BLACKMOOR GATE FUNCTIONAL SERVICING REPORT

STRAW HAT RESTORATION

CONFIDENTIAL

PROJECT NO.: 171-16446-00
DATE: MAY 2018

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

WSP Canada Inc. has been engaged by Straw Hat Restoration to undertake the following Functional Servicing Report to review municipal services available, and to present the preliminary servicing design for the proposed Blackmoor Gate residential infill development in Collingwood, Ontario. Further, the Functional Servicing Report identifies in general, the availability and/or inadequacies of such services for the proposed residential development of the existing 1.71 ha parcel.

2 PROPERTY DESCRIPTION

The proposed Blackmoor Gate residential development is comprised of three (3) existing properties; 774 Hurontario Street, 33 Findlay Drive, and 750 Hurontario Street. These three properties encompass part of Lot 5, Lot O, and Block P (registered plan 353) and part of Block A (registered plan 334) in the Town of Collingwood (Simcoe County). The draft plan of survey of the existing properties can be found in **Appendix A**.

The subject properties have a collective area of 1.71 ha, and the following frontages:

- → Hurontario Street (between Campbell Street and Findlay Drive) – 34.61 m
- → Campbell Street (between Hurontario Street and Maple Street) – 12.70 m
- → Findlay Drive (between Hurontario Street and– 27.28 m

The existing site ground profile gently slopes in a northwesterly direction and consists of a mix of grassy, overgrown brush, and treed areas. Two (2) existing homes are located on the property, one with frontage on Hurontario Street and another with frontage on Findlay Drive.

3 PROPOSED DEVELOPMENT AND SERVICE POPULATION

It is proposed that the full parcel be used for single family residential through development of thirty-four (34) units including four (4) new semi-detached units, twenty-nine (29) new detached units (including two freehold units), and one (1) existing detached residence to remain at 774 Hurontario Street. The two (2) freehold units are proposed to access by private entrance to Findlay Drive, the existing unit is proposed to maintain its current access to Hurontario, and the remaining thirty-one units are proposed to access to Campbell Street from a proposed new roadway. The Concept Sketch in **Figure 1**(attached) illustrates the proposed configuration for the development including the units and proposed roadway.

Total Proposed Service Population (excluding two (2) freehold lots on Findlay Drive and current house to remain on Hurontario Street):

31 units @ 2.9 p/u = 90 persons

Where population density = 2.9 persons/unit

Concept Sketch

Blackmoor Gate
Collingwood

Site Area = 1.70ha
Units = 34
Density = 20.0upha

31 new condo units (15,176m² =20upha)
1 existing unit on Hurontario (899m² = 11upha)
2 new units on Findlay (915m² = 22upha)

Front Garage

A 16 x 30ft. detached units
Building Width = 9.0m (29.5 ft.)
Building Depth = 12.0m (39.3 ft.)
Max. GFA = 177m² (1,900 sq.ft.)

Rear Garage

B 11 x 30ft. detached units
Building Width = 9.0m (29.5 ft.)
Building Depth = 12.0m (39.3 ft.)
Max. GFA = 177m² (1,900 sq.ft.)

C 4 x 25ft. semi-detached units
Building Width = 7.5m (24.6 ft.)
Building Depth = 12.0m (39.3 ft.)
Max. GFA = 140m² (1,500 sq.ft.)

Scale 1 : 1,200

April 9, 2018

wsp

4 EXISTING SITE SERVICE

4.1 ROADWAYS

4.1.1 HURONTARIO STREET

Hurontario Street serves as a primary public roadway in the Town of Collingwood. It is classified as an arterial road and constructed as an undivided 2 lane paved facility with an urban cross section. The roadway has concrete sidewalk on the west side of the right of way, and curb, gutter and municipal services.

4.1.2 CAMPBELL STREET

Campbell Street serves as a public roadway in the Town of Collingwood. It is classified as a local road, and constructed as an undivided 2 lane paved facility with a semi-urban cross section. The roadway has concrete sidewalk on the north side of the right of way, water main, and sanitary sewer services. There are no curbs, gutters, or storm sewers currently in place.

4.1.3 FINDLAY DRIVE

Findlay Drive serves as a public roadway in the Town of Collingwood. It is classified as a local road and constructed as an undivided 2 lane paved facility with an urban cross section. The roadway has concrete sidewalk on the north side of the right of way, and curb, gutter and municipal services.

4.2 SANITARY SEWER SERVICE

HURONTARIO STREET

Hurontario Street has an existing 375 mm diameter trunk sanitary sewer at the frontage of the proposed development. This sewer increases to a 450 mm diameter sewer at the Campbell Street intersection and continues north. The existing home at 774 Hurontario Street is serviced by lateral connection to this trunk sanitary sewer.

CAMPBELL STREET

Campbell Street has an existing 200 mm diameter sanitary sewer at the frontage of the proposed development. This sewer connects to the 250 mm diameter trunk sewer on Maple Street at their intersection and continues north along Maple Street.

FINDLAY DRIVE

Findlay Drive has an existing 375 mm diameter sanitary sewer at the frontage of the proposed development. This sewer connects to the 350 mm dia. sewer on Hurontario Street and continues north along Hurontario Street. The existing home at 33 Findlay Drive is serviced by lateral connection to this sanitary sewer.

4.3 STORM SEWER SERVICE

4.3.1 EXISTING SERVICES

HURONTARIO STREET

Hurontario Street has an existing 525 mm diameter storm sewer adjacent to the proposed development. This storm sewer flows north on Hurontario Street to an outlet ditch of unknown capacity.

CAMPBELL STREET

Campbell Street does not currently have a storm sewer adjacent to the proposed development. There is an existing storm sewer on Maple Street, which collects drainage from Campbell Street via a catchbasin located at the northeast quadrant of the intersection.

FINDLAY DRIVE

Findlay Drive has an existing 375 mm diameter storm sewer adjacent to the proposed development. This sewer connects to a 500 mm dia. sewer on Hurontario Street, which increases to a 525 mm diameter and continues north along Hurontario Street to an existing outlet channel.

4.3.2 EXISTING LAND-USE AND DRAINAGE

The subject property is a 1.71 ha parcel of land comprising three (3) existing residential lots at 774 Hurontario Street, 750 Hurontario Street and 33 Findlay Drive. Under pre-development conditions, the subject site consists of 97% pervious surfaces, and has an estimated runoff coefficient of 0.32.

Existing drainage patterns for the site were determined based on topographic survey information. The pre-development catchment areas are as illustrated in **Figure 2** (attached).

4.3.3 RAINFALL INFORMATION

The rainfall intensity for the site was calculated using the following equation:

$$I = \left[\frac{A}{(T_d + C)^B}\right]$$

Where:

- I = rainfall intensity (mm/hr)
- T_d = storm duration (minutes)
- A, B, C = IDF parameters for each return period (see below)

The parameters (A, B and C) recommended for use by the Town of Collingwood Development Standards (Standard 110, 2003) are summarized below in **Table 1**.

LEGEND

- PROJECT AREA BOUNDARY
- SUB-CATCHMENT BOUNDARIES
- OVERLAND FLOW ROUTE

ID — SUB-CATCHMENT ID.
AREA — DRAINAGE AREA (ha)
C — RUNOFF COEFFICIENT

Topographic survey prepared by SMC Geomatics (December 2017)

CLIENT: STRAWHAT RESTORATION

TITLE: BLACKMOOR GATE

EXISTING CONDITIONS

Checked B.W.	Drawn AutoCAD/J.W.
Date MARCH 2018	Proj. No. 171-16446-00
Scale 1:1,200	Figure No. 2 Gr.No.

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160316_Figure 2.dwg 11x17 (2) \\Canott1000sto01\Water Resources\Projects\2016\171-16446-00_Blackmoor Gate\Drawings\ Mar 16, 2018 - 12:1pm

Table 1: Town of Collingwood Rainfall Parameters

RETURN PERIOD (YEARS)	2	5	10	25	50	100
A	807.4	1135.4	1387.0	1676.2	1973.1	2193.1
B	0.828	0.841	0.852	0.858	0.868	0.871
C	6.750	7.500	7.970	8.300	9.000	9.040

4.3.4 ALLOWABLE FLOW RATES

Relevant policies from the Town of Collingwood and the Nottawasaga Valley Conservation Authority (NVCA) require the post-development discharge rate from the site to match pre-development flows for the 2- to 100-year storm events and safe conveyance of the Regulatory Flow through the site. However, a conservative approach has been taken to control the 100-year post-development flow to the 2-year pre-development flow as runoff from the site is proposed be discharging to a municipal storm sewer.

Rational method was used to calculate the peak flow rates for the site in the pre-development conditions summarized in **Table 2**. Detailed calculations are provided in **Appendix B**.

Table 2: Pre-Development Peak Flow Rate Calculations (Based on T_d= 10 minutes and C=0.32)

RETURN PERIOD (Years)	RAINFALL INTENSITY, I (mm/hour)	PEAK FLOW RATE (L/sec)
2	**78.3**	**113**
5	102.3	147
10	118.4	170
25	138.4	199
50	153.2	221
100	168.4	243

4.4 WATER SERVICE

HURONTARIO STREET

Presently, there is a 300 mm diameter trunk watermain servicing Hurontario Street. The existing home to remain on Hurontario Street has a 19 mm diameter service to this system.

CAMPBELL STREET

Presently, there is a 200 mm diameter watermain servicing Campbell Street.

FINDLAY DRIVE

Presently, there is a 450 mm diameter watermain servicing Findlay Drive. The existing home on Findlay Drive has a 19 mm diameter service to this system.

4.5 TOWN SERVICING PLANS

The following is a list of existing servicing plans for the previously described services that have been provided by the Town's Engineering Services Department. The existing servicing plans have been included in **Appendix B**.

DESCRIPTION	ID NO.
Town of Collingwood, Sanitary Sewer Renewal Program (2008) Plan and Profile – Maple Street	PP-70 & PP-71
Town of Collingwood, Maple Street Drainage Improvements (2017) Storm Drainage Plan	STM-1
Town of Collingwood, South Collingwood Servicing (2006) Plan and Profile – Hurontario Street	PP-20-23
Town of Collingwood, Campbell Street Reconstruction (1973) Plan and Profile – Campbell Streel	72228-1
Town of Collingwood, Hurontario Street Road Widening (1973) Plan and Profile – Hurontario Street	2675-PP1-5

4.6 UTILITIES SERVICING

Collus Power Stream Corp., Enbridge, Bell and Rogers Cable currently have services in the existing right-of-ways adjacent to the Blackmoor Gate site.

5 PROPOSED SITE SERVICING

5.1 SANITARY SEWER SERVICING

It is proposed that the 34 unit development be serviced by the Birch Street sanitary catchment. The existing home at 774 Hurontario Street is proposed to remain post development and maintain its current lateral connection on Hurontario Street. The two (2) proposed units with frontage on Findlay Drive are proposed to each connect via new lateral connections to the existing sewer on Findlay Drive.

The remaining 31 lots of the proposed subdivision are to be serviced by new sanitary sewers outletting to the Town of Collingwood's existing sanitary sewer system on Campbell Street. The preliminary servicing plan and accompanying flow sheet can be found in **Appendix C**.

The Blackmoor Gate sanitary sewer is proposed to be constructed of 200mm to 250 mm diameter PVC DR 35 sewer pipe with rubber gasketed connections and will have a minimum grade of 0.4%.

All sewer construction and pipe bedding shall conform to Town of Collingwood and OPSS standards for sanitary sewer construction.

Service connections, complete with prefabricated tees, are proposed to be constructed using PVC SDR 28 sewer pipe with a diameter of 125 mm installed at 2.0% minimum grade. Design flows were calculated on the assumption of 2.9 persons per unit and an average daily per capita flow of 450 L/d. The peaking factor was calculated using the Harmon Formula.

Peak Flow = $\frac{MQP}{86.4} + IA$

Where: Q = 450 L/cap/day

M = Peak Flow Factor "Harmon" = $1 + \frac{14}{4+P^{0.5}} = 4.25$

P = Population/1000 = $31 * 2.9 / 1000 = 0.089$

I = 0.23 L/ha. (extraneous flow)

A = Area (site) = (1.71 ha.)

Therefore, Peak Flow = $\frac{4.25*450*0.089}{86.4} + 0.23 * 1.71$

= $1.97 + 0.39$

= 2.36 L/s

Design flows are based on the assumption that maintenance hole openings are located in the center line of the roadway and do not occur in extreme sags in the roadway where ponding may occur. In addition, the above also assumes that no roof or foundation drains will be connected to sanitary sewers, there will be adequate inspection and testing during the construction of public sewers and private connections, and a routine inspection and maintenance programme will be undertaken by the operating authority to ensure that a water-tight sewer system is maintained.

The proposed sewer was reviewed in terms of capacity. A Manning "n" value of 0.013 was used in the design of the sewers as per the Town of Collingwood Development Standards, which should adequately reflects the PVC DR 35 smooth walled pipe proposed.

5.2 STORM WATER MANAGEMENT AND SERVICING

5.2.1 DESIGN CRITERIA

The anticipated SWM design criteria for the project, from each of the applicable sources, are detailed below.

TOWN OF COLLINGWOOD DESIGN STANDARDS (2002)

- **Water Quality-** controls are to be implemented on applications in accordance with the applicable Master Drainage or Sub watershed Plan or site specific plan. A sub watershed plan for Black Ask Creek has been prepared by the NVCA in association with the Town of Collingwood et al. In the absence of an established plan the MOE- SWM Practices, Planning and Design Manual should be used.

During consultation discussions with Town staff it is also understood that capacity of the receiving storm drainage system is a concern, and therefore control of peak flow rates will be necessary to ensure post-development conditions do not exacerbate downstream issues. On this basis it is proposed that post-development peak runoff rates for all events up to the 100-year storm are controlled to the pre-development 2-year storm or capacity of the receiving system.

NOTTAWASAGA VALLEY CONSERVATION AUTHORITY STORMWATER TECHNICAL GUIDE (2013)

- **Stormwater Quantity-** control post-development flows to pre-development levels for the 2- to 100-year storm events and safe conveyance of the Regulatory flow through the site.
- **Stormwater Quality-** enhanced level of protection as per the latest MOE SWMPDM is required (80% TSS Removal).
- **Water Balance-** for significant groundwater recharge areas and highly vulnerable aquifers, site-specific water balance analyses are required.

5.2.2 GENERAL

The proposed Blackmoor Gate post-development condition details are shown in **Figure 3** including land uses and estimated stormwater sub-catchments.

Vehicular access to the site is proposed to be provided by new roadway from Campbell Street. A single discharge point is proposed at Campbell Street. It is proposed that a new storm sewer is installed on Campbell Street, connecting to the existing storm sewer on Maple Street to accommodate discharge from the site. The preliminary layout of the proposed new storm sewer on Campbell Street can be found in **Appendix D**.

The Blackmoor Gate storm sewer is proposed to be constructed of 300mm to 375 mm diameter HDPE smooth wall ribbed pipe with a minimum grade of 0.4%.

All storm sewer construction and pipe bedding shall conform to Town of Collingwood and OPSS standards for storm sewer construction.

The onsite storm sewer servicing plan and flow design sheet can be found in **Appendix D**.

An estimated area breakdown for the new site layout (concept plan) is provided in **Table 3** below.

CAMPBELL STREET

OUTLET PIPE TO BE 200mmØ
STORM DESIGN ON CAMPBELL TO BE DETERMINED.
ASSUMED INVERT ELEVATION FROM RECORD DWG'S WILL BE
1.2m BELLOW EXISTING CENTER LINE GRADE.

68.91m OF 2400X1200 BOX CULVERT @ -0.05% C/W ENDCAPS
TOTAL 198 CUBIC METERS OF STORM WATER STORAGE

55.34m OF 1800X1200 BOX CULVERT @ 0.00% C/W ENDCAPS
TOTAL 119.5 CUBIC METERS OF STORM WATER STORAGE

MAPLE STREET

HURONTARIO STREET

PROPOSED REAR SWALE
TO DRAIN TO DI

PROPOSED REAR SWALE
TO DRAIN TO DI

CSP
189.240

SAMH

CB

SIB

IB

WTV

101
1.25
0.64

102
0.37
0.74

11.58%
12.57%
4.98%
3.46%
3.11%
0.87%
3.54%
3.13%
1.59%
10.65%
7.27%

LEGEND

- PROJECT AREA BOUNDARY
- SUB-CATCHMENT BOUNDARIES
- ID — SUB-CATCHMENT ID.
- AREA — DRAINAGE AREA (ha)
- C — RUNOFF COEFFICIENT

CLIENT
STRAWHAT RESTORATION

TITLE
BLACKMOOR GATE

PROPOSED CONDITIONS

Checked B.W.	Drawn AutoCAD/J.W.	
Date MAY 2018	Proj. No. 171-16446-00	
Scale 1:1,250	Figure No. 3	Gr.No.

180504_Blackmoor_Figure3.dwg PROGRADE (2) C:\Users\julia.wanstrough\Desktop\ May 08, 2018 - 2:16pm

Table 3: Proposed Land-Use Area Breakdown

LAND-USE	AREA (M2)	% COVERAGE	RUNOFF COEFFICIENT
Controlled Drainage Areas (Catchment Area: 101)			
Impervious Roof	2532	16%	0.9
Walkways and Driveways (Permeable Pavers)	951	6%	0.6*
Asphalt	3986	25%	0.9
Soft-landscaping	5015	31%	0.3
Controlled Drainage Areas (Catchment Area: 102)			
Impervious Roof	1606	10%	0.9
Walkways and Driveways (Permeable Pavers)	1177	7%	0.6*
Asphalt	503	3%	0.9
Soft-landscaping	414	3%	0.3
TOTALS	16,183	100%	

**Runoff coefficient is reduced due to expected use of permeable pavers (Unilock Ecolock product or similar)*

In addition, the weighted runoff coefficients for each subcatchment have been tabulated below (**Table 4**).

Table 4: Subcatchment Runoff Coefficients

CATCHMENT ID		AREA (m^2)	WEIGHTED RUNOFF COEFFICIENT
101	**Controlled**	12,483	0.64
102		3,700	0.74

To meet stormwater management objectives, as defined by the design criteria outlined in section 5.2.1, the following components have been proposed:

- → Permeable pavement for walkways and driveways
- → Raised planter beds – from pre-consultation document
- → Underground storage (provided by concrete box culvets)
- → OGS unit

The application and sizing of these proposed stormwater management facilities is outlined in the following sections.

5.2.3 WATER QUALITY

As noted previously, a single outlet location at Campbell Street is proposed for this site and runoff will be released through orifice control of an oversized pipe. A suitably sized oil and grit separator (OGS) unit is proposed to achieve minimum 80% TSS removal ("Enhanced" level, per development criteria) for runoff from the at-grade parking and asphalt areas.

It is assumed that runoff from the proposed rooftop areas, walkways and pervious areas will be free of typical sediment-generating activities and therefore runoff will leave them effectively unchanged, and can be considered clean for the purposes of water quality assessment.

Refer to the Stormwater Management Report, prepared by WSP Canada Inc. dated May 9, 2018 for further details on the OGS sizing.

5.2.4 WATER QUANTITY

As noted in section 4.3.4, the target discharge rate to the municipal sewer system from the site is 113 l/sec. This is equivalent to the peak runoff rate under pre-development conditions during a 2-year design storm event.

In post-development conditions, it is proposed that water quantity control for the site will be provided by two box culverts with orifice control on the outlet. The proposed design features are indicated below:

MAIN STORAGE- CAMPBELL STREET OUTLET

- → 2400 mm x 1200 mm Box Culvert (69 m length)
- → 6 Manholes Assumed
- → 0.1% slope assumed
- → Orifice control plate- 225 mm diameter- to be installed at the invert of the downstream end

COMMON AREA STORAGE

- → 1800 mm x 1200 mm Box Culvert (55 m length)
- → 0.1% slope assumed
- → Orifice control plate- 90 mm diameter- to be installed at the invert of the downstream end

The modified rational method was used to determine the storage required to control the post-development flows to the allowable release rate. Refer to the Stormwater Management Report for detailed calculations.

5.2.5 WATER BALANCE

Based on review of NVCA online mapping, it has been determined that the proposed site is not within a significant groundwater recharge area or highly vulnerable aquifer and therefore a site-specific water balance analysis is not required (see map in **Appendix D**).

5.3 WATER SERVICING

Water servicing for the proposed subdivision is proposed to be accomplished by making connection to existing water services on Campbell Street and Hurontario Street, with looping of the watermain through the proposed Blackmoor Gate development. The proposed watermain layout is shown on the servicing plan found in **Appendix E**.

Water supply design has two (2) components; supply demand flow and fire protection flow at minimum pressure requirements.

Following the Town's Development Standards, the proposed development's water demand has been calculated as follows:

Maximum Day Flow required for the 31 units:

$\mathbf{Q_{Max\ Day}} = \frac{Q*P*2.0}{86.4} = \frac{450*0.089*2.75}{86.4} = \mathbf{0.93\ L/s}$

Where: Q=450litres/capita/day, and P=population/1000, Maximum Daily Demand Factor= 2.0

Peak Hour Flow:

$\mathbf{Q_{Peak\ Hour}} = \frac{Q*P*4.5}{86.4} = \frac{450*0.089*4.5}{86.4}$ **2.086 L/s**

Where: Q=450litres/capita/day, and P=population/1000, Peak Hourly Demand Factor= 4.5

Fire Flow Requirements based on a single worst-case lot:

Fire Flows	$\mathbf{Q_{fire}}$	**= 150 L/s**
Storage Requirements (for 1.75 hours)		**= 945 m^3**

Fire flow calculations have been completed in accordance with the current issue of the Fire Underwriters Survey publication *Water Supply for Public Fire Protection*. Detailed fire flow calculations can be found in **Appendix E.**

As per the Town of Collingwood's standards and current applicable MOECC regulatory standards:

- The maximum sustained operating pressure shall not exceed 700 kPa and not fall below 275 kPa
- The maximum static pressure shall not exceed 550 kPa

The 31 proposed units of Blackmoor Gate are proposed to be serviced by a 150 mm diameter class 52 ductile iron pipe, making connection to the existing Hurontario Street and Campbell Street watermains, with looping through the development. The existing watermain on Hurontario Street is a 300 mm diameter ductile iron pipe, and the existing watermain on Campbell Street is a 200 mm diameter ductile iron watermain.

The existing unit on Hurontario is proposed to maintain its current 19 mm service connection to Hurontario Street.

The two (2) single detached units with frontage on Findlay Drive are proposed to be serviced by two (2) new service connections to the existing 450 mm trunk watermain on Findlay drive. The existing unit's current connection is proposed to be removed following the turn off and disconnection at the curb stop completed by the Town's Water Department.

Proposed service connections shall be 20 mm diameter type K copper pipe and terminate at the property line, centered across the frontage. Fittings will be mechanical joint ductile iron with Rolmac gripper ring in accordance with the Town of Collingwood's current Development Standards.

The minimum cover on all proposed watermains, water services and hydrant leads will be 1.7 m. Watermains and services across roadways will be backfilled with approved granular materials and thoroughly compacted in appropriate layers. Thrust blocks or restrained joints and anchored tees (to Town satisfaction) corresponding to OPSD 1103.010 and 1103.020 will be constructed where the pipe is placed in undisturbed native soils, where the minimum soil bearing capacity exceeds 200 kPa, or where soil conditions are suspected to be inadequate.

The hydrant spacing along street lines in the subdivision will not exceed 90 m. There are two (2) proposed fire hydrants required as shown on the servicing plan found **in Appendix E**. An existing hydrant on Hurontario Street is located on the north side of the proposed developments Hurontario Street frontage.

5.4 UTILITY SERVICING

Existing Collus Power, gas, telephone and cable utilities perimeter the lot to provide services for the proposed development. However, access and any upgrade/improvements will need to be determined by the utility providers during the detailed design stage.

The preliminary streetlighting (LED luminaries) layout and photometric design have been completed to Town of Collingwood standards. The proposed Lighting Plan for the development can be found in **Appendix F**.

6 PRELIMINARY GRADING

A preliminary grading plan has been prepared and can be found in **Appendix G**. The preliminary grading design is based on a number of parameters including the required 0.5 m separation from the groundwater table to the underside of basement slab, minimum cover on all proposed services, and the existing perimeter grades. The minimum grade of the proposed roads is 0.5% per the Town of Collingwood Design Standards.

7 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing, the following is concluded regarding the proposed residential development.

1. Existing public roadway access is available to the site, subject to entrance access construction to the Town's standards and approval.
2. Storm Water Management including onsite storage, grading, and drainage shall be designed/completed in accordance with Town Development Standards and approvals and necessary agency approvals shall be obtained.
3. The storm sewer on Maple Street has the available capacity to accept post development flows not exceeding the pre-development flows at the 2 year storm from the proposed development.
4. An OGS unit (suitably sized Stormceptor unit, or equivalent) is proposed downstream of the orifice control for the Campbell Street outlet to meet MOE Enhanced treatment standards (80% TSS removal).
5. Controlled runoff on site is proposed to be directed to a storm sewer network with two box culverts having a minimum combined storage volume of 359 m^3. Outflow from the common area storage culvert is proposed to be controlled by a 90 mm orifice plate, and the main storage culvert controlled by a 225mm diameter orifice plate in order to satisfy equivalent maximum pre-development release rate of 113 l/sec for all events up to and including the 100-year return period.
6. A preliminary analysis of the required grade raise to accommodate the underground storage network was undertaken, establishing the proposed profile of the new roadway will not pose conflict with the existing profile of Campbell Street. The site grading plan will be finalized prior to further reporting and design.
7. The sanitary sewer on Campbell Street has the available capacity to provide service for the proposed 31 new units of the development. The proposed sewer shall be designed/completed in accordance with Town Engineering Standards and approvals and necessary agency approvals shall be obtained.
8. The new watermain within the development is proposed to connect on Hurontario Street and Campbell Street to service 31 new units of the development satisfying residential and fire flows. The watermain on Findlay Drive is proposed to service the two new units with frontage on Findlay Drive. All site proposed water mains and service connections and shall be constructed to Town Standards and in accordance with current applicable MOECC requirements.
9. Utility companies will be notified of the proposed development to confirm servicing requirements and planning for plant upgrades, if necessary, to provide such servicing to the site.
10. That a meeting with Town officials should be scheduled for discussions regarding the content of this Functional Servicing Report, feasibility, and direction prior to completion more detailed design, engineering submissions, and final reporting, to meet their approval prior to this development proceeding.

APPENDIX

A EXISTING LEGAL SURVEY

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE _____

_____
MICHAEL MACEK, O.L.S.

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

PLAN 51R-

RECEIVED AND DEPOSITED

DATE _____

_____
REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF SIMCOE (NO. 51)

SCHEDULE

PART	LOT	REGISTERED PLAN	P. I. NO.	AREA
1	PART OF BLOCK P	REGISTERED PLAN 353	ALL OF PIN 58261-0261	7920.5 m^2
2				1565.6 m^2
3	PART OF LOT 5		ALL OF PIN 58261-0262	1012.6 m^2
4	PART OF BLOCK A	REGISTERED PLAN 334	ALL OF PIN 58261-0103	5430.3 m^2
5	PART OF LOT O	REGISTERED PLAN 353	ALL OF PIN 58261-0259	1077.3 m^2

PLAN OF SURVEY OF

PART OF LOT 5, PART OF LOT O AND PART OF BLOCK P REGISTERED PLAN 353

AND

PART OF BLOCK A REGISTERED PLAN 334

IN THE

TOWN OF COLLINGWOOD

COUNTY OF SIMCOE

SCALE 1: 500

5 0 5 10 15 20 30 50 metres

WSP GEOMATICS ONTARIO LIMITED
ONTARIO LAND SURVEYORS
2017

NOTE

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATIONS, UTM ZONE 17, NAD83(CSRS)(2010).

SPECIFIED CONTROL POINTS (SCPs) UTM ZONE 17 NAD83 (ORIGINAL), COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10		
POINT ID	NORTHING	EASTING
A	4926121.38	562489.41
B	4926070.04	562318.28
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

DISTANCES HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR 0.9996326

LEGEND

■	DENOTES	FOUND
□	DENOTES	PLANTED
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
PB	DENOTES	PLASTIC BAR
MMM	DENOTES	WSP GEOMATICS ONTARIO LIMITED (FORMERLY MMM GEOMATICS ONTARIO LIMITED)
OU	DENOTES	ORIGIN UNKNOWN
WIT	DENOTES	WITNESS
P1	DENOTES	PLAN 51R-39905
P2	DENOTES	PLAN 51R-36293
P3	DENOTES	PLAN 51R-33885
P4	DENOTES	PLAN 51R-23404
P5	DENOTES	PLAN 51R-26909
P6	DENOTES	PLAN 51R-1209
MTO	DENOTES	MINISTRY OF TRANSPORTATION
ZUMO	DENOTES	ZUBEK, EMO, PATTEN AND THOMSEN LIMITED, O.L.S.
JDB	DENOTES	J.D. BARNES LTD, O.L.S.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 18TH DAY OF OCTOBER, 2017.

DATE _____ MICHAEL MACEK, ONTARIO LAND SURVEYOR

WSP Geomatics Ontario Limited — Ontario Land Surveyors
610 Chartwell Road, Suite 300, Oakville, Ontario Canada, L6J 4A5
t: 905-823-8500 f: 905-823-8503 Website : www.wspgroup.ca

Drawing Number : **17M-01364-100**

P.Chief : L.L. / J.S.	Dwg. By : M.A.M.	Chk'd by : M.M.	
Job Number : 17M-01364-00-GEO1		Tab Name: R-PLAN	
Dwg File Name: P17-M1003-61_R03_ C3D2015.DWG			

K:\Jobs\17P\17M1003-61-SR1_Blackmoor Collingwood\05. Drawings\01. DWG\P17-M1003-61_R03_ c3d2015.dwg

APPENDIX

B EXISTING SERVICES

Project: Blackmoor Gate		No.: 171-16446-00	
By: JW		Date: 5/8/2018	Page: 1
Checked:			

Subject: **SWM Calculations - Allowable Release Rate**

Calculation of existing runoff rate is undertaken using the Rational Method: $Q = 2.78CiA$

Where: Q = peak flow rate (litres/second)
C = runoff coefficient
i = rainfall intensity (mm/hour)
A = catchment area (hectares)

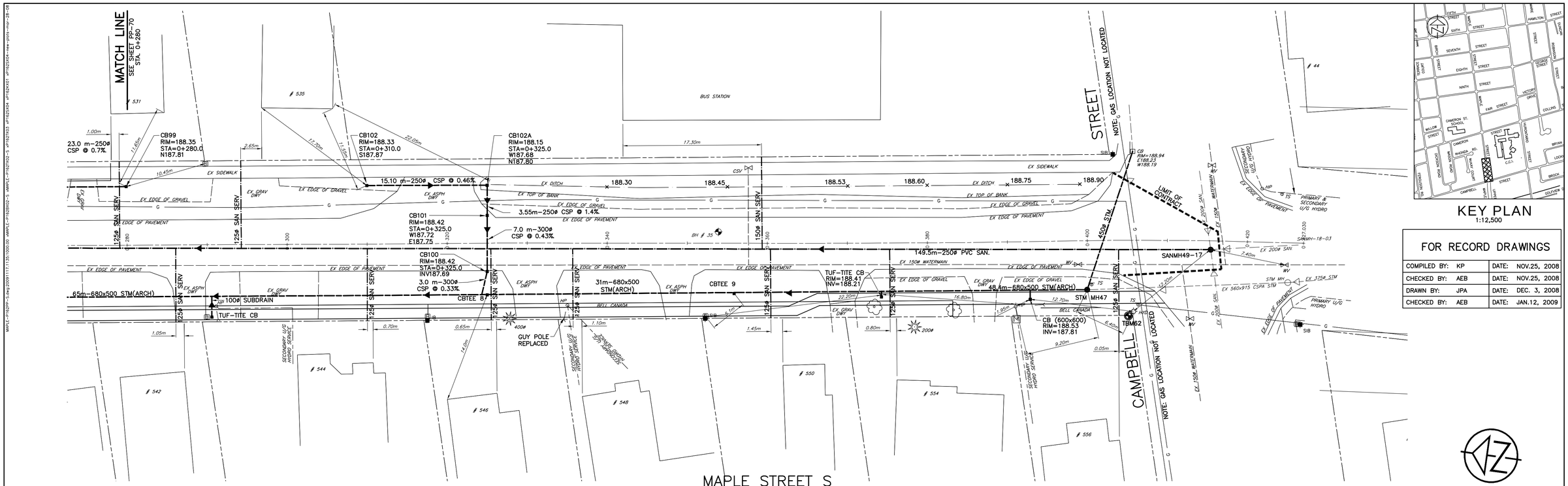
Site Area, A	16,183	m^2
Site Area, A	1.62	hectares
Runoff Coefficient, C	0.32	

Rainfall intensity calculated using the Town of Collingwood IDF parameters (Town of Collingwood Development Standards, 2003):

$$i = \left[\frac{A}{(Td + C)^B}\right]$$

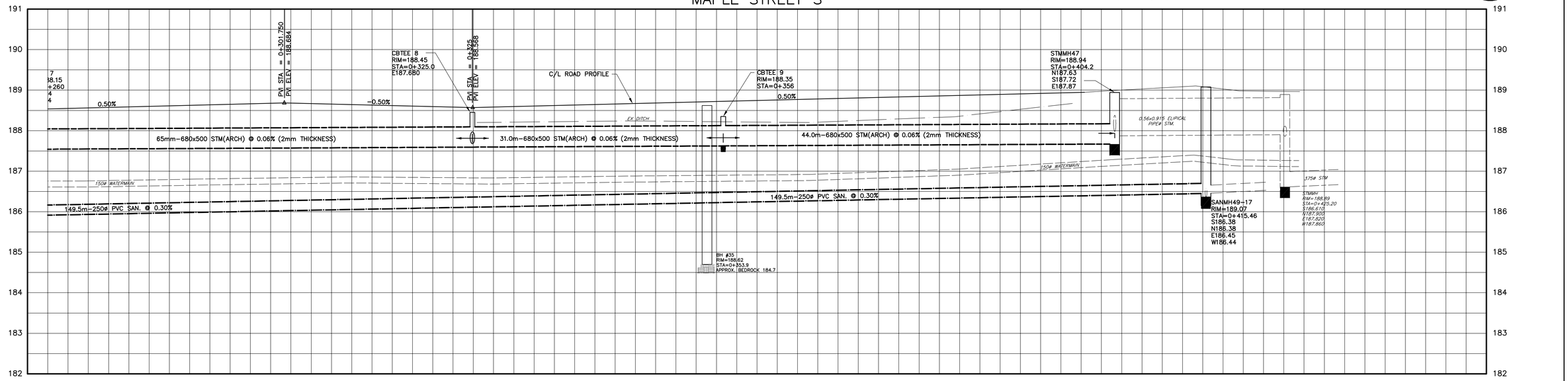
Where: A, B, C = regression constants for each return period (Standard 110)
i = rainfall intensity (mm/hour)
Td = storm duration (minutes) 10 minutes

Return Period (Years)	2	5	10	25	50	100
A	807.4	1,135.4	1,387.0	1,676.2	1,973.1	2,193.1
B	0.828	0.841	0.852	0.858	0.868	0.871
C	6.750	7.500	7.970	8.300	9.000	9.040
T (mins)	10	10	10	10	10	10
I (mm/hr)	78.3	102.3	118.4	138.4	153.2	168.4
Q (litres/sec)	**113**	**147**	**170**	**199**	**221**	**243**
Q (m3/sec)	0.113	0.147	0.170	0.199	0.221	0.243



FOR RECORD DRAWINGS	
COMPILED BY: KP	DATE: NOV.25, 2008
CHECKED BY: AEB	DATE: NOV.25, 2008
DRAWN BY: JPA	DATE: DEC. 3, 2008
CHECKED BY: AEB	DATE: JAN.12, 2009

MAPLE STREET S



C/L ELEV	188.57	188.68	188.59	188.64	188.74	188.84	188.94			C/L ELEV
CHAINAGE	0+280	0+290	0+300	0+320	0+340	0+360	0+380	0+400	0+420	0+427

NOTES

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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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.

NO.	REVISIONS	DATE	INITIAL
4.	FOR RECORD INFORMATION ADDED	DEC 5/08	BFS
3.	ISSUED FOR CONSTRUCTION	MAY 6/08	BFS
2.	ISSUED FOR MOE SUBMISSION	MAR.28/08	KRS
1.	ISSUED FOR TENDER	MAR.25/08	KRS

APPROVED

ORIGINAL STAMPED BY B. F. STANTON MAY 6 2008

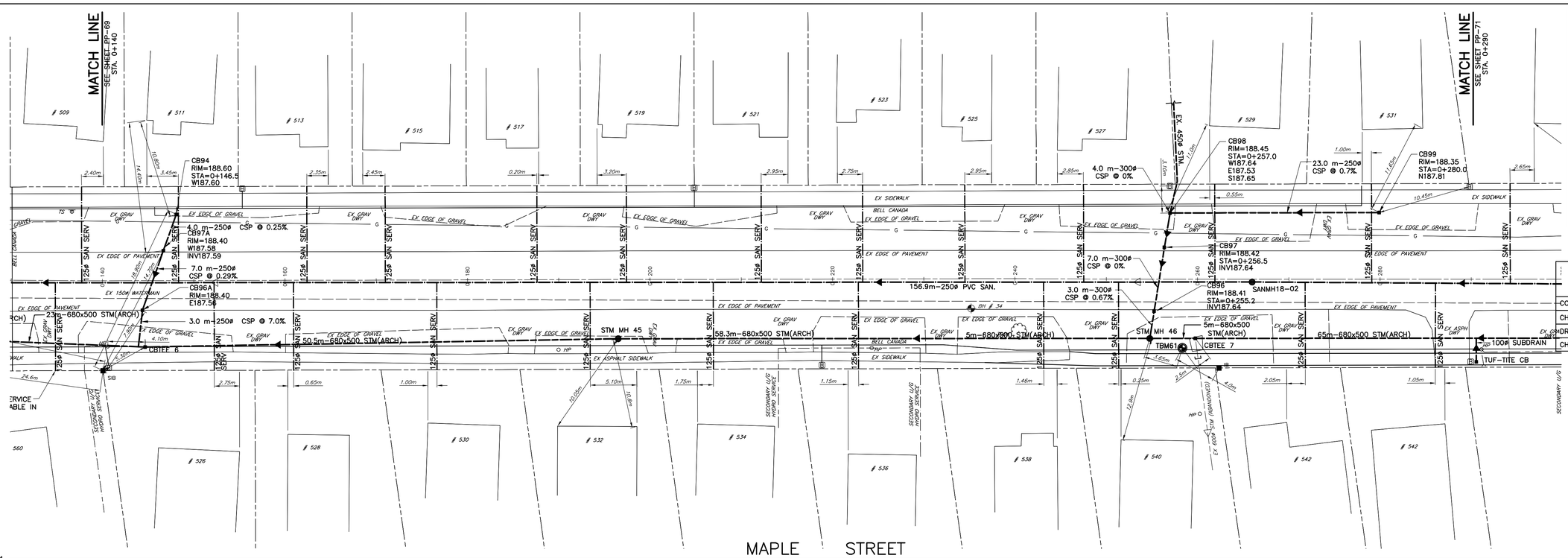
ORIGINAL STAMPED BY K. R. SANSOM MAY 6 2008

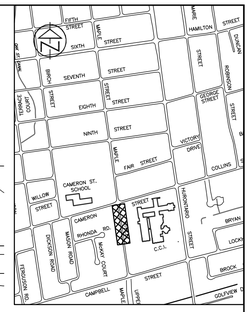
TOWN OF COLLINGWOOD
SANITARY SEWER RENEWAL PROGRAM
PHASE 1- CONTRACT 4

PLAN AND PROFILE MAPLE STREET STA. 0+290 TO 0+427

C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

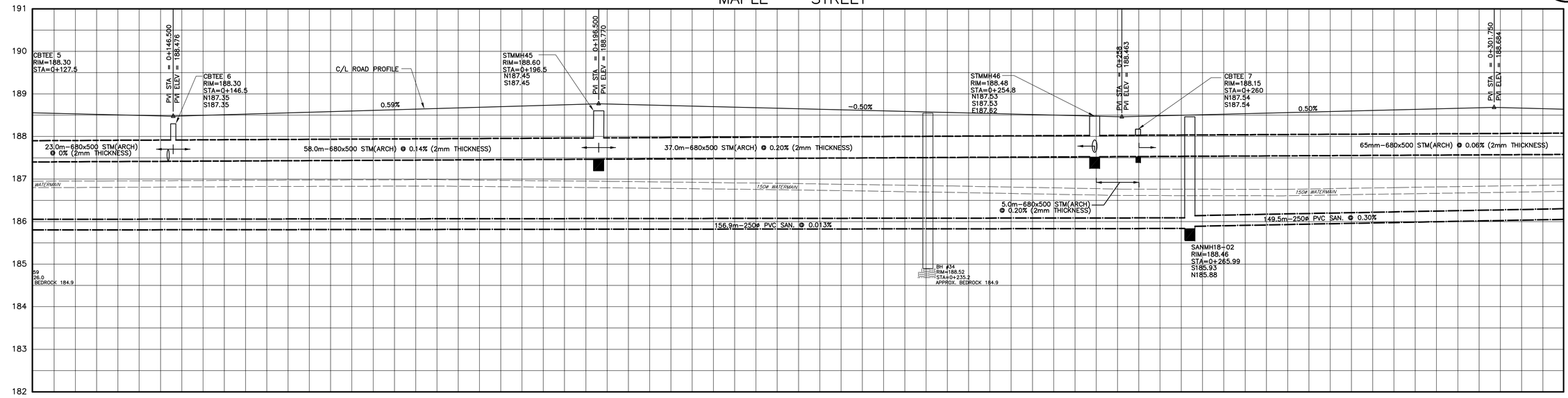
SCALE: HORIZ. 1:250 VERT. 1:50		JOB NO.	105162-11
DESIGN: WK	CHECKED: KRS	DWG.	PP-71
DRAWN: WK	DATE: MAR./2008		





FOR RECORD DRAWINGS

COMPILED BY:	KP	DATE:	NOV.25, 2008
CHECKED BY:	AEB	DATE:	NOV.25, 2008
DRAWN BY:	JPA	DATE:	DEC. 3, 2008
CHECKED BY:	AEB	DATE:	JAN.12, 2009



C/L ELEV		188.51		188.56		188.67	188.75	188.65	188.55	188.47	188.57	188.68	C/L ELEV
CHAINAGE	0+130	0+140		0+160		0+180	0+200	0+220	0+240	0+260	0+280	0+290	CHAINAGE

NOTES

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NO.	REVISIONS	DATE	INITIAL
4.	FOR RECORD INFORMATION ADDED	DEC 5/08	BFS
3.	ISSUED FOR CONSTRUCTION	MAY 6/08	BFS
2.	ISSUED FOR MOE SUBMISSION	MAR.28/08	KRS
1.	ISSUED FOR TENDER	MAR.25/08	KRS

APPROVED

ORIGINAL STAMPED BY B. F. STANTON MAY 6 2008

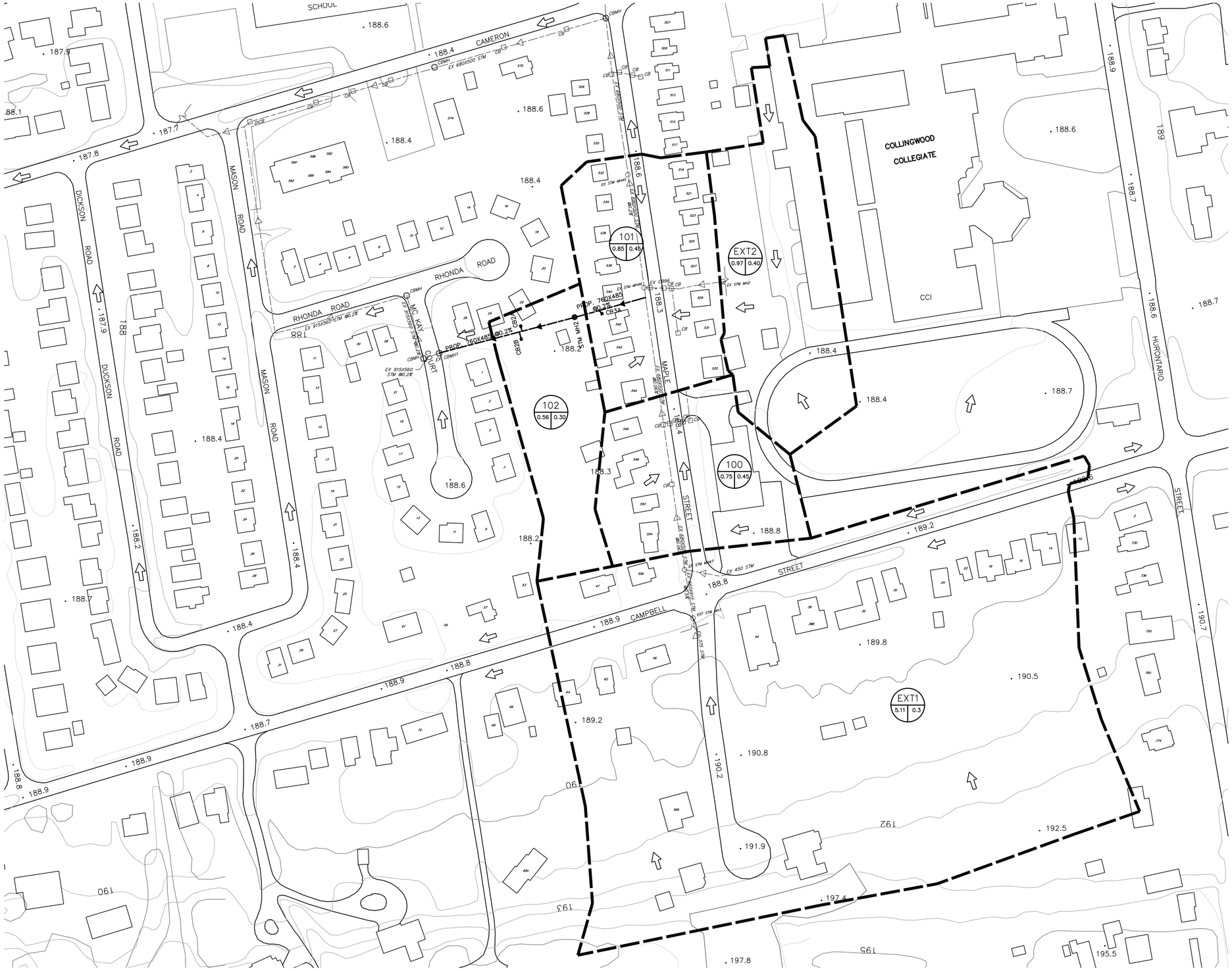
ORIGINAL STAMPED BY K. R. SANSOM MAY 6 2008

TOWN OF COLLINGWOOD
SANITARY SEWER RENEWAL PROGRAM
PHASE 1- CONTRACT 4

PLAN AND PROFILE MAPLE STREET STA. 0+140 TO 0+290

C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

SCALE: HORIZ. 1:250 VERT. 1:50		JOB NO.	105162-11
DESIGN: WK	CHECKED: KRS	DWG.	PP-70
DRAWN: WK	DATE: MAR./2008		



NOTES

1. CONTOURS AND ELEVATIONS FROM ONTARIO BASE MAPS.
2. DRAINAGE BOUNDARIES BASED ON OBM CONTOURS, FIELD INVESTIGATIONS, AND TOPOGRAPHIC SURVEY INFORMATION COMPILED BY CCTA.
3. COLLINGWOOD COLLEGIATE INSTITUTE DRAINAGE BOUNDARY BASED ON AS-BUILT DRAWINGS BY GREENLAND CONSULTING ENGINEERS PROJECT NO. 05-G-1781 DATED APRIL 20, 2006.
4. EXISTING INFRASTRUCTURE INFORMATION ON MAPLE STREET FROM AS-BUILT DRAWINGS BY CCTA FOR PROJECT 105162-11 DATED DECEMBER 5, 2008. EXISTING INFRASTRUCTURE INFORMATION ON MCKAY COURT AND RHONDA ROAD FROM AINLEY & ASSOCIATES DWG NO. 7552-4 DATED SEPTEMBER 1975.

LEGEND

CATCHMENT ID — 100
AREA IN HECTARES — 0.75
RUNOFF COEFFICIENT — 0.45
EXISTING CONTOUR — 192
EXISTING MAJOR OVERLAND FLOW DIRECTION
CATCHMENT AREA

CONTRACT DRAWINGS

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TBM-61: ELEVATION 188.76m
NAIL AND WASHERS IN SOUTH FACE OF HYDRO POLE NEAR SOUTH PROPERTY LINE OF 540 MAPLE STREET

NO.	REVISIONS	DATE	INITIAL
1.	ISSUED FOR MOECC ECA APPROVAL	JUNE/17	AEB

APPROVED

LICENSED PROFESSIONAL ENGINEER
A.E. BROWNRIDGE
100120565
JUNE 20/17
PROVINCE OF ONTARIO

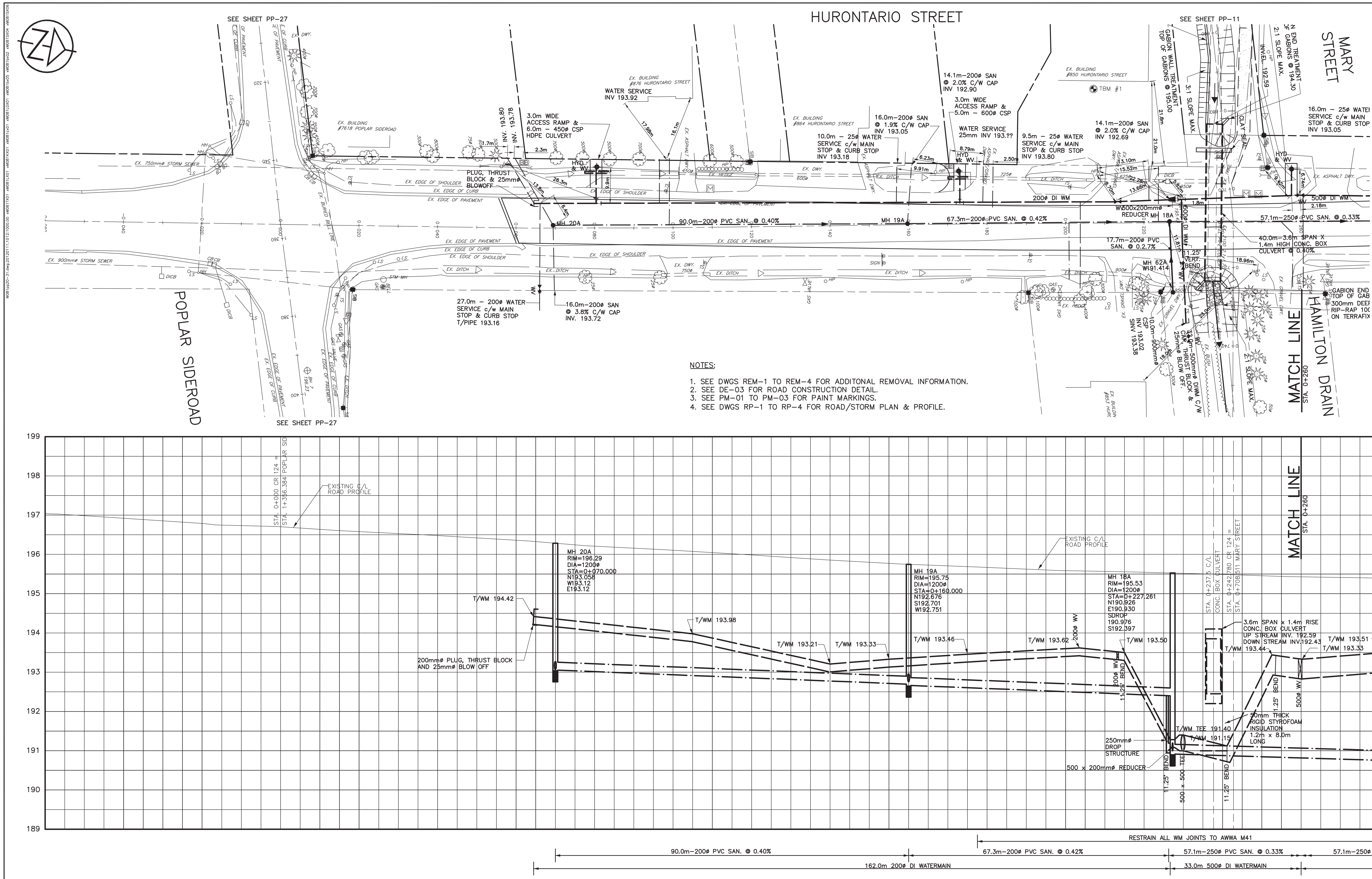
MAPLE STREET DRAINAGE IMPROVEMENTS TOWN OF COLLINGWOOD

STORM DRAINAGE PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

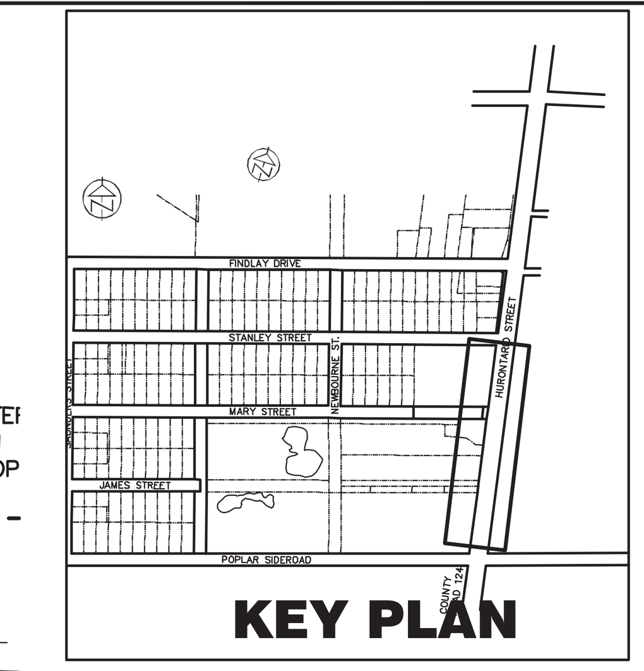
SCALE: 1:1000		JOB NO.	116248
DESIGN: APR	CHECKED: AEB	DWG.	STM-1
DRAWN: APR	DATE: FEB/17		

Drawing Name: 116248-STM1.dwg, Plotted: Jun 20, 2017



NOTES:

1. SEE DWGS REM–1 TO REM–4 FOR ADDITONAL REMOVAL INFORMATION.
2. SEE DE–03 FOR ROAD CONSTRUCTION DETAIL.
3. SEE PM–01 TO PM–03 FOR PAINT MARKINGS.
4. SEE DWGS RP–1 TO RP–4 FOR ROAD/STORM PLAN & PROFILE.



KEY PLAN

FOR RECORD DRAWINGS

COMPILED BY:	MH	DATE:	3/30/2007
CHECKED BY:	SEM	DATE:	3/30/2007
DRAWN BY:	PM	DATE:	3/14/2008
CHECKED BY:	BFS	DATE:	3/28/2008

CHAINAGE	–0+060	–0+040	–0+020	0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240	0+260	0+280
PROPOSED C/L ELEV																		
EXISTING C/L ELEV	197.04	196.92	196.79	196.70	196.58	196.48	196.36	196.21	196.11	195.99	195.85	195.75	195.67	195.59	195.55	195.49	195.43	195.40

LEGEND

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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 COPING OF BRIDGE AT NORTHWEST END, 1.25m BELOW TOP OF CONCRETE END POST AND 48cm EAST OF WEST END OF BRIDGE.

TBM #1 ELEVATION 195.956

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

TBM #2 ELEVATION 196.421

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

NO.	REVISIONS	DATE	INITIAL
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

APPROVED

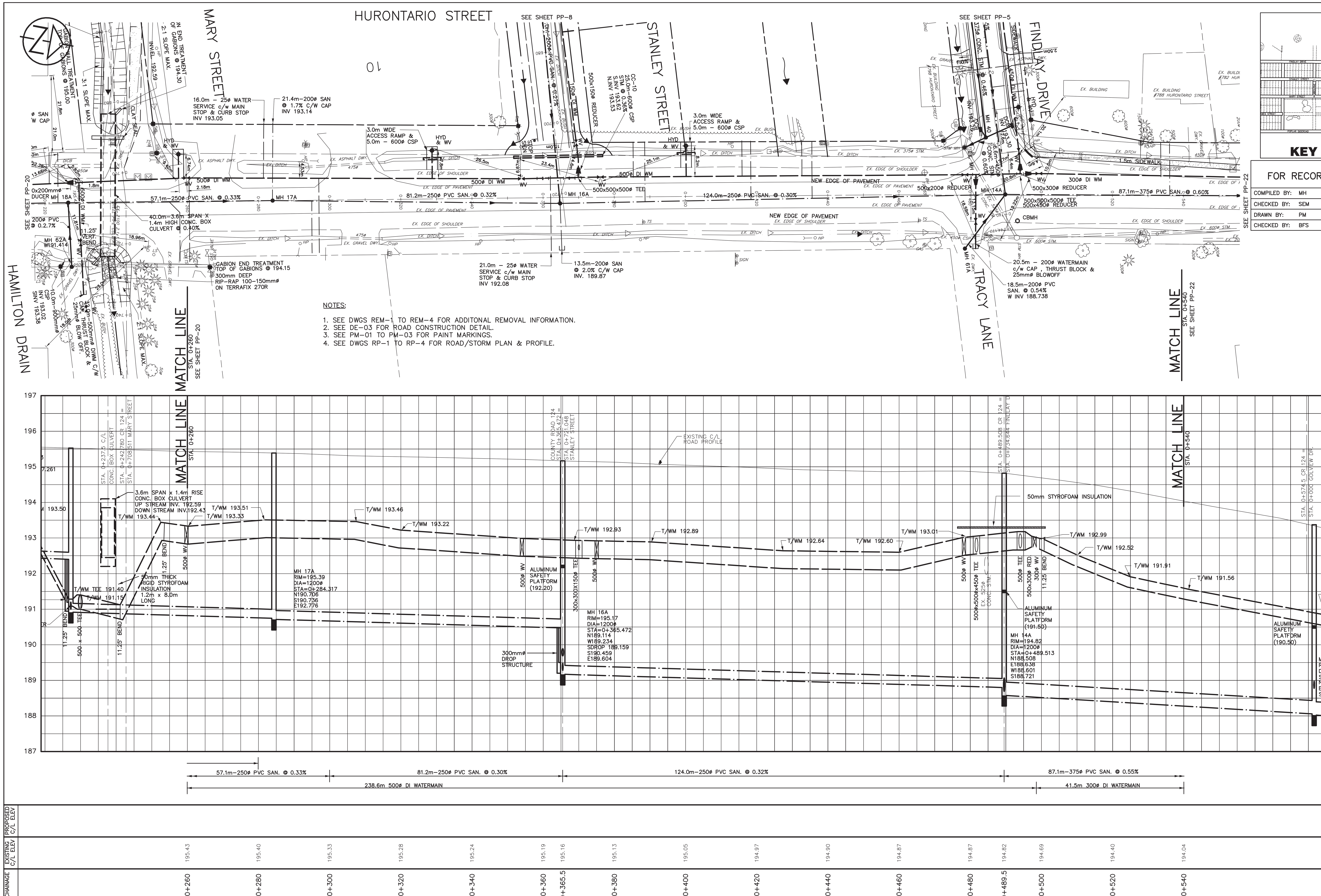
ORIGINAL STAMPED BY
B. F. STANTON
MAR 30/06

SOUTH COLLINGWOOD SERVICING
RESIDENTIAL SUBDIVISION
TOWN OF COLLINGWOOD

PLAN AND PROFILE
HURONTARIO STREET
STA. 0–040 TO 0+260

C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

SCALE: HORZ. 1:500 VERT. 1:50		JOB NO.	102081
DESIGN: RJF	CHECKED: RS	**DWG.**	**PP-20**
DRAWN: MCA/WJV	DATE: MARCH 2006		



FOR RECORD DRAWINGS

COMPILED BY:	MH	DATE:	3/30/2007
CHECKED BY:	SEM	DATE:	3/30/2007
DRAWN BY:	PM	DATE:	3/14/2008
CHECKED BY:	BFS	DATE:	3/28/2008

LEGEND

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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 COPING OF BRIDGE AT NORTHWEST END, 1.25m BELOW TOP OF CONCRETE END POST AND 48cm EAST OF WEST END OF BRIDGE.

TBM #1 ELEVATION 195.956

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

TBM #2 ELEVATION 196.421

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

NO.	REVISIONS	DATE	INITIAL
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

APPROVED

ORIGINAL STAMPED BY B. F. STANTON MAR 30/06

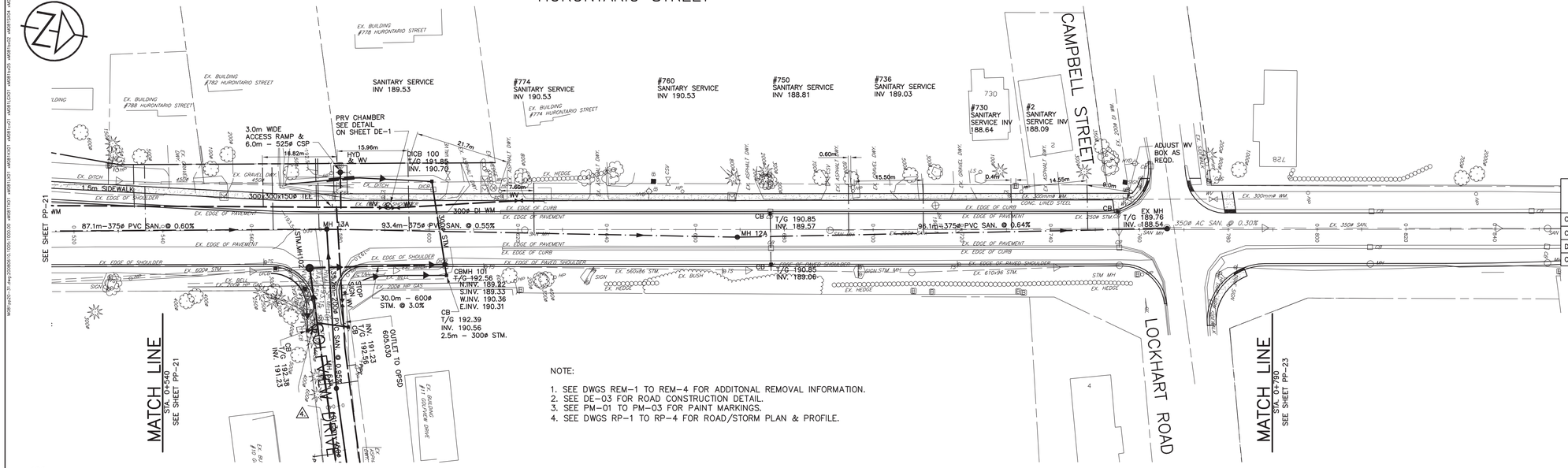
SOUTH COLLINGWOOD SERVICING
RESIDENTIAL SUBDIVISION
TOWN OF COLLINGWOOD

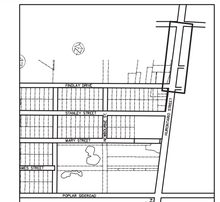
PLAN AND PROFILE
HURONTARIO STREET
STA. 0+260 TO 0+540

C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

SCALE: HORZ. 1:500 VERT. 1:50		JOB NO.	102081
DESIGN: RJF	CHECKED: RS	**DWG.**	**PP-21**
DRAWN: MCA/WJV	DATE: MARCH 2006		

HURONTARIO STREET

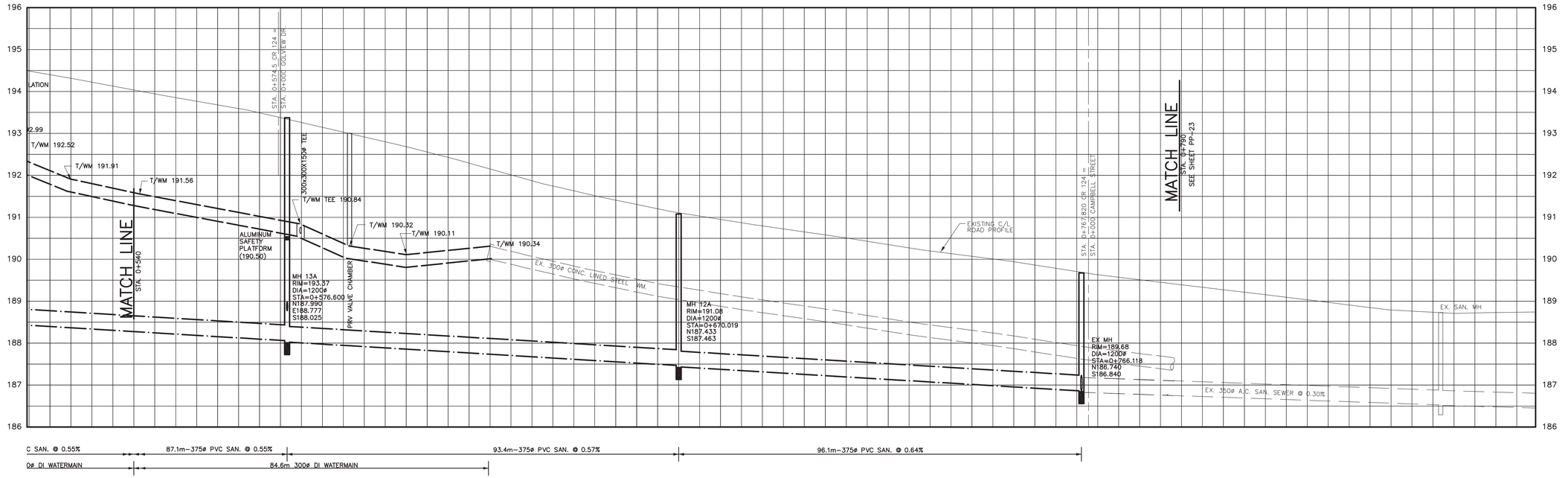




NOTE:

1. SEE DWGS REM–1 TO REM–4 FOR ADDITONAL REMOVAL INFORMATION.
2. SEE DE–03 FOR ROAD CONSTRUCTION DETAIL.
3. SEE PM–01 TO PM–03 FOR PAINT MARKINGS.
4. SEE DWGS RP–1 TO RP–4 FOR ROAD/STORM PLAN & PROFILE.

FOR RECORD DRAWINGS			
COMPILED BY:	MH	DATE:	3/30/2007
CHECKED BY:	SEM	DATE:	3/30/2007
DRAWN BY:	PM	DATE:	3/14/2008
CHECKED BY:	BFS	DATE:	3/28/2008



CHAINAGE	0+540	0+560	0+580	0+600	0+620	0+640	0+660	0+680	0+700	0+720	0+740	0+760	0+780	0+790
EXISTING C/L ELEV	194.04	193.68	193.26	192.80	192.29	191.75	191.31	190.95	190.65	190.35	190.07	189.79	189.51	189.39
PROPOSED C/L ELEV														

LEGEND

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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 COPING OF BRIDGE AT NORTHWEST END, 1.25m BELOW TOP OF CONCRETE END POST AND 48cm EAST OF WEST END OF BRIDGE.

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

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

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

APPROVED

ORIGINAL STAMPED BY B. F. STANTON MAR 30/06

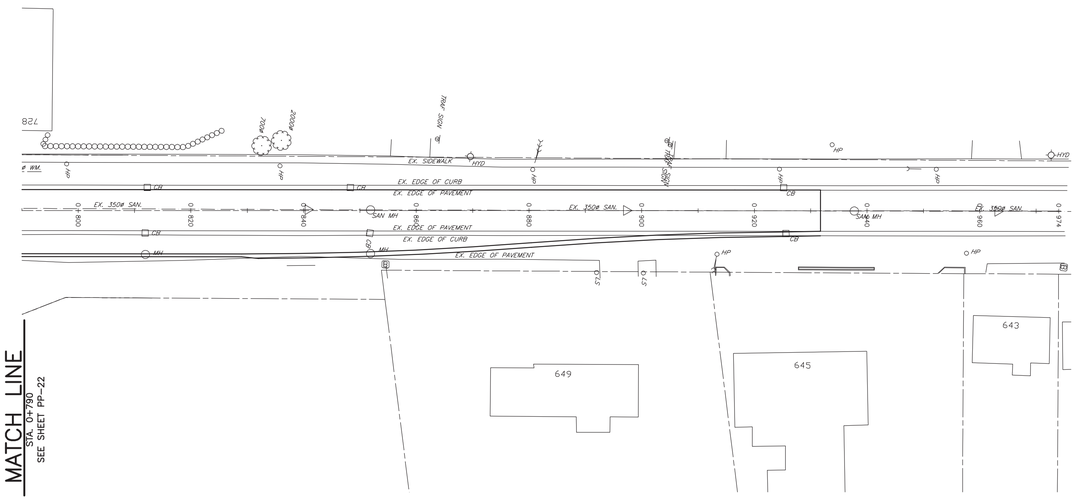
SOUTH COLLINGWOOD SERVICING
RESIDENTIAL SUBDIVISION
TOWN OF COLLINGWOOD

PLAN AND PROFILE HURONTARIO STREET STA. 0+540 TO 0+790

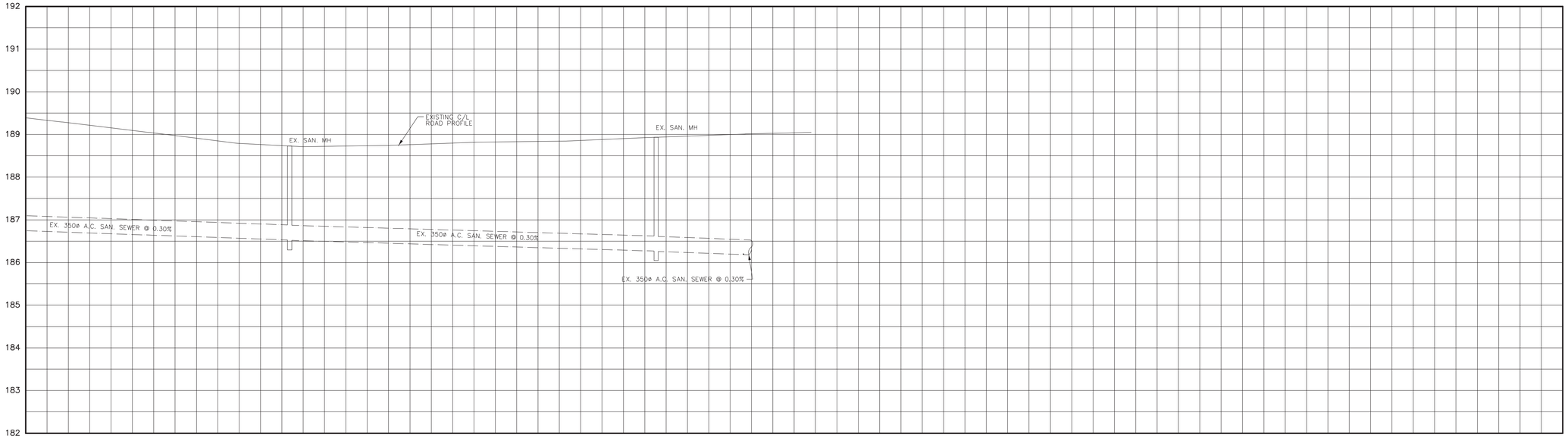
C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

SCALE: HORZ. 1:500		JOB NO.	102081
DESIGN: PM	CHECKED: MH	DWG.	PP-22
DRAWN: PM	DATE: MARCH 2006		

HURONTARIO STREET



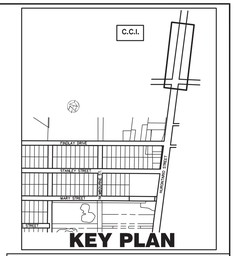
MATCH LINE
STA. 0+790
SEE SHEET PP-22



PROPOSED C/L ELEV										
EXISTING C/L ELEV	189.39	189.27	189.04	188.79	188.72	188.76	188.83	188.86	188.94	189.02
CHAINAGE	0+790	0+800	0+820	0+840	0+860	0+880	0+900	0+920	0+940	0+960	0+974

NOTES:

1. SEE DWGS REM-1 TO REM-4 FOR ADDITONAL REMOVAL INFORMATION.
2. SEE DE-03 FOR ROAD CONSTRUCTION DETAIL.
3. SEE PM-01 TO PM-03 FOR PAINT MARKINGS.
4. SEE DWGS RP-1 TO RP-4 FOR ROAD/STORM PLAN & PROFILE.



FOR RECORD DRAWINGS

COMPILED BY:	MH	DATE:	3/30/2007
CHECKED BY:	SEM	DATE:	3/30/2007
DRAWN BY:	PM	DATE:	3/14/2008
CHECKED BY:	BFS	DATE:	3/28/2008

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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RECORD DRAWING : NOTICE TO USERS

INFORMATION CONTAINED ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES AND MAY HAVE CHANGED SINCE COMPLETION OF CONSTRUCTION. NO WARRANTY CAN BE PROVIDED AS TO ITS ACCURACY AND/OR COMPLETENESS. CCTA SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY RESULT FROM RELIANCE ON INFORMATION HEREIN.

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 COPING OF BRIDGE AT NORTHWEST END, 1.25m BELOW TOP OF CONCRETE END POST AND 48cm EAST OF WEST END OF BRIDGE.

TBM #1 ELEVATION 195.956

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

TBM #2 ELEVATION 196.421

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

NO.	REVISIONS	DATE	INITIAL
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

APPROVED

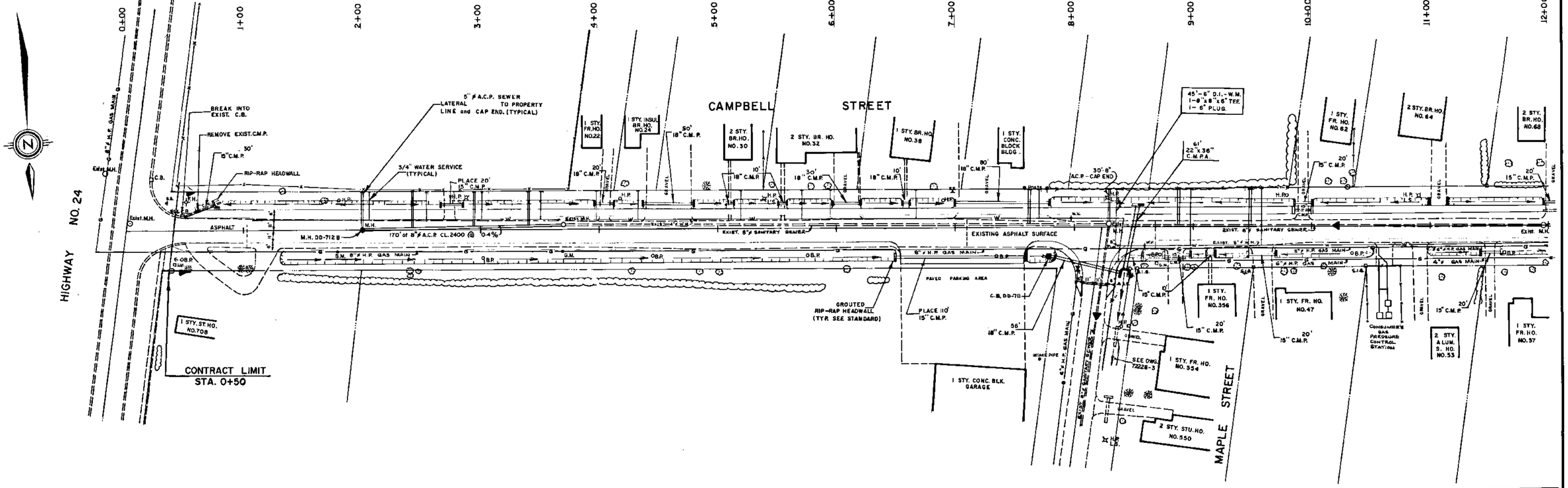
ORIGINAL STAMPED BY
B. F. STANTON
MAR 30/06

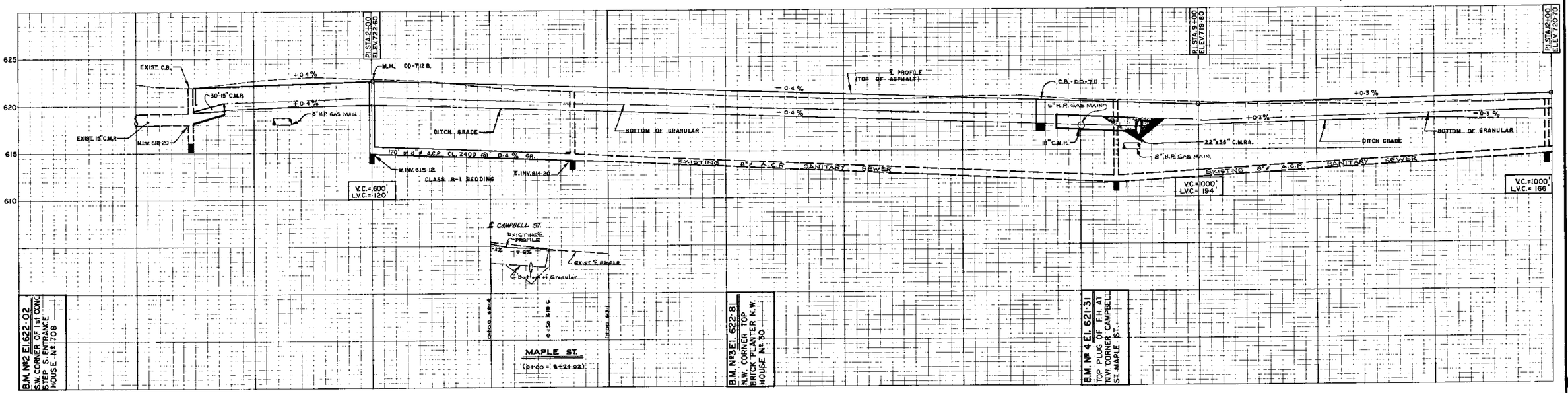
SOUTH COLLINGWOOD SERVICING
RESIDENTIAL SUBDIVISION
TOWN OF COLLINGWOOD

PLAN AND PROFILE HURONTARIO STREET STA. 0+790 TO 0+974

C.C. TATHAM & ASSOCIATES LTD.
CONSULTING ENGINEERS
Collingwood Bracebridge Orillia Barrie

SCALE: HORZ. 1:500	VERT. 1:50	JOB NO.	102081
DESIGN: RJF	CHECKED: RS	DWG.	PP-23
DRAWN: MCA/WJV	DATE: MARCH 2006		





CHAINAGE	0+00	+50	1+00	+50	2+00	+50	3+00	+50	4+00	+50	5+00	+50	6+00	+50	7+00	+50	8+00	+50	9+00	+50	10+00	+50	11+00	+50	12+00
EXISTING ℄ ELEV.		622.0		622.7		625.1		622.8		622.5		621.9		621.5		621.3		621.2		620.9		620.7		620.5	
PROPOSED ℄ ELEV.				622.20		622.39		622.46		622.39		622.20		622.00		621.80		621.60		621.40		621.20		621.00	

CHAINAGE		620.5		620.5		620.7		620.8		620.4		620.3		620.0		619.8		619.8		619.7		619.9		619.9		620.0
EXISTING ℄ ELEV.																										
PROPOSED ℄ ELEV.		620.80		620.60		620.40		620.20		620.04		619.97		619.99		620.10		620.25		620.40		620.53		620.58		

Notes:

NO.	REVISIONS	DATE	INITIAL

Approved

REGISTERED PROFESSIONAL ENGINEER — CIVIL — P. W. AINLEY — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — CIVIL — J. S. McGAVIN — PROVINCE OF ONTARIO

TOWN OF COLLINGWOOD
CAMPBELL STREET RECONSTRUCTION
PLAN and PROFILE
"AS BUILT"

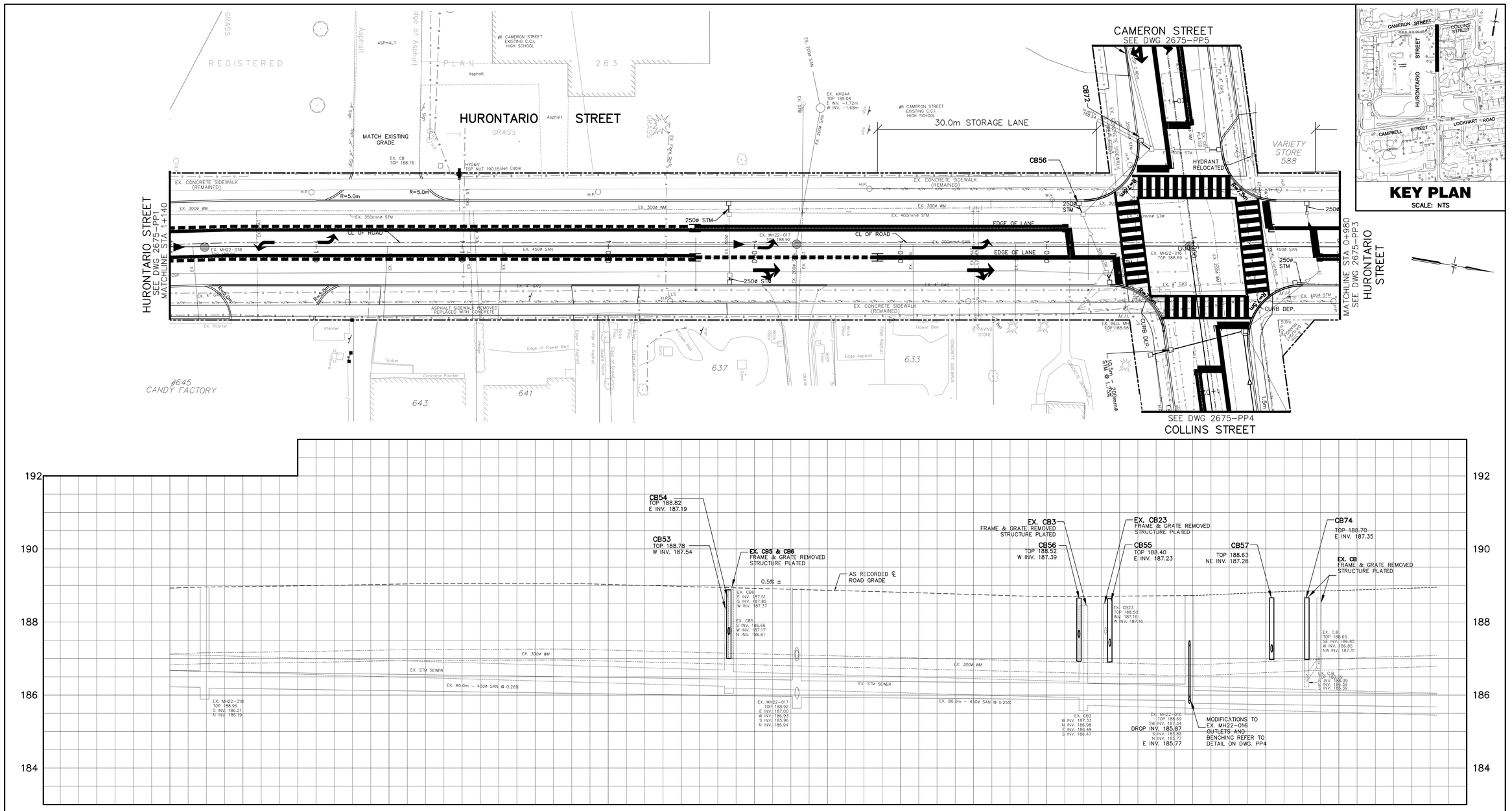
AINLEY and ASSOCIATES LTD.
Consulting Engineers
Barrie — Collingwood

SCALE: HORZ. 1"=40' VERT. 1"= 5'

DESIGN	K.C.H.	CHECKED	J.S.M.
DRAWN	L.G.B.	DATE	JAN. 1973.

DWG. No 72228-1

DRD-0307



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: .....

NO.	REVISIONS	DATE	INITIAL
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.

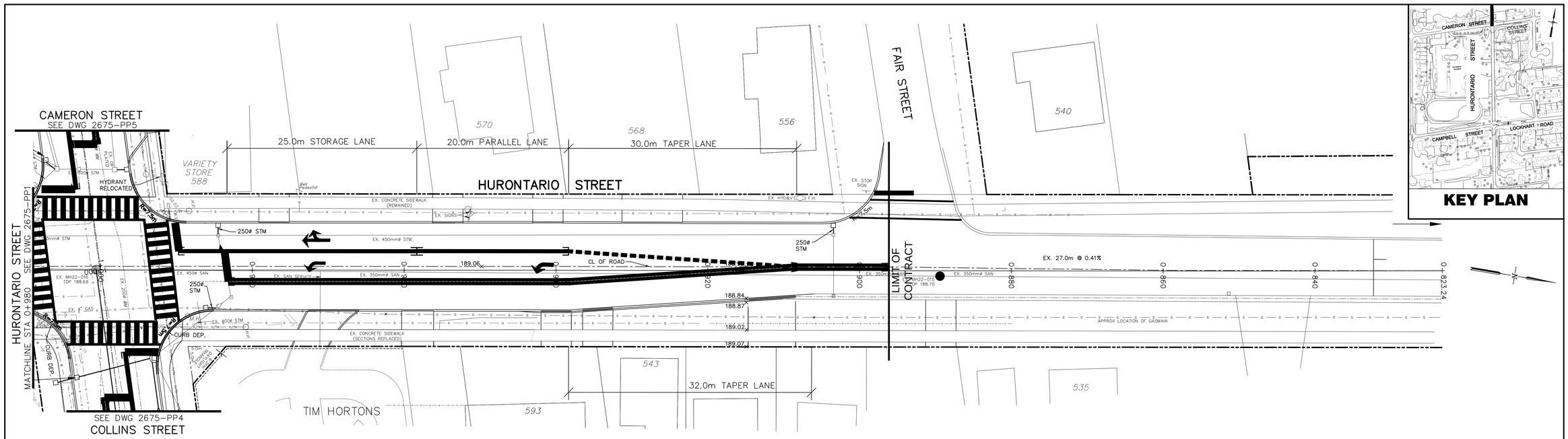
APPROVED

HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD

HURONTARIO STREET
PLAN & PROFILE
STA: 1+140 TO STA: 0+980

GREENLAND® Consulting Engineers
120 Hume Street
Collingwood, Ontario, L9Y 1V5
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@gmland.com
Website: www.gmland.com

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



RECORDED C/L ELEV	188.72	188.86	189.00	189.03	188.96	188.84	188.68	188.51	188.49	188.00±
PREVIOUS C/L ELEV	188.72	189.06	188.94	189.08	188.96	188.84	188.68	188.51	188.49	188.00±
CHAINAGE	1+000	0+980	0+960	0+940	0+920	0+900	0+880	0+860	0+840	0+823.24

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

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NOTE:
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ACCEPTED FOR CONSTRUCTION
Town of Collingwood
per .....
Date: .....

NO.	REVISIONS	DATE	INITIAL
6.	AS RECORDED	MAY 14/14	R.H.
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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.

APPROVED

HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD

HURONTARIO STREET
PLAN & PROFILE
STA: 0+980 TO STA: 0+895

GREENLAND® Consulting Engineers
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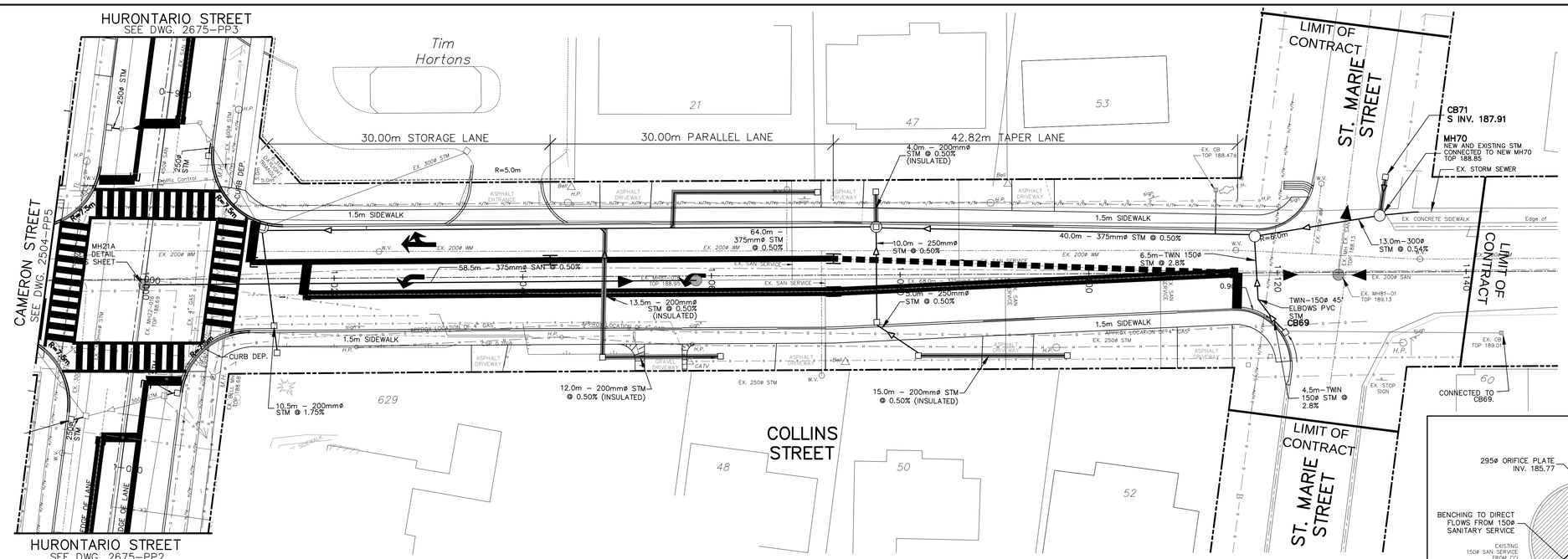
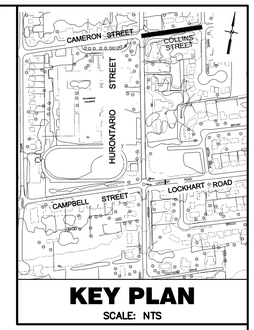
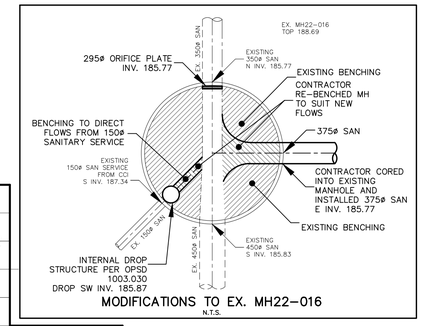
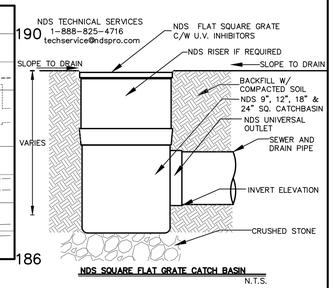
Collingwood, Ontario, L9Y 1V5
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@gmland.com
Website: www.gmland.com

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-PP3**









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

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.

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

ACCEPTED FOR CONSTRUCTION
Town of Collingwood
per .....
Date: .....

NO.	REVISIONS	DATE	INITIAL
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.

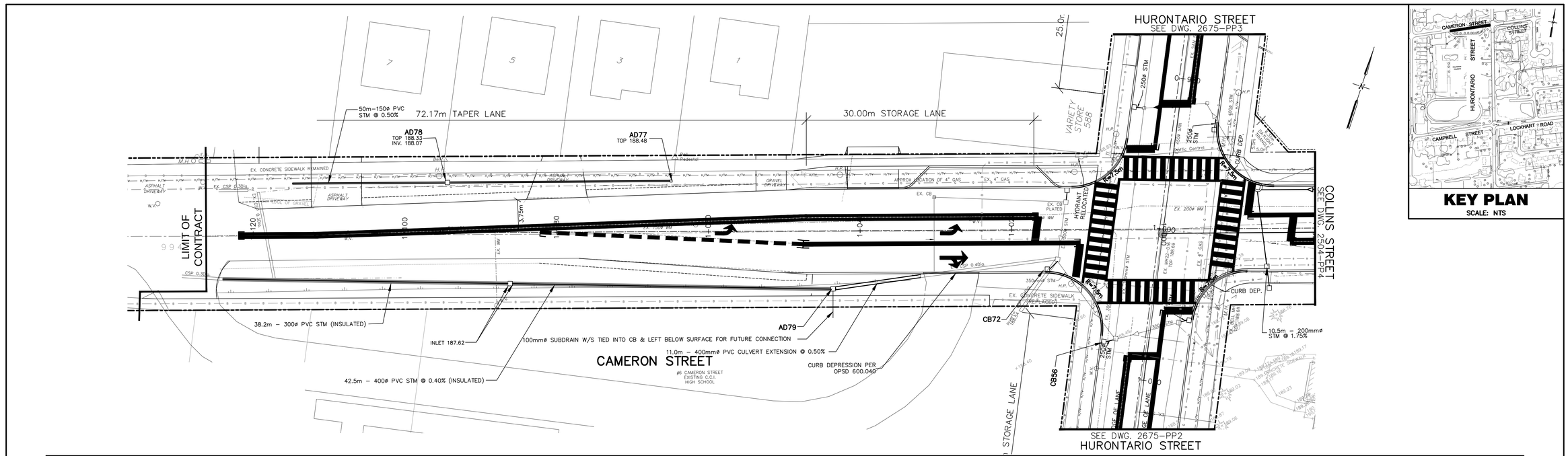
APPROVED

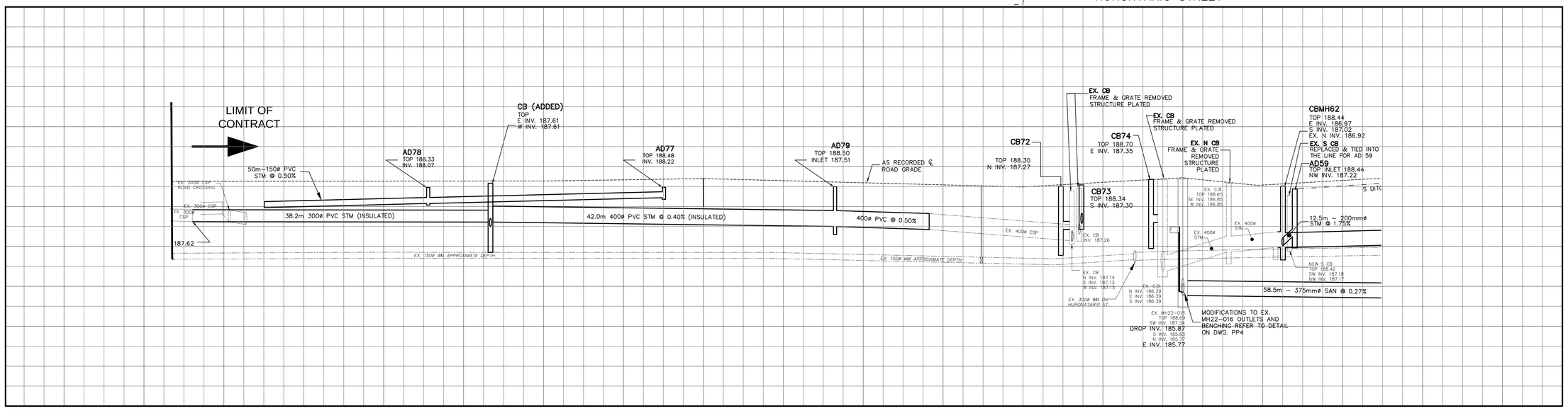
HURONTARIO STREET ROAD WIDENING TOWN OF COLLINGWOOD

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

GREENLAND® Consulting Engineers
120 Hume Street
Collingwood, Ontario, L9Y 1V5
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@gmland.com
Website: www.gmland.com

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-PP4**





RECORDED C/L ELEV			188.64			188.64			188.64			188.70			188.61			188.45			188.72		
C/L ELEV																							
CHAINAGE			1+120			1+100			1+080			1+060			1+040			1+020			1+000		

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

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

ACCEPTED FOR CONSTRUCTION
Town of Collingwood
per .....
Date: .....

NO.	REVISIONS	DATE	INITIAL
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.

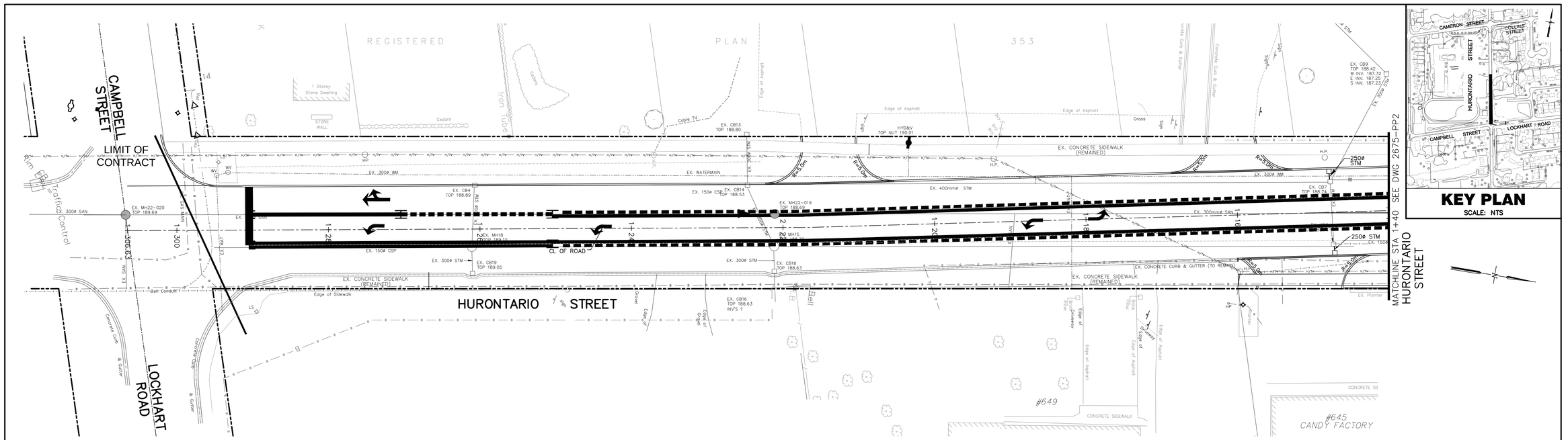
APPROVED

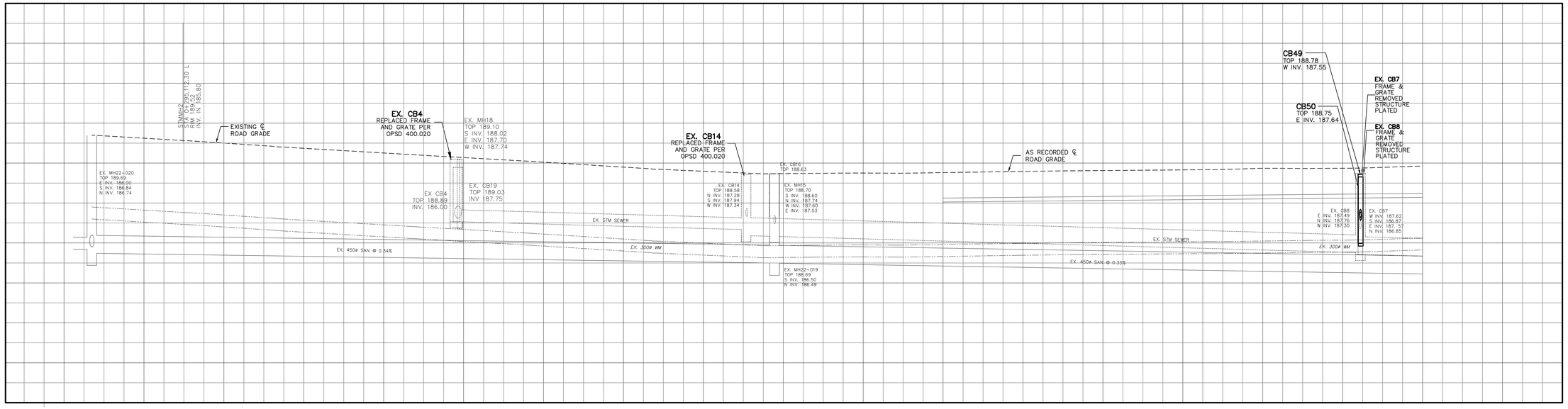
HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD

CAMERON STREET
PLAN & PROFILE
STA: 1+000 TO STA: 1+126.24

GREENLAND® Consulting Engineers
120 Hume Street
Collingwood, Ontario, L9Y 1V5
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@grnland.com
Website: www.grnland.com

SCALE: H-1:250 V-1:50		JOB NO.	11-2675
DESIGN: P. ELLIS	CHECKED: J. HARTMAN	DWG.	**2675-PP5**
DRAWN: B. KLESS	DATE: NOV 03, 2011		





CHAINAGE	1+300	1+280	1+260	1+240	1+220	1+200	1+180	1+160	1+140
PREVIOUS C/L ELEV	189.49	189.49	189.15	188.91	188.75	188.75	188.80	188.84	188.92
RECORDED C/L ELEV	189.49	189.49	189.15	188.91	188.75	188.75	188.80	188.87	188.93

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

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

ACCEPTED FOR CONSTRUCTION
Town of Collingwood
per .....
Date: .....

NO.	REVISIONS	DATE	INITIAL
6.	AS RECORDED	MAY 14/14	R.H.
5.	ISSUED FOR CONSTRUCTION	JUNE 04/12	J.H.
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APPROVED

HURONTARIO STREET
ROAD WIDENING
TOWN OF COLLINGWOOD

HURONTARIO STREET
PLAN & PROFILE
STA: 1+306.63 TO STA: 1+140

GREENLAND® Consulting Engineers
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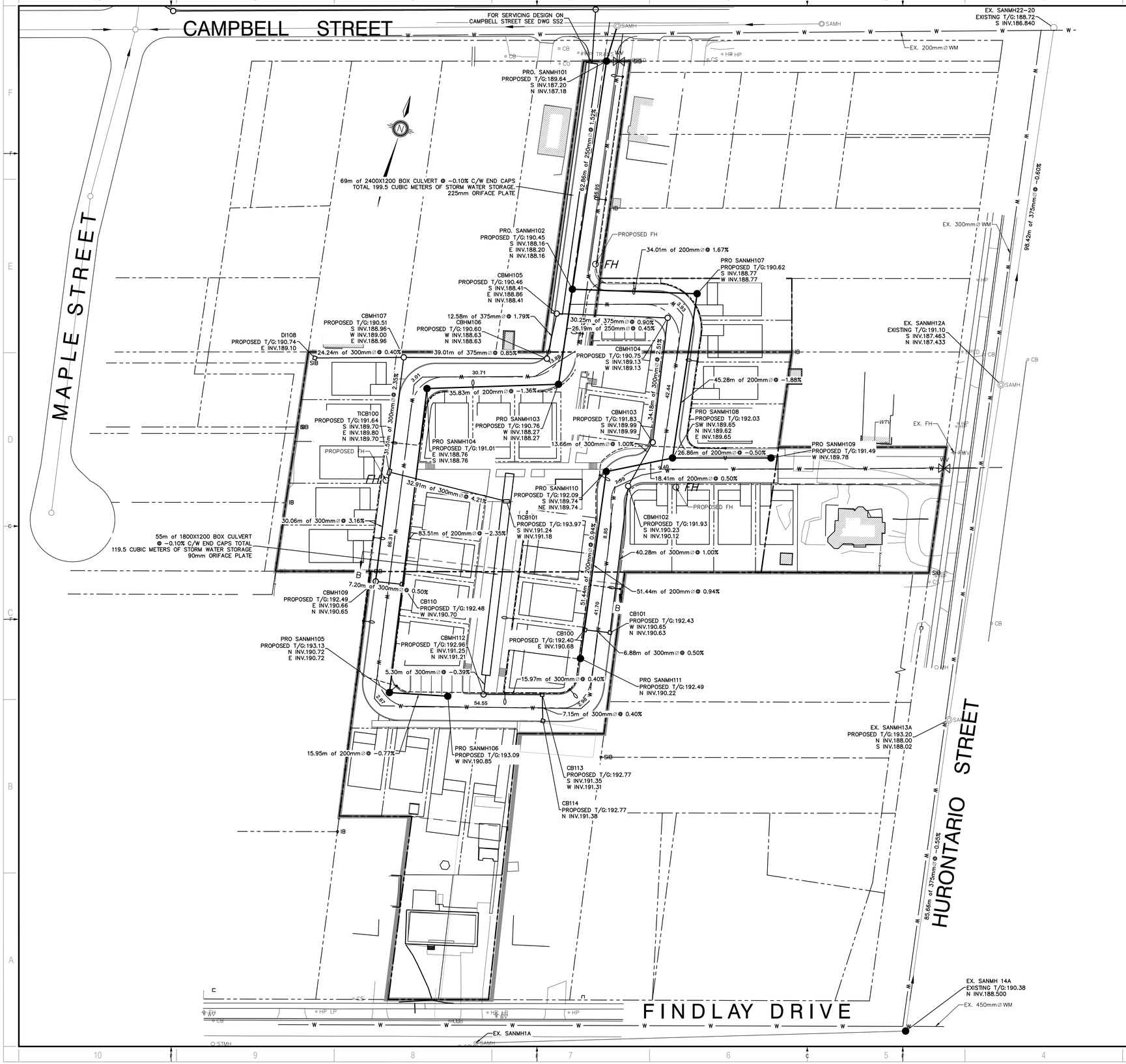
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@gmland.com
Website: www.gmland.com

SCALE: H-1:250 V-1:50		JOB NO.	11-2675
DESIGN: P. ELLIS	CHECKED: J. HARTMAN	DWG.	**2675-PP1**
DRAWN: B. KLESS	DATE: NOV 03, 2011		

APPENDIX

C PROPOSED SANITARY SEWER SERVICING



LEGEND

EXISTING CONDITIONS

- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING 0.25m CONTOURS
- EXISTING TREELINE
- SANITARY SEWER
- WATERMAIN
- STORMSEWER
- BOTTOM OF SLOPE
- TOP OF SLOPE
- EXISTING BUILDING
- MH EXISTING SANITARY MANHOLE
- CBMH EXISTING CATCHBASIN MANHOLE
- POST EXISTING POST
- CB EXISTING CATCHBASIN
- CO EXISTING SANITARY CLEANOUT
- CS EXISTING CURB STOP VALVE
- FH EXISTING FIRE HYDRANT
- WV EXISTING WATERVALVE
- HP EXISTING HYDRO POLE AND ANCHOR
- BPED EXISTING BELL PEDESTAL
- BMH EXISTING BELL MANHOLE
- SIB EXISTING STANDARD IRON BAR
- IB EXISTING IRON BAR
- RIB EXISTING ROUND IRON BAR
- EXISTING ROAD SIGN
- EXISTING FLOWERBED
- EXISTING CONIFEROUS TREE
- EXISTING DECIDUOUS TREE
- EXISTING DECIDUOUS SHRUB

PROPOSED CONSTRUCTION

- PROPOSED CENTRELINE OF ROAD
- EDGE OF ASPHALT AND BACK OF CURB
- SANITARY SEWER
- STORM SEWER
- W WATERMAIN
- UNDER GROUND HYDRO
- WV PROPOSED WATERMAIN VALVE
- FH PROPOSED FIRE HYDRANT
- MH1 PROPOSED SANITARY MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED LIGHT POST
- 203.59 EXISTING GRADE
- 203.86 PROPOSED GRADE
- PROPOSED FLOW DIRECTION
- PROPOSED BOTTOM OF SWALE

NOTES:

- ALL PROPOSED WATERMAIN TO BE 150mmØ CLASS 52 DUCTILE IRON
- ALL STORM AND SANITARY STURCTURES TO COMPLY WITH OPSD REQUIRMENTS.
- ALL STORM PIPE TO BE HDPE SMOOTH WALL RIBBED PIPE
- ALL SANITARY PIPE TO BE PVC DR18

wsp
101-1450 1st AVENUE W,
OWEN SOUND, ONTARIO, CANADA N4K6W2
PHONE: 519-376-7612 FAX: 519-376-8008
WWW.WSP.COM

CONSULTANT:

SEAL:

CLIENT:

STRAW HAT RESTORATION

CLIENT REF. #: --

PROJECT:

BLACKMOOR GATE

KEY PLAN:

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THIS DRAWING IS NOT TO BE SCALED.

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
	00	04/05/18	FIRST SUBMISSION SPA
-	-	-	--

PROJECT NO: 171-16446-00
DATE: APRIL 2018
ORIGINAL SCALE: 1:500
DESIGNED BY: K H
DRAWN BY: T J J
CHECKED BY: C W
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DISCIPLINE: CIVIL
TITLE: SERVICING PLAN
SHEET NUMBER: SS1
SHEET #: -- OF: --
ISSUE: FIRST SUBMISSION SPA
REV #: 0
DATE OF: --

BLACKMOOR GATE
PROPOSED SANITARY SERVICE
FLOW SHEET

WSP CANADA INC. - OWEN SOUND OFFICE

n = mannings coefficient = 0.013
q = average daily per capita flow = 450 L/cap. d)
I = unit of peak extraneous flow = 0.23 L/ha. s)
M = peaking factor
Q (p) = peak population flow (L/s)
Q (i) = peak extraneous flow (L/s)
Q (d) = peak design flow

PROJECT: Blackmoor Gate Proposed Sanitary Sewer Capacity Analysis
DATE: 2-May-18
PROJECT NO: 171-16446-00
COMPLETED BY: KH
CHECKED BY: CW

Data from Sanitary Design Sheet Master Plan - Birch
Information to be varified in field

$M = 1 + \frac{14}{4+\sqrt{P}}$ *where P = population in 1000's*
where M = peaking factor (Harmon Formula)

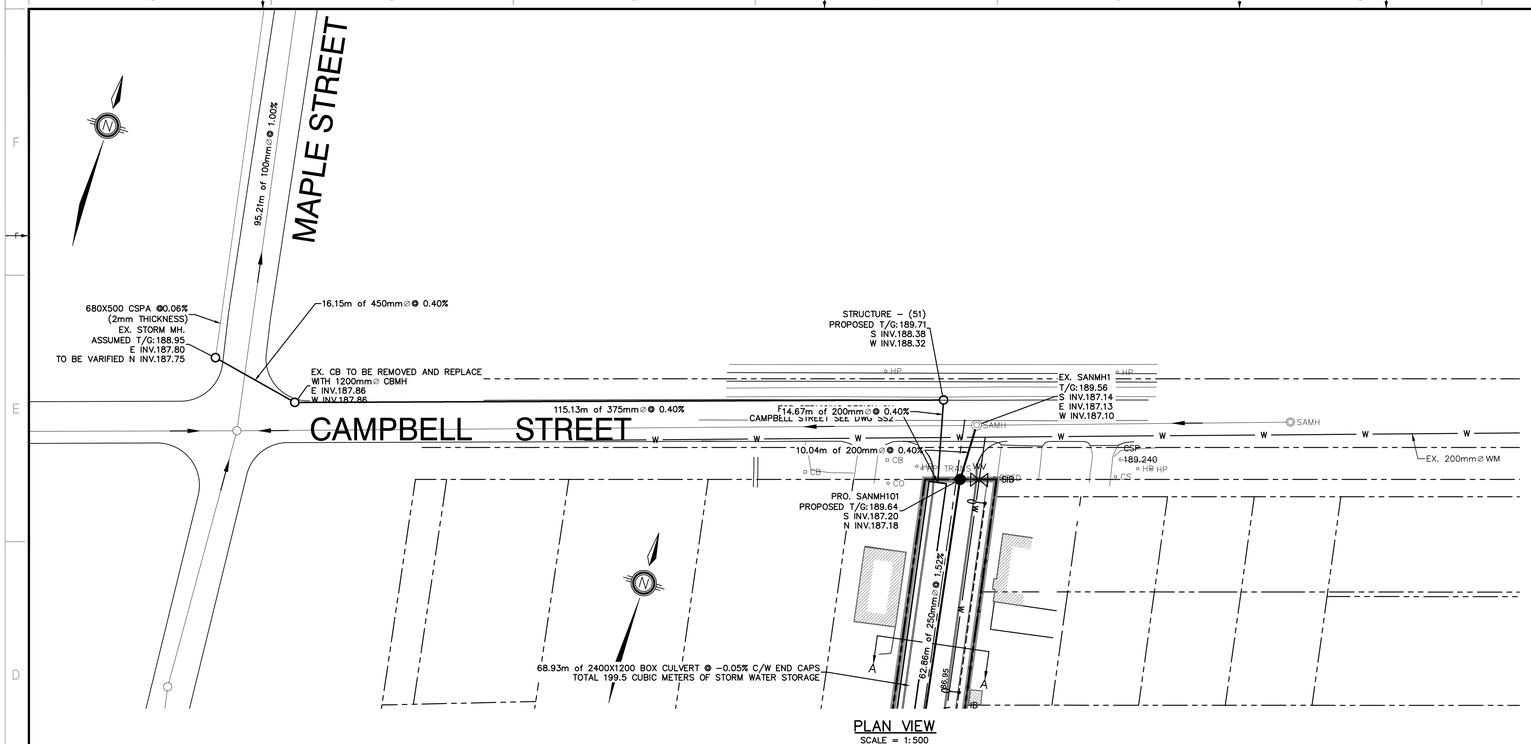
$Q(p) = \frac{PqM}{86.4}$ *(L/s)*

Q(i) = IA (L/s) where A = area in hectares
Q(d) = Q(p) + Q(i) (L/s)

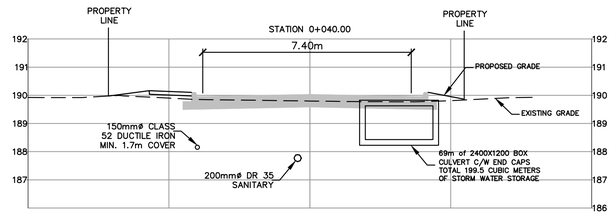
LOCATION				INDIVIDUAL		CUMULATIVE						PROPOSED SEWER						
STREET	FROM	TO	Units	Population	Tributary Area (hectares)	Population	Tributary Area (hectares)	Peaking factor M	Pop. Flow Q (p) (L/s)	Peak extraneous flow Q(i) (L/s)	**Peak design flow Q(d) (L/s)**	Length (m)	Pipe size (mm)	Type of pipe	Grade %	**Capacity (L/s) n=0.013**	Full flow velocity (m/s)	Actual Velocity at Q(d) (m/s)
Blackmoor Gate	MH111	MH110	5	14.5	0.21	14.5	0.21	4.40	0.33	0.05	**0.38**	51.44	200	PVC	0.94	**31.80**	1.01	0.35
Blackmoor Gate	MH110	MH108	1	2.9	0.04	17.4	0.24	4.39	0.40	0.06	**0.45**	18.41	200	PVC	0.50	**23.19**	0.74	0.29
Blackmoor Gate	MH109	MH108	3	8.7	0.09	8.7	0.33	4.42	0.20	0.08	**0.28**	26.86	200	PVC	0.50	**23.19**	0.74	0.26
Blackmoor Gate	MH108	MH107	6	17.4	0.26	43.5	0.83	4.33	0.98	0.19	**1.17**	45.28	200	PVC	1.88	**44.97**	1.43	0.61
Blackmoor Gate	MH107	MH102	0	0.0	0.03	43.5	0.86	4.33	0.98	0.20	**1.18**	34.01	200	PVC	1.67	**42.38**	1.35	0.59
Blackmoor Gate	MH106	MH105	4	11.6	0.22	11.6	0.22	4.41	0.27	0.05	**0.32**	15.95	200	PVC	0.77	**28.78**	0.92	0.31
Blackmoor Gate	MH105	MH104	9	26.1	0.39	37.7	0.61	4.34	0.85	0.14	**0.99**	83.51	200	PVC	2.35	**50.27**	1.60	0.64
Blackmoor Gate	MH104	MH103	3	8.7	0.12	46.4	0.73	4.32	1.04	0.17	**1.21**	35.83	200	PVC	1.36	**38.25**	1.22	0.55
Blackmoor Gate	MH103	MH102	0	0.0	0.02	46.4	0.76	4.32	1.04	0.17	**1.22**	26.86	250	PVC	0.45	**39.89**	0.81	0.36
Blackmoor Gate	MH102	MH101	0	0.0	0.08	89.9	1.70	4.26	1.99	0.39	**2.38**	62.86	250	PVC	1.52	**73.31**	1.49	0.68
Blackmoor Gate	MH101	SANMH1	1	0.0	0.02	89.9	1.72	4.26	1.99	0.39	**2.39**	10.04	250	PVC	0.40	**37.61**	0.77	0.42
Campbell Street & Upper Maple	SANMH1	049-17	49	142.1	1.56	232.0	3.28	4.12	4.98	0.75	**5.74**	95.00	200	PVC	0.40	**20.74**	0.66	0.54
Maple Street	049-17	018-12	2	5.8	0.31	237.8	3.59	4.12	5.10	0.82	**5.93**	149.50	250	PVC	0.30	**32.57**	0.66	0.48
Maple Street	018-12	045-08	9	26.1	0.62	263.9	4.21	4.10	5.64	0.97	**6.60**	156.90	250	PVC	0.01	**6.78**	0.14	0.14

APPENDIX

D PROPOSED STORM SEWER SERVICING



PLAN VIEW
SCALE = 1:500



SECTION A–A
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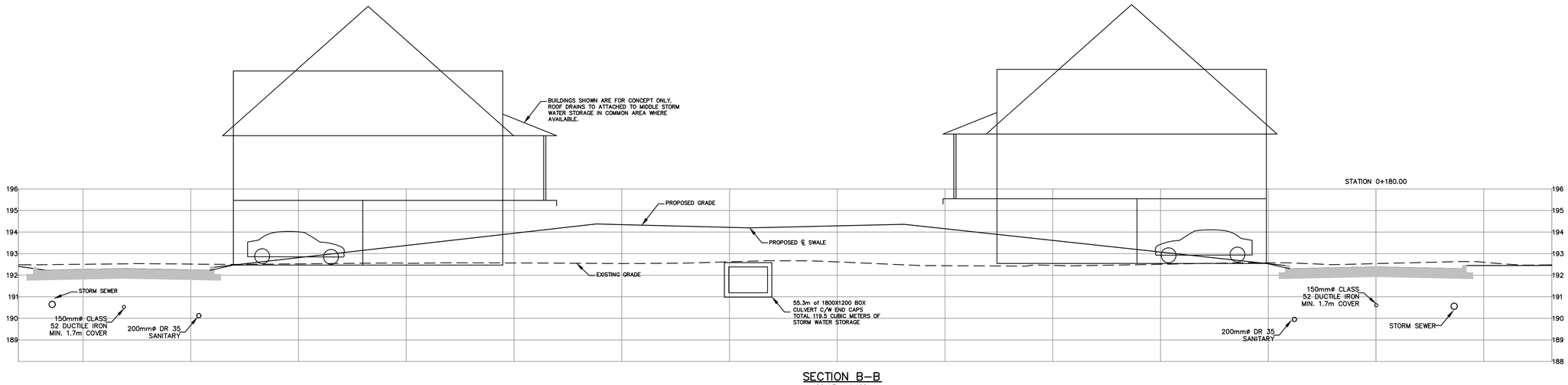

SECTION B–B
SCALE = 1:100

LEGEND

EXISTING CONDITIONS

- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING 0.25m CONTOURS
- EXISTING TREELINE
- SANITARY SEWER
- WATERMAIN
- STORMSEWER
- BOTTOM OF SLOPE
- TOP OF SLOPE
- EXISTING BUILDING
- MH EXISTING SANITARY MANHOLE
- CBMH EXISTING CATCHBASIN MANHOLE
- POST EXISTING POST
- CB EXISTING CATCHBASIN
- CO EXISTING SANITARY CLEANOUT
- CS EXISTING CURB STOP VALVE
- FH EXISTING FIRE HYDRANT
- WV EXISTING WATERVALVE
- HP AN EXISTING HYDRO POLE AND ANCHOR
- BPED EXISTING BELL PEDESTAL
- BMH EXISTING BELL MANHOLE
- SIB EXISTING STANDARD IRON BAR
- IB EXISTING IRON BAR
- RIB EXISTING ROUND IRON BAR
- EXISTING ROAD SIGN
- EXISTING FLOWERBED
- EXISTING CONIFEROUS TREE
- EXISTING DECIDUOUS TREE
- EXISTING DECIDUOUS SHRUB

PROPOSED CONSTRUCTION

- PROPOSED CENTRELINE OF ROAD
- EDGE OF ASPHALT AND BACK OF CURB
- SANITARY SEWER
- STORM SEWER
- W WATERMAIN
- UNDER GROUND HYDRO
- WV PROPOSED WATERMAIN VALVE
- FH PROPOSED FIRE HYDRANT
- MH1 PROPOSED SANITARY MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED LIGHT POST
- 203.59 EXISTING GRADE
- 203.86 PROPOSED GRADE
- PROPOSED FLOW DIRECTION
- PROPOSED BOTTOM OF SWALE

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CONSULTANT:

SEAL:

CLIENT:

STRAW HAT RESTORATION

CLIENT REF. #: --

PROJECT:

BLACKMOOR GATE

KEY PLAN:

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THIS DRAWING IS NOT TO BE SCALED.

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
	00	04/05/18	FIRST SUBMISSION SPA
-	-	-	--

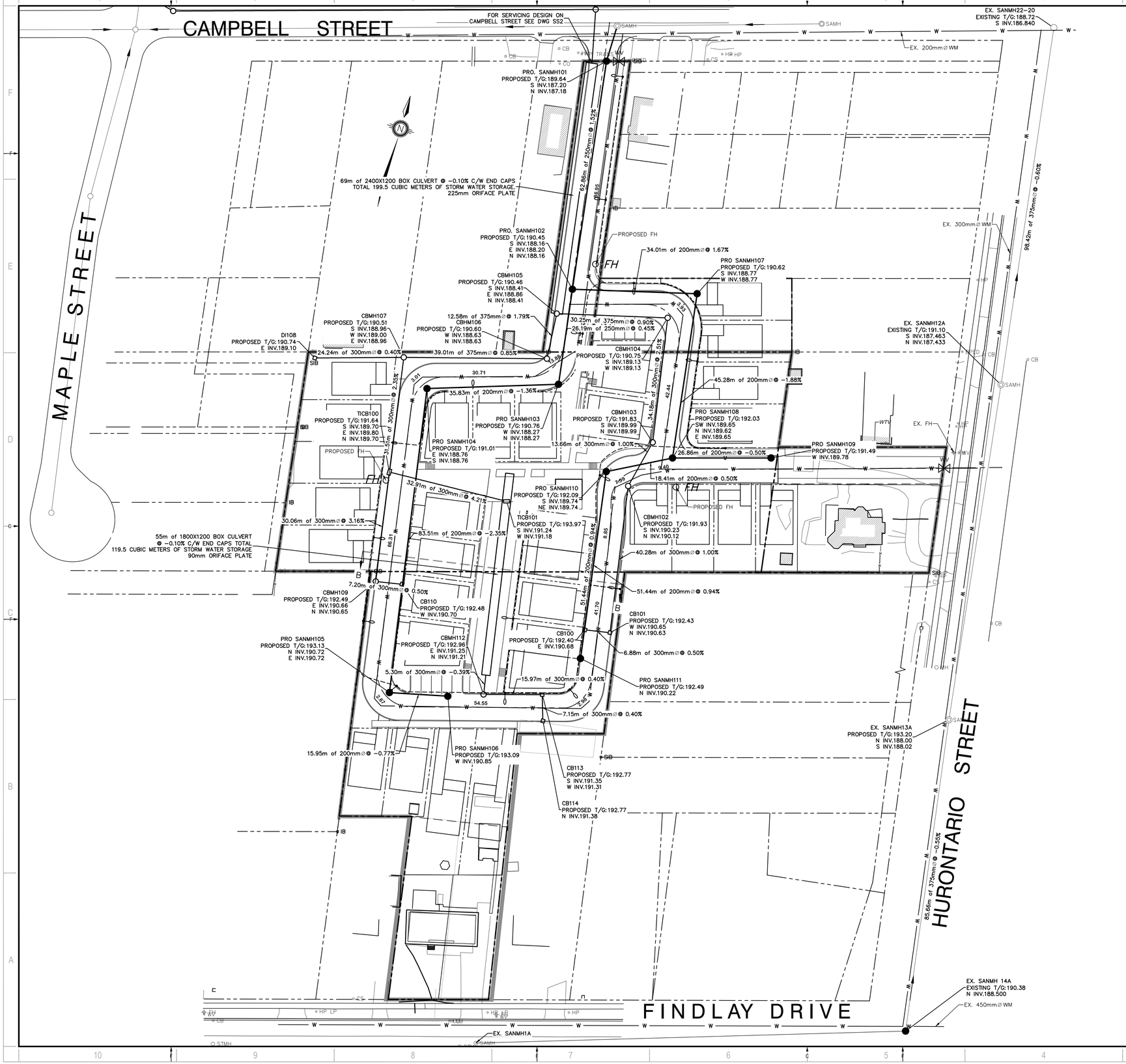
PROJECT NO: 171-16446-00
DATE: APRIL 2018
ORIGINAL SCALE: 1:500
DESIGNED BY: K H
DRAWN BY: T J
CHECKED BY: C W
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

DISCIPLINE: CIVIL

TITLE: SERVICING PLAN

SHEET NUMBER: SS2
SHEET #: -- OF --

ISSUE: FIRST SUBMISSION SPA
REV #: 0
DATE OF: --



LEGEND

EXISTING CONDITIONS

- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING 0.25m CONTOURS
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- SANITARY SEWER
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- CS EXISTING CURB STOP VALVE
- FH EXISTING FIRE HYDRANT
- WV EXISTING WATERVALVE
- HP EXISTING HYDRO POLE AND ANCHOR
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- FH PROPOSED FIRE HYDRANT
- MH1 PROPOSED SANITARY MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED LIGHT POST
- 203.59 EXISTING GRADE
- 203.86 PROPOSED GRADE
- PROPOSED FLOW DIRECTION
- PROPOSED BOTTOM OF SWALE

NOTES:

- ALL PROPOSED WATERMAIN TO BE 150mmØ CLASS 52 DUCTILE IRON
- ALL STORM AND SANITARY STURCTURES TO COMPLY WITH OPSD REQUIRMENTS.
- ALL STORM PIPE TO BE HDPE SMOOTH WALL RIBBED PIPE
- ALL SANITARY PIPE TO BE PVC DR18

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CONSULTANT:

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STRAW HAT RESTORATION

CLIENT REF. #: --

PROJECT:

BLACKMOOR GATE

KEY PLAN:

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ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
	00	04/05/18	FIRST SUBMISSION SPA
-	-	-	--

PROJECT NO: 171-16446-00
DATE: APRIL 2018
ORIGINAL SCALE: 1:500
DESIGNED BY: K H
DRAWN BY: T J J
CHECKED BY: C W
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DISCIPLINE: CIVIL
TITLE: SERVICING PLAN
SHEET NUMBER: SS1
SHEET #: -- OF: --
ISSUE: FIRST SUBMISSION SPA
REV #: 0
DATE OF: --

TOWN OF COLLINGWOOD
STORM SEWER DESIGN

5 Yr. STORM

Q = 0.0028CIA

C = Runoff Coef. (See notes below)
A = Area (ha)
i = Rainfall Intensity $i_5 = 1135.4\ (t + 7.5)^{-0.841}$

CONSULTANT WSP Canada Group Limited

PROJECT Blackmoor Gate
PROJECT NO. 171-16446-00

Date 2018-05-09

Notes	FROM MH	TO MH	LENGTH (m)	AREA (ha)	CUMUL AREA (ha)	RUNOFF COEFF.	CA	CUMUL CA	INT. (I 5) (mm/hr)	FLOW (Q5) (m^3/s)	PIPE DIA. (mm)	PIPE DIA. ACTUAL (mm)	SLOPE (%)	CAPACITY (m^3/s)	VELOCITY (m/s)	SECTION TIME (min)	ACCUM TIME (min)	INLET TIME (min)	% FULL
	TICB101	**TICB100**	32.9	0.37	0.37	0.45	0.167	0.17	102.27	0.048	300	305	4.20	0.207	2.83	0.19	10.19	10.00	23.1%
	CBMH109	**TICB100**	30.1	0.19	0.19	0.45	0.086	0.09	102.27	0.024	300	305	3.16	0.179	2.46	0.20	10.20	10.00	13.7%
	TICB100	**CBMH107**	31.5	0.08	0.64	0.45	0.036	0.29	101.28	0.082	300	305	2.35	0.155	2.12	0.25	10.45	10.20	52.8%
	DI108	**CBMH107**	24.2	0.05	0.05	0.35	0.018	0.02	102.27	0.005	300	305	0.40	0.064	0.87	0.46	10.46	10.00	7.9%
	CBMH107	**CBMH106**	39.0	0.15	0.84	0.45	0.068	0.37	100.06	0.105	375	381	0.85	0.169	1.48	0.44	10.90	10.46	62.0%
	CBMH106	**CBMH105**	12.6	0.00	0.84	0.45	0.000	0.37	98.04	0.102	375	381	1.79	0.245	2.15	0.10	11.00	10.90	41.8%
	CB101	**CBMH102**	40.3	0.15	0.15	0.60	0.090	0.09	102.27	0.026	300	305	1.00	0.101	1.38	0.49	10.49	10.00	25.5%
	CBMH102	**CBMH103**	13.7	0.11	0.26	0.45	0.050	0.14	99.94	0.039	300	305	1.00	0.101	1.38	0.17	10.65	10.49	38.7%
	CBMH103	**CBMH104**	34.2	0.19	0.45	0.45	0.086	0.23	99.18	0.062	300	305	2.51	0.160	2.19	0.26	10.91	10.65	39.1%
	CBMH104	**CBMH105**	30.3	0.07	0.52	0.90	0.063	0.29	98.00	0.079	375	381	0.88	0.172	1.51	0.33	11.25	10.91	46.1%

RUNOFF COEFFICIENTS

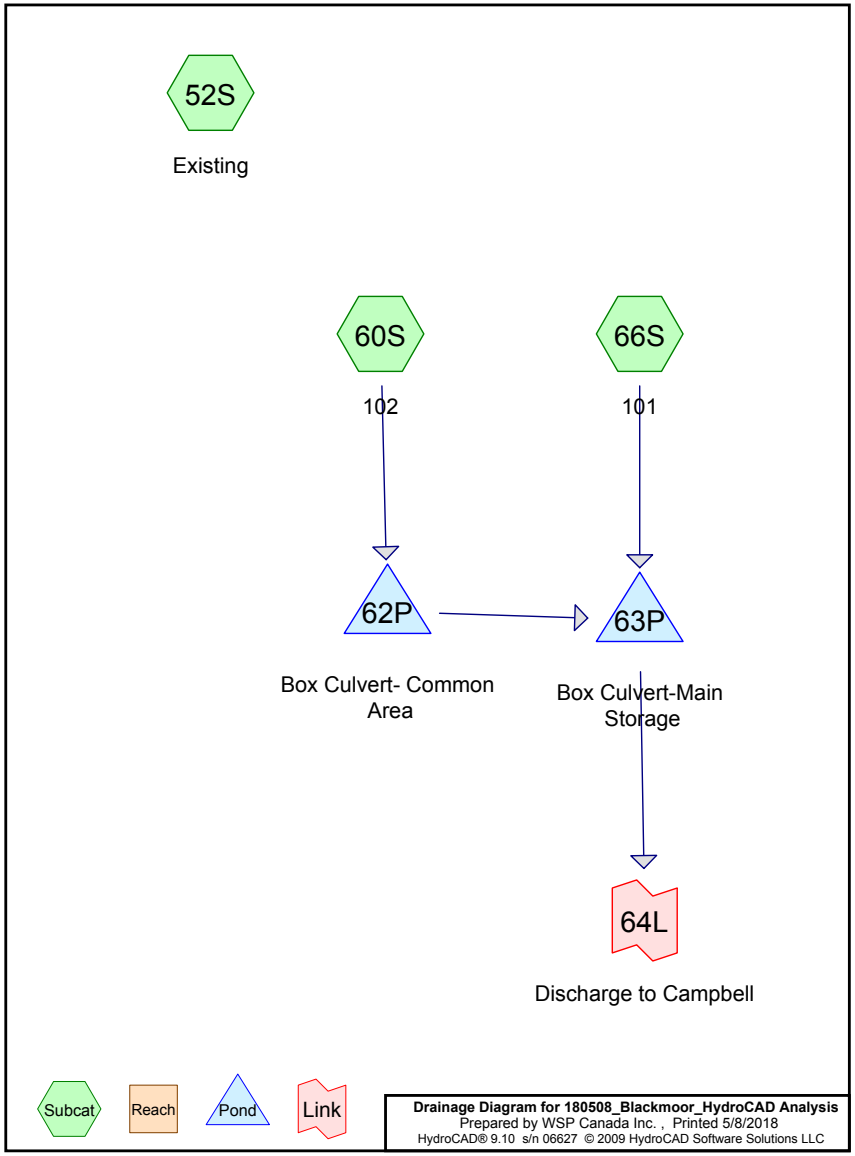
0.15-0.35	PARK-GRASSLAND	$Q = \frac{Area \times R^{2/3} \times S^{1/2}}{n}$
0.40-0.45	SINGLE FAMILY RESIDENTIAL	
0.50-0.70	TOWN HOUSES	$V = \frac{R^{2/3} \times S^{1/2}}{n}$
0.60-0.75	APTS. & MED DENSITY	
0.40-0.75	SCHOOLS-CHURCHES-INSTITUTIONS	
0.65-0.75	INDUSTRIAL AREAS	
0.75-0.85	COMMERCIAL AREAS	
0.90-1.00	ASPHALT-CONCRETE-ROOFS	

Consultant:
WSP Canada Group Limited

No.	Revision	Date	Author
5			
4			
3			
2			
1			

5 YEAR STORM DESIGN SHEET

Date: MAY 2018
Dwg:



Area Listing (all nodes)

Area (hectares)	C	Description (subcatchment-numbers)
1.6183	0.32	(52S)
1.2483	0.64	(66S)
0.3700	0.74	(60S)
3.2366		**TOTAL AREA**

Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
3.2366	Other	52S, 60S, 66S
3.2366		**TOTAL AREA**

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment52S: Existing Runoff Area=16,183.0 m² 0.00% Impervious Runoff Depth=15 mm
Tc=10.0 min C=0.32 Runoff=0.1241 m³/s 0.238 Ml

Subcatchment60S: 102 Runoff Area=0.3700 ha 0.00% Impervious Runoff Depth=34 mm
Tc=10.0 min C=0.74 Runoff=0.0656 m³/s 0.126 Ml

Subcatchment66S: 101 Runoff Area=12,483.0 m² 0.00% Impervious Runoff Depth=29 mm
Tc=10.0 min C=0.64 Runoff=0.1915 m³/s 0.368 Ml

Pond 62P: Box Culvert- Common Peak Elev=192.199 m Storage=0.100 Ml Inflow=0.0656 m³/s 0.126 Ml
Outflow=0.0167 m³/s 0.115 Ml

Pond 63P: Box Culvert-Main Storage Peak Elev=189.826 m Storage=0.228 Ml Inflow=0.2071 m³/s 0.483 Ml
Outflow=0.1100 m³/s 0.471 Ml

Link 64L: Discharge to Campbell Inflow=0.1100 m³/s 0.471 Ml
Primary=0.1100 m³/s 0.471 Ml

Total Runoff Area = 3.2366 ha Runoff Volume = 0.732 Ml Average Runoff Depth = 23 mm
100.00% Pervious = 3.2366 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 52S: Existing

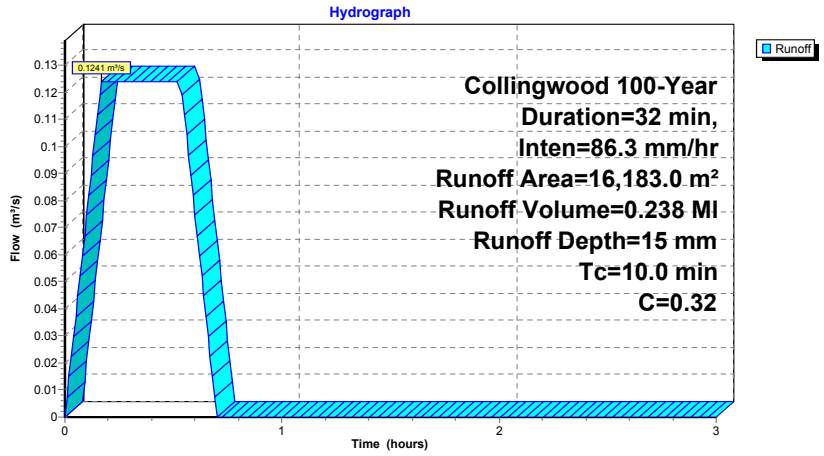
Runoff = 0.1241 m³/s @ 0.17 hrs, Volume= 0.238 Ml, Depth= 15 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=32 min, Inten=86.3 mm/hr

Area (m²)	C	Description
16,183.0	0.32	
16,183.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 52S: Existing



Summary for Subcatchment 60S: 102

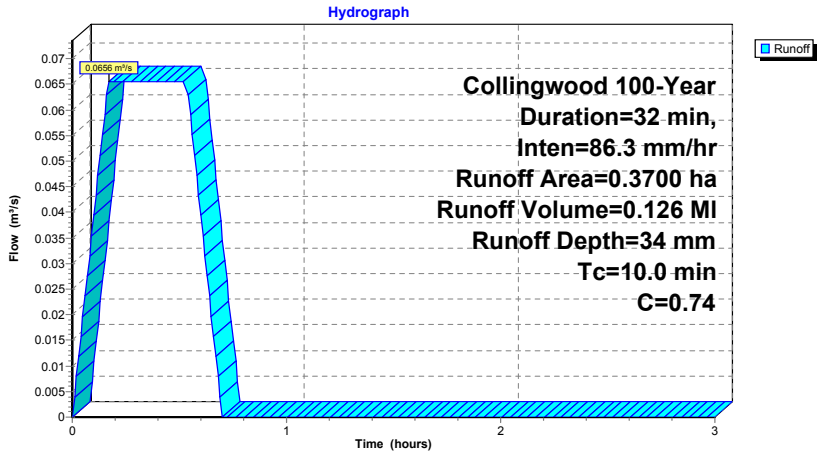
Runoff = 0.0656 m³/s @ 0.17 hrs, Volume= 0.126 Ml, Depth= 34 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=32 min, Inten=86.3 mm/hr

Area (ha)	C	Description
0.3700	0.74	
0.3700		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 60S: 102



Summary for Subcatchment 66S: 101

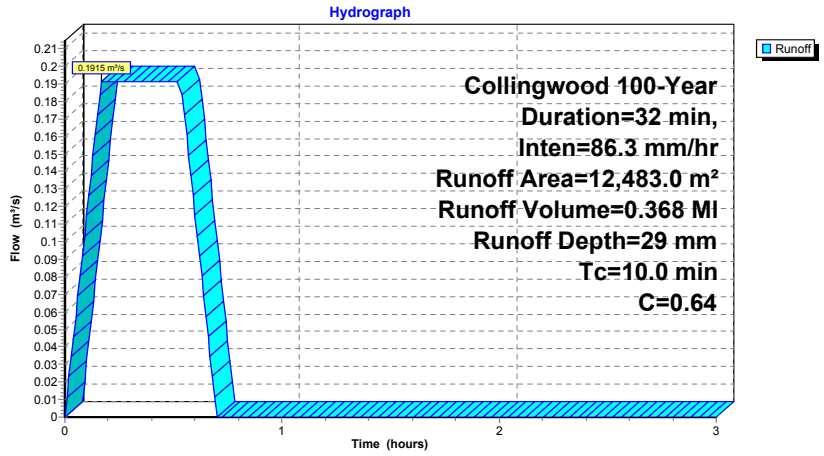
Runoff = 0.1915 m³/s @ 0.17 hrs, Volume= 0.368 Ml, Depth= 29 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=32 min, Inten=86.3 mm/hr

Area (m²)	C	Description
12,483.0	0.64	
12,483.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 66S: 101



Summary for Pond 62P: Box Culvert- Common Area

Inflow Area = 0.3700 ha, 0.00% Impervious, Inflow Depth = 34 mm for 100-Year event
Inflow = 0.0656 m³/s @ 0.17 hrs, Volume= 0.126 Ml
Outflow = 0.0167 m³/s @ 0.66 hrs, Volume= 0.115 Ml, Atten= 75%, Lag= 29.3 min
Primary = 0.0167 m³/s @ 0.66 hrs, Volume= 0.115 Ml

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 192.199 m @ 0.66 hrs Surf.Area= 0.0100 ha Storage= 0.100 Ml

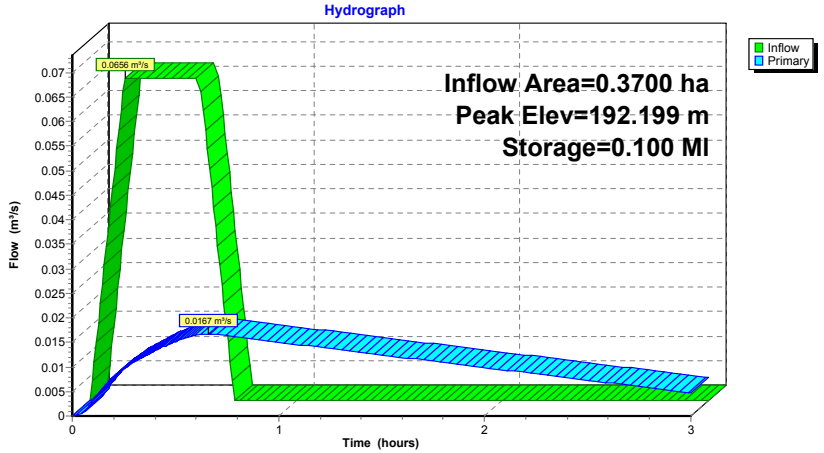
Plug-Flow detention time= 61.7 min calculated for 0.115 Ml (91% of inflow)
Center-of-Mass det. time= 60.5 min (81.5 - 21.0)

Volume	Invert	Avail.Storage	Storage Description
#1	191.180 m	0.120 Ml	**1,800 mmW x 1,200 mmH x 55.34 mL Pipe Storage S= 0.0005 m/m**

Device	Routing	Invert	Outlet Devices
#1	Primary	191.180 m	**90 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0167 m³/s @ 0.66 hrs HW=192.199 m TW=191.080 m (Fixed TW Elev= 191.080 m)
↑└**1=Orifice/Grate** (Orifice Controls 0.0167 m³/s @ 2.62 m/s)

Pond 62P: Box Culvert- Common Area



Summary for Pond 63P: Box Culvert-Main Storage

Inflow Area = 1.6183 ha, 0.00% Impervious, Inflow Depth > 30 mm for 100-Year event
Inflow = 0.2071 m³/s @ 0.53 hrs, Volume= 0.483 Ml
Outflow = 0.1100 m³/s @ 0.62 hrs, Volume= 0.471 Ml, Atten= 47%, Lag= 5.3 min
Primary = 0.1100 m³/s @ 0.62 hrs, Volume= 0.471 Ml

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 189.826 m @ 0.62 hrs Surf.Area= 0.0193 ha Storage= 0.228 Ml

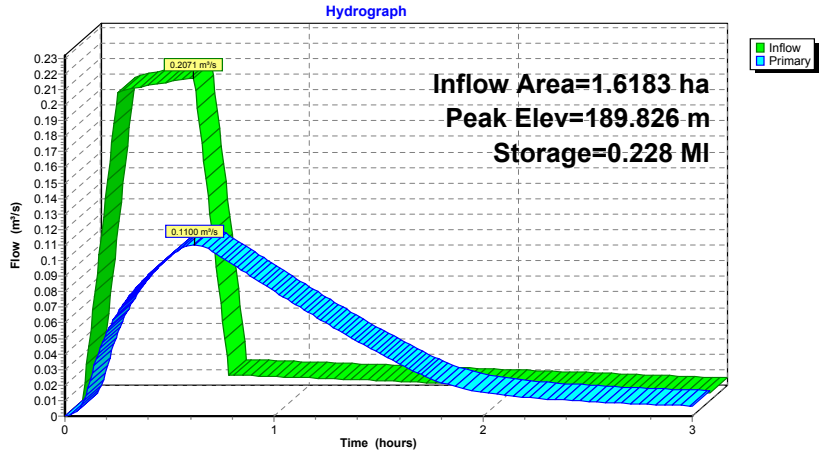
Plug-Flow detention time= 26.9 min calculated for 0.469 Ml (97% of inflow)
Center-of-Mass det. time= 23.6 min (59.0 - 35.4)

Volume	Invert	Avail.Storage	Storage Description
#1	188.630 m	0.199 Ml	**2,400 mmW x 1,200 mmH x 69.00 mL Pipe Storage S= 0.0005 m/m**
#2	188.630 m	0.041 Ml	**2.40 mD x 1.50 mH Vertical Cone/Cylinder** x 6
		0.239 Ml	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	188.630 m	**225 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.1100 m³/s @ 0.62 hrs HW=189.826 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.1100 m³/s @ 2.77 m/s)

Pond 63P: Box Culvert-Main Storage

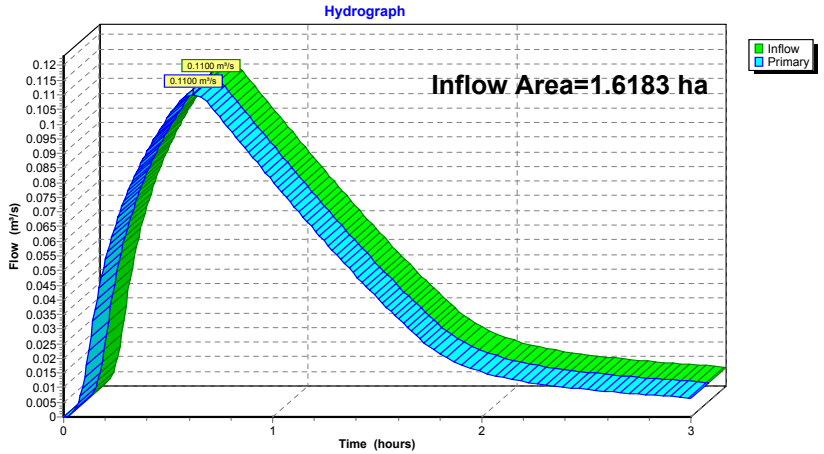


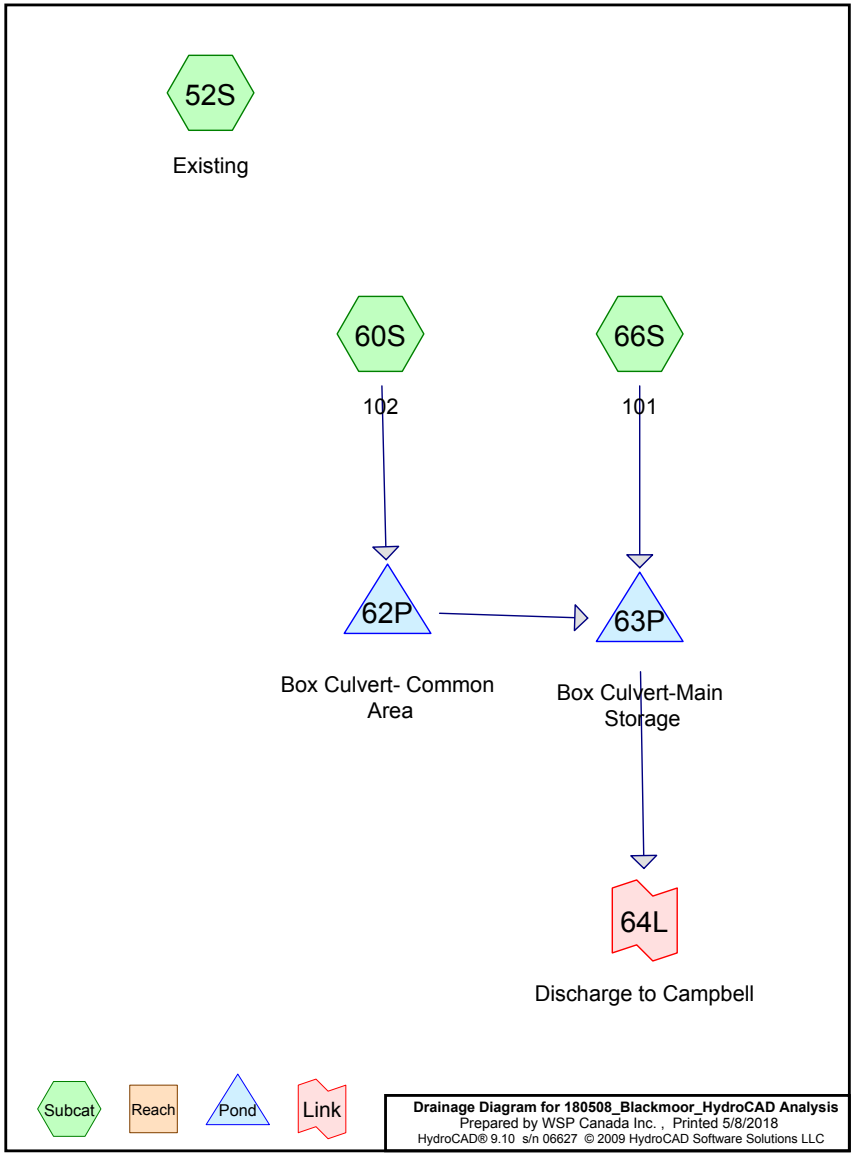
Summary for Link 64L: Discharge to Campbell

Inflow Area = 1.6183 ha, 0.00% Impervious, Inflow Depth > 29 mm for 100-Year event
Inflow = 0.1100 m³/s @ 0.62 hrs, Volume= 0.471 Ml
Primary = 0.1100 m³/s @ 0.62 hrs, Volume= 0.471 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link 64L: Discharge to Campbell





Area Listing (all nodes)

Area (hectares)	C	Description (subcatchment-numbers)
1.6183	0.32	(52S)
1.2483	0.64	(66S)
0.3700	0.74	(60S)
3.2366		**TOTAL AREA**

Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
3.2366	Other	52S, 60S, 66S
3.2366		**TOTAL AREA**

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment52S: Existing Runoff Area=16,183.0 m² 0.00% Impervious Runoff Depth=17 mm
Tc=10.0 min C=0.32 Runoff=0.0854 m³/s 0.277 Ml

Subcatchment60S: 102 Runoff Area=0.3700 ha 0.00% Impervious Runoff Depth=40 mm
Tc=10.0 min C=0.74 Runoff=0.0452 m³/s 0.146 Ml

Subcatchment66S: 101 Runoff Area=12,483.0 m² 0.00% Impervious Runoff Depth=34 mm
Tc=10.0 min C=0.64 Runoff=0.1318 m³/s 0.427 Ml

Pond 62P: Box Culvert- Common Peak Elev=192.245 m Storage=0.105 Ml Inflow=0.0452 m³/s 0.146 Ml
Outflow=0.0171 m³/s 0.127 Ml

Pond 63P: Box Culvert-Main Storage Peak Elev=189.740 m Storage=0.211 Ml Inflow=0.1484 m³/s 0.554 Ml
Outflow=0.1055 m³/s 0.539 Ml

Link 64L: Discharge to Campbell Inflow=0.1055 m³/s 0.539 Ml
Primary=0.1055 m³/s 0.539 Ml

Total Runoff Area = 3.2366 ha Runoff Volume = 0.850 Ml Average Runoff Depth = 26 mm
100.00% Pervious = 3.2366 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 52S: Existing

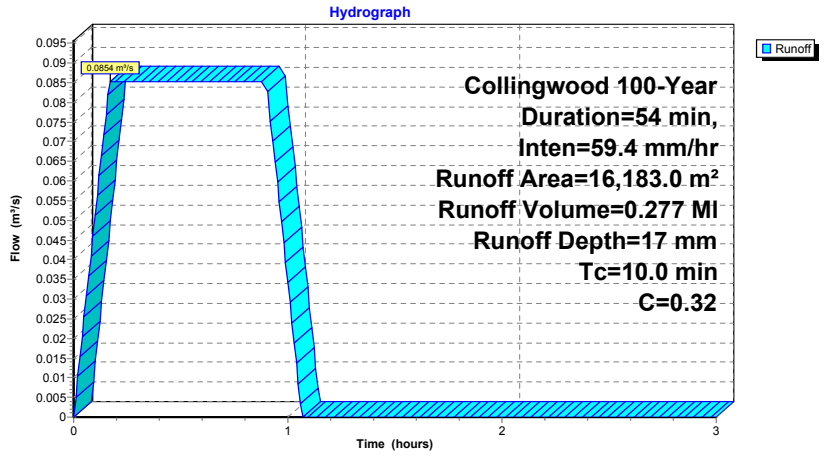
Runoff = 0.0854 m³/s @ 0.17 hrs, Volume= 0.277 Ml, Depth= 17 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=54 min, Inten=59.4 mm/hr

Area (m²)	C	Description
16,183.0	0.32	
16,183.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 52S: Existing



Summary for Subcatchment 60S: 102

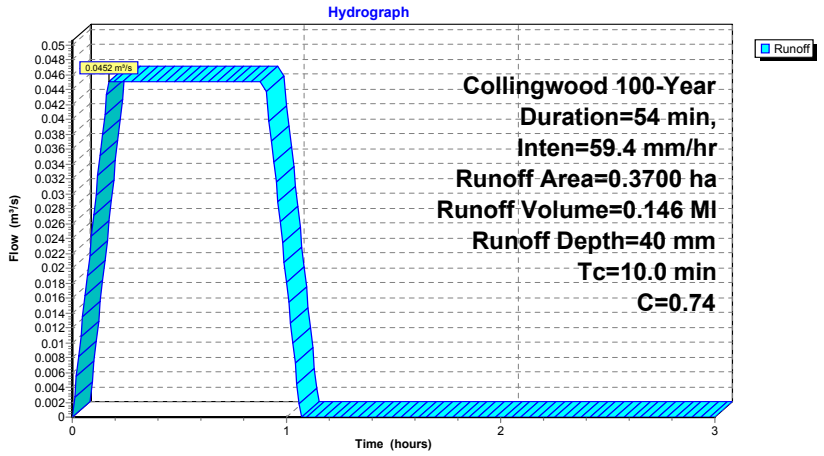
Runoff = 0.0452 m³/s @ 0.17 hrs, Volume= 0.146 Ml, Depth= 40 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=54 min, Inten=59.4 mm/hr

Area (ha)	C	Description
0.3700	0.74	
0.3700		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 60S: 102



Summary for Subcatchment 66S: 101

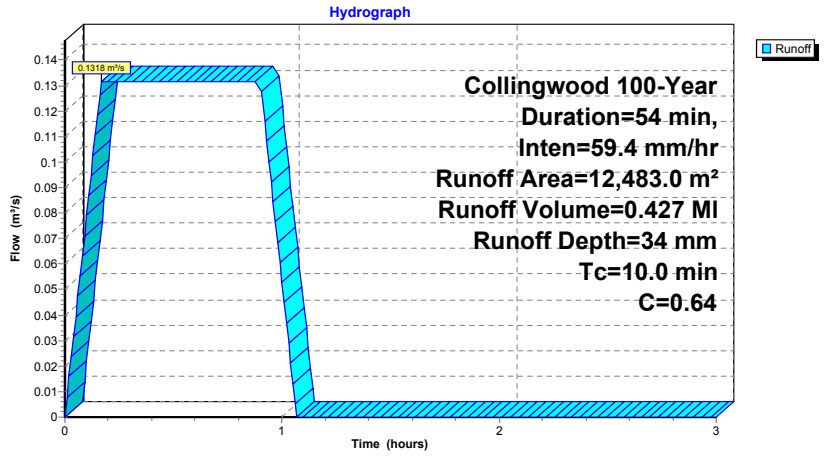
Runoff = 0.1318 m³/s @ 0.17 hrs, Volume= 0.427 Ml, Depth= 34 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Collingwood 100-Year Duration=54 min, Inten=59.4 mm/hr

Area (m²)	C	Description
12,483.0	0.64	
12,483.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 66S: 101



Summary for Pond 62P: Box Culvert- Common Area

Inflow Area = 0.3700 ha, 0.00% Impervious, Inflow Depth = 40 mm for 100-Year event
Inflow = 0.0452 m³/s @ 0.17 hrs, Volume= 0.146 Ml
Outflow = 0.0171 m³/s @ 1.00 hrs, Volume= 0.127 Ml, Atten= 62%, Lag= 50.0 min
Primary = 0.0171 m³/s @ 1.00 hrs, Volume= 0.127 Ml

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 192.245 m @ 1.00 hrs Surf.Area= 0.0100 ha Storage= 0.105 Ml

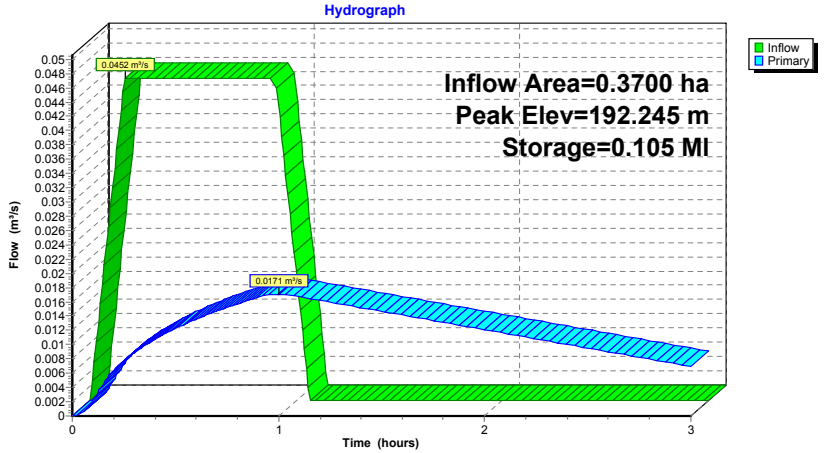
Plug-Flow detention time= 60.1 min calculated for 0.126 Ml (86% of inflow)
Center-of-Mass det. time= 56.6 min (88.6 - 32.0)

Volume	Invert	Avail.Storage	Storage Description
#1	191.180 m	0.120 Ml	**1,800 mmW x 1,200 mmH x 55.34 mL Pipe Storage S= 0.0005 m/m**

Device	Routing	Invert	Outlet Devices
#1	Primary	191.180 m	**90 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0171 m³/s @ 1.00 hrs HW=192.245 m TW=191.080 m (Fixed TW Elev= 191.080 m)
└**1=Orifice/Grate** (Orifice Controls 0.0171 m³/s @ 2.68 m/s)

Pond 62P: Box Culvert- Common Area



Summary for Pond 63P: Box Culvert-Main Storage

Inflow Area = 1.6183 ha, 0.00% Impervious, Inflow Depth > 34 mm for 100-Year event
Inflow = 0.1484 m³/s @ 0.90 hrs, Volume= 0.554 Ml
Outflow = 0.1055 m³/s @ 0.95 hrs, Volume= 0.539 Ml, Atten= 29%, Lag= 3.3 min
Primary = 0.1055 m³/s @ 0.95 hrs, Volume= 0.539 Ml

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 189.740 m @ 0.95 hrs Surf.Area= 0.0193 ha Storage= 0.211 Ml

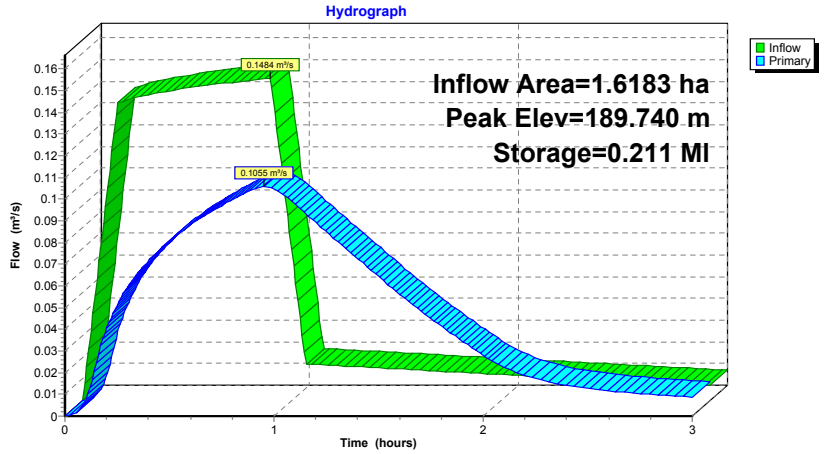
Plug-Flow detention time= 26.5 min calculated for 0.537 Ml (97% of inflow)
Center-of-Mass det. time= 23.3 min (68.2 - 44.9)

Volume	Invert	Avail.Storage	Storage Description
#1	188.630 m	0.199 Ml	**2,400 mmW x 1,200 mmH x 69.00 mL Pipe Storage S= 0.0005 m/m**
#2	188.630 m	0.041 Ml	**2.40 mD x 1.50 mH Vertical Cone/Cylinder** x 6
		0.239 Ml	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	188.630 m	**225 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.1055 m³/s @ 0.95 hrs HW=189.740 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.1055 m³/s @ 2.65 m/s)

Pond 63P: Box Culvert-Main Storage

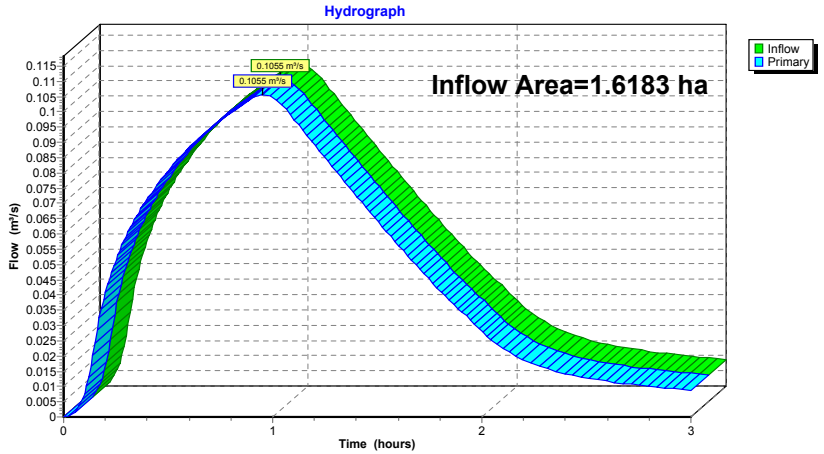


Summary for Link 64L: Discharge to Campbell

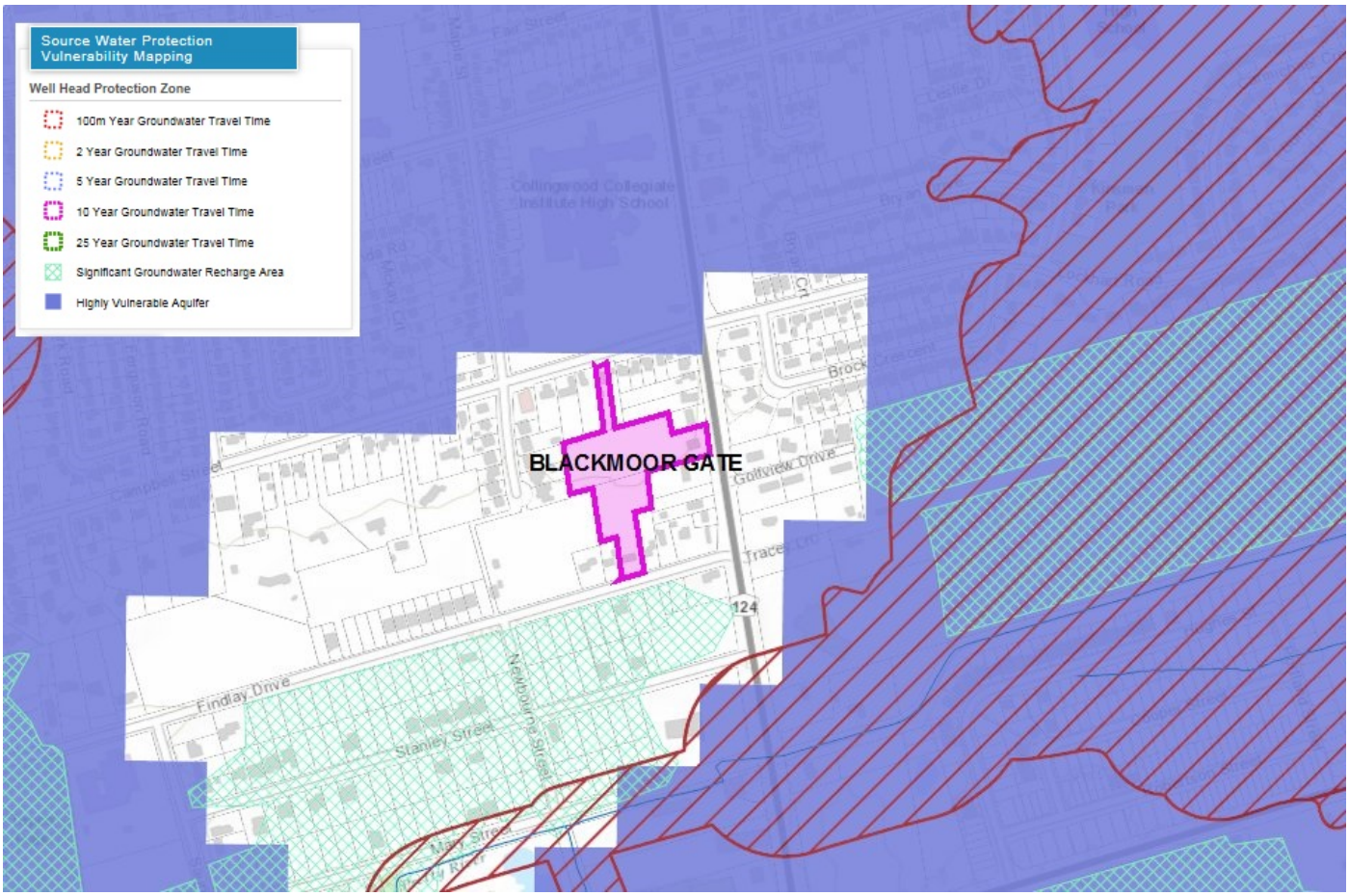
Inflow Area = 1.6183 ha, 0.00% Impervious, Inflow Depth > 33 mm for 100-Year event
Inflow = 0.1055 m³/s @ 0.95 hrs, Volume= 0.539 Ml
Primary = 0.1055 m³/s @ 0.95 hrs, Volume= 0.539 Ml, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link 64L: Discharge to Campbell



NVCA Source Water Protection
Vulnerability Mapping



NOTES:

1) THIS PERMEABLE PAVEMENT DETAIL IS A RECOMMENDED MINIMUM AND MUST BE DESIGNED BY A PROFESSIONAL ENGINEER.

2) ALL AGGREGATE MATERAIL SHALL BE CRUSHED, ANGULAR STONE AND FREE OF FINES.

3) COMPACT SUBSOIL WITH A CALIFORNIA BEARING RATIO (CBR) OF LESS THAN 5% AS DIRECTED BY A PROFESSIONAL ENGINEER.

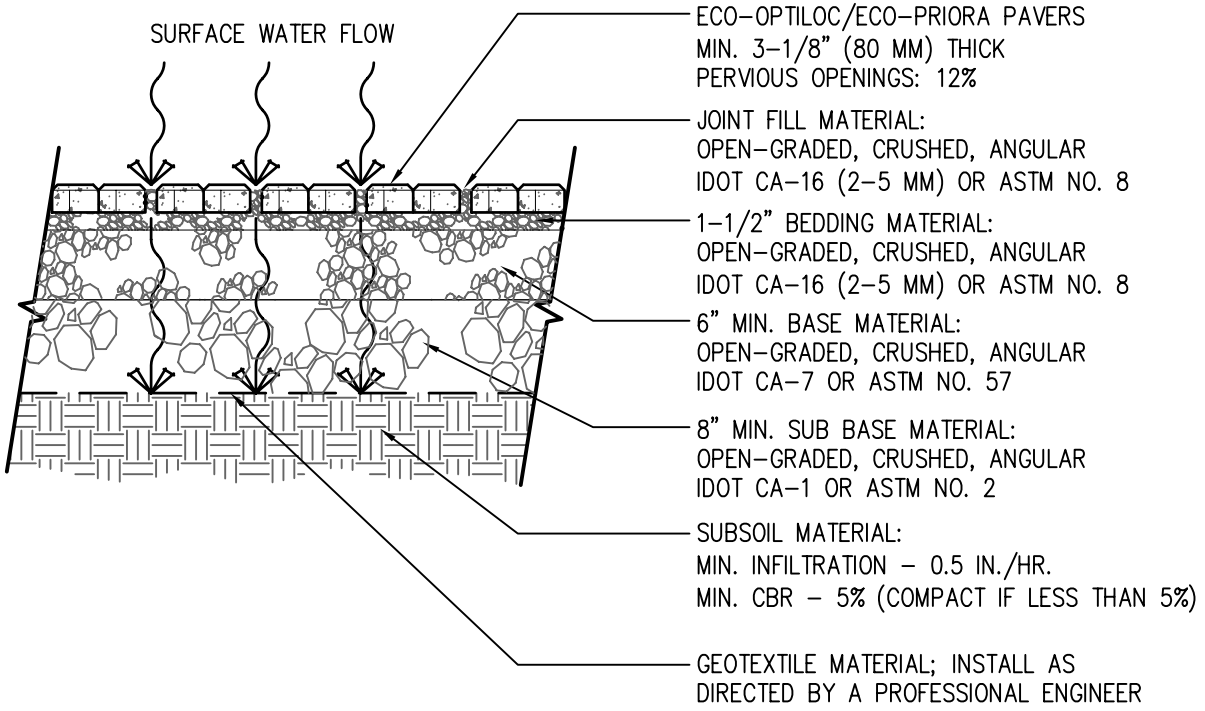
4) SURFACE SLOPE SHALL BE A MINIMUM OF 1% AND A MAXIMUM OF 5%.

5) INSTALL PVC UNDERDRAIN PIPE WHERE INFILTRATION RATE OF SUBSOIL IS LESS THAN 0.5 IN./HR. SIZE AS DIRECTED BY A PROFESSIONAL ENGINEER.

6) NEVER BUILD PERMEABLE PAVEMENTS ON ORGANIC CLAY SOILS OF HIGH PLASTICITY AND/OR PEAT, MULCH, SOILS WITH HIGH ORGANIC CONTENT.

7) MAINTAIN A MINIMUM DISTANCE OF 2' BETWEEN BOTTOM OF PERMEABLE BASE AND WATER TABLE.

8) THE MINIMUM AGGREGATE THICKNESSES ARE AFTER COMPACTION.



UNILOCK®

287 ARMSTRONG AVE.
GEORGETOWN, ON. L7G4X6
1.800.UNILOCK
416.646.9000

NOTE:
POOR SITE CONDITIONS CAN AFFECT THE STABILITY OF THE STRUCTURE, CONSULT A QUALIFIED PROFESSIONAL ENGINEER TO DETERMINE SITE SPECIFIC CONSTRUCTION DETAILS

PERMEABLE PAVEMENT

FULL INFILTRATION

LIGHT DUTY

PERMPV-T1.DWG

ECORASTER®

Product Overview

Quality Permeable Ground Reinforcement

X30 | Bloxx | E40 | E50

ECORASTER® E40 | E50

Quality permeable ground reinforcement

High quality permeable ground reinforcement.
E40 Allround and E50 Heavy-Duty.

20 YEAR warranty ECORASTER®

Your Benefits:

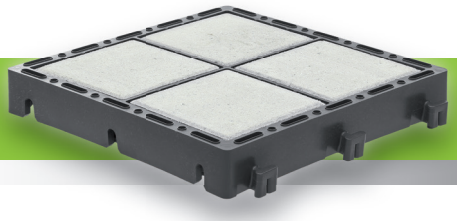
- ✓ easy and quick installation (up to 100 m²| 1,076 ft²/h per person)
- ✓ high resilience (up to 800 t/m²)
- ✓ low maintenance
- ✓ installation without heavy construction equipment
- ✓ no edging needed
- ✓ permeable ground reinforcement
- ✓ low transport and handling costs
- ✓ versatile applicable, accessories available
- ✓ weatherproof and unbreakable
- ✓ Safety interlocking, 36 notches per m²
- ✓ UV-resistant and frostproof
- ✓ immediately green area (ECORASTER® Green, pre-greened)
- ✓ 20 year warranty
- ✓ „Made in Germany“ (TÜV Nord)

Easy to install:

Type:	Dimensions:	Material:	Wall thickness:	Load:	Solubility:	Compressive strength:	Weight per piece:	Weight per m² | 10.76 ft²:
E50 Heavy Duty	330 x 330 x 50 mm • 12.99 x 12.99 x 1.97 "	100% recycled Polyethylene (LDPE)	5 mm • 0.1968 "	up to 800 t/m² (depending on fill type)	resistant to acids, alkalis, alcohol, oil and petrol (de-icing salt, ammonia, acid rain, etc.)	up to 20t point axle load (DIN 1072)	1,06 kg • 2.34 lbs	9,55 kg • 21.05 lbs
E40 Allround	330 x 330 x 40 mm • 12.99 x 12.99 x 1.57 "		3,6 mm • 0.14 "				0,58 kg • 1.27 lbs	5,22 kg • 11.50 lbs

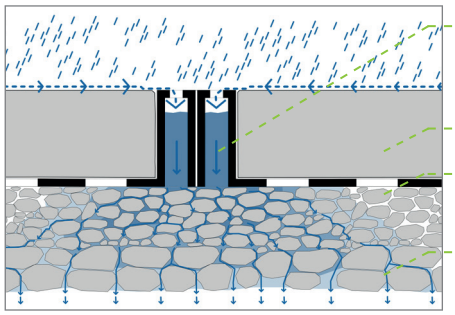
ECORASTER® Bloxx

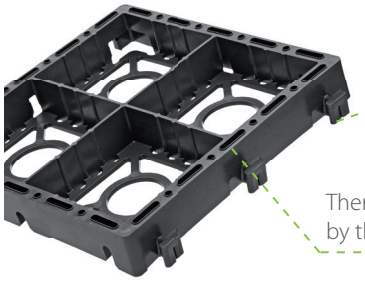
With integrated „no-clogging“ drainage



Get paved areas with less efforts - permeable!
Safe money, time and maintenance.

How it works:





Be Creative! ECORASTER® Bloxx fits into the ECORASTER® system.

Thermal expansion is compensated by the expansion elements

Easy to install:

ECORASTER® Bloxx, unpack, snap together, and drop the blocks in. No need to tuckpoint the joints!

Bloxx elements connect together in seconds!

Bloxx Paver Elements, replaceable without loosening the cluster (e.g. exchange dirty paver)

Fully accessible!!!

Unique safety interlocking, NO bumps, NO trip hazards!

Colorful: Dark grey, light grey, red, white... combine as u like.

Clogging? Not possible!

- ✓ **Safety Locking System**
- ✓ **High infiltration rate**
- ✓ **Quick Installation**
- ✓ **Low maintenance**

Type:	Dimensions:	Material:	Paver colors:	Solubility:	Compressive strength:	Weight per m^2:
Bloxx	330 x 330 x 50 mm • 12.99 x 12.99 x 1.97“	100% recycled Polyethylene (LDPE)	red, white, dark grey and light grey	resistant to acids, alkalis, alcohol, oil and petrol (de-icing salt, ammonia, acid rain, etc.)	up to 20t point axle load (DIN 1072)	approx. 85 kg • 187.39 lbs (incl. pavers)

QUALITY made in GERMANY

ECORASTER® X30

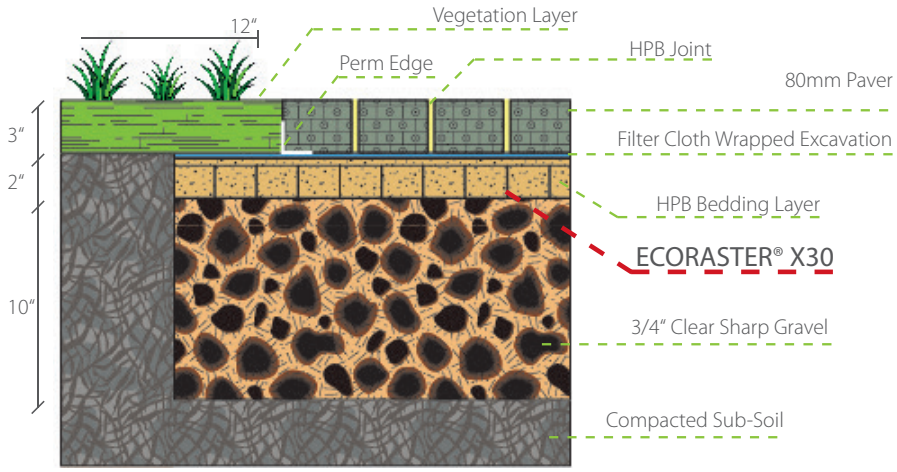
Hardscape Base Stabilizing System

A heavy duty linking grid system that allows you to build stronger hardscapes by stabilizing the base material.

Your Benefits:

- » Up to 50% base reduction in excavation
- » Up to 30% labour cost savings
- » Wider pin-point load dispersal
- » Reduced warrantee call-backs from shifting and sinking
- » Reduced risk of poor sub-base compaction
- » Sustainable, efficient, and profitable!

Easy to install:



Applications:

- » Heavy Duty Base Stabilization
- » Permeable Base Stabilization
- » Interlock Driveway Base Support
- » Permeable Interlock Concrete Paving Installation

Questions? Give us a call:
+1-800-495-5517 (Toll Free)

Type:	Dimensions:	Material:	Wall thickness:	Load up to:	Solubility:	Compressive strength:	Weight per piece:	Weight per m^2 | 10.76 ft^2:
X30 Base Stabilizer	330 x 330 x 30 mm • 12.99 x 12.99 x 1.18"	100% recycled Polyethylene (LDPE)	0.2 in	23 t/ft^2 (unfilled) 75 t/ft^2 (filled)	resistant to acids, alkalis, alcohol, oil and petrol (de-icing salt, ammonia, acid rain, etc.)	up to 20t point axle load (DIN 1072)	0,77 kg • 1.7 lbs	6,93 kg • 15.3 lbs

Specifications

Sustainable and cost-saving

ECORASTER® Application			GREEN / MICROGREEN	MINERAL	Bloxx
			vegetated	gravel filled	paved
Load		Roads and paths used only for pedestrians and bicycles may use this	E40 alternative: S50	E40 alternative: S50	✓
		Paths, walkways and similar applications, as well as car parking	E40 alternative: E50 or S50	E40 alternative: E50	✓
		Roads, road shoulders and parking lots used for all types of vehicles	E50	E50* alternative: ECORASTER® STONE	✓
		Areas used with high point axle loading e.g. warehousing (forklifts and trucks), truck parking lots, bus parking, helicopter landing pads.	---	E50* alternative: ECORASTER® STONE	✓
Installed and unfilled, the **ECORASTER®** system can be driven on with heavy wheeled vehicles (EN 124 / D400 | except Bloxx).					

*with 3/8" - 3/4" inches covering-over

20 YEAR warranty ECORASTER

TÜV NORD Made in Germany

NATO zertifiziert

TÜV NORD Freiwillige Prüfung Verlegung überwacht Achslast nach DIN 1072 bis 20 t Umweltneutral nach OECD 202

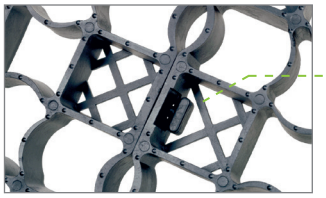
Certificates and Approvals

- ✓ UV-resistant, certified DIN EN 60068-2-5
- ✓ Point axle loading up to 20 t/m², DIN 1072:1985
- ✓ Heavy-duty, tried and tested DIN EN 124:2011
- ✓ Environmentally safe, tested OECD 202:2004
- ✓ Factory warranty: 20 years from purchase date (private use)
- ✓ NATO certified E50 - MOD / 9330-99-858-1406
- ✓ TÜV CERT
- ✓ TÜV Nord „Made in Germany"

Accessories

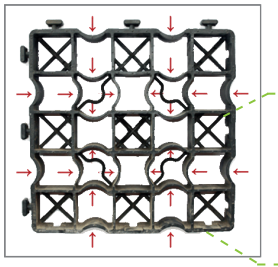
PURUS offer accessories for ECORASTER® ground reinforcement systems, including hinge and curve adaptors as well as parking markers.

Safety interlocking system



Effective safety snap connections are quick and easy to install.

Deploy without expansion joints



Not affected by temperature variations due to the integral expansion elements.

Installed and unfilled, the ECORASTER® system can be driven on with heavy wheeled vehicles (class D 400, excl. Bloxx).

Please note: Please read the manual/ check our website for more information!

$1m^2 = 10.764\ ft^2$

Developing sustainable solutions for a permeable ground reinforcement.

German engineering – installed worldwide.
Questions? Please give us a call:

20 YEAR warranty
ECORASTER®

PURUS PLASTICS NORTH AMERICA

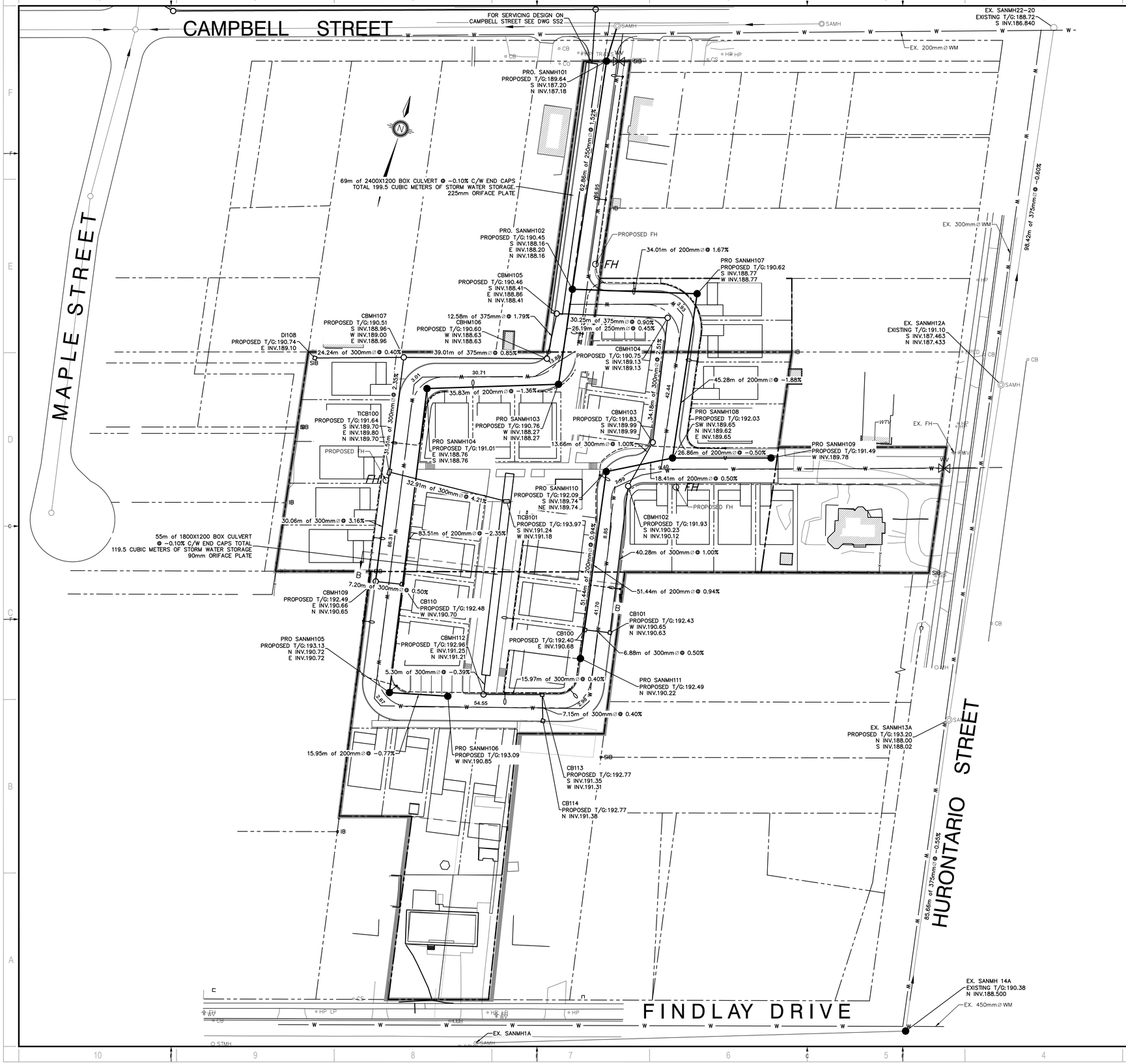
PURUS North America Inc. | 1790 Avenue Road Unit A | Toronto, ON | M5M 3Z1
Tollfree: +1 800 495 55 17 | purus@purus-northamerica.com

ECORASTER® is a PURUS PLASTICS GmbH brand.
Subject to change without prior notice. E. & O. E.

Version Av1_2015

APPENDIX

E PROPOSED WATER SERVICING



LEGEND

EXISTING CONDITIONS

- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING 0.25m CONTOURS
- EXISTING TREELINE
- SANITARY SEWER
- WATERMAIN
- STORMSEWER
- BOTTOM OF SLOPE
- TOP OF SLOPE
- EXISTING BUILDING
- MH EXISTING SANITARY MANHOLE
- CBMH EXISTING CATCHBASIN MANHOLE
- POST EXISTING POST
- CB EXISTING CATCHBASIN
- CO EXISTING SANITARY CLEANOUT
- CS EXISTING CURB STOP VALVE
- FH EXISTING FIRE HYDRANT
- WV EXISTING WATERVALVE
- HP EXISTING HYDRO POLE AND ANCHOR
- BPED EXISTING BELL PEDESTAL
- BMH EXISTING BELL MANHOLE
- SIB EXISTING STANDARD IRON BAR
- IB EXISTING IRON BAR
- RIB EXISTING ROUND IRON BAR
- EXISTING ROAD SIGN
- EXISTING FLOWERBED
- EXISTING CONIFEROUS TREE
- EXISTING DECIDUOUS TREE
- EXISTING DECIDUOUS SHRUB

PROPOSED CONSTRUCTION

- PROPOSED CENTRELINE OF ROAD
- EDGE OF ASPHALT AND BACK OF CURB
- SANITARY SEWER
- STORM SEWER
- W WATERMAIN
- UNDER GROUND HYDRO
- WV PROPOSED WATERMAIN VALVE
- FH PROPOSED FIRE HYDRANT
- MH1 PROPOSED SANITARY MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED LIGHT POST
- 203.59 EXISTING GRADE
- 203.86 PROPOSED GRADE
- PROPOSED FLOW DIRECTION
- PROPOSED BOTTOM OF SWALE

NOTES:

- ALL PROPOSED WATERMAIN TO BE 150mmØ CLASS 52 DUCTILE IRON
- ALL STORM AND SANITARY STURCTURES TO COMPLY WITH OPSD REQUIRMENTS.
- ALL STORM PIPE TO BE HDPE SMOOTH WALL RIBBED PIPE
- ALL SANITARY PIPE TO BE PVC DR18

wsp
101-1450 1st AVENUE W,
OWEN SOUND, ONTARIO, CANADA N4K6W2
PHONE: 519-376-7612 FAX: 519-376-8008
WWW.WSP.COM

CONSULTANT:

SEAL:

CLIENT:

STRAW HAT RESTORATION

CLIENT REF. #: --

PROJECT:

BLACKMOOR GATE

KEY PLAN:

DISCLAIMER: COPYRIGHT:
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ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
	00	04/05/18	FIRST SUBMISSION SPA
-	-	-	--

PROJECT NO: 171-16446-00
DATE: APRIL 2018
ORIGINAL SCALE: 1:500
DESIGNED BY: K H
DRAWN BY: T J J
CHECKED BY: C W
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DISCIPLINE: CIVIL
TITLE: SERVICING PLAN
SHEET NUMBER: SS1
SHEET #: -- OF: --
ISSUE: FIRST SUBMISSION SPA
REV #: 0
DATE OF: --

Table 1.0 - Fire Flows and Fire Storage Requirement Calculation

Project: **Blackmoor Gate, Collingwood**

Owner: **Straw Hat Restoration**

Project No. 171-16446-00

Guidelines: **Water Supply for Public Fire Protection - Fire Underwriters Survey - 1999**

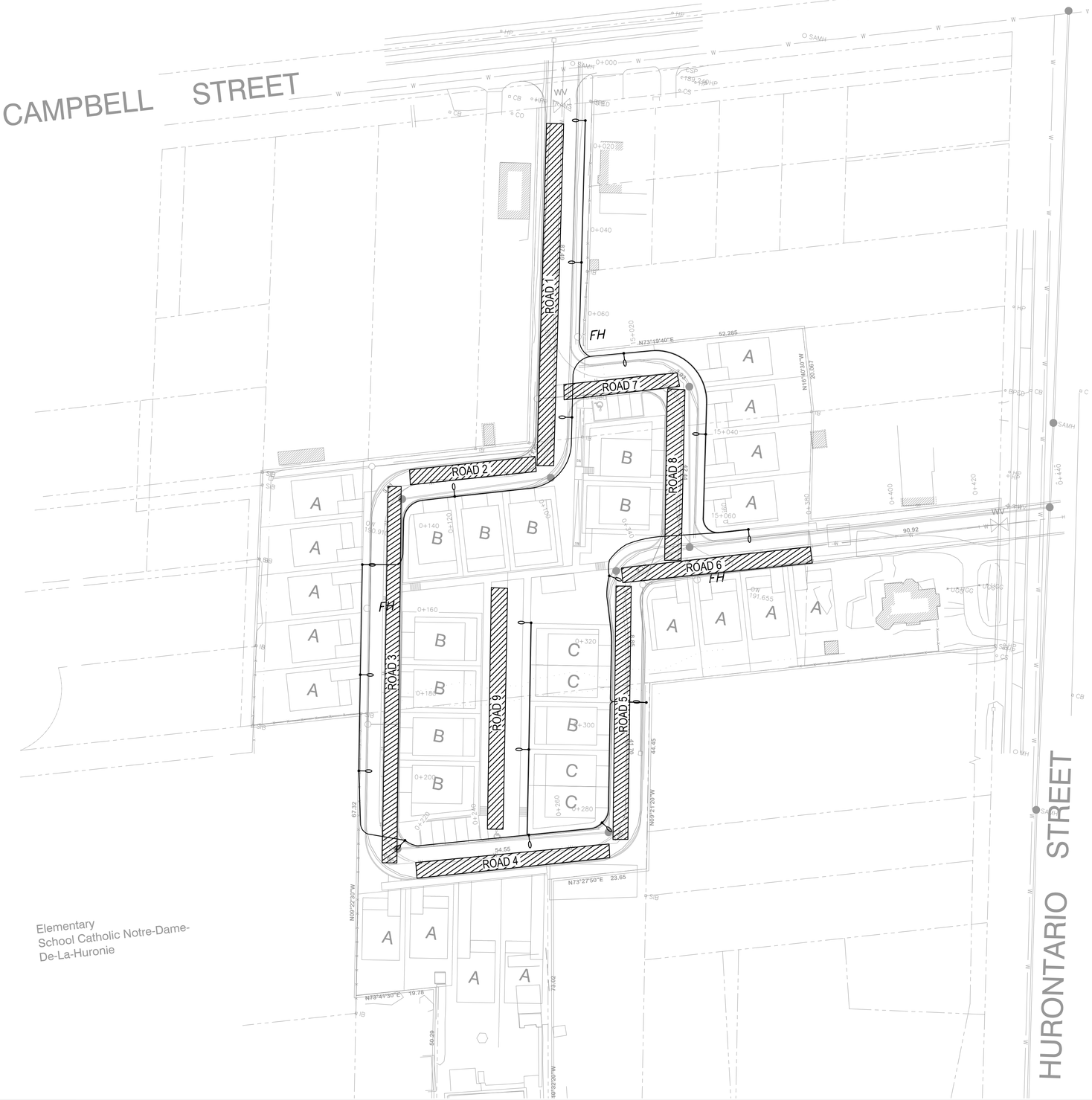
Date: March 2018

Facility	Building Classification								Fire Flow Calculations			Adjustments to Fire Flow			Recommended Values		
	Occupancy	Floor Area (m^2)		Fire Walls	Dist. To Adj. Bldgs (m)	Roofing Material	Construction		C	A	F	Occupancy Hazard	Sprinkler Reduction	Building Exposure	**Fire Flow Rate** (l/s)	**Duration** (hours)	**Fire Storage** (m^3)
		Above Grade	Basement				Type	Year	Value	Area (m^2)	Fire F (l/min)						
1. Semi Detached Unit																	
	Group C	360	0	N/A	side 1 ~ 3m side 2 ~ 3m side 3 ~ 30m side 4 ~ 11m	Asphalt Shingles	Wood framed two storey structure	2019	1.5	360	6,000	-15%	0%	75%	150	1.75	945

1. Floor Area - Total floor area in square metres (including all storeys, but excluding basements which are at least 50% below grade) in the building considered. Condos assumed to contain loft (1.5xmain floor area was used).
2. C Value - Coefficient related to the type of construction: 1.5 - for wood frame construction (structure essentially all combustible); 1.0 - for ordinary construction (brick or other masonary walls, combustible floor and interior; 0.8 - for non-combustible construction (unprotected metal structural components, masonry or metal walls; 0.6 - for fire-resistive construction (fully protected frame, floors, roof)
3. F - the required fire flow in litres per minute calculated as follows: $F = 220 \times C \times A^{0.5}$
4. Occupancy Hazard Adjustments: the calculated fire flow may be modified based on the potential fire hazard of the occupancy contents. Adjustment factors for the type of contents are as follows: Non-combustible: -25%; Limited combustible: -15%; Combustible: no change; Free burning: +15%; Rapid burning: +25%. The fire flow demand shall not be less than 2,000 l/min.
5. Automatic Sprinkler Protection - the adjusted fire flow (as modified by the Occupancy Hazard Adjustment) may be further reduced by up to 50% for complete automatic sprinkler protection, depending upon adequacy of of the system. Typical adjustments include: -30% for sprinkler system that complies with NFPA 13 and other sprinkler standards; additional credit of up to -10% if the water supply is standard for both the system and fire department hose lines; additional credit up to -10% for for a fully supervised system.
6. Adjacent Building Exposure - the value obtained in #4 above (adjusted fire flow as modified by the Occupancy Hazard Adjustment) should be increased for structures exposed within 45 metres by the fire area under consideration. The charge for any one side generally should not exceed the following limits for the separations shown: 0 to 3 m 25%; 3.1 to 10 m 20%; 10.1 to 20 m 15%; 20.1 to 30 m 10%; 30.1 to 45 m 5%. The total shall be the sum of the percentages for all sides, but shall not exceed 75%.
7. The adjusted fire flow shall not exceed 45,000 l/min nor be less than 2,000 l/min.
8. Required Duration of Fire Flow: 2,000 l/min or less - 1.0 hr; 3,000 l/min - 1.25 hrs; 4,000 l/min - 1.5 hrs; 5,000 l/min - 1.75 hrs; 6,000 l/min - 2 hrs; 8,000 l/min - 2.0 hrs.
9. HRDC approved the use of NFPA 1142 for calculating the fire flow and fire storage volume for the school. Based on the NFPA calculations, the fireflow rate should be 39.4 l/s for a duration of 2 hrs resulting in a storage volume of 284 cu. m

APPENDIX

F PROPOSED UTILITIES SERVICING



LEGEND

PROPOSED WORK

LED STREET LIGHT MOUNTED ON A 8.5m POLE - DIRECT BURIED (OPSD 2225.010) WITH 1.8m ALUMINUM TAPERED ELLIPTICAL DAVIT ARM (OPSD 2420.010) APPROVED MANUFACTURER FIXTURES:
CREE RSW SERIES SMALL, TYPE II MEDIUM, 27.9 WATTS
PHILIPS ROADSTAR SERIES, TYPE II MEDIUM, 27.0 WATTS
AMERICAN ELECTRIC ATB0 SERIES, TYPE III SHORT, 37 WATTS

53mm (2.0in) TYPE 2 DUCT/CONDUIT c/w 3#10+GND (OR AS SHOWN), CSA APPROVED FOR DIRECT BURIAL. CABLE SHALL BE COPPER.

POWER FEED FROM COLLUS POWERSTREAM TRANSFORMER TO BREAKER PEDESTAL, ALL TO COLLUS POWERSTREAM APPROVAL. (3-#3/0+#6GND, 53C)

LIGHTING CALCULATION GRID AREA

STREET LIGHTING POWER PEDESTAL (ES-1) c/w POWER BREAKER + METER. PEDESTAL SHALL BE MODEL SLM422 FROM PSI SOLUTION INC. THE PEDESTAL SHALL BE COMPLETE WITH METER. THE METER SHALL FACE THE PROPERTY SIDE.

PAD & METER MOUNTED SINGLE PHASE 240/120 VOLT SECONDARY TRANSFORMER c/w CONCRETE BASE. TRANSFORMER AND METER BY COLLUS POWERSTREAM. BASE TO BE SUPPLIED BY CONTRACTOR.

CENTERLINE OF TRENCH TO BE LOCATED 3.75M FROM PROPERTY LINE AS PER TYPICAL SECTION ON PAGE C1-7.

STREET LIGHTING POWER PEDESTAL

THE STREET LIGHTING POWER BREAKER SHALL BE ENCLOSED IN AN EEMAC TYPE 4 ENCLOSURE AND MOUNTED ON A 150X150MMX3.0M GALVANIZED STEEL POST (OESC TABLE 102) WHERE SHOWN ON THE DRAWINGS AT A MOUNTING HEIGHT OF APPROXIMATELY 1.5M ABOVE GRADE AND BURIAL DEPTH OF 1.5M.

THE CIRCUIT BREAKER ENCLOSURE SHALL BE TYPE 316, STAINLESS STEEL, SIZE 12" X 10" X 5" DEEP (305 X 254 X 127MM), COMPLETE WITH CONTINUOUS STAINLESS STEEL HINGED COVER SECURED WITH STAINLESS STEEL CLAMPS AND TAMPERPROOF SCREWS, HASP FOR PAD-LOCKING, MOUNTING LUGS AND REMOVABLE INNER PANEL, HAMMOND PART NO. 1414 N4 PHS X OR APPROVED EQUIVALENT.

THE CIRCUIT BREAKER SHALL BE 15 AMPERE, 240 VOLT, 2 POLE 18 KA I.C., THERMAL MAGNETIC, FPE CAT. NO. CE2015 E4 OR APPROVED EQUIVALENT. THE CIRCUIT BREAKER SHALL BE MOUNTED SECURELY ON THE INNER PANEL OF THE ABOVE ENCLOSURE.

THE ENCLOSURE SHALL BE MOUNTED SECURELY ON THE POST, WHERE SHOWN ON THE DRAWING BOLTED TO POST WITH GALVANIZED (2-1/2"Ø X REQUIRED LENGTH BOLTS). INSTALL A 50MM RIGID PVC CONDUIT FROM THE BOTTOM OF THE ENCLOSURE TO 900MM BELOW GRADE FOR THE INCOMING STREET LIGHTING CABLE FROM THE TRANSFORMER TO THE LINE SIDE OF THE BREAKER AND INSTALL 2 - 53MM CONDUITS FROM THE BOTTOM OF THE ENCLOSURE TO 900MM BELOW GRADE FOR THE CONDUCTORS FROM THE BREAKER TO THE STREET LIGHTING POLE BASE HAND HOLES AS SHOWN ON THE DRAWING. ENSURE THAT ALL DOOR CLAMPS ARE SECURED AND THE ENCLOSURE IS PADLOCKED AFTER ENERGIZATION.

THE STREET LIGHTING CONDUIT SHALL BE LOCATED WHERE SHOWN AND AS SHOWN ON THE COLLUS POWERSTREAM DRAWINGS AND TO THE APPROVAL OF COLLUS POWERSTREAM. IN THE JOINT USE UTILITY TRENCHES.

Calculation Summary

Label	Avg	Max	Min	Avg/Min	Max/Min	LVRatio
Road_1_Illuminance	4.59	9.7	1.9	2.42	5.11	N.A.
Road_1_Luminance	0.24	0.4	0.1	2.40	4.00	0.21
Road_2_Illuminance	4.78	8.6	2.4	1.99	3.58	N.A.
Road_2_Luminance	0.24	0.4	0.1	2.40	4.00	0.04
Road_3_Illuminance	5.81	10.0	2.8	2.08	3.57	N.A.
Road_3_Luminance	0.28	0.5	0.1	2.80	5.00	0.29
Road_4_Illuminance	5.10	8.9	1.5	3.40	5.93	N.A.
Road_4_Luminance	0.24	0.4	0.2	1.20	2.00	0.04
Road_5_Illuminance	5.43	9.6	1.5	3.62	6.40	N.A.
Road_5_Luminance	0.23	0.4	0.1	2.30	4.00	0.04
Road_6_Illuminance	4.86	7.9	2.3	2.11	3.43	N.A.
Road_6_Luminance	0.20	0.3	0.1	2.00	3.00	0.15
Road_7_Illuminance	5.72	7.9	3.7	1.55	2.14	N.A.
Road_7_Luminance	0.23	0.3	0.2	1.15	1.50	-
Road_8_Illuminance	4.43	7.7	1.9	2.33	4.05	N.A.
Road_8_Luminance	0.18	0.4	0.1	1.80	4.00	-
Road_9_Illuminance	4.46	7.4	2.2	2.03	3.36	N.A.
Road_9_Luminance	0.19	0.3	0.1	1.90	3.00	0.11
Illuminance Overall	5.06	10.0	1.5	3.37	6.67	N.A.
Luminance Overall	0.23	0.5	0.1	2.30	5.00	N.A.

NOTES

GENERAL NOTES

A) ILLUMINATION CALCULATIONS AS PER RP-8-00 USING LED LUMINAIRES. THE FOLLOWING CRITERIA WAS USED BASED ON THE CLASSIFICATION OF THE ROADWAY AS LOCAL WITH LOW PEDESTRIAN VOLUME:
AVERAGE MAINTAINED ILLUMINANCE = 4 LUX;
AVERAGE /MINIMUM RATIO = 6:1 OR BETTER

B) ONLY ILLUMINATION CALCULATIONS WERE CONSIDERED FOR THE DESIGN OF THE ROADWAY LIGHTING. LUMINANCE CALCULATIONS ARE SHOWN FOR REFERENCE ONLY, AS THE STRAIGHT ROAD SEGMENTS ARE TO SHORT TO PRODUCE ACCURATE RESULTS. FOR REFERENCE, THE LUMINANCE CRITERIA HAD THEY BEEN CONSIDERED WOULD BE BASED ON RP-8-14 AND THE CLASSIFICATION OF THE ROADWAY AS LOCAL WITH LOW PEDESTRIAN VOLUME:
AVERAGE MAINTAINED LUMINANCE = 0.3 CD/M2;
AVERAGE /MINIMUM RATIO = 6:1 OR BETTER;
MAXIMUM /MINIMUM RATIO = 10:1;
VEILING LUMINANCE RATIO = 0.4 OR BETTER

wsp
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 wsp.com

CONSULTANT - SUB-CONSULTANT:

SEAL:

CLIENT:

STRAW HAT RESTORATION

CLIENT REF. #: 131-25444-00

PROJECT:

BLACKMOOR GATE

KEY PLAN:

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CAUTION :
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

ISSUED FOR - REVISION:

IS.	RV.	DATE	DESCRIPTION
	1	MAY. 2018	FIRST SUBMISSION SPA

PROJECT NO.: 171-16446-00
DATE: MAY 2018
ORIGINAL SCALE: 1:500
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE
25mm
DESIGNED BY: G.WALPER
DRAWN BY: G.WALPER
CHECKED BY:

DISCIPLINE: **ELECTRICAL**

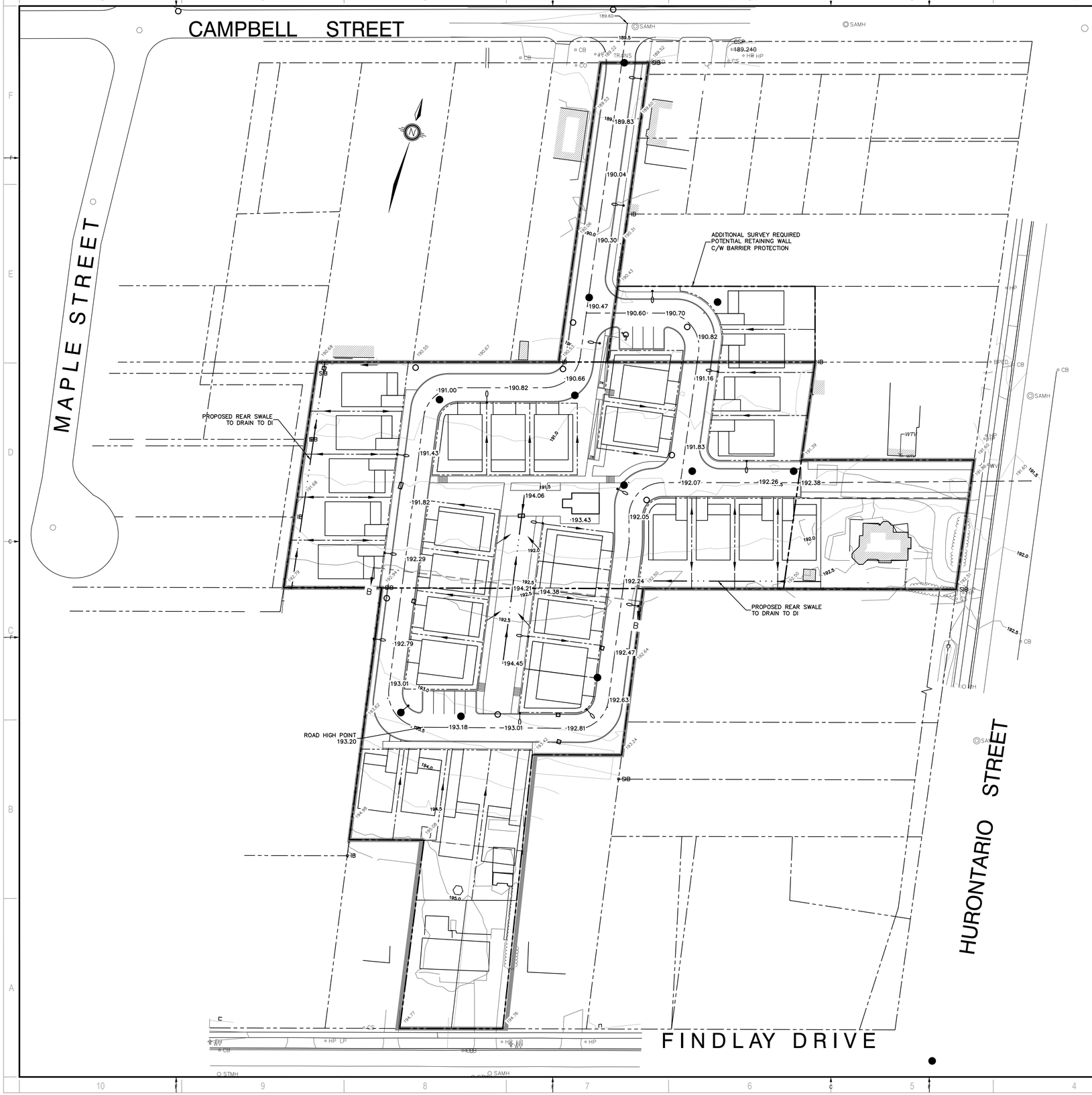
TITLE: **STREET LIGHTING LAYOUT**

SHEET NUMBER:
SHEET #: OF

ISSUE: **FIRST SUBMISSION SPA** RV. # **0**
DATE OF:

APPENDIX

G PRELIMINARY SITE GRADING



LEGEND

EXISTING CONDITIONS

- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING 0.25m CONTOURS
- EXISTING TREELINE
- SANITARY SEWER
- WATERMAIN
- STORMSEWER
- BOTTOM OF SLOPE
- TOP OF SLOPE
- EXISTING BUILDING
- MH — EXISTING SANITARY MANHOLE
- CBMH — EXISTING CATCHBASIN MANHOLE
- POST — EXISTING POST
- CB — EXISTING CATCHBASIN
- CO — EXISTING SANITARY CLEANOUT
- CS — EXISTING CURB STOP VALVE
- FH — EXISTING FIRE HYDRANT
- WV — EXISTING WATERVALVE
- HP — AN — EXISTING HYDRO POLE AND ANCHOR
- BPED — EXISTING BELL PEDESTAL
- BMH — EXISTING BELL MANHOLE
- SIB — EXISTING STANDARD IRON BAR
- IB — EXISTING IRON BAR
- RIB — EXISTING ROUND IRON BAR
- EXISTING ROAD SIGN
- EXISTING FLOWERBED
- EXISTING CONIFEROUS TREE
- EXISTING DECIDUOUS TREE
- EXISTING DECIDUOUS SHRUB

PROPOSED CONSTRUCTION

- PROPOSED CENTRELINE OF ROAD
- EDGE OF ASPHALT AND BACK OF CURB
- WV — PROPOSED WATERMAIN VALVE
- FH — PROPOSED FIRE HYDRANT
- MH1 — PROPOSED SANITARY MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED LIGHT POST
- 203.539 — EXISTING GRADE
- 203.86 — PROPOSED GRADE
- PROPOSED FLOW DIRECTION
- PROPOSED BOTTOM OF SWALE

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PHONE: 519-376-7612 FAX: 519-376-8008
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CONSULTANT:

SEAL:

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STRAW HAT RESTORATION

CLIENT REF. #: --

PROJECT:

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-		-	--

PROJECT NO: 171-16446-00

DATE: APRIL 2018

ORIGINAL SCALE: 1:500

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm

DESIGNED BY: K H

DRAWN BY: T J J

CHECKED BY: C W

DISCIPLINE: CIVIL

TITLE: SITE GRADING AND DRAINAGE PLAN

SHEET NUMBER: SG1

SHEET #: -- OF --

ISSUE: FIRST SUBMISSION SPA

REV #: 0

DATE OF: --