

**SERVICING & STORMWATER MANAGEMENT
IMPLEMENTATION REPORT**

629 HURONTARIO STREET

**TOWN OF COLLINGWOOD
SIMCOE COUNTY**

PREPARED FOR:

DR. SUSAN O'TOOLE

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
70 HURON STREET, SUITE 100
COLLINGWOOD, ON L9Y 4L4**

FEBRUARY 2025

CFCA FILE NO. 2361-7140

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Revision Number	Date	Comments
Rev.0	August 2023	1 st Submission (OPA/ZBA)
Rev.1	July 2024	1 st Submission (SPA)
Rev.2	February 2025	4 th Submission (SPA)

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1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Dr. Susan O'Toole to prepare a Servicing & Stormwater Management Implementation Report in support of a Site Plan Approval (SPA) application for the proposed change of use for the existing dwelling located at 629 Hurontario Street, Town of Collingwood, Simcoe County. Crozier has previously completed a Functional Servicing & Preliminary Stormwater Management Report in support of the Official Plan Amendment and Zoning By-law Amendment Applications for the proposed development. For this report, the property, which is subject to the SPA application, will be referred to as the "Site". The location of the Site is reflected on the Site Location Plan included as **Figure 1**.

This Servicing & Stormwater Management Implementation Report provides information about the existing water and sanitary servicing and outlines the proposed stormwater management (SWM) strategy required to service the Site.

External documents/plans were reviewed over the course of completing this engineering report. As such, the servicing and design considerations contained herein are assisted by the following:

- Town of Collingwood Development Standards (2007, amended 2022)
- As-Constructed Drawings along Hurontario Street and Collins Street (Greenland Consulting Engineers, 2011)
- Plan of Survey (Van Harten Surveying Inc., 2022)
- Traffic Impact Brief (Crozier, 2023)
- Functional Servicing & Preliminary Stormwater Management Report (Crozier, 2023)

2.0 SITE DESCRIPTION & BACKGROUND

The Site covers an area of approximately 0.1 ha and currently consists of a residential dwelling and detached garage. The Site has been recently rezoned under Town File No. D0840323 from Residential (R2) to Mixed Use Commercial – Exception (C4XX) in the Town of Collingwood Zoning By-Law (2018, amended 2023). The property, located in a residential neighbourhood, is bound by Collins Street to the north, residential land uses to the east and south, as well as Hurontario Street and the Collingwood Collegiate Institute to the west. The existing Site currently has two (2) entrances from Collins Street; one entrance leads to the detached garage; the second entrance leads to the existing gravel parking area. These two (2) existing entrances will be removed, and a new entrance will be installed to service the proposed parking lot area.

The existing residential building on the Site is proposed to be re-purposed into a medical office. The existing gravel parking area and backyard is proposed to be re-purposed into an asphalt parking lot for the medical office, with a single access from Collins Street to replace the two existing entrances. This proposed parking lot is shown on the Site Plan, which has been included as **Figure 2** in this report.

3.0 TRANSPORTATION

Access to the Subject Development will be provided via one connection to Collins Street to the north of the Site. Within the Site, there will be a parking lot with eleven (11) parking spots (one spot is accessible) that will provide access to the proposed medical office. Refer to the Traffic Impact Brief (Crozier, 2023) for additional information regarding impacts to traffic in the area.

4.0 GRADING

The site grading will be influenced by the existing and proposed drainage systems within the Site. Grading will tie into the existing elevations along the property limits, match the pre-development overland stormwater flow patterns where possible, and provide sufficient cover for the proposed storm servicing infrastructure. A concrete toe wall per OPSD 3120.100 is proposed along the southwest corner of the parking lot to promote positive drainage from the parking lot to the proposed catchbasins. Refer to **Drawing C103** for the site grading plan and **Drawing C104A-B** for standard notes and details.

5.0 WATER SUPPLY

Potable water for the Site will be supplied by the Town of Collingwood municipal water distribution system.

5.1 Existing Potable Water Supply Infrastructure

5.1.1 Water Distribution System

The existing water distribution infrastructure at or near the Site includes the following:

- 200 mm diameter watermain on Collins Street
- 300 mm diameter watermain on Hurontario Street

An existing potable water connection to the 300 mm diameter watermain on Hurontario Street currently services the Site. The approximate location of the existing service lateral is shown on **Drawing C102**, which is based on the plan and profile drawings by Greenland Consulting Engineers (2011) provided in **Appendix A** of this report.

5.2 Water Demand

The Town of Collingwood Development Standards were referenced to calculate the existing water demand for the Site. The Ontario Building Code (2012) was referenced to calculate the proposed water demand for the Site.

5.2.1 Existing Domestic Water Demand

Water demands for the existing residential dwelling were determined in accordance with the design flows and peaking factors identified in Section 4.4.3.2 of the Collingwood Development Standards. The design criteria used to estimate existing domestic water demand include:

- | | |
|---------------------------------|----------------------|
| • Average Residential Flow Rate | 260 L/cap/day |
| • Max Day/Peak Hour Factors | 1.77/2.70 |
| • Population Density | 2.9 Persons Per Unit |

It is estimated that the maximum water demands for the existing development are as follows:

- Average Day 0.009 L/sec
- Max Day 0.015 L/sec
- Peak Hour 0.024 L/sec

5.2.2 Proposed Domestic Water Demand

As noted in Section 2.0, the existing building is to be maintained on Site and converted into a medical office. It is anticipated that the medical office will employ four (4) practitioners and one (1) administrative employee. Water demands for the proposed medical office were determined in accordance with the design flows identified for commercial doctor's offices in Table 8.2.1.3 of the OBC. Peak factors were determined in accordance with the newly amended Town of Collingwood Engineering Standards (2022). The design criteria used to estimate domestic water demand include:

- Commercial (Doctor's Office) Flow Rates 275 L/practitioner/day
(OBC 8.2.1.3) 75 L/employee per 8-hour shift/day
- Max Day/Peak Hour Factors 1.77/2.70

It is estimated that the maximum water demands for the proposed development are as follows:

- Average Day 0.014 L/sec
- Max Day 0.024 L/sec
- Peak Hour 0.037 L/sec

Refer to **Appendix B** for the water demand calculations.

5.2.3 Fire Flow Demand

Since the proposed change of use for the Site does not include any additions to the existing building, the fire flow calculations are the same under existing and proposed conditions. Fire flows required to service the site were determined to be 66.67 L/s per the Fire Underwriter's Survey (2020). Refer to **Appendix B** for the fire flow calculations.

Since the Site is located within a developed area consisting of other commercial, institutional, and residential properties, it is assumed that the Town's water distribution system provides adequate fire flows and that no external upgrades are required.

5.3 **Proposed Water Servicing Strategy**

Water servicing for the Site will be supplied by the existing water service connecting to the 300 mm diameter watermain on Hurontario Street.

6.0 SANITARY SERVICING

6.1 Existing Sanitary Sewer Infrastructure

6.1.1 Sanitary Sewer System

The existing sanitary sewer infrastructure at or near the Site consists of the following:

- 375 mm diameter sanitary sewer along Collins Street
- 450 mm diameter sanitary sewers along Hurontario Street

An existing sanitary connection to the 450 mm diameter sewer on Hurontario Street currently services the Site. The approximate location of the existing water service lateral is shown on **Drawing C102**, which is based on the plan and profile drawings by Greenland Consulting Engineers (2011) in **Appendix A**.

6.2 Sanitary Demand

The Town of Collingwood Development Standards were referenced to calculate the sanitary demand for the Site.

6.2.1 Existing Sanitary Demand

Sanitary flow rates for the existing residential dwelling were determined in accordance with the design parameters Section 4.3.3.1 of the Collingwood Development Standards. The design criteria used to estimate sanitary demand include:

- Average Residential Flow Rate 260 L/cap/day
- Infiltration 0.23 L/s/ha
- Persons Per Residential Unit 2.9
- Peaking Factor Harmon Formula

Based on these values it is estimated that existing peak sanitary flow from the Site is 0.062 L/s.

Refer to **Appendix C** for the sanitary demand calculations. The approximate location of the existing sanitary service lateral is shown on **Drawing C102**, which is based on the plan and profile drawings by Greenland Consulting Engineers (2011) in **Appendix A**.

6.2.2 Proposed Sanitary Demand

Sanitary flow rates for the proposed medical office were determined in accordance with the design parameters identified in Table 8.2.1.3 of the OBC (2012). The design criteria used to estimate sanitary demand includes:

- Commercial (Doctor's Office) Flow Rates 275 L/practitioner/day
(OBC 8.2.1.3) 75 L/employee per 8-hour shift/day
- Infiltration 0.23 L/s/ha
- Persons Per Residential Unit 2.9
- Peaking Factor Harmon Formula

Based on these values it is estimated that peak sanitary flow from the Site will be 0.083 L/s.

Refer to **Appendix C** for the sanitary demand calculations.

6.3 Proposed Sanitary Servicing Strategy

Sanitary servicing for the Site will be supplied by the existing sanitary service connecting to the 450 mm diameter sanitary sewer on Hurontario Street.

7.0 STORMWATER MANAGEMENT AND SITE DRAINAGE

7.1 Stormwater Management Criteria

The management of stormwater and Site drainage for the entire Site must comply with the policies and standards of the various agencies including the Town of Collingwood and the Ministry of Environment, Conservation and Parks (MECP).

The stormwater management criteria for the future development include:

- Water Quantity Control
 - 100-year post-development flow to 5-year pre-development flow control.
- Water Quality Control
 - Provide an Enhanced Level of Protection (80% TSS removal for 90% of the annual runoff).

7.2 Existing Drainage Conditions

A topographic survey was completed by Van Harten Surveying Inc. (December 2022), which has been included as **Appendix D** of this report. Upon review of the survey, our office determined that the Site drains towards existing catchbasins located within the boulevards on Collins Street and Hurontario Street, which collect runoff from the Site and conveys it to the existing storm sewers via 200 mm diameter catchbasin leads. The existing storm sewers adjacent to the site are listed below:

- 375 mm diameter storm sewer on Collins Street
- 400 mm diameter storm sewer on Hurontario Street

The topographic survey also indicates that a portion of the lot to the south of the Site may drain through the Site towards Collins Street. Both the internal and external drainage catchments have been shown on the Pre-Development Drainage Plan (**Figure 3**). To facilitate the pre-development stormwater analysis, the following five (5) catchments have been discretized based on the existing drainage conditions.

- **Catchment 101:** This catchment area is approximately 0.05 ha and is located in the western portion of the Site. It consists of the existing single detached dwelling, side and front lawn, and an existing paved walkway.
- **Catchment 102:** This catchment area is approximately 0.06 ha and is located in the eastern portion of the Site. It consists of the existing detached garage, existing driveway, existing wood deck, and lawn area.

- **External Catchment 1:** This catchment area is approximately 0.01 ha and is located along the southern property line. It consists of an existing shed and lawn area.
- **External Catchment 2:** This catchment area is approximately 0.01 ha and is located along the southern property line. It consists of lawn area adjacent to the southern property line.

7.3 Proposed Drainage Conditions

Per the Town's development standards, the proposed drainage system within the development will be required to convey internal runoff to an appropriate outlet and all infrastructure must be sized accordingly. The stormwater outlet will be the existing storm sewer infrastructure on Collins Street, which is conveyed to the storm sewer on Hurontario Street.

Internal paved areas within the Site will be graded with varying slopes typically ranging from 0.5% - 5% to promote stormwater drainage from the parking area towards proposed catchbasins which connect to the existing storm sewer infrastructure on Collins Street.

The proposed reuse of the Site will not significantly alter the current drainage conditions. Under post-development conditions, the minor and major storm events will be collected via a storm sewer network within the proposed parking lot. A control structure, complete with an 85 mm diameter orifice plate, will be installed to ensure that the flow rates leaving the Site do not exceed pre-development peak flows. Connection to the Town's storm network will be made via the existing 200 mm diameter catchbasin lead on Collins Street.

External drainage will be collected by two proposed ditch inlet catchbasins in the south-east corner of the Site and conveyed through the proposed storm sewer network within the parking lot.

Refer to the Post-Development Drainage Plan shown in **Figure 4**. To facilitate the post-development stormwater analysis, the following five (5) catchments have been discretized based on the proposed drainage conditions.

- **Catchment 201:** This catchment area is approximately 0.05 ha and is located in the western portion of the Site. It consists of the proposed medical office, lawn area, and an existing paved walkway.
- **Catchment 202:** This catchment area is approximately 0.06 ha and is located in the eastern portion of the Site. It consists of the existing detached garage, proposed asphalt parking lot, proposed accessibility lift, and the Site entrance located along Collins Street.
- **External Catchment 1:** This catchment area is approximately 0.01 ha and is located along the southern property line. It consists of an existing shed and lawn area. It remains the same from pre-development drainage conditions.
- **External Catchment 2:** This catchment area is approximately 0.01 ha and is located along the southern property line. It consists of lawn area adjacent to the property line. It remains the same from pre-development drainage conditions.

7.4 Stormwater Quantity Control

Based on the Site Plan, the Site will have an increase in impervious area due to the addition of the proposed parking lot. Stormwater runoff for minor and major flow events will be directed to Collins Street via proposed stormwater infrastructure. Post-development peak flows will be controlled to meet

the existing pre-development 5-year peak flows through the use of an orifice plate within a control structure. Stormwater storage will be provided on-site through pipe, structure, and surface ponding within the proposed parking lot. In the event of a blockage, an emergency overland flow route is available to convey stormwater from the parking lot to Collins Street.

Per the Town of Collingwood Development Standards, the Modified Rational Method was used to calculate the pre- and post-development flow rate produced on Site for the 2-year to 100-year storm events. The Intensity-Duration-Frequency Curves for the Town, adapted from the Atmospheric Environment Services Owen Sound Station, were used in the calculations.

Runoff coefficients were estimated by measuring the impervious and pervious areas for the Site under pre- and post- development conditions. A weighted average was calculated to determine a design runoff coefficient for the Site in pre- and post-development which was used to estimate peak flows. Pre- and post-development flows are summarized below in **Table 1**. Refer to **Appendix E** for the Rational Method calculations.

Table 1. Pre- and Post-Development Peak Flow Rates

Pre-Development Peak Flow Rate (m ³ /s)		Post-Development Peak Flow Rate (m ³ /s)	
5-year	100-year	5-year	100-year
0.018	0.030	0.022	0.036

The Modified Rational Method was used to calculate the storage requirements to control post-development flows to the 5-year pre-development peak flow rate. The storage requirements for the 5-year and 100-year post-development storm events are shown below in **Table 2**.

Table 2. Storage Requirements for 5-year and 100-year Post-Development Storm Events

5-Year Controlled Release Rate (m ³ /s)	5-Year Storage Requirement (m ³)	100-Year Controlled Release Rate (m ³ /s)	100-Year Storage Requirement (m ³)
0.018	3.1	0.018	13.7

A combination of stormwater infrastructure (structures, pipes, and surface ponding) is proposed to provide the 100-year storage requirement of 13.7 m³. A storage of 15.9 m³ is provided as shown below in **Table 3**.

Table 3. Storage Provided During 100-year Post-Development Storm Event

Type of Infrastructure	Description	Storage Provided (m ³)
Structure	DICB1	0.71
Structure	DICB2	0.65
Structure	DCBMH2	1.96
Pipe	DICB1 to DCBMH2	0.54
Pipe	DICB2 to DCBMH2	0.61
Pipe	DCBMH2 to MH3	0.71
Ponding	Surface Ponding	10.70
TOTAL		15.9

As shown on the Servicing Plan (**Drawing C102**), the three proposed 250 mm – 300 mm diameter pipes and three structures within the parking lot provide approximately 5.0 m³ of storage, while the surface

ponding provides an additional storage volume of approximately 10.7 m³. Therefore, the total storage volume of 15.9 m³ on Site exceeds the minimum storage required.

7.5 Stormwater Quality Control

An Oil-Grit-Separator (OGS) unit is proposed to be installed at the downstream end of the internal storm sewer system to protect water quality by ensuring runoff from the parking lot is treated before entering the Town's storm sewer system on Collins Street. To achieve an "enhanced" treatment level for the oil/grit separator, the unit must provide an annual total suspended solids (TSS) removal of 80% or greater and treat 90% of the total annual runoff volume. The Contech Engineered Solutions OGS model PMSU2015-4 was chosen to provide treatment for up to 90% TSS removal of fine particles from stormwater runoff from the 0.07 ha parking lot.

Refer to for a detailed breakdown of proposed oil/grit separator performance. Refer to **Appendix F** for the proposed Stormceptor water quality treatment unit sizing report.

Table 4. Oil/Grit Separator Sizing Criteria

Contributing Drainage Area (ha)	Contributing Area Percent Impervious (%)	Oil/Grit Separator Unit	Total Suspended Solids Removal (%)	Total Annual Runoff Volume Treated (%)
0.07	90	PMSU2015-4	90	>90

8.0 UTILITIES

The Site is to be serviced with existing natural gas, telephone, cable TV and hydro. The Site Lighting & Photometrics design can be found in **Drawings E100 – E101**.

9.0 EROSION & SEDIMENT CONTROLS

Erosion and sediment controls will be installed prior to the commencement of any earthworks and maintained throughout until the site is stabilized or as directed by the Engineer and/or Township. Controls are to be inspected regularly, after each significant rainfall, and maintained in proper working condition. Erosion and sediment controls measures to be considered include, but are not limited to, the following:

- Silt Fence

Silt fence will be installed where required to intercept sheet flow. Heavy duty silt fence will be located around the perimeter of the work zone limits. It should be noted that additional silt fencing may be added based on field decisions by the Site Engineer and Owner prior to, during, and following construction.

- Dust Suppression

During earthwork activities, the Contractor will ensure that measures for dust suppression are provided as required, such as the application of water or lime.

- Silt Sacks

Silt sacks will be installed on existing catchbasins to help filter silt and soil out of stormwater from the Site prior to entering the stormwater conveyance system.

10.0 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed change of use for the Site can utilize the existing services and the proposed parking can be graded to maintain existing drainage conditions. The stormwater management strategy includes a combination of pipes, structures, and surface storage within the parking lot to provide quantity control, and an OGS unit to provide quality control.

We trust that this report will be sufficient in supporting the Site Plan Approval application. Should you have any questions or require further information, please do not hesitate to contact the undersigned. Thank you.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



George Cooper, P.Eng.
Project Manager

C.F. CROZIER & ASSOCIATES INC.

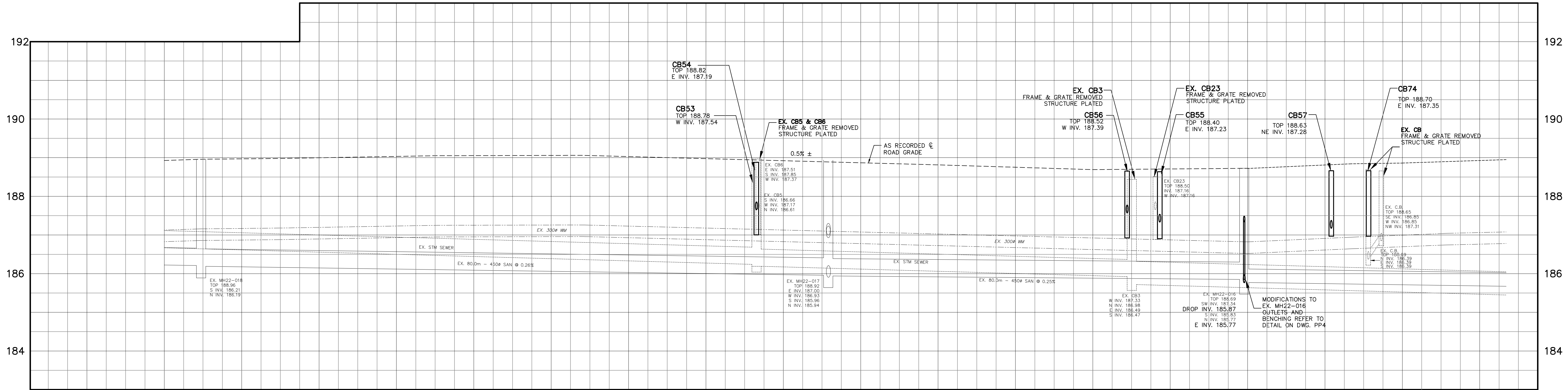
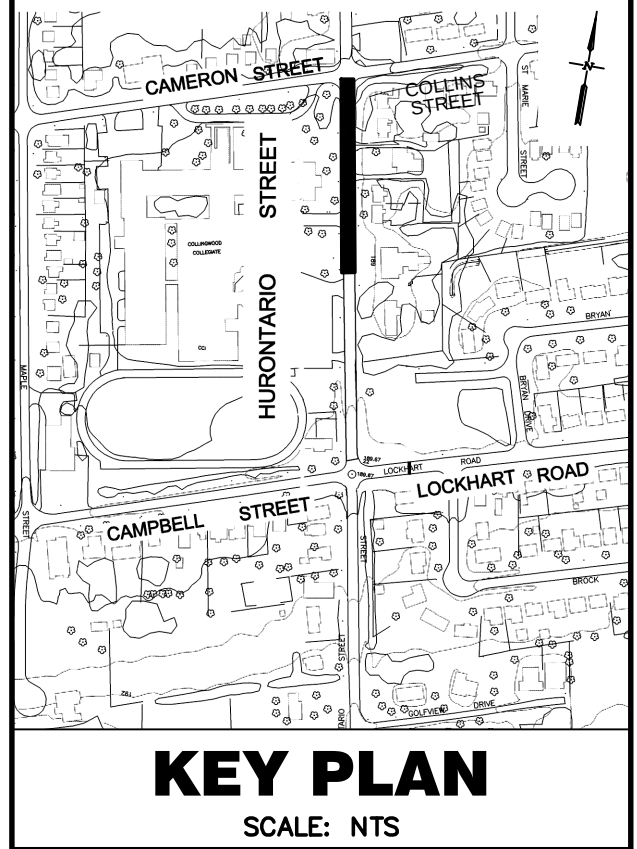
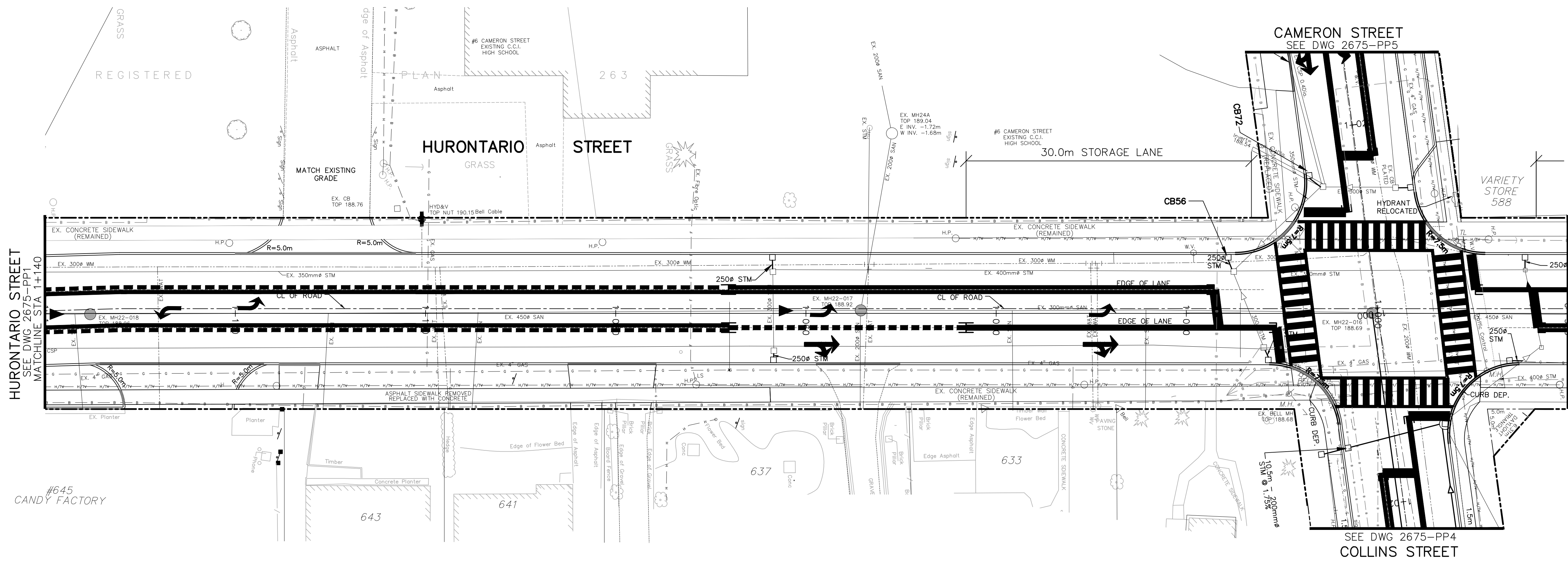


Jonathon Kerschbaumer, P. Eng.
Project Engineer

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APPENDIX A

As-Recorded Information



CHAINAGE	PREVIOUS C/L ELEV	RECORDED C/L ELEV
0+980	189.06	188.86
1+000	188.72	188.72
1+020	188.73	188.69
1+040	188.83	188.81
1+060	188.95	188.92
1+080	189.05	189.02
1+100	189.06	189.05
1+120	189.00	189.00
1+140	188.92	188.93

- LEGEND
- EXISTING STORM MANHOLE
 - ⊙ EXISTING CATCHBASIN MANHOLE
 - EXISTING SINGLE CATCHBASIN
 - ⊙ EXISTING SANITARY MANHOLE
 - STORM MANHOLE
 - ⊙ CATCHBASIN MANHOLE
 - SINGLE CATCHBASIN
 - CURB DEPRESSION

1. PIPE SIZES ARE IN MILLIMETRES UNLESS INDICATED. ELEVATIONS ARE IN METRES UNLESS INDICATED. ALL DIMENSIONS, ELEVATIONS AND SIZES ARE IN METRIC UNITS UNLESS INDICATED.

NOTE:
THIS PLAN TO BE READ IN CONJUNCTION WITH ALL 2675 DRAWINGS IN THIS SET.

ACCEPTED FOR
CONSTRUCTION
Town of Collingwood
per
Date:

6.	AS RECORDED	MAY 14/14	R.H.
5.	ISSUED FOR CONSTRUCTION	JUNE 04/12	J.H.
4.	ISSUED FOR TENDER	MAY 04/12	J.H.
3.	ISSUED FOR TENDER REVIEW	APR 25/12	J.H.
2.	ISSUED FOR TOWN APPROVAL	MAR 07/12	J.H.
NO.	REVISIONS	DATE	INITIAL

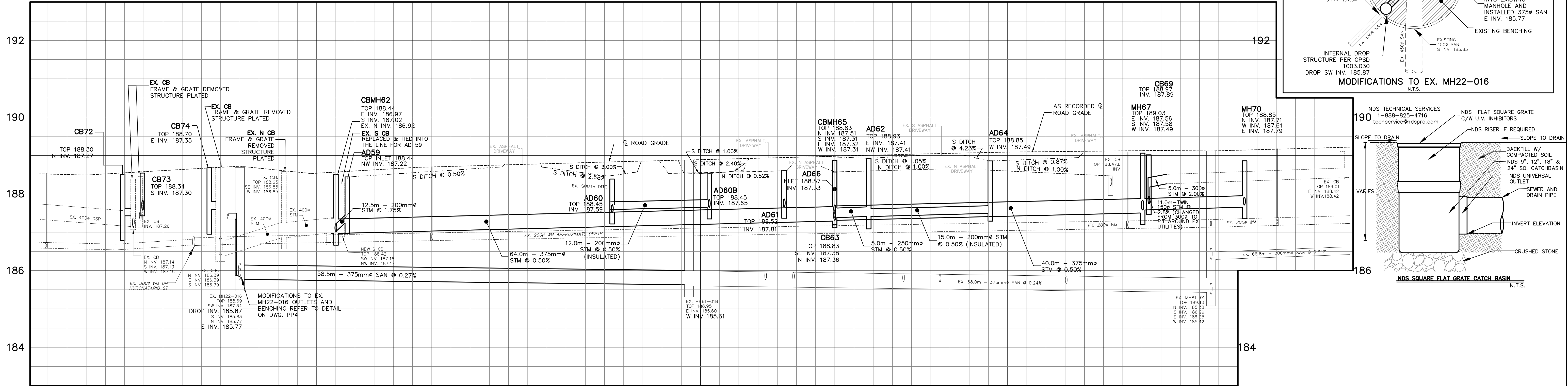
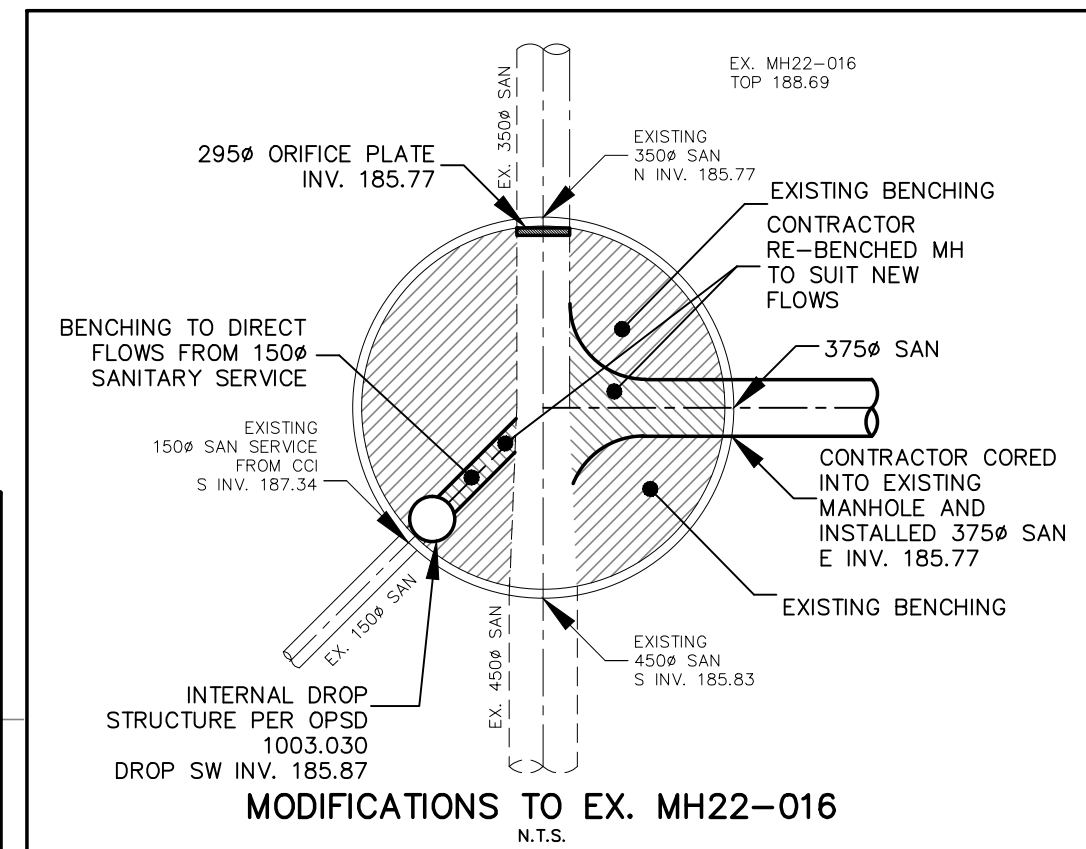
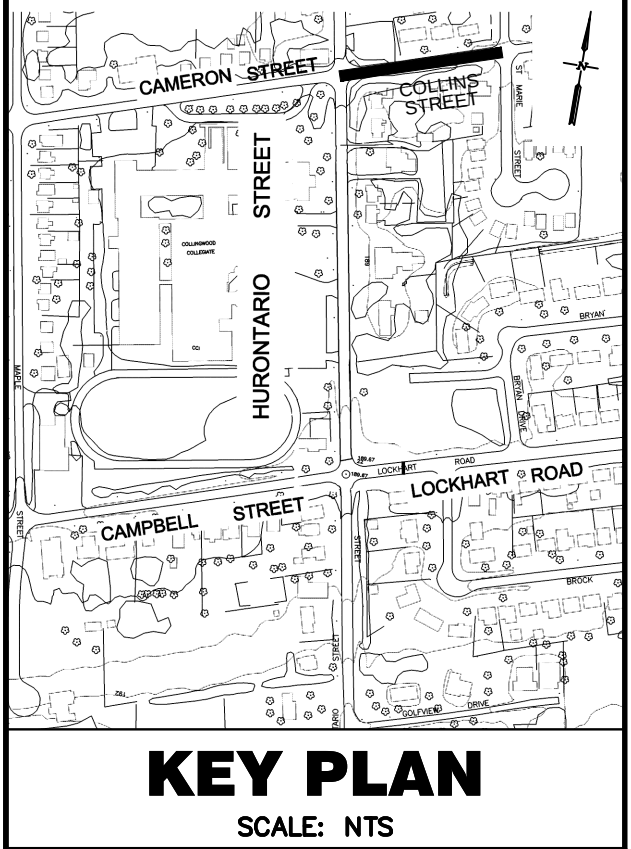
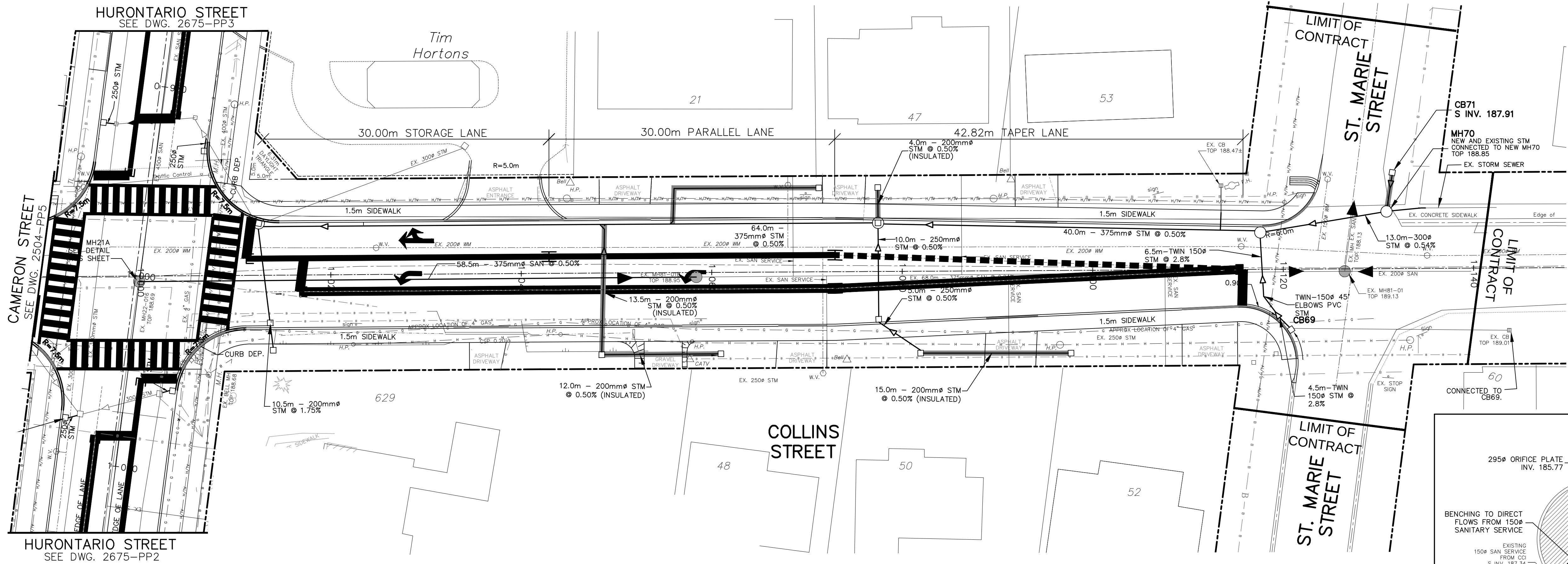
APPROVED

HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD
HURONTARIO STREET
PLAN & PROFILE
STA: 1+140 TO STA: 0+980



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SCALE: H=1:250 V=1:50	JOB NO. 11-2675
DESIGN: P. ELLIS	CHECKED: J. HARTMAN
DRAWN: B. KLESS	DATE: NOV 03, 2011
DWG. 2675-PP2	



CHAINAGE	EXISTING C/L ELEV	RECORDED C/L ELEV
1+000	188.72	188.72
1+020	188.64	188.64
1+040	188.77	188.77
1+060	188.88	188.88
1+080	188.94	188.94
1+100	189.07	189.07
1+120	189.13	189.13
1+140	189.13	189.13

LEGEND

- EXISTING STORM MANHOLE
- EXISTING CATCHBASIN MANHOLE
- EXISTING SINGLE CATCHBASIN
- EXISTING SANITARY MANHOLE
- STORM MANHOLE
- CATCHBASIN MANHOLE
- SINGLE CATCHBASIN/AREA DRAIN
- INSULATION
- CURB DEPRESSION

1. PIPE SIZES ARE IN MILLIMETRES UNLESS INDICATED. ELEVATIONS ARE IN METRES UNLESS INDICATED. ALL DIMENSIONS, ELEVATIONS AND SIZES ARE IN METRIC UNITS UNLESS INDICATED.

ACCEPTED FOR CONSTRUCTION
Town of Collingwood

per
Date:

6.	AS RECORDED	MAY 14/14	R.H.
5.	ISSUED FOR CONSTRUCTION	JUNE 04/12	J.H.
4.	ISSUED FOR TENDER	MAY 04/12	J.H.
3.	ISSUED FOR TENDER REVIEW	APR 25/12	J.H.
2.	ISSUED FOR TOWN APPROVAL	MAR 07/12	J.H.
NO.	REVISIONS	DATE	INITIAL

**HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD**

**COLLINS STREET
PLAN & PROFILE
STA: 1+000 TO STA: 1+140**

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Fax: (705) 444-5482
E-mail: greenland@grmland.com
Website: www.grmland.com

SCALE: H=1:250 V=1:50
DESIGN: P. ELLIS
DRAWN: B. KLESS

JOB NO. 11-2675
CHECKED: J. HARTMAN
DATE: NOV 03, 2011
DWG. **2675-PP4**

APPENDIX B

Water Demand and Fire Flow Calculations

629 Hurontario Street - Existing Domestic Water Demand

Developed Site Area	0.10 ha
Number of Residential Units and Land Usage	
1) Single Residential	1 Units
2) Commercial Area	- m ²
Person Per Residential Unit	
1) Single Residential (Per Master Servicing Plan for Water and Sanitary Sewer Systems, 2019)	2.9 persons/unit
Total Residential Population	2.9 Persons
<u>Domestic Water Design Flows</u>	
Residential (Per Town Standards)	260 L/C-day
Commercial (Per Master Servicing Plan for Water and Sanitary Sewer Systems, 2019)	21.6 m ³ /ha/d
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	0.009 L/sec
Max Day Peak Factor (Per Town Standards)	1.77
Max Day Demand Flow	0.015 L/sec
Peak Hour Factor (Per Town Standards)	2.70
Peak Hour Flow	0.024 L/sec

629 Hurontario Street - Proposed Domestic Water Demand

Developed Site Area	0.10 ha
Number of Residential Units and Land Usage	
1) Single Residential	- Units
2) Commercial Area	189 m²
Person Per Residential Unit	
1) Single Residential (Per Town Standards)	2.9 persons/unit
Total Residential Population	5 Persons
<u>Domestic Water Design Flows</u>	
Residential (Per Town Standards)	260 L/C-day
Commercial (Doctor's Office, Per OBC 8.2.1.3)	275 L/practitioner/d 75 L/employee per 8 hr shift/day
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	0.014 L/sec
Max Day Peak Factor (Per Town Standards)	1.77
Max Day Demand Flow	0.024 L/sec
Peak Hour Factor (Per Town Standards)	2.70
Peak Hour Flow	0.037 L/sec

Water Supply for Public Fire Protection - 2020
Fire Underwriters Survey
Part II - Guide for Determination of Required 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 Resistant 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) 1.0 = 1.0 for Type III Ordinary Construction

Yes/No/Unknown

Is basement at least 50% below grade?

Yes

If yes, basement floor area excluded

Vertical openings protected?

Unknown

*For consideration for effective area calculations

Step B. Proposed Building

Medical Office

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

Floors Above Grade	Total Floor Area (m ²)	% of Area Considered	Effective Floor Area (m ²)
Basement		NA	NA
Ground Floor	157.5	100%	157.5
Level 2	61.8	100%	61.8
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	219.3		219.3

*Includes detached garage
 *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.

Total Effective Floor Area 219.3 m²

Step C. Therefore RFF = 3,000 L/min (rounded to nearest 1000 L/min)

Step D. 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.

Type of Occupancy

Adjustment Factor

Medical Office

Combustible

0%

0 L/min surcharge

RFF = 3,000 L/min (not rounded)

Occupancy and Contents Adjustment Factor

Non-Combustible -25%

Limited Combustible -15%

Combustible 0%

Free Burning 15%

Rapid Burning 25%

Step E. 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?	Unknown	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction %

0% (reduction)

*Reduction available assumes complete building coverage

*30% reduction typical for building requiring sprinkler system

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

Step F. 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%

Exposed buildings

Name		Distance (m)	Surcharge
North	Adjacent Dwelling	>30	0%
East	Adjacent Dwelling	20.6	10%
South	Adjacent Dwelling	7.8	20%
West	Adjacent Dwelling	>30	0%

0

300

600

0

900 L/min Surcharge (not rounded)

Step G. Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand

3,000 L/min

Step E - Sprinkler (Reduction)

0 L/min

Step F - Exposure Charge

900 L/min

Final Required Fire Flow:

3,900 L/min

4,000 1000L/min)

or

66.7 L/s

1,057 USGPM

Determine Required Fire Storage Volume

Flow from above 4,000 L/min
Required duration 1.50 hours

Refer to **Table 1** for Duration

Therefore: **360,000** Litres or

360 m³ is the required fire storage volume.

Table 1 - FUS 2020

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or 2000	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
...	...
36,000	8.5
38,000	9.0
40,000 or 40,000	9.5

***Interpolate for intermediate figures**

APPENDIX C

Sanitary Demand Calculations

629 Hurontario Street - Existing Sanitary Demand

Developed Site Area	0.10 ha
Number of Residential Units and Land Usage	
1) Single Residential	1 Units
2) Commercial Area	- m ²
Person Per Residential Unit	
1) Single Residential (Per Town Standards)	2.9 persons/unit
Total Residential Population	3 Persons
Unit Sewage flows	
Residential (Per Town Standards)	260 L/C-day
Commercial (Per Town Standards)	21.6 m ³ /ha/d
Infiltration (Per Town Standards)	0.23 L/s/ha
Total Design Sewage Flows	
Infiltration/Inflow Residential	0.02 L/sec
Average Daily Residential Flow	0.009 L/sec
Residential Peak Factor (Harmon Formula)	4.5
Total Peak Daily Flow	0.062 L/sec

629 Hurontario Street - Proposed Sanitary Demand

Developed Site Area	0.10 ha
Number of Residential Units and Land Usage	
1) Single Residential	- Units
2) Commercial Area	189 m ²
Person Per Residential Unit	
1) Single Residential (Per Town Standards)	2.9 persons/unit
Total Population (four practioners and one employee)	5 Persons
Unit Sewage flows	
Residential (Per Town Standards)	260 L/C-day
Commercial (Doctor's Office, Per OBC 8.2.1.3)	275 L/practitioner/d
	75 L/employee per 8 hr shift/day
Infiltration (Per Town Standards)	0.23 L/s/ha
Total Design Sewage Flows	
Infiltration/Inflow Residential	0.023 L/sec
Average Daily Flow	0.014 L/sec
Peak Factor (Harmon Formula)	4.4
Total Peak Daily Flow	0.083 L/sec

APPENDIX D

Topographic Survey (Van Harten Surveying Inc., December
2022)

APPENDIX E

Stormwater Management Calculations (Modified Rational
Method Calculations, Stage Storage Discharge, Pipe Volume
Calculations)

Modified Rational Method Storage Sizing - 5-Year

Peak Flow

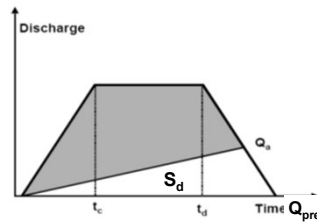
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B)^C$$

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	Collingwood	Intensity (mm/hr):	102.27
Return Period	5 yr		
Time of Concentration (min)	10		
Coeff A	1135.4		
Coeff B	7.5		
Coeff C	0.841		
Runoff Coeff (Unadjusted)	0.48	Flow (m³/s)	0.018
Runoff Coefficient (Adjusted)	0.48		
Area (ha)	0.133		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	102.27
Return Period	5 yr		
Time of Concentration (min)	10		
Coeff A	1135.4		
Coeff B	7.5		
Coeff C	0.841		
Runoff Coeff (unadjusted)	0.57	Uncont. Flow (m³/s)	0.022
Runoff Coefficient (Adjusted)	0.57		
Area (ha)	0.133		

Target Flow (m³/s)	0.018
--------------------	-------

REQUIRED STORAGE VOLUME:	2.1
--------------------------	-----

Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	208.56	0	0.045	-5.5
1	187.72	60	0.040	-3.7
2	170.96	120	0.037	-2.3
3	157.16	180	0.034	-1.1
4	145.58	240	0.031	-0.3
5	135.72	300	0.029	0.4
6	127.21	360	0.027	0.9
7	119.79	420	0.026	1.3
8	113.26	480	0.024	1.7
9	107.46	540	0.023	1.9
10	102.27	600	0.022	2.0
15	82.79	900	0.018	2.1
20	69.93	1200	0.015	1.3
25	60.77	1500	0.013	0.1
30	53.88	1800	0.012	-1.4
35	48.49	2100	0.010	-3.1
40	44.16	2400	0.009	-5.0
45	40.60	2700	0.009	-7.0
50	37.61	3000	0.008	-9.1
55	35.06	3300	0.007	-11.2
60	32.86	3600	0.007	-13.4
65	30.95	3900	0.007	-15.7
70	29.26	4200	0.006	-18.0
75	27.76	4500	0.006	-20.3
80	26.42	4800	0.006	-22.7
85	25.21	5100	0.005	-25.1

Modified Rational Method Storage Sizing - 100-Year

Peak Flow

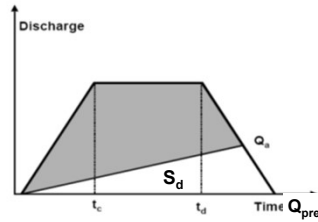
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T + B)^c$$

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	Collingwood	Intensity (mm/hr):	168.45
Return Period	100 yr		
Time of Concentration (min)	10		
Coeff A	2193.1		
Coeff B	9.04		
Coeff C	0.871		
Runoff Coeff (Unadjusted)	0.48	Flow (m³/s)	0.030
Runoff Coefficient (Adjusted)	0.48		
Area (ha)	0.133		

Post-Development Scenario Data			
Inputs		Outputs	
IDF Location	Collingwood	Intensity (mm/hr):	168.45
Return Period	100 yr		
Time of Concentration (min)	10		
Coeff A	2193.1		
Coeff B	9.04		
Coeff C	0.871		
Runoff Coeff (unadjusted)	0.57	Uncont. Flow (m³/s)	0.036
Runoff Coefficient (Adjusted)	0.57		
Area (ha)	0.133		

Target Flow (m³/s) 0.018

REQUIRED STORAGE VOLUME: 13.7

Storage Volume Determination (Detailed)				
T _d	i	T _d	Q _{Uncont}	S _d
min	mm/hr	sec	m³/s	m³
0	322.28	0	0.069	-5.4
1	294.14	60	0.063	-2.2
2	270.79	120	0.058	0.5
3	251.09	180	0.054	2.6
4	234.23	240	0.050	4.4
5	219.64	300	0.047	6.0
6	206.86	360	0.044	7.3
7	195.58	420	0.042	8.4
8	185.54	480	0.040	9.3
9	176.55	540	0.038	10.1
10	168.45	600	0.036	10.8
15	137.49	900	0.029	12.9
20	116.62	1200	0.025	13.7
25	101.55	1500	0.022	13.6
30	90.13	1800	0.019	13.1
35	81.15	2100	0.017	12.1
40	73.89	2400	0.016	10.9
45	67.90	2700	0.015	9.5
50	62.86	3000	0.013	7.9
55	58.57	3300	0.013	6.2
60	54.85	3600	0.012	4.4
65	51.61	3900	0.011	2.5
70	48.76	4200	0.010	0.5
75	46.22	4500	0.010	-1.5
80	43.95	4800	0.009	-3.5
85	41.91	5100	0.009	-5.6



629 HURONTARIO STREET - SUPERPIPE STORAGE CALCULATIONS

Storm Sewer Network Parameters							
Sewer #	From	To	Length (m)	Slope (%)	US Invert	DS Invert	Size (mm)
#1	DICB1	DCBMH2	10.90	0.50	187.770	187.720	250
#2	DICB2	DCBMH2	11.10	0.50	187.790	187.725	250
#3	DCBMH2	MH3	8.70	0.40	187.670	187.640	300

Sewer #	Water Depth at DS Invert of Sewer (m) for each Storm Event										Water Depth at US Invert of Sewer (m) for each Storm Event									
Event	1	2	3	4	5	6	7	8	9	Ponding HWL	1	2	3	4	5	6	7	8	9	Ponding HWL
Water Level (m)	187.64	187.80	187.96	188.12	188.28	188.44	188.60	188.76	188.92	188.94	187.64	187.80	187.96	188.12	188.28	188.44	188.60	188.76	188.92	188.94
#1	0.00	0.07	0.23	0.39	0.55	0.71	0.87	1.03	1.19	1.22	0.00	0.07	0.23	0.39	0.55	0.71	0.87	1.03	1.19	1.22
#2	0.00	0.07	0.24	0.40	0.56	0.72	0.88	1.04	1.20	1.22	0.00	0.08	0.24	0.40	0.56	0.72	0.88	1.04	1.20	1.22
#3	0.00	0.16	0.32	0.48	0.64	0.80	0.96	1.12	1.28	1.30	0.00	0.13	0.29	0.45	0.61	0.77	0.93	1.09	1.25	1.27

Note: Water Depth in each sewer is calculated as Storm Event Water Elevation - Invert Elevation (DS or US). In cases where the sewer invert is above the storm water elevation, the water depth is equal to 0.

Sewer #	Water-Filled Area at DS Invert of Sewer (m ²) for each Storm Event										Water-Filled Area at US Invert of Sewer (m ²) for each Storm Event									
Event	1	2	3	4	5	6	7	8	9	Ponding HWL	1	2	3	4	5	6	7	8	9	Ponding HWL
Water Level (m)	187.64	187.80	187.96	188.12	188.28	188.44	188.60	188.76	188.92	188.94	187.64	187.80	187.96	188.12	188.28	188.44	188.60	188.76	188.92	188.94
#1	0.00	0.0124	0.0479	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.00	0.0124	0.0479	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491
#2	0.00	0.0124	0.0484	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.00	0.0135	0.0484	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491	0.0491
#3	0.00	0.0383	0.0707	0.0707	0.0707	0.0707	0.0707	0.0707	0.0707	0.0707	0.00	0.0294	0.0700	0.0707	0.0707	0.0707	0.0707	0.0707	0.0707	0.0707

Note: Water-Filled Areas are calculated using the following equation, where R = Sewer radius (m) and h = Water depth in sewer (m):
In cases where the sewer cross-section is full, the Water-Filled Area is calculated as π*R².

$$\text{Area} = R^2 \cos^{-1} \left(\frac{R-h}{R} \right) - (R-h) \sqrt{2 R h - h^2}$$

Sewer #	Storage Volume in Sewer (m ³) for each Storm Event									
Event	1	2	3	4	5	6	7	8	9	10
Water Level (m)	187.64	187.80	187.96	188.12	188.28	188.44	188.60	188.76	188.92	188.94
#1	0.00	0.14	0.52	0.54	0.54	0.54	0.54	0.54	0.54	0.54
#2	0.00	0.14	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
#3	0.00	0.29	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
TOTAL	0.0	0.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7

Note: Storage Volume is calculated as the Sewer Length multiplied by the average of the DS and US Water-Filled Areas. Total Storage in the system is calculated as the sum of the storage volume in each sewer.



Project: 629 Hurontario Street
Project No.: 2361-6530
Design by: JK
Date: 2025-02-11

629 Hurontario Street

Supersize Pipe Storage Data

Storm Structure Storage Data				
CB Structures	Area	T/G Elevation	Inv Elev	Volume
	(m ²)	(m)	(m)	(m ³)
DICB1	0.72	188.76	187.77	0.71
DICB2	0.72	188.69	187.79	0.65
DCBMH2	1.77	188.83	187.72	1.96
Total Structure Storage (m ³)				3.3

Pipe Storage Data				
From MH#	To MH#	Length	Diameter	Storage Vol.
		(m)	(mm)	(m ³)
DICB1	DCBMH2	10.9	250	0.54
DICB2	DCBMH2	11.1	250	0.54
DCBMH2	MH3	8.7	300	0.61
Total Pipe Storage (m ³)				1.7

Stage-Storage-Discharge Table - External Conveyance System

187.61 m Orifice Diameter 0.085 m

Supersize Pipe Stage-Storage-Discharge Data

Comments	Water Level Elevation	Water Depth above Lower ICD Invert	Pipe #1 Storage (DICB1 to DCBMH2)	Pipe #2 Storage (DICB2 to DCBMH2)	Pipe #3 Storage (DCBMH2 to MH3)	DICB1	DICB2	DCBMH2	Ponding	Total Storage	Orifice A Discharge	Total Discharge
	(m)	(m)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³)	(m ³ /s)	(m ³ /s)
	187.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.000	0.000
	187.80	0.16	0.14	0.29	0.34	0.02	0.01	0.14	0.00	0.9	0.006	0.006
	187.96	0.32	0.52	0.61	0.70	0.14	0.12	0.42	0.00	2.5	0.008	0.008
	188.12	0.48	0.54	0.61	0.71	0.25	0.24	0.71	0.00	3.1	0.011	0.011
	188.28	0.64	0.54	0.61	0.71	0.37	0.35	0.99	0.00	3.6	0.012	0.012
	188.44	0.80	0.54	0.61	0.71	0.48	0.47	1.27	0.00	4.1	0.014	0.014
	188.60	0.96	0.54	0.61	0.71	0.60	0.58	1.56	0.00	4.6	0.015	0.015
	188.76	1.12	0.54	0.61	0.71	0.71	0.65	1.84	0.00	5.1	0.017	0.017
	188.92	1.28	0.54	0.61	0.71	0.71	0.65	1.96	5.30	10.5	0.018	0.018
	188.94	1.30	0.54	0.61	0.71	0.71	0.65	1.96	10.70	15.9	0.018	0.018

**Please refer to 2024.06.27 Pipe Volume Calculations Spreadsheet for Storage Details

APPENDIX F

Oil/Grit Separator Sizing Report



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: 629 Hurontario St	Engineer: Crozier & Associates Consulting Eng
Location: Collingwood, ON	Contact: Jonathon Kerschbaumer
OGS #: OGS	Report Date: 4-Dec-24

Area 0.07 ha Weighted C 0.9 CDS Model 2015-4	Rainfall Station # 203 Particle Size Distribution FINE CDS Treatment Capacity 20 l/s
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<u>Rainfall Intensity¹</u> (mm/hr)	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
0.5	8.7%	8.7%	0.1	0.1	0.4	98.7	8.6
1.0	10.8%	19.6%	0.2	0.2	0.9	98.6	10.7
1.5	9.5%	29.0%	0.3	0.3	1.3	98.5	9.3
2.0	8.4%	37.4%	0.4	0.4	1.8	98.4	8.3
2.5	6.8%	44.2%	0.4	0.4	2.2	98.2	6.7
3.0	5.6%	49.8%	0.5	0.5	2.7	98.1	5.5
3.5	5.1%	54.9%	0.6	0.6	3.1	98.0	5.0
4.0	4.9%	59.8%	0.7	0.7	3.5	97.8	4.8
4.5	4.1%	63.9%	0.8	0.8	4.0	97.7	4.0
5.0	3.5%	67.4%	0.9	0.9	4.4	97.6	3.4
6.0	4.9%	72.3%	1.1	1.1	5.3	97.3	4.8
7.0	4.0%	76.3%	1.2	1.2	6.2	97.1	3.9
8.0	3.2%	79.5%	1.4	1.4	7.1	96.8	3.1
9.0	2.2%	81.7%	1.6	1.6	8.0	96.6	2.1
10.0	2.0%	83.7%	1.8	1.8	8.8	96.3	1.9
15.0	8.2%	91.9%	2.6	2.6	13.3	95.1	7.8
20.0	3.4%	95.2%	3.5	3.5	17.7	93.8	3.2
25.0	2.5%	97.7%	4.4	4.4	22.1	92.5	2.3
30.0	1.4%	99.1%	5.3	5.3	26.5	91.3	1.3
35.0	0.3%	99.4%	6.1	6.1	30.9	90.0	0.2
40.0	0.6%	100.0%	7.0	7.0	35.3	88.7	0.5
45.0	0.0%	100.0%	7.9	7.9	39.8	87.5	0.0
50.0	0.0%	100.0%	8.8	8.8	44.2	86.2	0.0

97.3

Removal Efficiency Adjustment² = 6.5%

Predicted Net Annual Load Removal Efficiency = 90.8%

Predicted % Annual Rainfall Treated = 100.0%

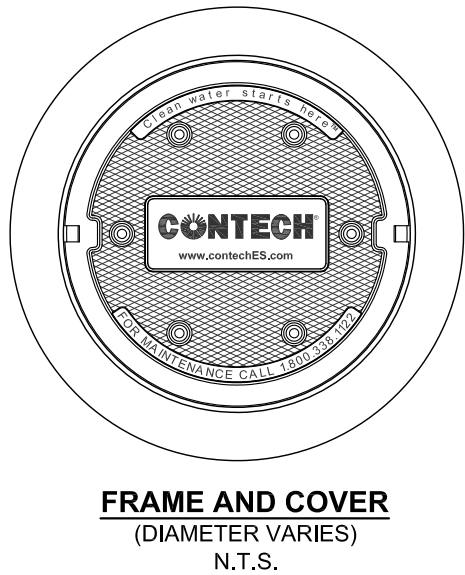
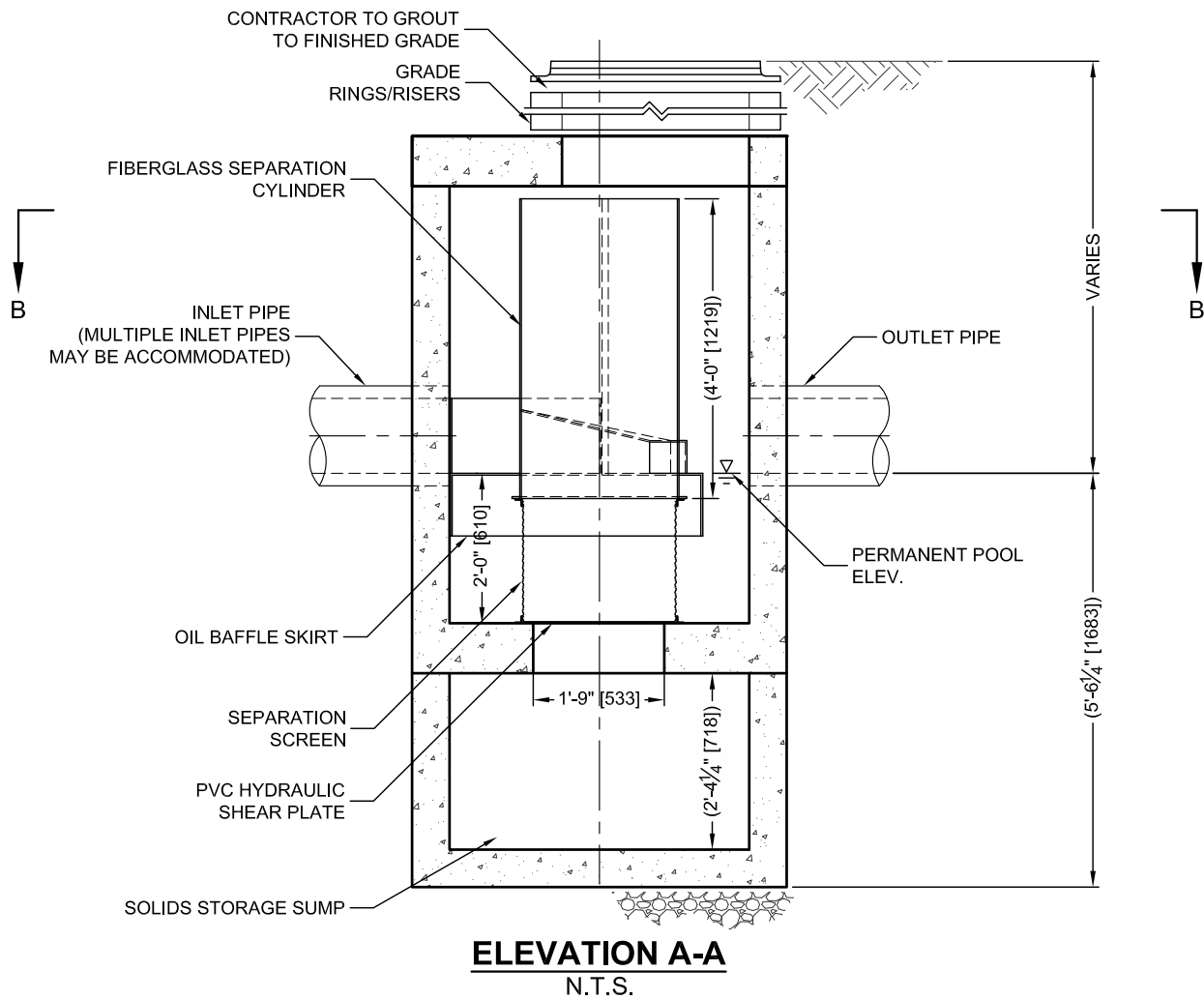
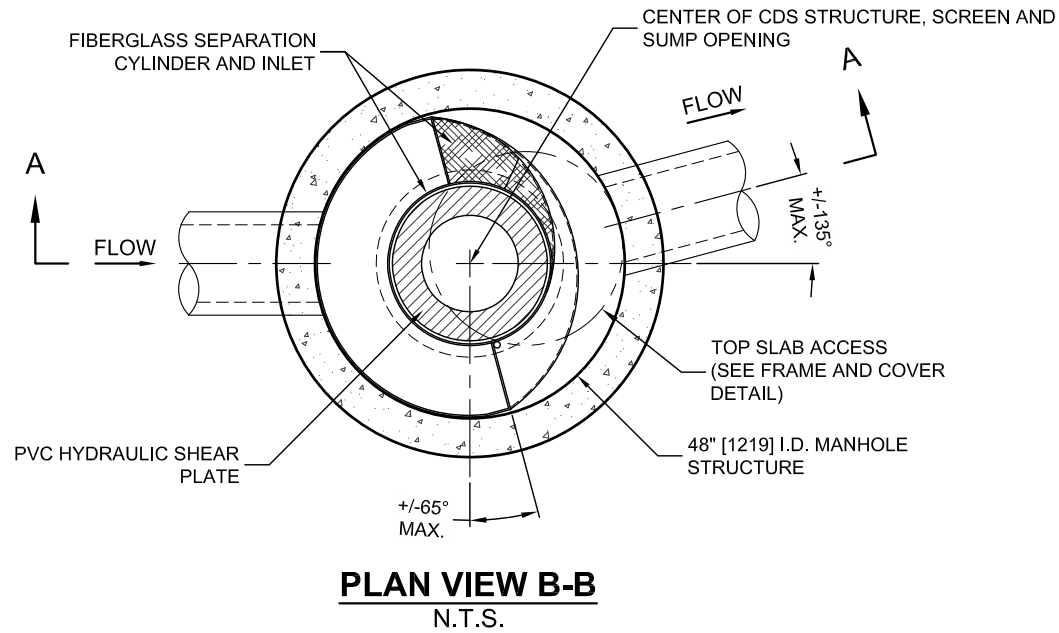
1 - Based on 27 years of hourly rainfall data from Canadian Station 6110557, Barrie ON

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

3 - CDS Efficiency based on testing conducted at the University of Central Florida

4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

C:\USERS\HUDA.ECHELON\ENVIDOCUMENTS\START ITEMS\PMSU SAMPLE DRAWINGS\CDS2015-4-C-DTL.DWG 5/30/2022 12:30 AM



SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)		*	
PEAK FLOW RATE (CFS OR L/s)		*	
RETURN PERIOD OF PEAK FLOW (YRS)		*	
SCREEN APERTURE (2400 OR 4700)		*	
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

- GENERAL NOTES**
- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
 - DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
 - FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
 - CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
 - STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
 - PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
- INSTALLATION NOTES**
- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 - CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
 - CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
 - CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
 - CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
ENGINEERED SOLUTIONS LLC

www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU2015-4-C
INLINE CDS
STANDARD DETAIL



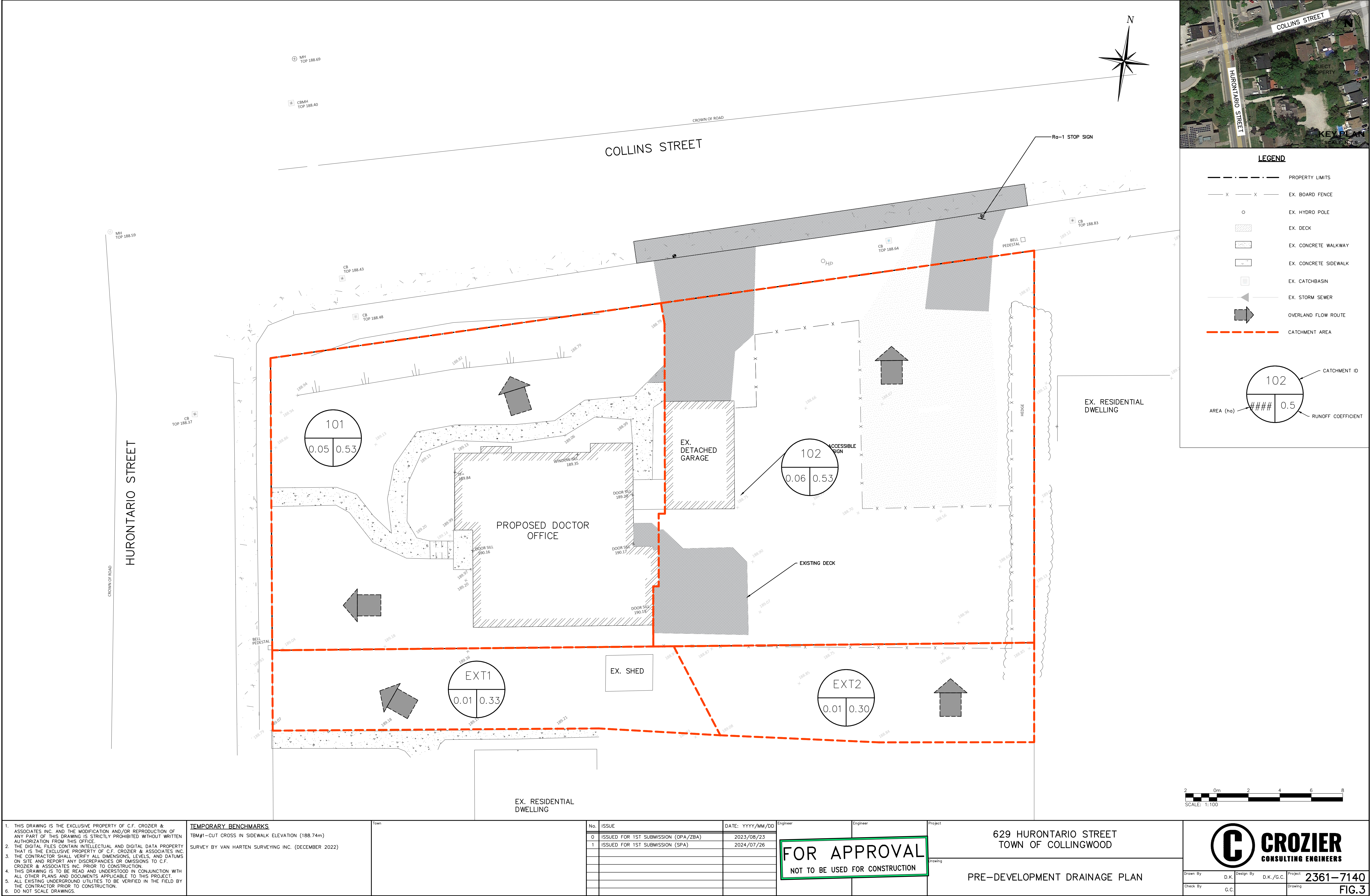
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,768,848; 6,841,722; 6,911,500; 6,981,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

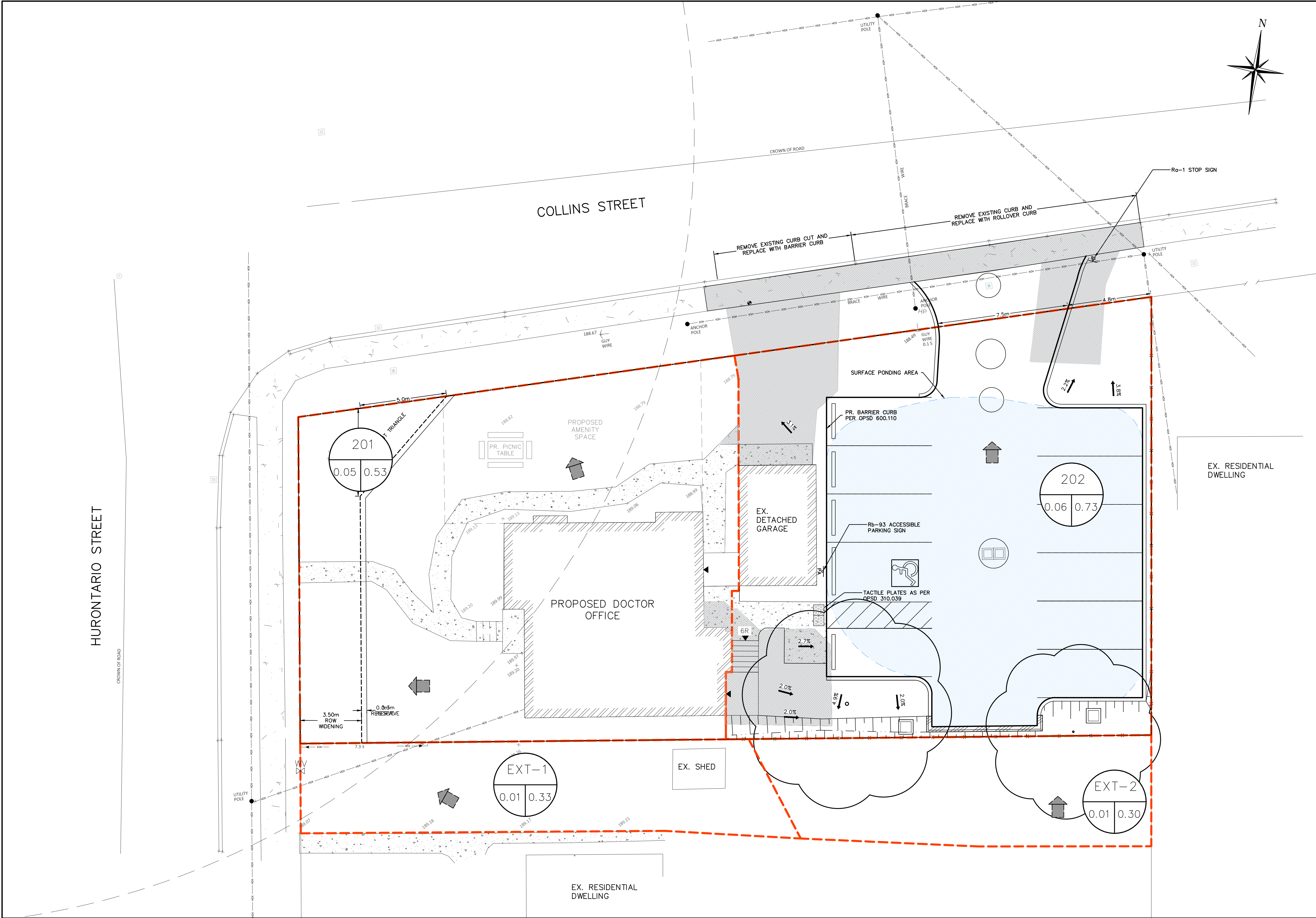
FIGURES

- | | |
|------------------|--------------------------------|
| Figure 1: | Site Location Plan |
| Figure 2: | Site Plan |
| Figure 3: | Pre-Development Drainage Plan |
| Figure 4: | Post-Development Drainage Plan |



Legend = SUBJECT LANDS	Project 629 HURONTARIO STREET TOWN OF COLLINGWOOD	C CROZIER CONSULTING ENGINEERS			
	Drawing SITE LOCATION PLAN	Drawn By D.K. Design By Project 2361-7140	Scale N.T.S. Date 08/23/2023 Check By G.C. Drawing FIG. 1		





LEGEND

PROPERTY LIMITS

EX. HYDRO POLE

EX. CONCRETE WALKWAY

EX. CONCRETE SIDEWALK

EX. CATCHBASIN

EX. STORM SEWER

PR. WALKWAY

PR. TOE WALL

PR. PRIVACY FENCE

PR. DOUBLE CATCHBASIN MANHOLE

PR. MANHOLE

CATCHMENT AREA

201

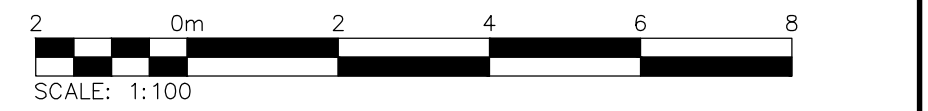
0.06

0.5

CATCHMENT ID

AREA (ha)

RUNOFF COEFFICIENT



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- ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
- DO NOT SCALE DRAWINGS.

TEMPORARY BENCHMARKS	
TBM#1—CUT CROSS IN SIDEWALK ELEVATION (188.74m)	
SURVEY BY VAN HARTEN SURVEYING INC. (DECEMBER 2022)	

No.	ISSUE	DATE: YYYY/MM/DD
0	ISSUED FOR 1ST SUBMISSION (OPA/ZBA)	2023/08/23
1	ISSUED FOR 1ST SUBMISSION (SPA)	2024/07/26
2	ISSUED FOR 2ND SUBMISSION (SPA)	2024/10/18
3	ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/07
4	RE-ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/22
5	ISSUED FOR 4TH SUBMISSION (SPA)	2025/02/11

Engineer	Engineer	Project
		629 HURONTARIO STREET TOWN OF COLLINGWOOD

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Drawing	POST-DEVELOPMENT DRAINAGE PLAN
---------	--------------------------------

Drawn By: D.K.

Design By: D.K./G.C.

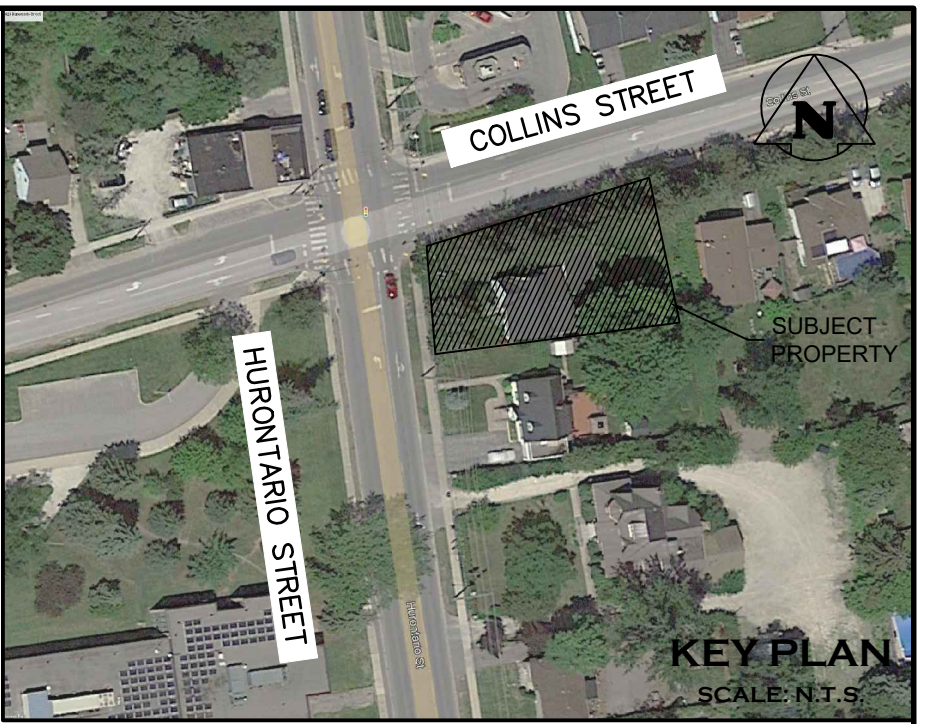
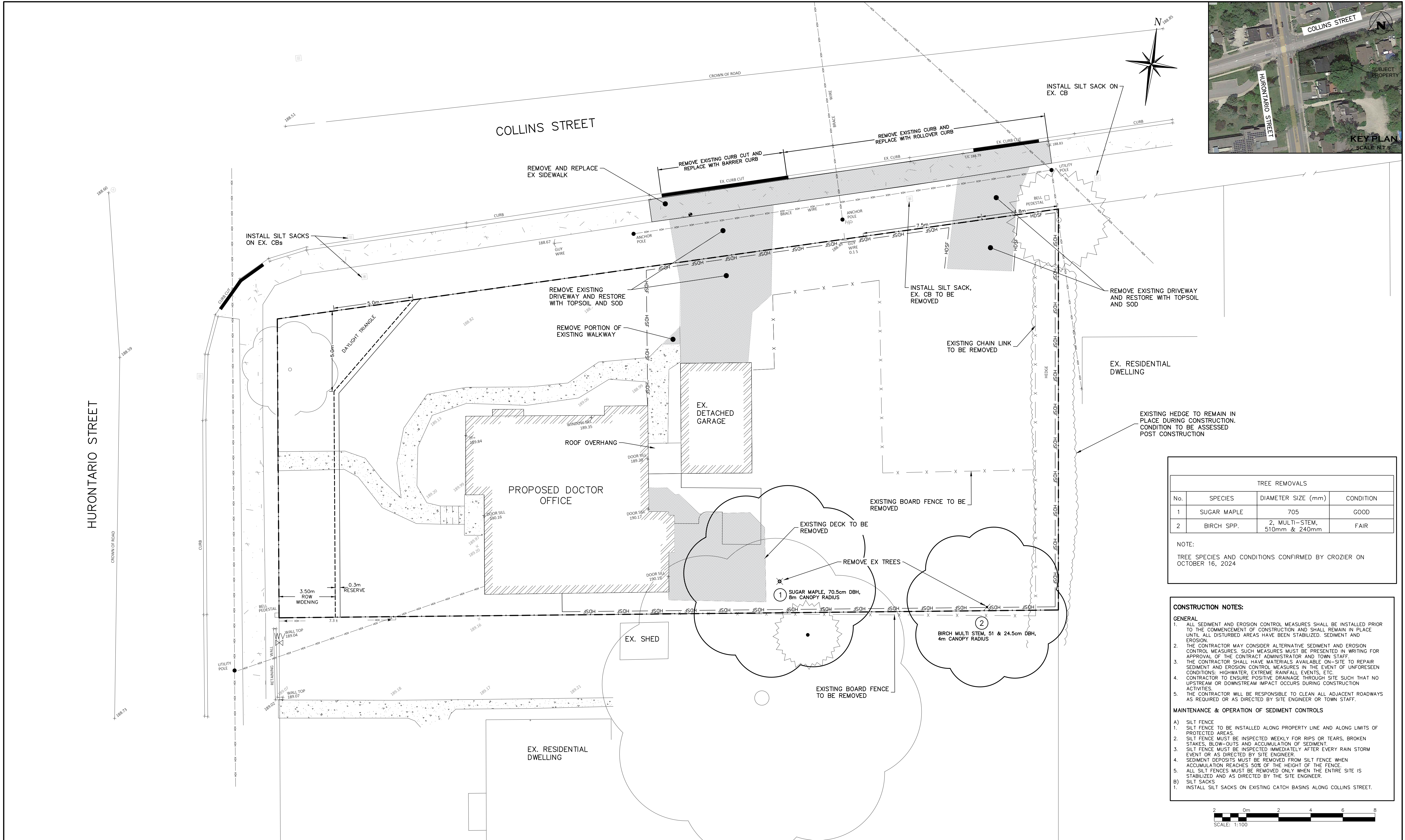
Project: 2361-7140

Check By: G.C.

Drawing: FIG.4

DRAWINGS

- Drawing C102:** Removals and Erosion & Sediment Control Plan
- Drawing C103:** Servicing Plan
- Drawing C104:** Grading Plan
- Drawing C105 – C106:** Standard Notes & Details



TREE REMOVALS			
No.	SPECIES	DIAMETER SIZE (mm)	CONDITION
1	SUGAR MAPLE	705	GOOD
2	BIRCH SPP.	2, MULTI-STEM, 510mm & 240mm	FAIR

NOTE:
TREE SPECIES AND CONDITIONS CONFIRMED BY CROZIER ON OCTOBER 16, 2024

CONSTRUCTION NOTES:	
GENERAL	
1.	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.
2.	THE CONTRACTOR MAY CONSIDER ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES. SUCH MEASURES MUST BE PRESENTED IN WRITING FOR APPROVAL OF THE CONTRACT ADMINISTRATOR AND TOWN STAFF.
3.	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.
4.	CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGH SITE SUCH THAT NO UPSTREAM OR DOWNSTREAM IMPACT OCCURS DURING CONSTRUCTION ACTIVITIES.
5.	THE CONTRACTOR WILL BE RESPONSIBLE TO CLEAN ALL ADJACENT ROADWAYS AS REQUIRED OR AS DIRECTED BY SITE ENGINEER OR TOWN STAFF.
MAINTENANCE & OPERATION OF SEDIMENT CONTROLS	
A)	SILT FENCE
1.	SILT FENCE TO BE INSTALLED ALONG PROPERTY LINE AND ALONG LIMITS OF PROTECTED AREAS.
2.	SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
3.	SILT FENCE MUST BE INSPECTED IMMEDIATELY AFTER EVERY RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
4.	SEDIMENT DEPOSITS MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
5.	ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.
B)	SILT SACKS
1.	INSTALL SILT SACKS ON EXISTING CATCH BASINS ALONG COLLINS STREET.

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

6. DO NOT SCALE DRAWINGS.

TEMPORARY BENCHMARKS

TBM#1-CUT CROSS IN SIDEWALK - ELEV. 188.74m

LEGAL AND TOPOGRAPHIC SURVEY BY VAN HARTEN SURVEYING INC. (DECEMBER 5, 2022)

Town

No.	ISSUE	DATE: YYYY/MM/DD
1	ISSUED FOR 1st SUBMISSION (SPA)	2024/07/26
2	ISSUED FOR 2ND SUBMISSION (SPA)	2024/10/18
3	ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/07
4	RE-ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/22

Engineer

Engineer

Project

629 HURONTARIO STREET
TOWN OF COLLINGWOOD

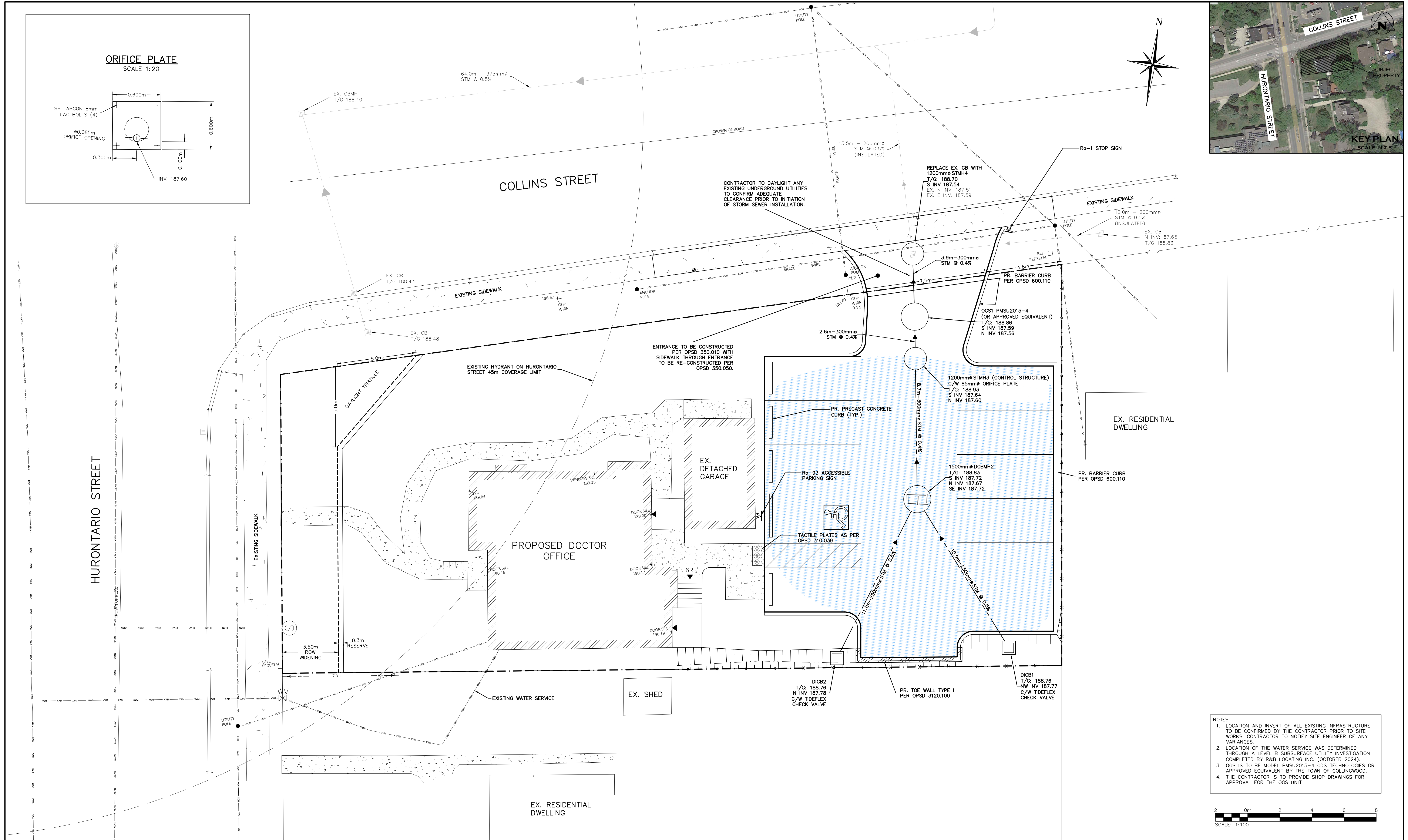
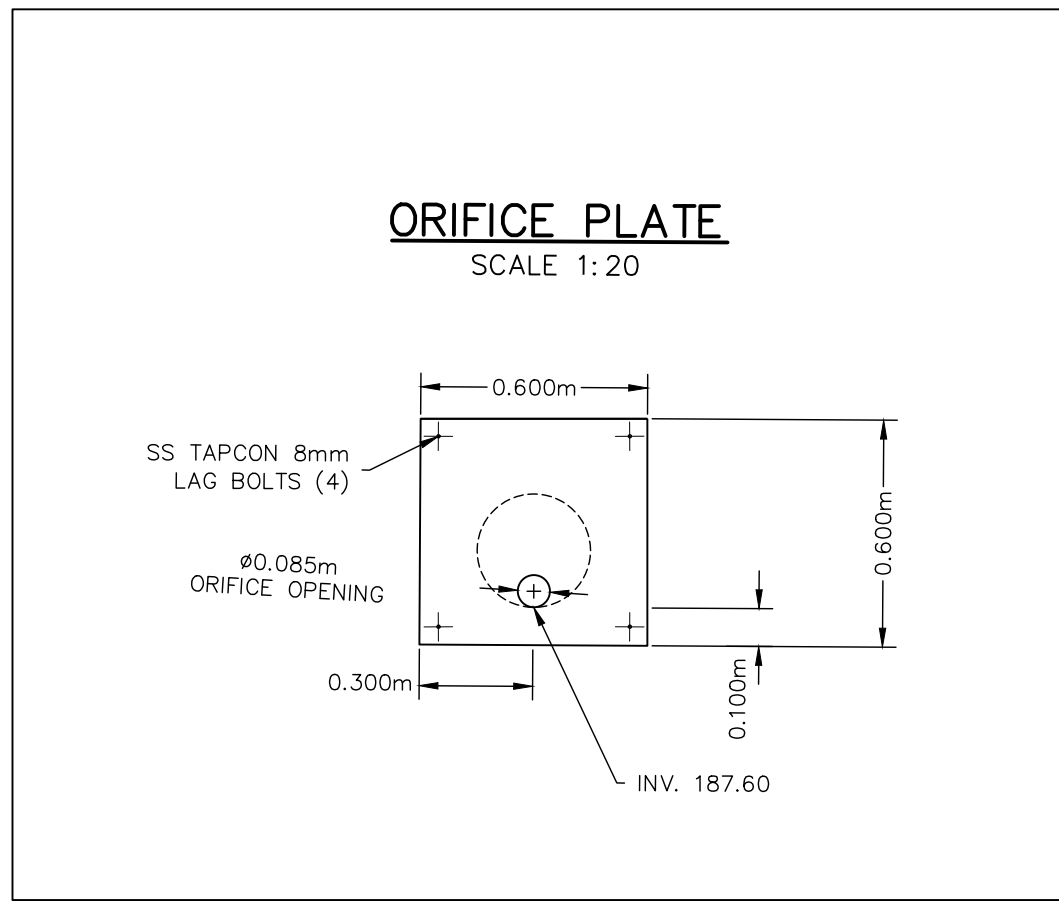
Drawing

REMOVALS AND EROSION & SEDIMENT CONTROL
PLAN

CROZIER
CONSULTING ENGINEERS

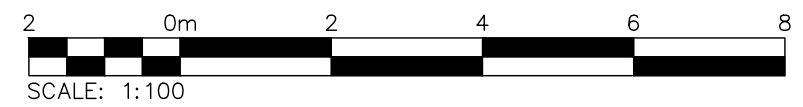
Drawn By: M.R./D.K. Design By: D.K./G.C. Project: 2361-7140

Check By: G.C. Drawing: C102



NOTES:

1. LOCATION AND INVERT OF ALL EXISTING INFRASTRUCTURE TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO SITE WORKS. CONTRACTOR TO NOTIFY SITE ENGINEER OF ANY VARIANCES.
2. LOCATION OF THE WATER SERVICE WAS DETERMINED THROUGH A LEVEL B SUBSURFACE UTILITY INVESTIGATION COMPLETED BY R&B LOCATING INC. (OCTOBER 2024).
3. OGS IS TO BE MODEL PMSU2015-4 CDS TECHNOLOGIES OR APPROVED EQUIVALENT BY THE TOWN OF COLLINGWOOD.
4. THE CONTRACTOR IS TO PROVIDE SHOP DRAWINGS FOR APPROVAL FOR THE OGS UNIT.



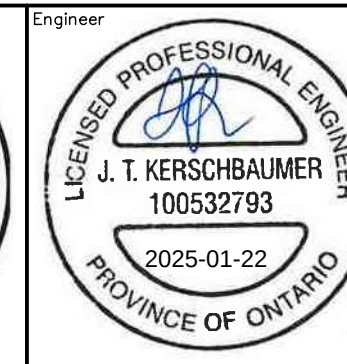
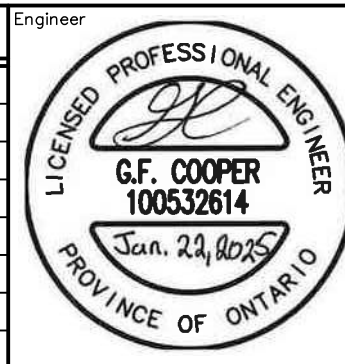
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TEMPORARY BENCHMARKS
TBM#1-CUT CROSS IN SIDEWALK - ELEV. 188.74m

LEGAL AND TOPOGRAPHIC SURVEY BY VAN HARTEN SURVEYING INC. (DECEMBER 5, 2022)

Town

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3	ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/07
4	RE-ISSUED FOR 3RD SUBMISSION (SPA)	2025/01/22



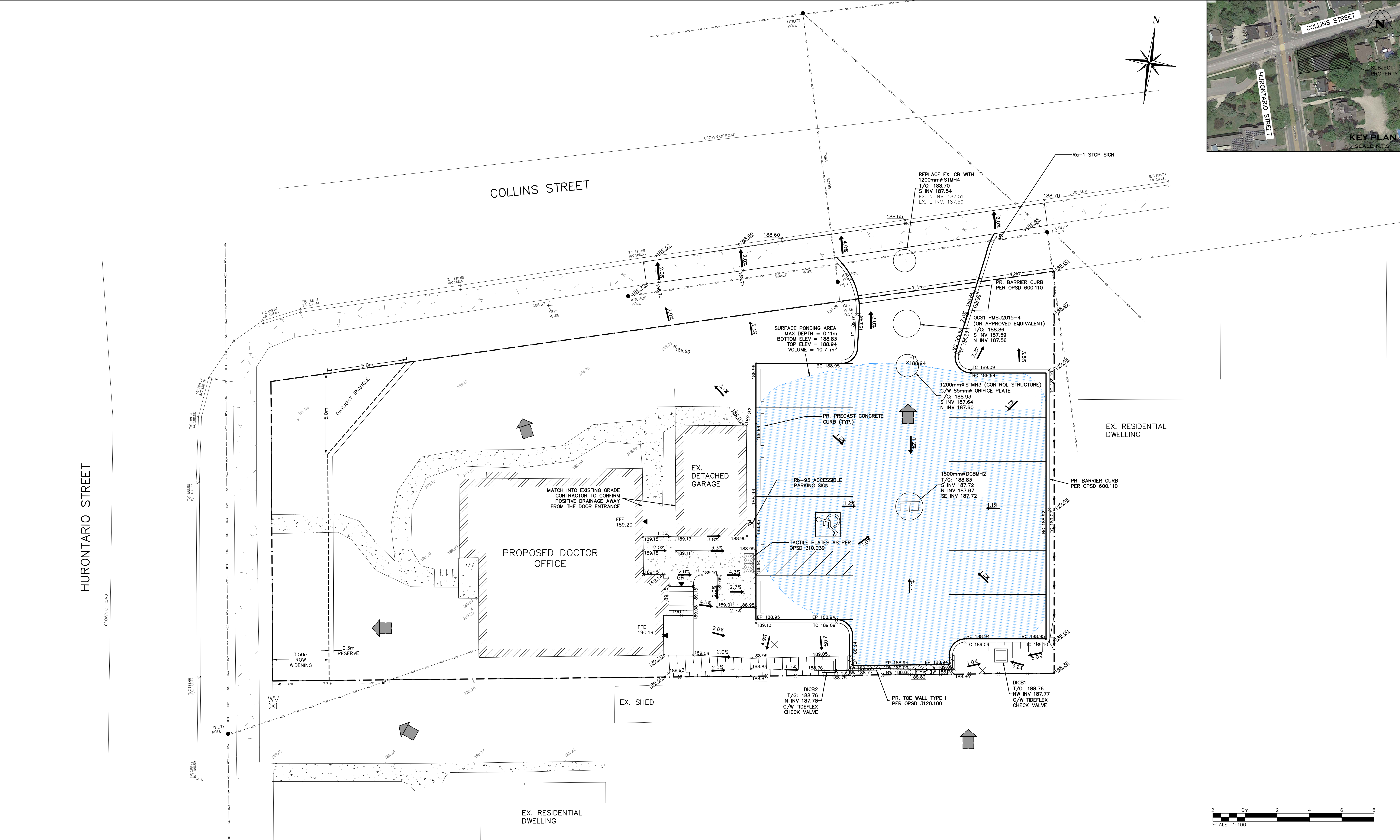
Project

629 HURONTARIO STREET
TOWN OF COLLINGWOOD

SERVICING PLAN



Drawn By: M.R./D.K. Design By: D.K./G.C. Project: 2361-7140
Check By: G.C. Check By: J.K. Drawing: C103

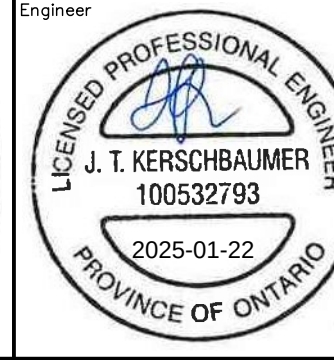
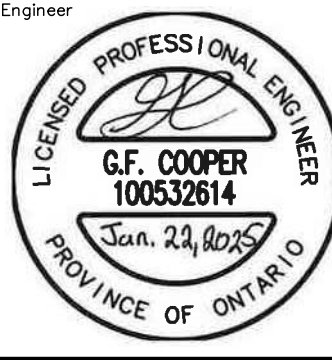


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TEMPORARY BENCHMARKS
TBM#1-CUT CROSS IN SIDEWALK - ELEV. 188.74m
LEGAL AND TOPOGRAPHIC SURVEY BY VAN HARTEN SURVEYING INC. (DECEMBER 5, 2022)

Town

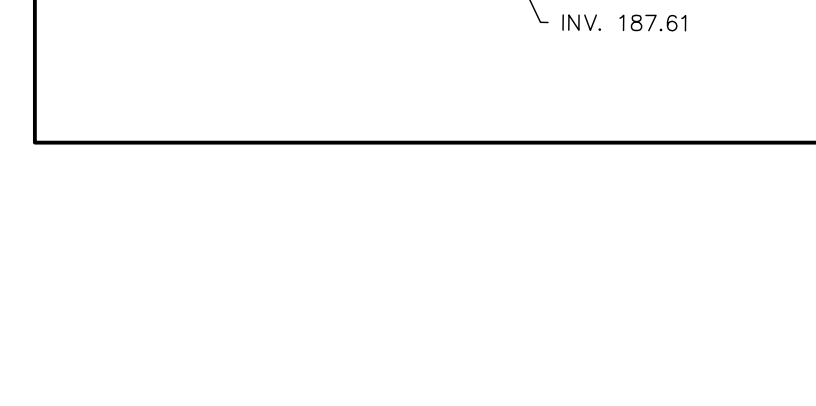
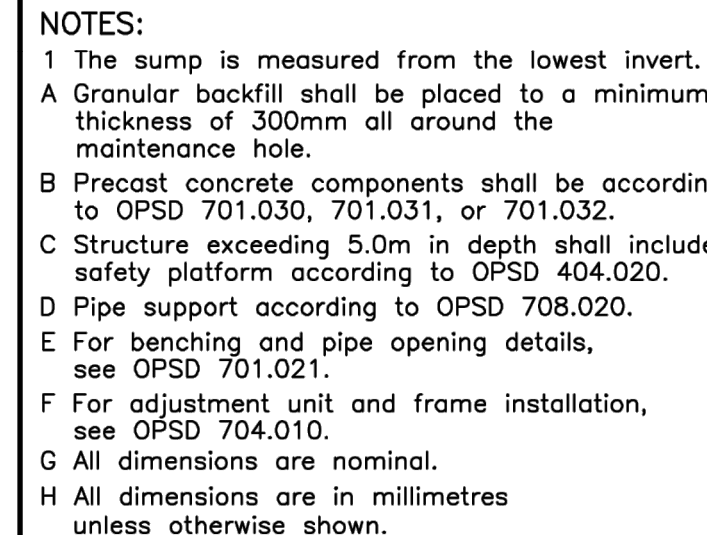
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Project
**629 HURONTARIO STREET
TOWN OF COLLINGWOOD**
Drawing

**CROZIER**
CONSULTING ENGINEERS

Drawn By	M.R./D.K.	Design By	D.K./G.C.	Project	2361-7140
Check By	G.C.	Check By	J.K.	Drawing	C104



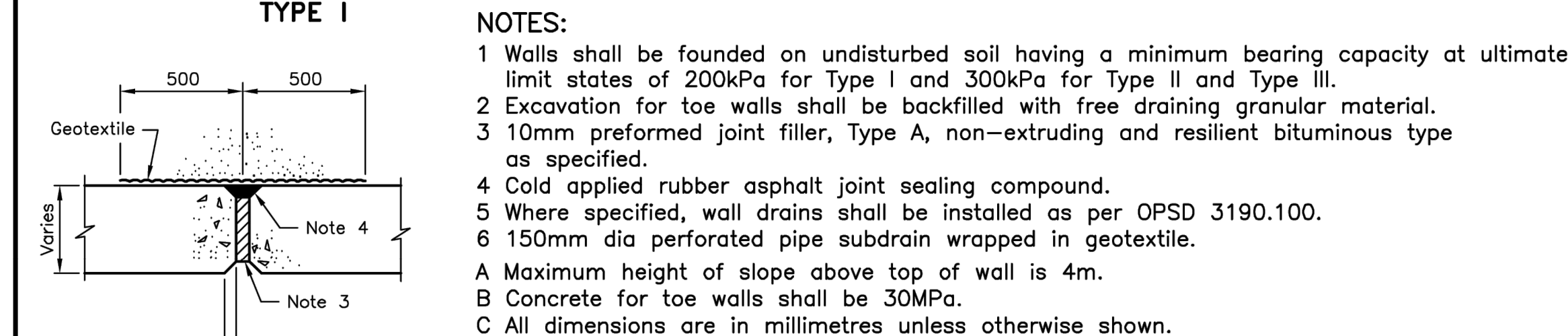
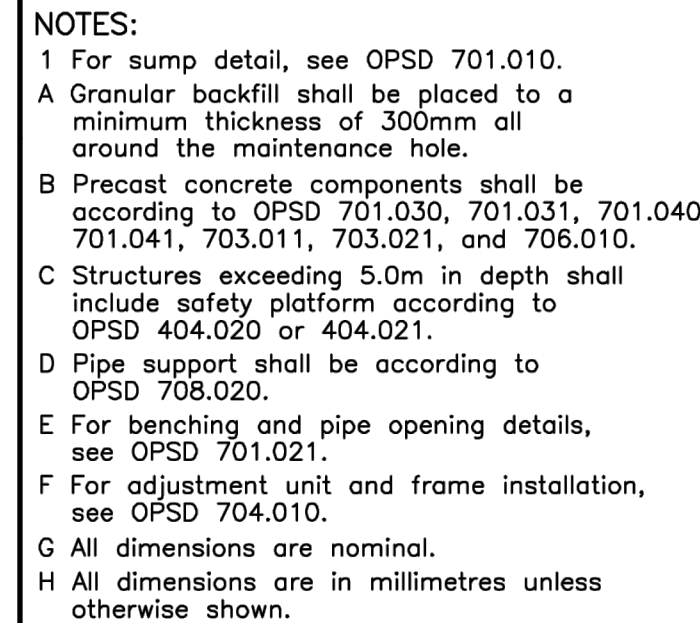
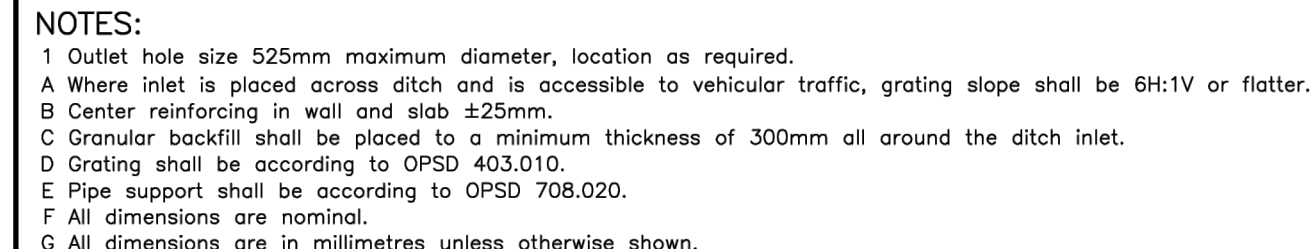
- A) GENERAL – CONSTRUCTION**
1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH TOWN OF COLLINGWOOD STANDARDS (2007), OPSD AND OPSS, WHERE CONFLICT OCCURS, TOWN OF COLLINGWOOD STANDARDS (2007) TO GOVERN.
2. TRENCH BACKFILL (OPSS 802.010 & 802.011) TO BE SELECT NATIVE MATERIAL OR IMPORTED SELECT SUBGRADE TO OPSS 1100, BACKFILL TO BE PLACED IN MAXIMUM 200mm THICK LIFTS AND COMPACTED TO 95% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMD0).
3. PIPE COVER AND BEDDING TO BE GRANULAR A, MINIMUM 150mm DEPTH COMPACTED TO A MINIMUM 95% SPMD0.
4. ALL EXISTING UTILITIES TO BE REMOVED TO AN APPROVED DEPTH TO BE STRENGTHENED TO MEET THE STANDARD OF THE TOWN OF COLLINGWOOD.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED LAYOUT OF THE WORK. THE OWNER'S ENGINEER WILL CONFIRM ALL BENCH MARK ELEVATIONS AND HORIZONTAL ALIGNMENT FOR THE CONTRACTOR.
6. ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY D.L.S. AT CONTRACTOR'S EXPENSE IF REMOVED DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR THE SUPPLY OF TEMPORARY WATER AND POWER.
8. Dewatering to be carried out in accordance with OPS5-517 and 518 TO MAINTAIN ALL TRENCHES IN A DRY CONDITION.
9. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER.
10. DISTURBED AREAS OUTSIDE THE PROJECT LIMITS TO BE RE-SPANNED TO PREVENT CONDITION OR BETTER.
11. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY ALL UTILITY COMPANIES PRIOR TO COMMENCING WORK AND CO-ORDINATE CONSTRUCTION ACCORDINGLY.
12. ALL EXCAVATION PER OPS5-208.
13. ALL EXCAVATION MUST BE CARRIED OUT IN FULL COMPLIANCE WITH MOST RECENT GUIDELINES OF OHSA.

1. SUBGRADE TO BE COMPACTED TO A MINIMUM DRY DENSITY OF AT LEAST 95% SPDM.
2. SUBGRADE TO BE PROPEL ROLLED AND CERTIFIED PRIOR TO PLACING GRANULAR 'B'.
3. GRANULAR 'A' AND ALL OTHER MATERIALS TO BE MATERIALS SPECIFIED IN THE MATERIALS RESPECTIVE SCHEDULE AND PLACED IN MAX. 150mm LIFTS.
4. REFER TO PAVEMENT STRUCTURE DETAILS FOR INTERNAL ROADWAY, DRIVEWAYS AND PARKING AREAS.
5. SELECT SUBGRADE MATERIAL, OR IMPORTED GRANULAR MATERIAL APPROVED BY THE ENGINEER, COMPACTED TO 98% SPDM USED TO BE USED AS FILL IN ALL AREAS WHERE PROPOSED PIPE INVERTS ARE HIGHER THAN EXISTING GRADE OR AS INSTRUCTED BY THE ENGINEER.
6. JOINTS AND ALL OTHER AREAS TO BE COMPACTED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
7. JOINTS WITH EXISTING ASPHALT TO BE SAW CUT STRAIGHT PRIOR TO PLACING NEW ASPHALT AND TACK COAT APPLIED TO EXISTING ASPHALT.
8. CONCRETE CURBS TO OPSD 600.010 AND OPSD 353. CONCRETE CURBS AND GUTTER TO OPSD 600.040 AND OPSD 353.
9. CONCRETE SIDEWALK TO OPSD 310.010, 310.030, 350.010 AND OPSD 351. SUBBASE TO CONSIST OF MIN. 150mm OF GRANULAR 'A' UNLESS OTHERWISE SPECIFIED.

1. MH AND CBMH TO OPSD - 701.012, 701.030, 701.100, 704.010, C/P SUMP UNLESS NOTED OTHERWISE.
2. PIPE TO OPSD 405.010.
3. MH, FRAMES AND GRATES TO OPSD - 401.01 OPEN COVER.
4. CB'S TO OPSD - 705.010.
5. CB'S AND CBMH FRAMES AND GRATES TO OPSD - 400.020.
6. PIPE SUPPORT AT MH'S, CB'S, CBMH'S AND DCBHM'S TO DCBHM CAP OPSD - 703.021.
7. PROTECTION DURING CONSTRUCTION TO OPSD - 808.010.
8. CB'S AND EMBEDMENT TO OPSD - 802.010 (FLEXIBLE PIPE) GRANULAR 'A' EMBEDMENT OR OPSD - 802.030, 802.031 AND 802.032 (RIGID PIPE) GRANULAR 'A' EMBEDMENT.
9. BACKFILL AND EMBEDMENT MATERIAL TO BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF THE MATERIAL'S SPMD.
10. ALL PIPE TO BE JOINTED WITH 300 PSI MINIMUM STRENGTH (3200PSI). ALL PIPE TO BE JOINED WITH A GASKETTED BELL AND SPIGOT SYSTEM. CATCHBASIN LEADS TO BE 250mmx PVC PIPE (SDR-35).

1. 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 SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND EROSION CONTROL MEASURES, SUCH MEASURES MUST BE PRESENTED IN WRITING FOR APPROVAL OF THE CONTRACT ADMINISTRATOR AND TOWN STAFF.
2. THE CONTRACTOR MAY CONSIDER ALTERNATIVE METHODS TO CONTROL SEDIMENT AND EROSION CONTROL MEASURES IN THE EVENT OF UNUSUAL CONDITIONS SUCH AS DROUGHT, EXTREME WEATHER, ETC.
3. THE CONTRACTOR TO ENSURE POSITIVE DRAINAGE THROUGH SITE SUCH THAT NO UPSTREAM OR DOWNSTREAM IMPACT OCCURS DURING CONSTRUCTION ACTIVITIES.
4. THE CONTRACTOR WILL BE RESPONSIBLE TO CLEAN ALL ADJACENT ROADWAYS AS REQUIRED OR AS DIRECTED BY SITE ENGINEER OR TOWN STAFF.

- A) SILT FENCE
1. SILT FENCE TO BE INSTALLED ALONG PROPERTY LINE AND ALONG LIMITS OF PROTECTED AREAS.
2. SILT FENCE MUST BE INSPECTED WEEKLY FOR RIPS OR TEARS, BROKEN STAKES, BLOW-OUTS AND ACCUMULATION OF SEDIMENT.
3. SILT FENCE MUST BE INSPECTED IMMEDIATELY AFTER EVERY RAIN STORM EVENT OR AS DIRECTED BY SITE ENGINEER.
4. SEDIMENT DEPOSITS MUST BE REMOVED FROM SILT FENCE WHEN ACCUMULATION REACHES 50% OF THE HEIGHT OF THE FENCE.
5. ALL SILT FENCES MUST BE REMOVED ONLY WHEN THE ENTIRE SITE IS STABILIZED AND AS DIRECTED BY THE SITE ENGINEER.
B) SILT SACKS
1. INSTALL SILT SACKS ON EXISTING CATCH BASINS ALONG COLLINS STREET.



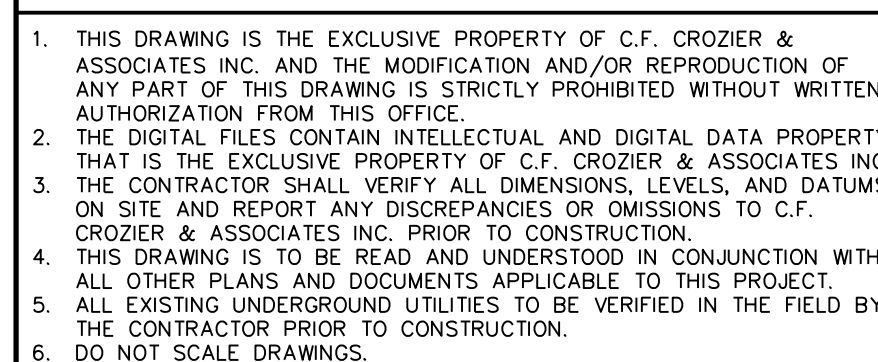
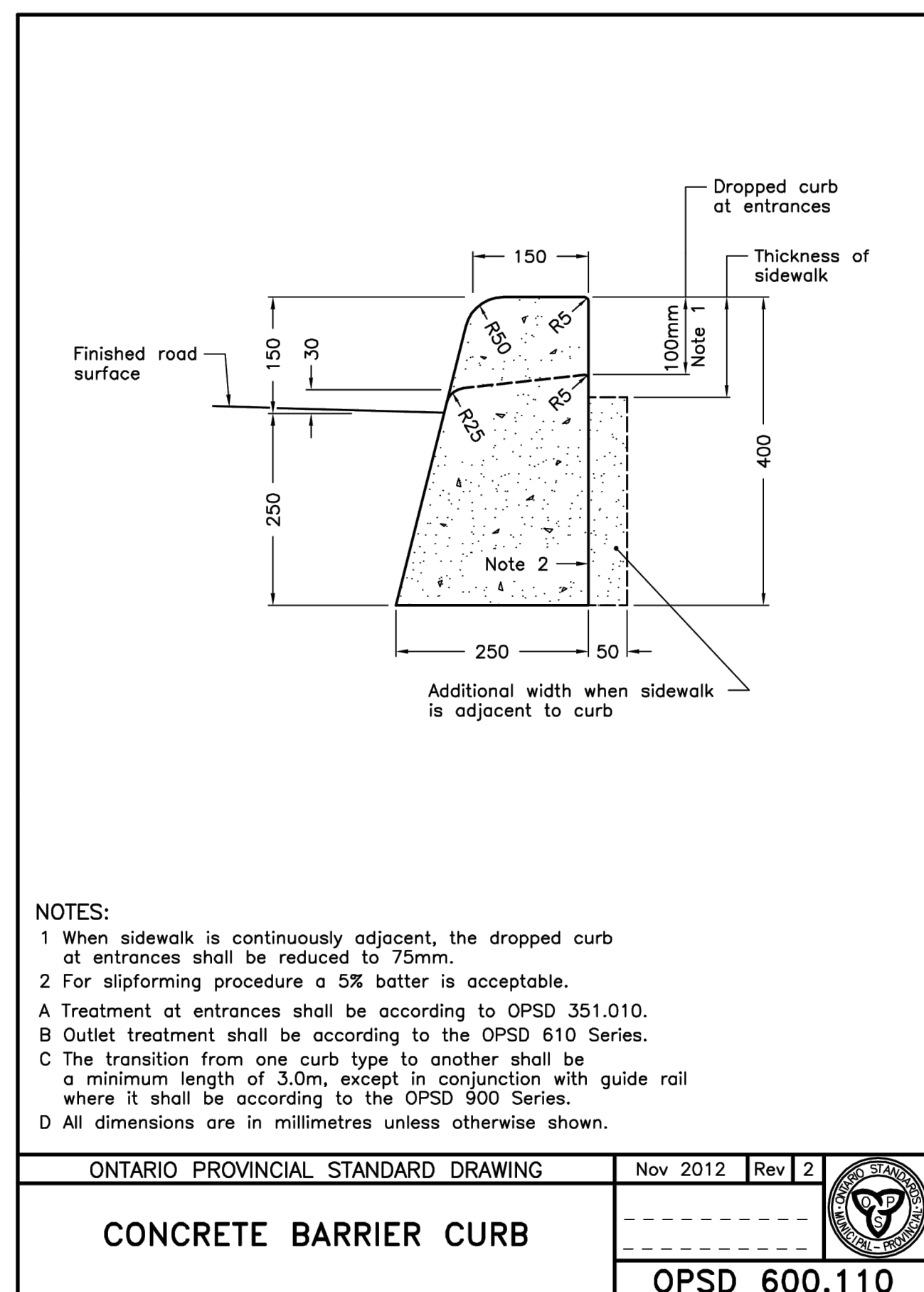
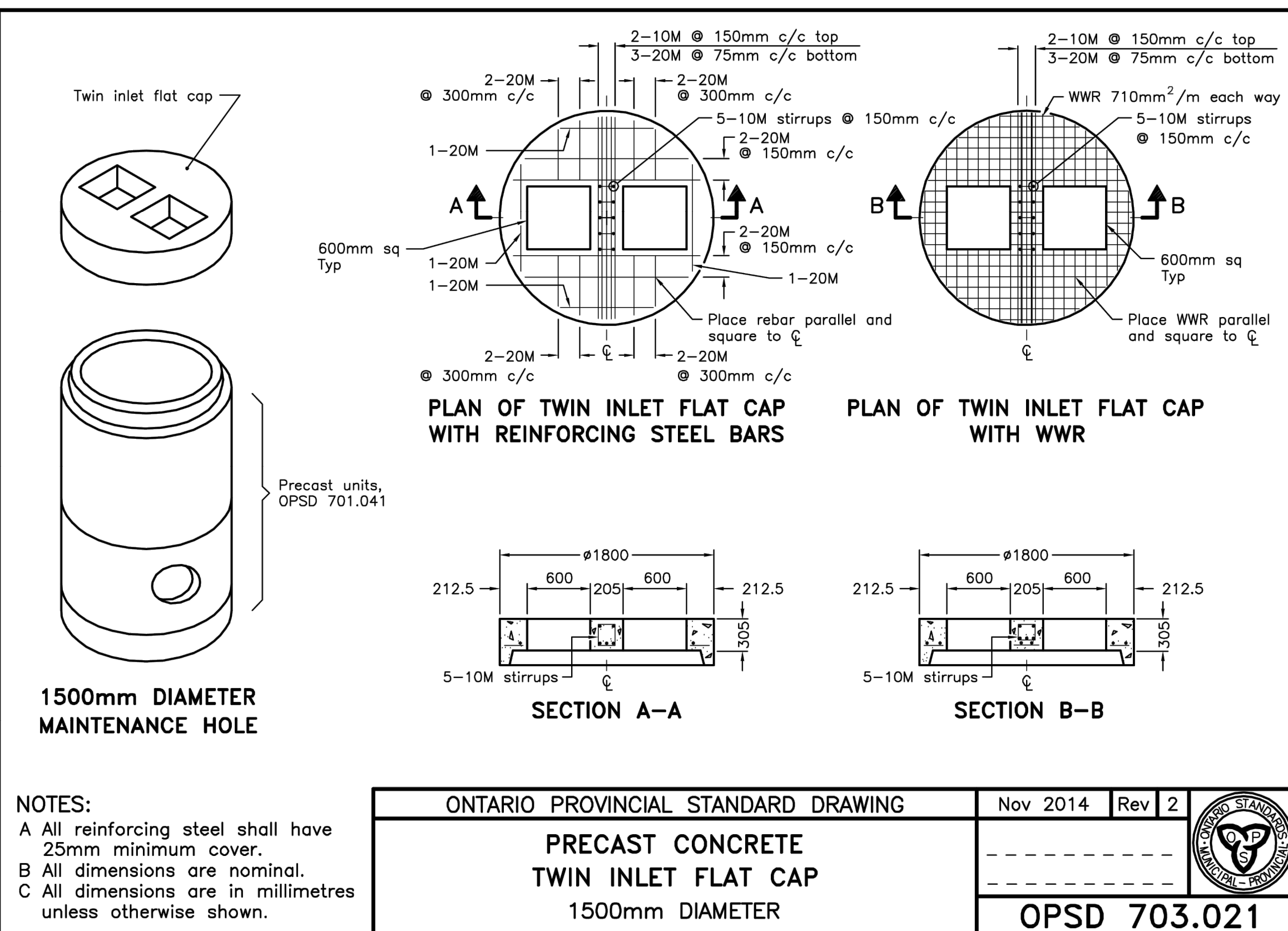
Project	
Drawing	

STANDARD NOTES AND DETAILS



CROZIER
CONSULTING ENGINEERS

Drawn By	M.R.	Design By	D.K./G.C.	Project	2361-7140
Check By	G.C.	Check By	J.K.	Drawing	C105



Engineer



LICENSED PROFESSIONAL ENGINEER
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Jan. 22, 2025
PROVINCE OF ONTARIO