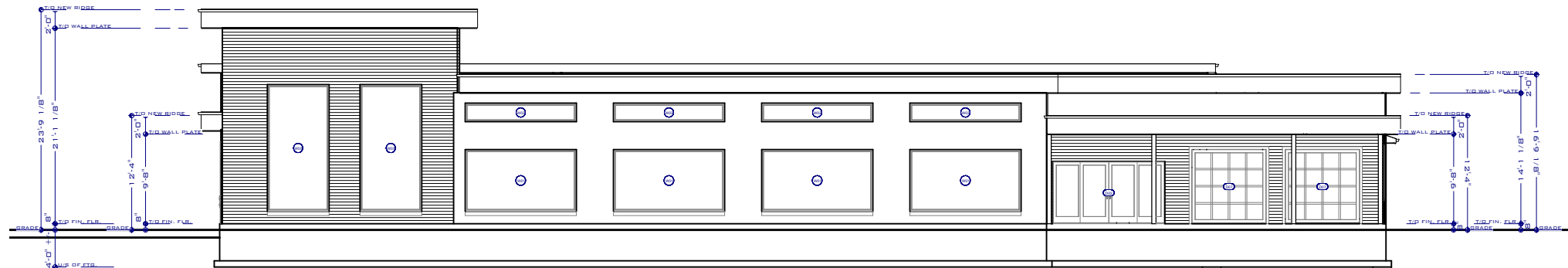
PROJECT:

GEORGIAN BOWL ADDITION

DATE:

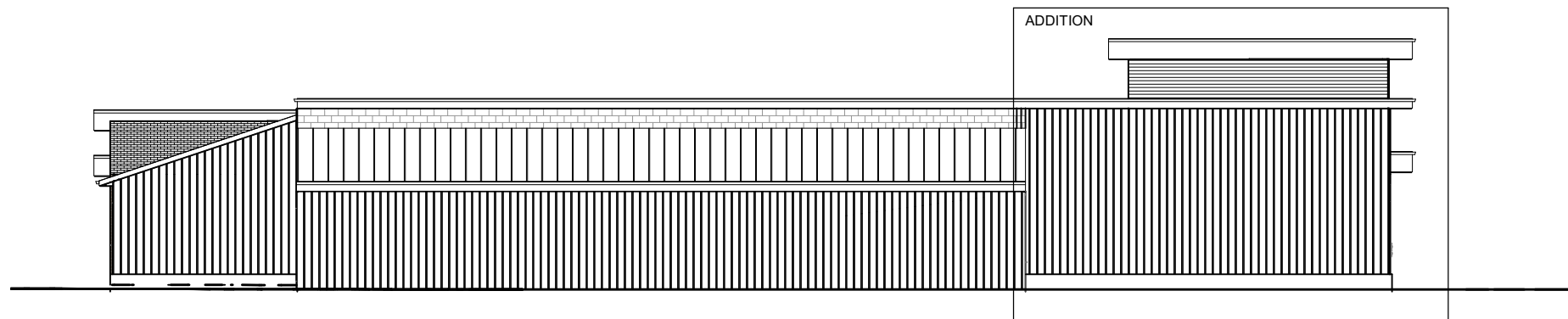
JULY 1, 2025

A-2



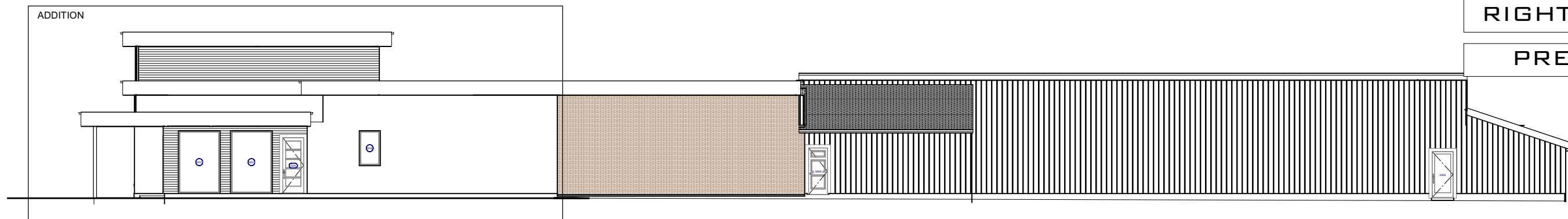
FRONT ELEVATION

PRELIMINARY



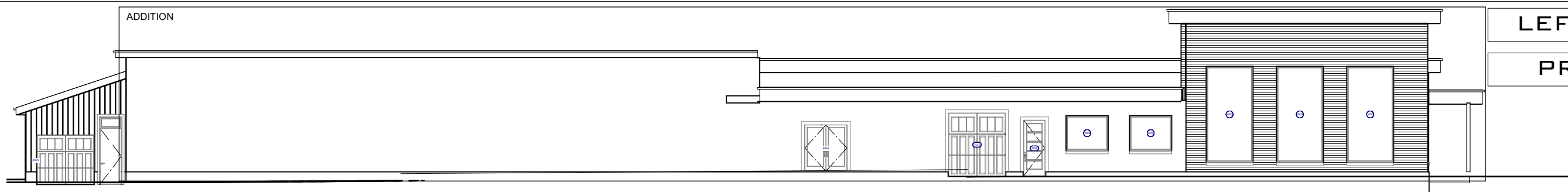
REAR ELEVATION

PRELIMINARY



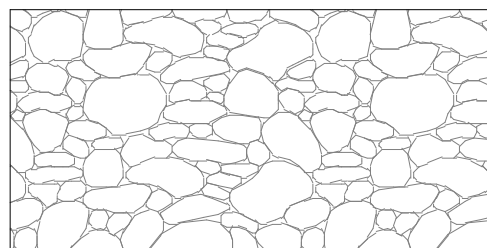
RIGHT ELEVATION

PRELIMINARY



LEFT ELEVATION

PRELIMINARY



PROJECT:

GEORGIAN BOWL
ADDITION

DATE:

JULY 1, 2025

A-3