

**FUNCTIONAL SERVICING &
STORMWATER
MANAGEMENT BRIEF**

THE ROYAL WINDSOR AT BALMORAL VILLAGE

**TOWN OF COLLINGWOOD
COUNTY OF SIMCOE**

PREPARED FOR:

REID'S HERITAGE HOMES

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
40 HURON STREET SUITE 301
COLLINGWOOD, ON L9Y 4R3**

JANUARY 2020

CFCA FILE NO. 183-4877

The material in this report reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Revision Number	Date	Comments
Rev.0	January 2020	Issued for Site Plan Approval

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION	1
3.0	WATER SERVICING	2
3.1	Existing Water Servicing	2
3.2	Design Water Demand	2
3.3	Fire Flow Demand	3
3.4	Proposed Water Servicing	3
4.0	SANITARY SERVICING	4
4.1	Existing Sanitary Servicing	4
4.2	Design Sanitary Flow	4
4.3	Proposed Sanitary Servicing	4
5.0	STORMWATER MANAGEMENT	5
5.1	Stormwater Management & Grading Criteria	5
5.2	Existing Drainage Conditions	6
5.2.1	Existing Block Grading.....	6
5.2.2	Hydraulic Grade Line Analysis	7
5.3	Proposed Drainage Conditions	7
6.0	UTILITIES	8
7.0	EROSION & SEDIMENT CONTROLS	8
8.0	CONCLUSIONS AND RECOMMENDATIONS	9

LIST OF TABLES

Table 1: Estimated Fire Demand Flows

Table 2: Drainage Area Comparison

LIST OF APPENDICES

Appendix A: Water Distribution Modeling Letter (Ainley, 2015)

Appendix B: Technical Memorandum (C3 Water, 2019)

Appendix C: Sanitary Flow Rate Calculations

LIST OF FIGURES

Figure 1: Site Location

Figure 2: Royal Windsor Site Plan (KNYMH, 2019)

Figure 3: Site Servicing Plan

Figure 4: Approved Storm Area Drainage Plan (CFCA, 2016)

Figure 5: Storm Area Comparisons

Figure 6: Sediment Control Plan

1.0 Introduction

C.F. Crozier & Associates has been retained by Reid's Heritage Homes to prepare a Functional Servicing and Storm Water Management Brief for the proposed development of Balmoral Village Block 2, also known as Royal Windsor. The need for this implementation study is precipitated by the Applicant's desire to obtain Site Plan Approval to construct 132 residential apartment units.

This report has been prepared to provide an analysis of the proposed servicing (water, sanitary, and utilities) and stormwater management (SWM) systems within Block 2. The servicing and stormwater strategies for this portion of Balmoral Village will be in conformance with the overall master grading and servicing designs for Balmoral Village as outlined in the following reports and designs:

- Balmoral Village – Site Plan Approved Drawing Set (CFCA, March 2016)
- Block 1 and 4 Servicing and Stormwater Management Implementation Report (CFCA, July 2015)
- Stormwater Management Implementation Report (CFCA, February 2015)
- Functional Servicing and Stormwater Management Report (CFCA, July 2011)

Note that in previous reports and drawings that Block 2 is referenced as Block B.

2.0 Site Description

Balmoral Village is a mixed-used adult lifestyle condominium development situated on a 9.5-hectare property and is located south of Harbour Street, northeast of the Georgian Trail, and northwest of Black Ash Creek. The Cranberry Golf Course operations yard is located west of the site and Highway 26 is located east of the site. The Site was previously used as a golf driving range, and the legal description of the property is Part Lot 45, Concession 10, former Town of Nottawasaga, now in the Town of Collingwood. Figure 1 illustrates the site location.

Block 2 is bounded by:

- Harbour Street to the north
- Sutton Lane to the south
- Residential Dwellings to the west
- Kimberly Lane to the east

Reid's Heritage Homes is proposing to develop Block 2 into a 5-storey mid-rise building. The building will be classified as residential-use and consist of 132 units. Surface parking will be provided, which will include 42 parking spots within the property and 122 parking spaces in the underground parking structure. Access to Block 2 will be from Kimberly Lane through two entrances south of Harbour Street. Refer to the Figure 2 for the Site Plan (KNYMH Architecture, January 2020).

3.0 Water Servicing

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

3.1 Existing Water Servicing

A review of the Site Plan Approved Drawings (CFCA, March 2016), Drawing 101D dated 09/29/2015 indicates that the following Municipal infrastructure is available in the adjacent roadways:

- 300 mm diameter trunk watermain on the north side of Harbour Street;
- 200 mm diameter watermain on Kimberly Lane;
- 200 mm diameter watermain on Sutton Lane;
- 150 mm diameter service lateral extended into Block 2; and
- Two hydrants located on the west side of Kimberly Lane.

Based on the size of the development, proposed uses and necessity to provide fire protection systems for mid-rise buildings, the internal watermain throughout Balmoral Village are all 200 mm diameter pipes, which exceeds the minimum Town standard diameter of 150 mm. This sizing was reviewed and confirmed by the Town and their consultant (Ainley Group) via completion of a distribution analysis and updates to the municipal network model. Refer to the report prepared by Ainley Group dated February 17, 2015 and provided in Appendix A of this report.

The Town of Collingwood treats and distributes potable water from its water treatment plant (WTP) located on Raglan Street, which draws water from Nottawasaga Bay. The rating of the daily treatment capacity of the plant is 31,140 m³/day. Per the 2018 Compliance report for the WTP, the yearly high Daily Average Demand was 22,032 m³ and the year high Maximum Day Demand was 24,277 m³, which indicates sufficient capacity is available for future development.

3.2 Design Water Demand

The water demands for the proposed development were calculated with reference to the Town of Collingwood Development Standards (2007). Per recent comments from the Town it is understood that Development Standards are being updated with typical persons per unit (PPU), based on census data. Therefore, the water demand calculations below were prepared assuming 1.9 PPU for apartment units. Water demands for Block 2 were calculated as follows:

- Average Residential Flow Rate 450 L/cap/day
- Max Day/Peak Hour Factors 2.0/4.5

It is estimated that water demands for Block 2 are as follows:

- Average Day 1.31 L/sec
- Max Day 2.61 L/sec
- Peak Hour 5.88 L/sec

3.3 Fire Flow Demand

The Fire Underwriters Survey method was used to estimate the fire flow requirements for the proposed development. This calculation estimates the preliminary watermain size required to service the development and is based on a building type of non-combustible construction and a gross floor area (GFA) of 10,850 sq. m. per Site Plan 1 dated January 7, 2020. Table 1 summarizes the required fire flow and duration to meet fire protection for the proposed development.

Table 1: Estimated Fire Demand Flows

Method	Demand Flow (L/s)	Duration (h)
Fire Underwriters Survey	333	4.5
Ontario Building Code	150	2

The Fire Underwriters Survey value is a conservative estimate for comparison purposes only. The proposed fire service is required to accommodate a fire flow of 150 L/s for a duration of 2 hours. The mechanical engineer for this development will complete the required analyses for fire protection, and the architect will design fire separation methods per the determined fire flow rate, in order to meet municipally available flows and pressures.

3.4 Proposed Water Servicing

Connection to the existing municipal system is straightforward and feasible. Block 2 will be serviced by connecting to the 200 mm diameter watermain on Kimberly Lane via an existing 150 mm diameter service lateral. The 5-storey mid-rise will be serviced with dedicated and separate potable and fire service lines. Refer to Figure 3 for the Site Servicing Plan.

The existing 150 mm diameter lateral was designed for a 5-storey residential building with 109 units and 3.5 PPU, which is equivalent to a peak hour flow of 8.94 L/sec. Since the water demand calculations for the proposed development are less than what was previously estimated, we conclude that the existing municipal infrastructure has sufficient capacity to support the proposed development without any required external improvements.

In September 2019, our office requested a watermain hydraulic assessment of the proposed development for Block 2 and its impacts on the existing water distribution system. C3 Water prepared a Technical Memorandum (C3 Water, October 2019) based on the water and fire flow demands from Block 2. The results of the memorandum have shown that the existing infrastructure will have adequate pressure within the system post development of Block 2. Refer to Appendix B for the Technical Memorandum.

4.0 Sanitary Servicing

The following section provides an analysis of the servicing strategy for the proposed sanitary sewage system for Block 2.

4.1 Existing Sanitary Servicing

The existing sewage infrastructure at or near the site includes the following:

- Black Ash Sewage Pumping Station on Highway 26;
- 1050 mm diameter public trunk sanitary sewer on the west side of Highway 26;
- 500 mm diameter public sanitary sewer along the centre line of Harbour Street;
- 200 mm diameter private sanitary sewer along the centre line of Kimberly Lane; and
- Two 150 mm diameter private sanitary service laterals extended into Block 2.

4.2 Design Sanitary Flow

The Town of Collingwood Development Standards (2007) were referenced to calculate sanitary design flows for the proposed development using the following design figures:

- Average Residential Flow Rate 450 L/cap/day
- Occupation Density 1.9 PPU
- Residential Peaking Factor 4.1 (Harmon Formula)
- Infiltration 0.23 L/s/ha

Based on the number of units above, the expected sanitary flows for the proposed development is approximately 5.57 L/s. Refer to Appendix C for the full calculations.

4.3 Proposed Sanitary Servicing

The development is proposed to be serviced by the two existing 150 mm diameter service laterals connected to existing manholes 23 and 28 each with a slope of 2.0 %. The proposed sanitary service will be designed per the Town standards. The Site Servicing Plan (Figure 3) illustrates the location of the sanitary sewer and both laterals. The internal sanitary system of the building will be designed per the mechanical engineer's details and specifications.

The two existing 150 mm diameter service laterals were designed for a 5-storey residential building with 109 units and 3.5 PPU, which is equivalent to a peak hour flow of 6.70 L/sec. Since the sanitary flow calculations for the proposed development are less than what was previously estimated, we conclude that the existing municipal infrastructure has sufficient capacity to support the proposed development without any required external improvements

5.0 STORMWATER MANAGEMENT

Per the Approved Storm Area Drainage Plan (Figure 4), drainage from the subject development will be conveyed to two separate outlets; namely, the SWM facility and Harbour Street. To limit the amount of site runoff that will be tributary to the Harbour Street drainage system, the overall Block Grading and Master Drainage Plan was designed to maximize the drainage area tributary to the SWM facility.

5.1 Stormwater Management & Grading Criteria

The applicable SWM and Grading Criteria to be applied to Block 2 from the SWM Implementation Report (2015) include the following:

- Proposed grading and drainage meet the intent of the master grading and drainage plan;
- Regardless of outlet, Block 2 is not to exceed the specified maximum impervious level for the development block;
- Site Grading to adhere to the findings of the Natural Hazards Assessment (2010) and Functional Servicing and Stormwater Management Report (2011);
 - The minimum specified site grade is above 178.95 m.
 - Flood hazards remain contained within the EP lands and the existing Regional water surface elevation of 178.65 m is respected upon development of the subject lands.
- Proposed parking lot grading to provide suitable cover over the private storm sewers to prevent frost heave and provide an overland route for major storm runoff; and
- All buildings within Block 2 to meet minimum groundwater separation per Town policy unless Town staff support a reduction in the minimum groundwater separation based on Geotechnical recommendations.

SWM Facility

- For site drainage directed to the Black Ash Creek via the private SWM facility, all site drainage should be directed to the sediment forebay of the SWM facility per the Master Grading & Drainage Plan.

Harbour Street

- Post-development peak flow rates for the Regulatory storm event from the total Harbour Street drainage area (including site flows) should be at or below pre-development levels.

The Harbour Street post and pre-development peak flow rates for the Regulatory storm event were established in the SWM Implementation Report (2015) via SWMHYMO modeling, to facilitate the design of the drainage system. The post-development SWMHYMO model determined the peak flows from the total drainage area including the 31 ha of external drainage area and approximately 1 ha of the site drainage area. The site drainage area was as per the approved Block Grading and Master Drainage Plan (DWG 103A, February 2015).

5.2 Existing Drainage Conditions

5.2.1 Existing Block Grading

The Block Grading and Master Drainage Plan (DWG 103A) was completed to support the Subdivision Agreement. This plan set the minimum grading to achieve the overall drainage objectives for the development and for each development block. At the site plan approval stage of a given block, the proponent of the block is required to demonstrate that the block grading meets the intent of the minimum site grades provided on the Block Grading and Master Drainage Plan.

At the time of preparing the Block Grading and Master Drainage Plan (March 2015), the monitoring program to determine the groundwater table across the subject lands had not been completed. Therefore, the groundwater table was not known at that time. To facilitate the setting of minimum finished grades across the site, a conservative assumption was made on the groundwater level. This established the low point along Kari Crescent at the SWM Facility overland flow route to be 180.70 m. The minimum finished grades were re-evaluated post completion of the groundwater monitoring program completed by Terraprobe in 2015, which set the minimum finished floor elevation (FFE) for Block 2 at 182.50 m.

Block 1 and Block 4 were Site Plan Approved in March 2016, which modified the approved Block Grading and Master Drainage Plan. The Storm Area Drainage Plan (C.F. Crozier and Associates, February 2016) was included in the approved engineering drawings set, which changed the allowable drainage areas for each block in Balmoral Village. Refer to Figure 4 for the approved Storm Area Drainage Plan. To maximize the portion of Blocks 2, 3, and 4 that is tributary to the SWM Facility, the following elements were incorporated into the design:

- Extension of storm sewers from Kari Crescent
 - Two storm sewers were extended to the three Blocks from Kari Crescent. The first storm sewer was extended to Block 4 via a servicing corridor between the retirement and apartment buildings, while the second storm sewer was extended north along Kimberly Lane. The storm sewers will capture runoff generated from the parking areas in Block 2.
- Minimize the proposed parking lot elevations.
 - Given the elevation change between Harbour Street and the site elevation (~1.8 m), maintaining the approved vertical curve of the Kimberly Lane access from Harbour Street and providing an acceptable vertical curve for the east access road results in a direct relationship between the parking lot elevations and the size of the drainage area tributary to Harbour Street (i.e. the higher the parking lot elevations, the more block drainage will outlet to Harbour Street). Per the SWM criteria, the Harbour Street tributary drainage area from the site is to be minimized.

It was determined that an overland flow route from Blocks 2, 3, and 4 to Kari Crescent cannot be provided without raising the parking lot elevations to the point where runoff from an unacceptably large portion of the said blocks would outlet to Harbour Street. Therefore, an alternative major system design was proposed whereby the storm sewer system within the Blocks 2, 3 and 4 will capture and convey the 100-year storm to the Kari Crescent storm sewer system and outlet to the SWM Facility. The parking lot areas have been designed to maximize the catchbasin capture (i.e. waffle grading design), while providing an emergency flow route to Harbour Street in case of catchbasin blockage.

Two storm sewer stubs have been provided for Block 2 to allow the proposed connection to the existing private storm sewer system. Major and minor storm flows from the two entrances on Kimberly Lane will outlet to the SWM Pond drainage system, which further minimizes the drainage area contributing to the Harbour Street drainage system.

5.2.2 Hydraulic Grade Line Analysis

A hydraulic grade line (HGL) analysis was completed for the SWM Implementation Report (CFCA, July 2015) to ensure that the storm sewer system will adequately function during the 100-year storm event to convey the 100-year peak flows from Blocks 2, 3, and 4. A 5-year storm sewer design sheet was also prepared to demonstrate free flow capacity in the minor storm event. A starting water surface elevation at the outlet of the storm sewer system was set equal to 178.55 m, which corresponds to the design 100-year high water level in the SWM Facility. This elevation also corresponds to the invert of the SWM facility emergency spillway. Typical procedures for HGL analyses were applied including analysis of friction losses, junction losses, manhole losses, per the methodology outlined in Modern Sewer Design (1999).

A catchbasin capture analysis was not completed. Rather, it was assumed that the storm sewer system will have 100-year peak flow capture. This assumption results in a conservative HGL given that it is unlikely that the entire major storm flows generated from Block 1 will enter into the storm sewer system. The results of the analysis indicated that the HGL within Blocks 2, 3, and 4 will be below the catchbasin/manhole top of grates during the 100-year event. Therefore, the existing storm sewer system will perform adequately during the 100-year event to convey the 100-year storm flows from the said blocks.

5.3 **Proposed Drainage Conditions**

As presented on Figure 5, there is an overall minor change in the drainage areas contributing to the Harbour Street and SWM Facility drainage systems from Block 2 as compared to the boundaries presented on the approved Storm Area Drainage Plan. The total drainage area contributing to the Harbour Street outlet was reduced as a result of the proposed Grading Plan for Block 2. Refer to Table 2 below

Table 2: Drainage Area Comparison

Conditions	SWM Facility Drainage Area (ha)	Harbour Street Drainage Area (ha)
Approved Drainage Area (2016)	6.52	1.13
Modified Drainage Area (2020)	6.56	1.10

Furthermore, the land uses within the said areas have not changed; therefore, there has not been an appreciable change in the level of imperviousness for Block 2. As a result, it is reasonable to assume that the post-development peak flow rates for the Regulatory storm event from the total Harbour Street drainage area (including site flows) will be consistent with the SWMHYMO model output per the Balmoral Master SWM Report.

6.0 Utilities

The Village will be serviced with natural gas, telephone, cable TV and hydro. All such utilities have been contacted, and each utility has confirmed that there are existing facilities available along Harbour Street and the constructed blocks within Balmoral Village, but that upgrades may be required. Upgrades will be required to the external hydro service to extend the existing 44kV hydro service on Highway 26 along Harbour Street to service the proposed development.

7.0 Erosion & Sediment Controls

Erosion & sediment controls will be implemented prior to any on-site construction works. An Erosion & Sediment Control Plan has been prepared for works associated with the internal Block 2 construction. Refer to Figure 6 to view the Erosion and Sediment Control Plan, which includes the following.

- Silt fencing

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

- Silt Sacks

Silt sacks will be installed in the downstream catchbasins in Balmoral Village. The silt sacks are intended to capture silt produced by construction activities and prevent blockages in the storm sewer system. The silt sacks will be maintained as required during the construction activities.

- Stone Mud Mat

A mud mat will be installed at the main access point to Block 2 to reduce the amount of mud tracking onto existing paved roadways during site servicing operations.

- Flow Check Dams

Temporary straw bale dams will be utilized on-site in order to prevent any silt mitigation off site during and after construction activities. These dams will promote settling of suspended solids and will reduce flow velocities. Sediment accumulation will be monitored and removed as necessary. The need for additional flow check dams will be based on the field condition at the discretion of the Engineer and Owners and implemented as necessary.

8.0 Conclusions and Recommendations

Based on the information offered in this report, we offer the following conclusions:

The analysis presented above provides a comprehensive servicing and stormwater management assessment in support of the proposed Block 2 development.

- Sanitary Servicing for Block 2 will be provided by existing private sanitary sewer along Kimberly Lane and conveyed to the existing municipal trunk sewer on Harbour Street. Both sewers have adequate capacity for the proposed developments of Block 2 in Balmoral Village;
- The mid-rise building will be serviced by connecting to the existing 200 mm diameter municipal watermain on Kimberly Lane. Fire and domestic services will be separated at the property line with isolation valves;
- Utilities are available adjacent to Block 2 and will be extended into the site. Upgrades will be required to the external hydro service to extend the existing 44kV hydro service on Highway 26 along Harbour Street to service the proposed development;
- The proposed grading and drainage system will meet the intent of the approved overall Master Storm Drainage Area Plan; and
- Runoff generated from Block 2 will outlet to both the Harbour Street drainage system and the private SWM Facility, which were previously designed and approved as part of the Subdivision Agreement. The proposed Block 2 drainage plans respect the drainage areas and impervious level assumptions that were incorporated into the design of the said receiving drainage systems. Therefore, SWM criteria per the Balmoral Master SWM Report will be met.

Given the above noted conclusions, we support the Site Plan Approval Application for the Royal Windsor at Balmoral Village from the perspective of engineering servicing and stormwater management requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Kevin Morris, P.Eng
Founding Partner

C.F. CROZIER & ASSOCIATES INC.



George Cooper, E.I.T.
Engineering Intern

KM/gc

J:\100\183 - Landex Projects\4877-Balmoral Blk 2 Apts Civil\Reports\site plan approval\2020.01.08 Balmoral Blk 2 SWM and FSR.docx

APPENDIX A

Water Distribution Modeling Letter (Ainley, 2015)

February 17, 2015

File No. 115020

Collingwood Utility Services
Box 189
43 Stewart Road
Collingwood, Ontario
L9Y 3Z5

Attn: Peggy Slama, P. Eng.
Manager, Water Services

Ref: Collingwood Utility Services
Balmoral Village Development

Dear Ms. Slama:

We have completed the review of the theoretical pressures and available fire flows at the proposed Balmoral Village Development, as per your January 29, 2015 request. This analysis was undertaken utilizing the CPU's water distribution system WaterCAD computer model, updated to 2012 Existing Conditions. It includes a review of pressures within the area of interest under average day demand (ADD), maximum day demand (MDD), peak hour (PH), maximum day demand plus available fire flow (MDD + FF), and an MDD extended period simulation (EPS).

The conditions for all scenarios are as follows:

- Demands for the proposed Balmoral Village Development are based on the following:
 - 94 residential units and population density of 3 people/unit based on the Collingwood Water Model Update for future residential units, the lot distribution is based on a drawing provided by Crozier & Associates.
 - 109, one and two bedroom condo units with a population density of 1.5 people/unit since it was assumed that the one and two bedroom units would have occupancy of 1 to 2 people. An average of 3 people seemed high
 - 2,800 m² of commercial space
 - 126 Retirement home units with 1 bedroom and no kitchen
 - 46 Senior Apartment units with a population density of 1.5 people/unit, it was assumed that the two bedroom units would have occupancy of 1 to 2 people. An average of 3 people seemed high
 - 1,120 m² of recreation centre which includes a therapeutic pool and showers to be used by the retirement home residents, it is assumed that there will be no additional water demands from the recreation centre since the people using the pool and shower live at the same location, they would either use the recreational centre showers or their own shower. It was also noted by Crozier & Associates that the pool would be filled by a water truck therefore no water demand to fill the pool would need to be modeled.
- The Average Day Demand (ADD) for residential units the proposed Balmoral Village Development is based on 450 L/cap•day from the Collingwood Town Standards and MOE Guidelines.

- The ADD for the commercial space is $28\text{m}^3/(\text{ha}\cdot\text{d})$ from the MOE guidelines.
- The ADD for the retirement home units was assumed to be the same as a hotel since each unit contains a bedroom but no kitchen and the MOE guidelines do not have a water demand for retirement units, the ADD used was 225 L/bedspace/day from the MOE design guidelines for a hotel
- A Maximum Day Factor (MDF) of 2.0 and a Peak Hour Factor (PHF) of 4.5 were used. The MDF and PHF are based on the Town of Collingwood Standards.
- The piping diameters and layout are based on the Watermain Distribution Plan Drawing provided by Crozier & Associates (Job number 362-2897, drawing no 107)
- Friction Factors for all proposed piping are based on MOE Design Guidelines.
- The elevations within the Balmoral Village Development are based on Drawing No. 107 (Water Distribution Plan) provided by Crozier & Associates.
- MDD + FF was modelled with a required minimum zone pressure of 140kPa as per the MOE Guidelines. The minimum fire flow required for the development per Crozier's calculations include 150 L/s required as per Ontario Building Code or 233 L/s required by the Fire Underwriters

Our analysis includes a review of existing system conditions and also of intermediate system demand conditions and ultimate build-out demand conditions.

EXISTING SYSTEM CONDITIONS

A review of pressures within the area of interest under ADD, MDD, PH and MDD + FF was completed under existing system conditions (updated to the end of 2012) plus the proposed development.

Under the above noted conditions system pressures in the vicinity of the proposed Balmoral Village development are approximately:

- range from 400 kPa to 420 kPa under ADD conditions
- range from 435 kPa to 455 kPa under MDD conditions
- range from 420 kPa to 440 kPa under PH conditions

The pressure differences that between occur ADD, MDD and PH conditions are due to additional pumps turning on for the different conditions. These pressures are within the range recommended in the MOE Design Guidelines for normal operating conditions (Per the MOE Design Guidelines for Drinking Water Systems 2008, Chapter 10, Section 10.2 Hydraulic Design, 10.2.2.1 Maximum and Minimum Operating Pressures: The normal operating pressure in the distribution system should be approximately 350 to 480 kPa and not less than 275kPa. The maximum pressures in the distribution system should not exceed 700 kPa to avoid damage to household plumbing and unnecessary water and energy consumption).

An MDD extended period simulation was performed under the above conditions. The pressures within the proposed development varied between 360kPa to 450kPa over the 72 hour simulation. These pressures are within the range recommended by the MOE Design Guidelines.

Under the above noted conditions and MDD the available fire flow in the vicinity of the proposed development ranges from approximately 265 L/s to 450 L/s.

INTERMEDIATE GROWTH CONDITION

The conditions for the intermediate system demand analysis included:

- Infilling and draft approved/proposed developments within Collingwood. Draft approved subdivisions/ developments include: Pretty River Estates, Mountain Croft (includes Tepco Holdings), Findlay, The Preserve at Georgian Bay (Consolate), Di Poce Industrial Subdivision, Tanglewood at Cranberry, Mair Mills Villages, Helen Court Homes, Georgian Meadows, 121 High Street (Heights of Collingwood), Eden Oak McNabb, Consolate West Lands, The Victoria Annex.
- Demand of 4,000m³/day to the Town of The Blue Mountains (Blue Mountains). The Town of Collingwood is currently initiating discussions with the Town of the Blue Mountains to reduce the committed capacity to 1,000m³/day, with more being allowed when required only if the Town of Collingwood is able to supply it without compromising flows and pressures to Collingwood. A future demand of 4,000m³/day to the Town of the Blue Mountains was used in the model and based on the potential to decrease the committed capacity to 1,000m³/day this is considered to be conservative.
- Blue Mountains demand is considered to be constant, ie. Maximum Day and Peak Hour factors have not been applied.

System improvements that have been included in the simulations are:

- Stewart Road Reservoir and Booster Pumping Station on-line
- Carmichael Reservoir modelled as a “flow-through” facility
- A loop of 400mm diameter watermain is required from the west entrance to Georgian Meadows on Sixth Street to the 10th Line and on the 10th Line from Sixth Street to the entrance of Georgian Meadows by Conners Drive

Under the above noted conditions system pressures in the vicinity of the Balmoral Village Development are approximately:

- range from 375 kPa to 395 kPa under ADD conditions
- range from 365 kPa to 385 kPa under MDD conditions
- range from 348 kPa to 368 kPa under PH conditions

The pressure differences that between occur ADD, MDD and PH conditions are due to additional pumps turning on for the different conditions. These pressures are within the range recommended in the MOE Design Guidelines for normal operating conditions (Per the MOE Design Guidelines for Drinking Water Systems 2008, Chapter 10, Section 10.2 Hydraulic Design, 10.2.2.1 Maximum and Minimum Operating Pressures: The normal operating pressure in the distribution system should be approximately 350 to 480 kPa and not less than 275kPa. The maximum pressures in the distribution system should not exceed 700 kPa to avoid damage to household plumbing and unnecessary water and energy consumption).

An MDD extended period simulation was performed under the above conditions. The pressures within the proposed development varied between 325 kPa to 375 kPa over the 72 hour simulation. These pressures are within the range recommended by the MOE Design Guidelines.

Under the above noted conditions and MDD the available fire flow in the vicinity of the proposed Balmoral Village Development ranges from approximately 95L/s to 170L/s. While these fire flows do not meet the minimum 233 L/s fire flow required by the Fire Underwriter, the minimum

fire flow of 150 L/s required by the Ontario Building Code (OBC) is generally met. The fire flows that are less than 150 L/s occur near the residential units where the minimum fire flow set by the OBC is 45L/s and 75 L/s as per the fire flows calculated by Crozier and Associates. The MOE guidelines indicated the minimum fire flow for residential area is 38L/s. Therefore, the fire flows are satisfactory.

ULTIMATE GROWTH CONDITION

Under ultimate-build out conditions system pressures in the vicinity of the proposed Balmoral Village Development are approximately:

- range from 320 kPa to 340 kPa under ADD conditions
- range from 320 Pa to 340 kPa under MDD conditions
- range from 310 kPa to 330 kPa under PH conditions

The pressure differences that between occur ADD, MDD and PH conditions are due to additional pumps turning on for the different conditions. These pressures are below the range recommended in the MOE Design Guidelines for normal operating conditions, however the pressures are greater than 275 kPa minimum (Per the MOE Design Guidelines for Drinking Water Systems 2008, Chapter 10, Section 10.2 Hydraulic Design, 10.2.2.1 Maximum and Minimum Operating Pressures: The normal operating pressure in the distribution system should be approximately 350 to 480 kPa and not less than 275kPa. The maximum pressures in the distribution system should not exceed 700 kPa to avoid damage to household plumbing and unnecessary water and energy consumption).

An MDD extended period simulation was performed under the above conditions. The pressures within the proposed developed varied between 315 kPa to 340 kPa over the 72 hour simulation. These pressures are more than the minimum recommended by the MOE Design Guidelines.

Under ultimate build out MDD-conditions, the available fire flow in the vicinity of the proposed development ranges from approximately 165L/s to 170L/s. While these fire flows do not meet the minimum 233 L/s fire flow required by the Fire Underwriter, the minimum fire flow of 150 L/s required by the Ontario Building Code (OBC) is met. Therefore, the fire flows are satisfactory.

We trust that the above modelling results will assist you in your assessment of the proposed Balmoral Village Development. If you have any questions or require further detail, please do not hesitate to contact this office.

Yours truly

AINLEY & ASSOCIATES LIMITED



Julia Roest E.I.T.

JER/S:\115020\Correspondence\Letter\Balmoral Village Development.docx

APPENDIX B

Technical Memorandum (C3 Water, 2019)



TECHNICAL MEMORANDUM

VERSION	DATE	DESCRIPTION OF REVISIONS	REVISED BY	REVIEWED BY
1	October 4, 2019	Draft 1	Michelle Scott	Emma Thompson Sam Ziemann
2	October 7, 2012	Final	Michelle Scott	Emma Thompson Sam Ziemann



TECHNICAL MEMORANDUM

Table of Contents

1.0	Introduction and Background	1
1.1	Design Standards	1
1.2	Demand and Fire Flow Calculations	2
2.0	Modelling Results.....	3
2.1	Pressure.....	3
2.2	Fire Flows.....	6
3.0	Summary and Recommendations	8

List of Appendices

APPENDIX A	Site Layout
APPENDIX B	Demand and Fire Flow Calculations

1.0 INTRODUCTION AND BACKGROUND

C3 Water (C3W) has been requested to conduct a watermain hydraulic assessment of the proposed Balmoral Block 2 development and its impacts on the existing distribution system. Figure 1-1 below provides an overview of the proposed development area. A detailed site plan developed by Crozier Consulting Engineers (Crozier) is included in Appendix A.

The proposed development is located in pressure Zone 1 on the west side of Kimberly Lane between Sutton Lane and Harbour Street encompassing an area of approximately 0.86 ha. The development design includes a five-story apartment building consisting of a total of 132 residential units. A new development area south of Harbour Street will include new roads Kimberley Lane, Sutton Lane and Kari Crescent. The new area is to be serviced by a network of 200 mm diameter watermains connected to the existing 300 mm diameter watermain on Harbour Street as shown in Figure 1-1.

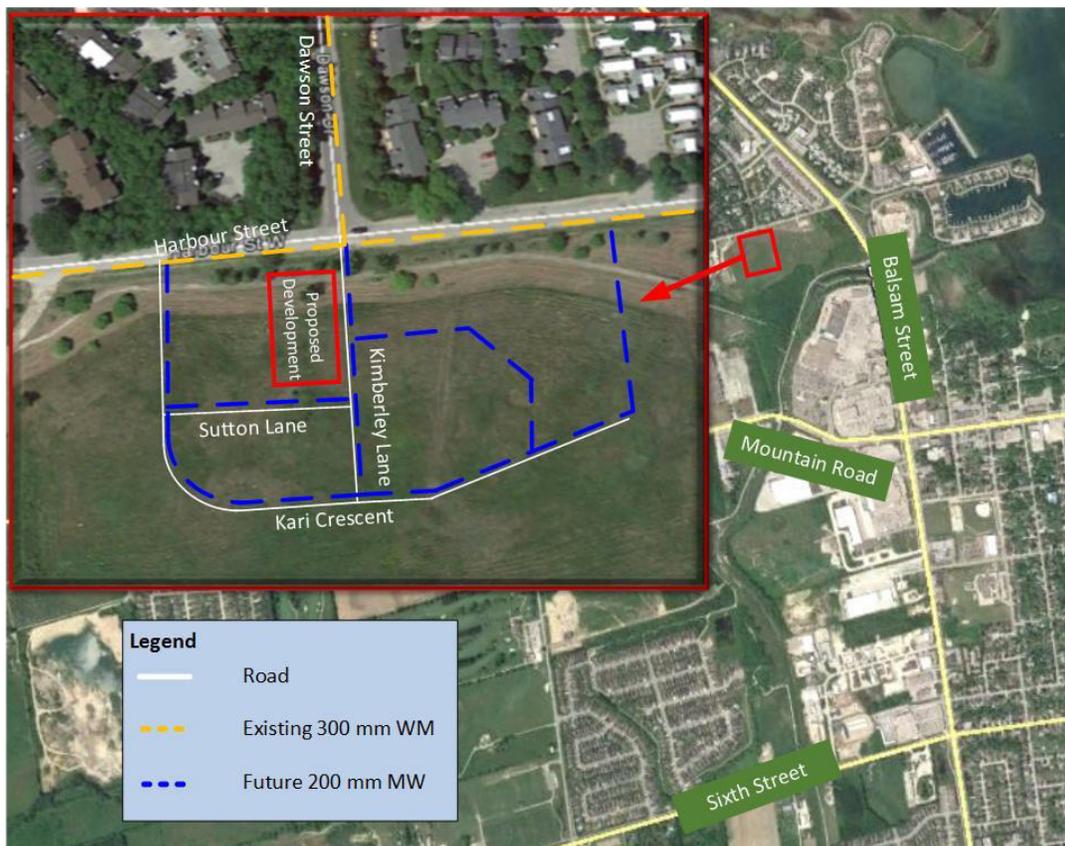


Figure 1-1: Proposed Development Area Site Overview (NTS)

1.1 Design Standards

The Town of Collingwood Development Standards (Town Standards) provide design criteria for assessing the impact of proposed developments. The Town Standards recommend that watermains be designed to provide maximum day demands plus fire flows according to the land use type. The Town Standards also outline minimum pressure requirements, as shown in Table 1.2 below.

Table 1.2 Town of Collingwood Design Standards

	Minimum	Preferred
Fire Flow Requirements		
Single-Family Residential	57 L/s	76 L/s
Industrial/Commercial Subdivisions	136 L/s	154 L/s
Downtown Commercial	136 L/s	189 L/s
Pressure Requirements		
Maximum Day Demands + Fire Flows	20 psi	
Standard Operating Conditions	40 psi (Peak Hour)	50 - 80 psi

1.2 Demand and Fire Flow Calculations

Crozier completed calculations for the anticipated water demands for the development. The calculations are based on recommended values from the Town Standards. The Max Day Demands (MDD) and Peak Hour Demands (PHD) were calculated based on the average flows, and recommended peaking factors of 2.0 for MDD and 4.5 for PHD as per MECP Design Guidelines for Drinking Water Systems 3.4.5.1 and Town Standards. The domestic demands for the proposed development are summarized in Table 1.2 below and detailed calculations are provided in Appendix B.

Table 1.2 Demand Calculated Values

Scenario	Demand (L/s)
ADD	1.31
MDD	2.61
PHD	5.88

Fire flow calculations were also completed by Crozier using the Fire Underwriters Survey (FUS) Method and the Ontario Building Code (OBC) for the proposed development. The FUS calculation was based on the total area of the 5-storey building of 10,850 m³ assuming non-combustible construction with a sprinkler system. The required fire flows calculated by Crozier are summarized in Table 1.3 below and provided in Appendix B. The largest preferred fire flow requirement specified in the Town Standards as shown in Table 1.2 is 189 L/s. For the purpose of this report, the FUS required fire flow of 333 L/s was used. The FUS Guidelines state that the required duration for a fire flow requirement of 333 L/s is 4.5 hours.

Table 1.3 Fire Flow Calculated Values

Calculation Method	Required Fire Flow (L/s)
FUS	333
OBC	150

2.0 MODELLING RESULTS

2.1 Pressure

The proposed development area was assessed using the model's existing (2016) Average Day Demand (ADD) and Maximum Day Demand (MDD) scenarios. Under ADD and MDD conditions, one pump is operated at Carmichael pump station for a short duration each day at a rate of approximately 110 L/s. Under each scenario, the model was run for a 48-hour period.

The area surrounding the proposed development was assessed excluding the Balmoral Block 2 development demands to determine the existing conditions. Under current ADD conditions, the minimum pressures in the surrounding area during the 48-hour model run range from 50 - 80 psi. Under MDD conditions, surrounding area had minimum pressures ranging from 40 - 50 psi. Figures 2-1 and 2-2 show the existing minimum pressures under ADD and MDD, respectively.

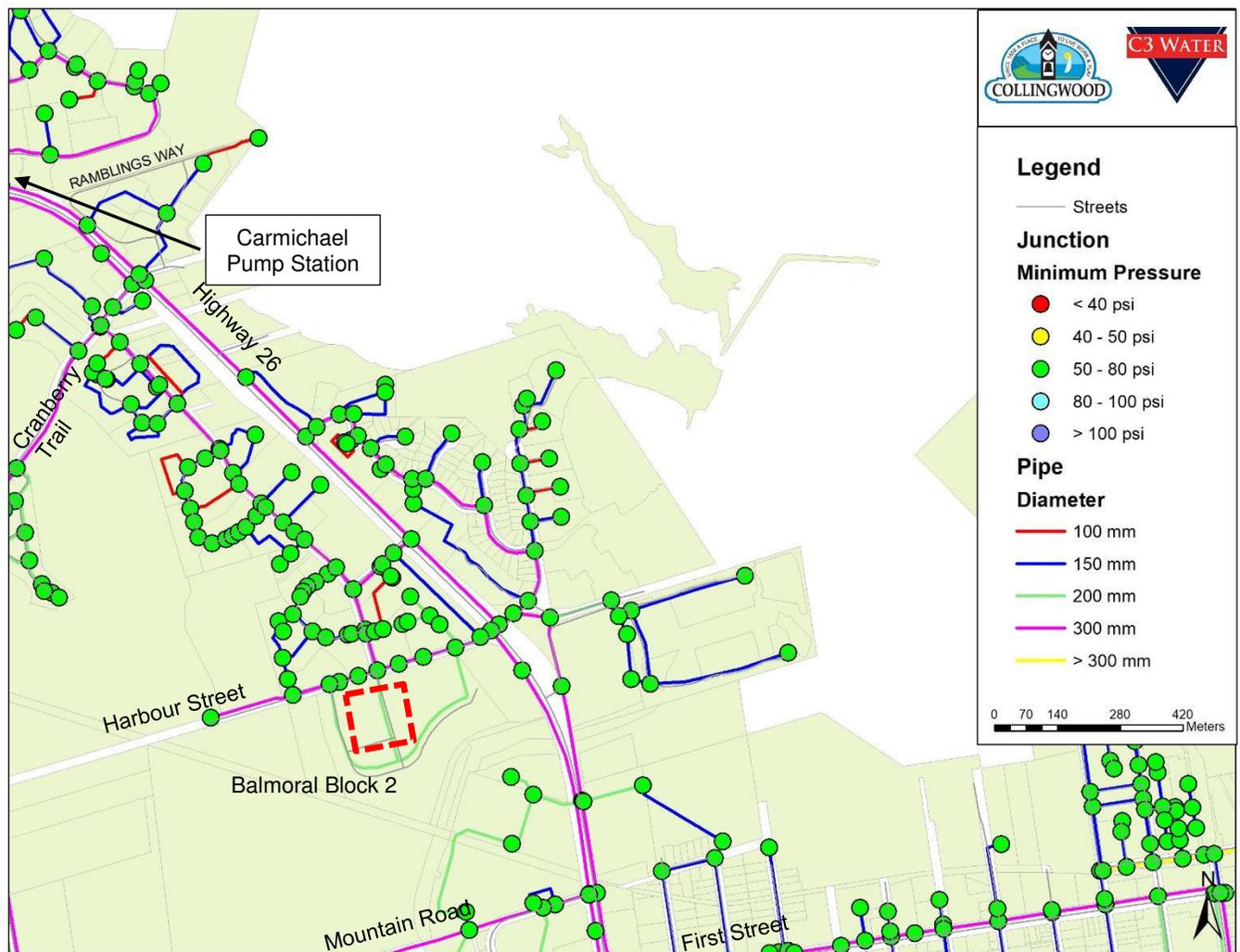


Figure 2-1 Existing Conditions ADD – Minimum Pressure – Excluding Balmoral Block 2

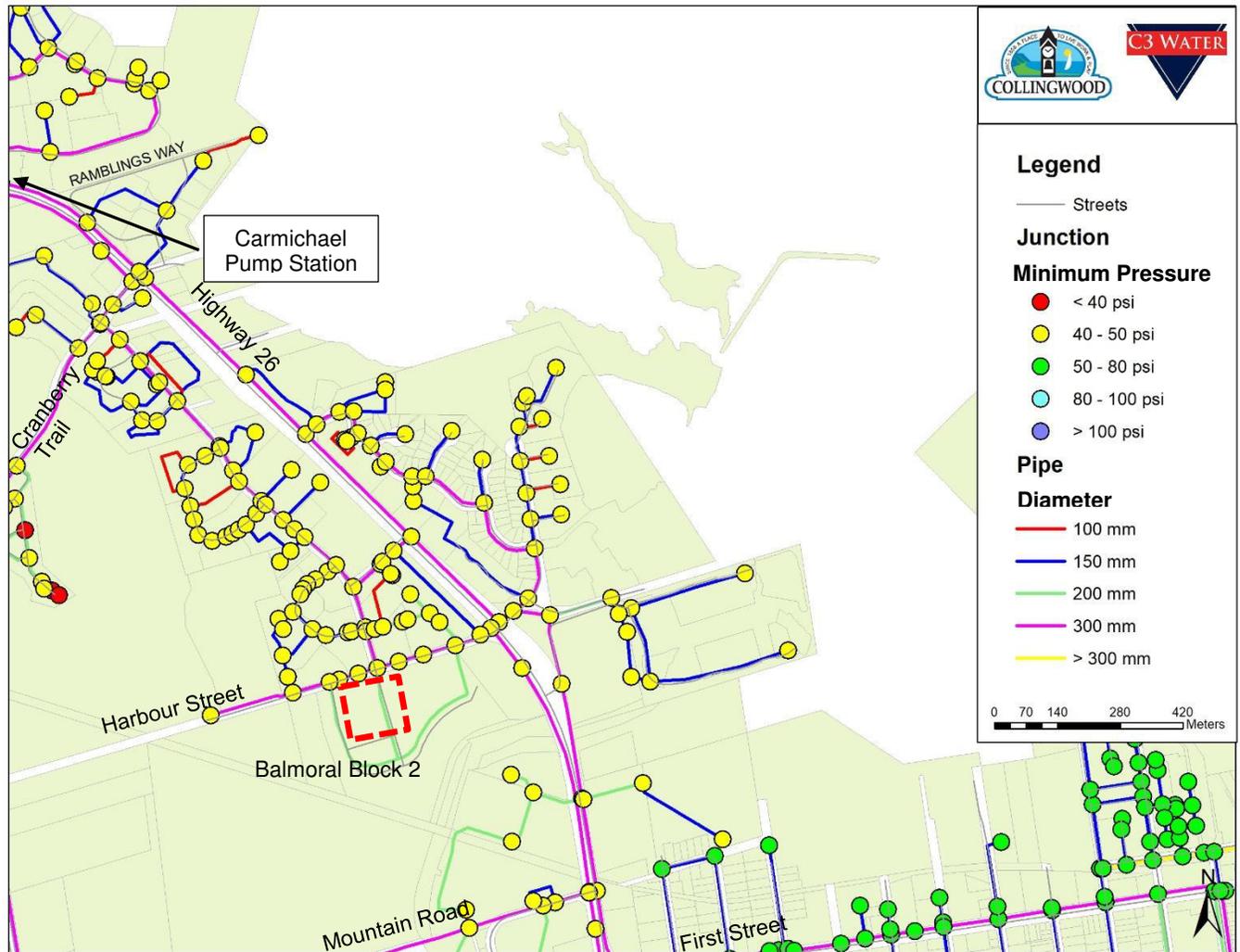


Figure 2-2 Existing Conditions MDD – Minimum Pressure – Excluding Balmoral Block 2

The range of ground elevations in the Balmoral Block 2 development is approximately 179 - 181 mASL, which is within the preferred Zone 1 elevations of 171 – 192 m. Based on the Zone 1 hydraulic grade line (HGL) of approximately 227m, it is expected that static pressures in the development would be 46 – 48 m of head, or 65 - 68 psi.

The calculated demands and the proposed watermains for the development were added to the model and pressures in the development were tested in Zone 1 under ADD and MDD scenarios under current conditions. The ADD development pressures were found to be 55 – 72 psi, which is within Town’s preferred operating criteria of 50 – 80 psi. The minimum pressure during MDD was found to be 42 – 71 psi which is slightly above the Town’s minimum pressure standard of 40 psi

The Balmoral Block 2 development was found to cause a decrease in pressure on Harbour Street of less than 1 psi under ADD conditions and approximately 3 psi under MDD conditions. Therefore, the development does not significantly impact the pressures in the surrounding area. Table 2.1 below summarizes the minimum, maximum and average pressures in the proposed development under the scenarios discussed. The minimum pressures under each scenario are shown in Figures 2-3 and 2-4.

Table 2.1 Pressure Results

Scenario	Average	Minimum	Maximum
2016 ADD	60	55	72
2016 MDD	53	42	71

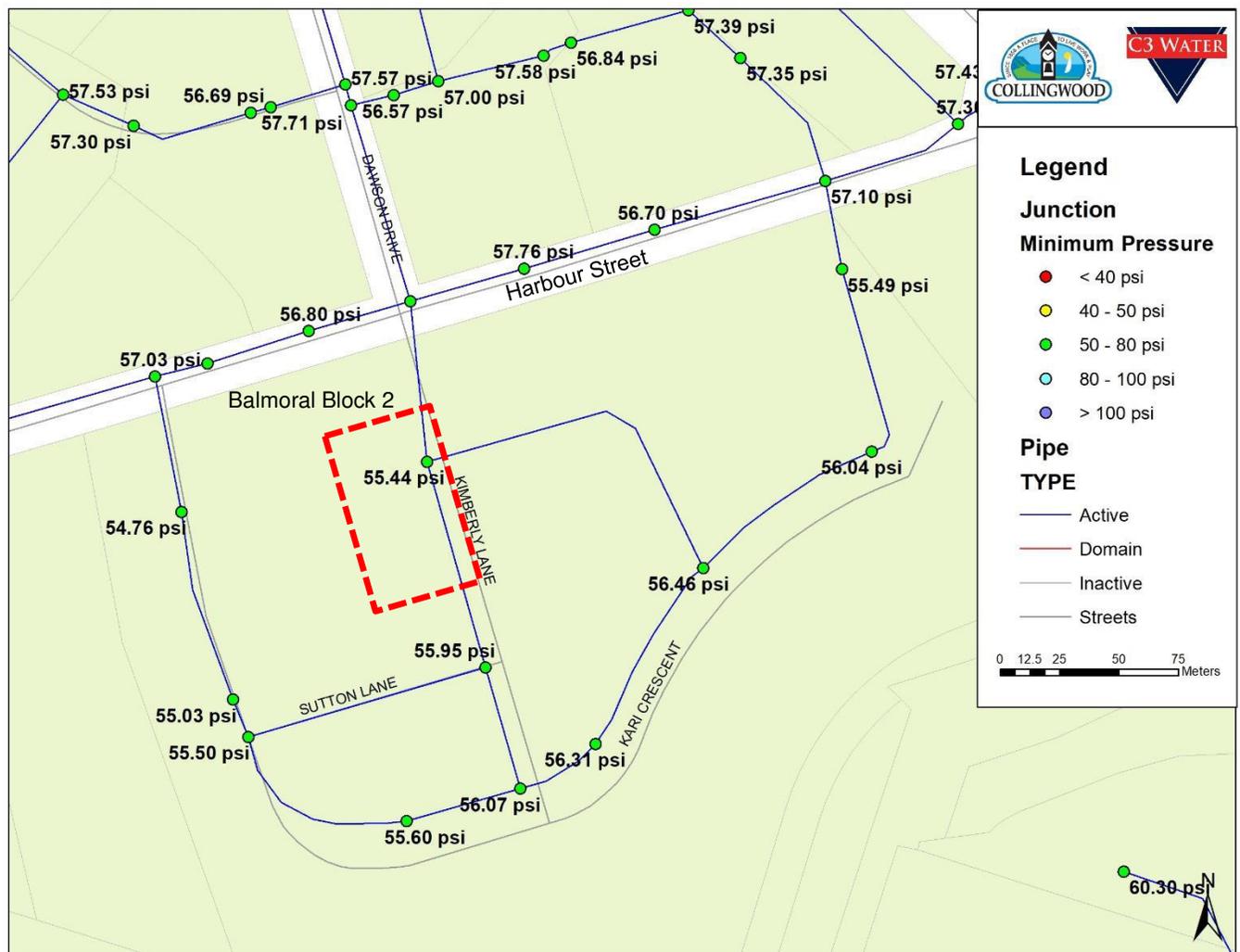


Figure 2-3 Minimum Pressure – ADD

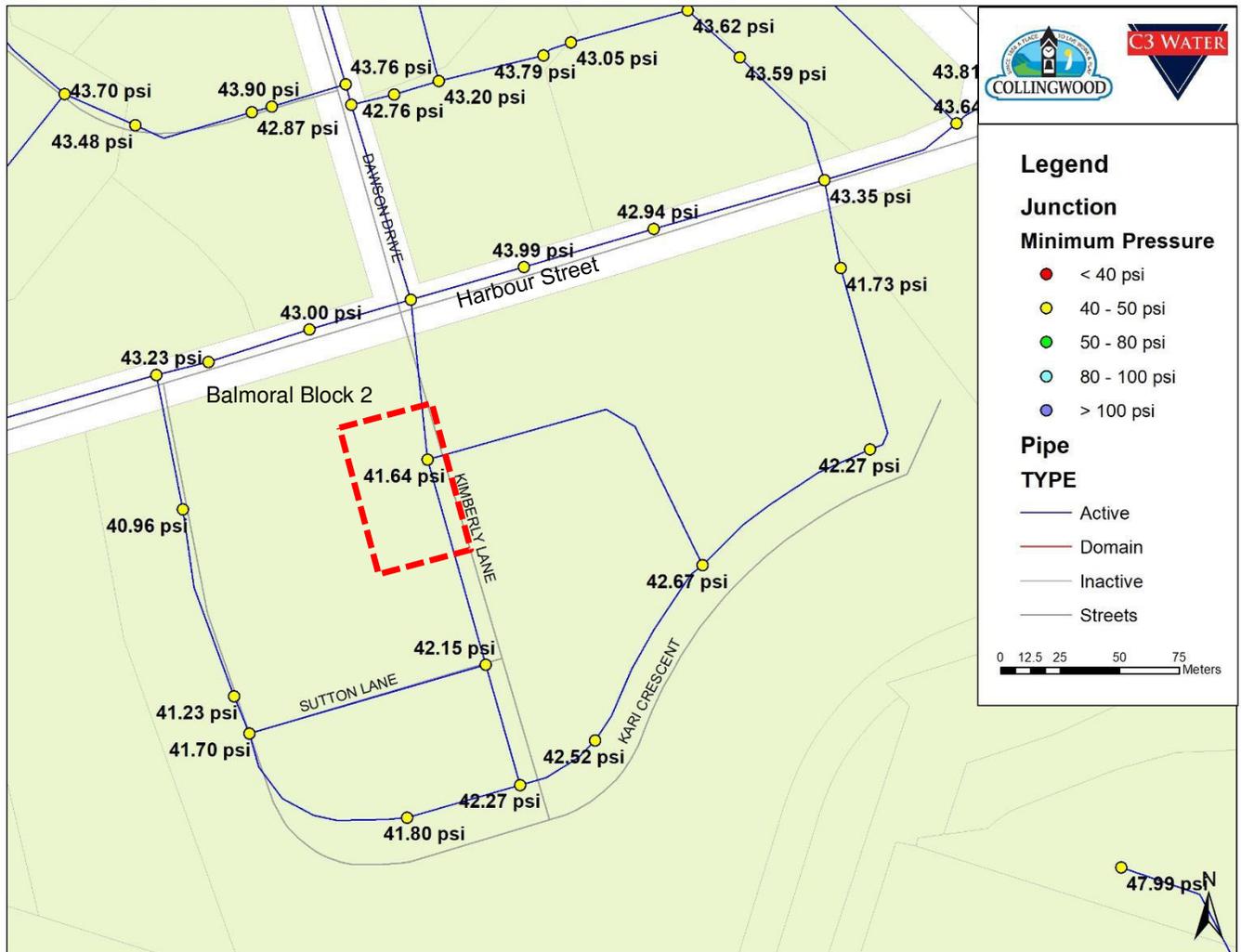


Figure 2-4 Minimum Pressure – MDD

2.2 Fire Flows

Modelling was conducted to determine the available fire flows at a residual pressure of 20 psi for a 4.5-hour fire flow scenario at 12:00pm under MDD conditions. A larger pump was run at Carmichael pump station for the duration of the fire at a rate of approximately 240 L/s.

The fire flow results predicted by the model are representative of the amount of water available in a watermain and not the extent of flow available from a hydrant. Several hydrants may need to be operated to provide the desired fire flows.

Under MDD conditions, the available fire flow at 20 psi was found to be 304 L/s at the development node on the 200 mm diameter watermain on Kimberley Lane. The available fire flow on Kimberley Lane does not meet the calculated FUS requirement of 333 L/s for a 4.5-hour duration, however, it does meet the OBC requirement of 150 L/s and the highest Town Standard requirement of 189 L/s.

An additional fire flow analysis was conducted assuming that the proposed development would be serviced by only a 200 mm dead-end pipe on Kimberley Lane connected to the 300 mm watermain on Harbour Street. This watermain configuration represents a worst-case scenario for the servicing to the proposed development if this building is developed prior to the other 200 mm watermains on Sutton Lane and Kari

Crescent. The available fire flow in the dead-end watermain at 20 psi was 250 L/s. This exceeds the Town Standards and OBC guidelines but does not meet the FUS requirement.

It should be noted that the 300 mm diameter watermains on Harbour street and Highway 26 contain portions with low C-factors of 48 as shown in Figure 2-5 below. The watermain roughness impacts the available fire flow. It is recommended that field testing and model calibration are used to confirm the available fire flow.

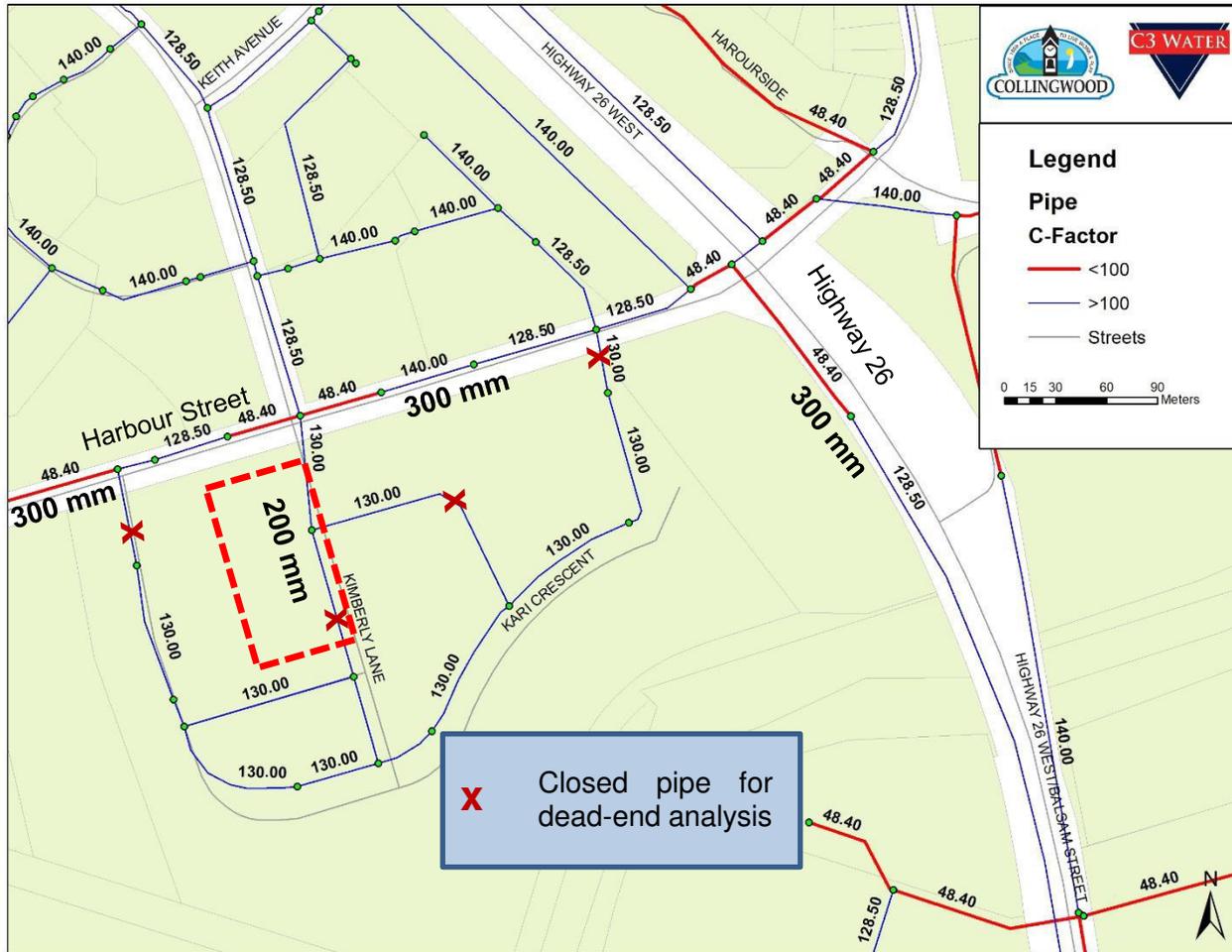


Figure 2-5 C-Factors on Surrounding Watermains

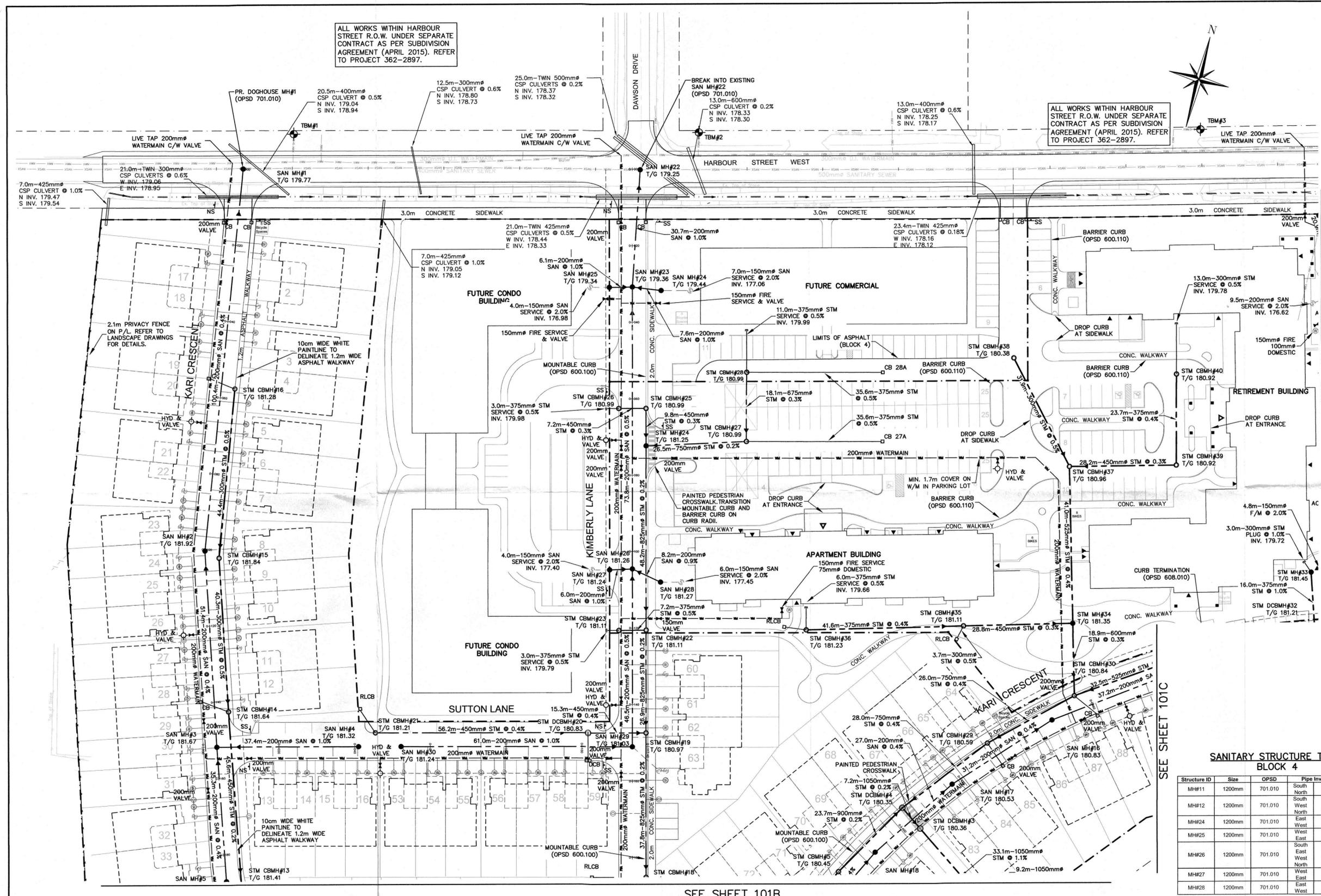
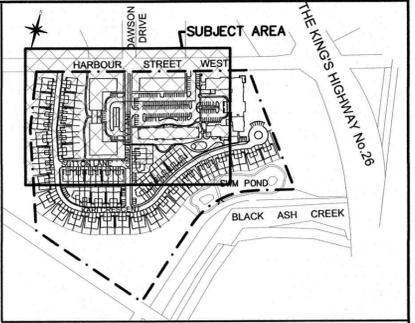
3.0 SUMMARY AND RECOMMENDATIONS

1. Under current conditions, the development ADD pressures range from 55 – 72 psi, which is within the Town's preferred operating range of 50 – 80 psi. Under MDD conditions the pressure ranges from 42 – 71 psi which is above the minimum allowable operating pressure of 40 psi. The estimated demands from the development are not expected to significantly impact the pressure in the surrounding area.
2. Under MDD conditions, the available fire flow on Kimberley Street was found to be 304 L/s for a duration of 4.5 hours at a residual pressure of 20 psi when a larger pump is operated at Carmichael pump station. The fire flow was additionally assessed by modelling the Kimberley Lane watermain as a dead-end pipe connected to the Harbour Street watermain. Under dead-end conditions, the available fire flow at 20 psi was 250 L/s. This does not meet the FUS requirement of 333 L/s for a 4.5-hour duration, however, it does meet the OBC requirement of 150 L/s and the highest Town Standards requirement of 189 L/s.
3. Due to low C-factors in the model on watermains on Harbour Street and Highway 26, it is recommended that field testing be undertaken to confirm C-factors and available fire flows.

APPENDIX A - *Site Layout*

ALL WORKS WITHIN HARBOUR STREET R.O.W. UNDER SEPARATE CONTRACT AS PER SUBDIVISION AGREEMENT (APRIL 2015). REFER TO PROJECT 362-2897.

ALL WORKS WITHIN HARBOUR STREET R.O.W. UNDER SEPARATE CONTRACT AS PER SUBDIVISION AGREEMENT (APRIL 2015). REFER TO PROJECT 362-2897.



**STORM STRUCTURE TABLE
BLOCK 4**

Structure ID	Size	OPSD	Inverts	T/G
CBMH #22	1800 mm	701.012	North 179.28 West 179.70 South 179.25	181.11
CBMH #23	1200 mm	701.010	West 179.74 East 179.74	181.11
MH #24	1800 mm	701.012	North 179.75 East 179.45 South 179.38	181.25
CBMH #25	1200 mm	701.010	West 179.86 South 179.78	180.99
CBMH #26	1200 mm	701.010	East 179.88 West 179.91	180.99
CBMH #27	1800 mm	701.012	North 179.58 East 179.50 West 179.50	180.99
CB #27A	600 x 600 mm	705.010	West 180.06 East 180.94	180.94
CBMH #28	1800 mm	701.012	North 179.93 East 179.93 South 179.63	180.99
CB #28A	600 x 600 mm	705.010	West 180.11 East 180.94	180.94
MH #33	1200 mm	701.010	South 179.61 West 179.61	181.45
MH #34	1500 mm	701.011	North 179.69 East 179.54 South 179.07	181.35
CBMH #35	1200 mm	701.010	West 179.38 East 179.31	181.11
CBMH #36	1200 mm	701.010	North 179.63 East 179.55	181.23
CBMH #37	1500 mm	701.011	North 179.54 East 179.39 South 179.31	180.96
CBMH #38	1200 mm	701.010	South 179.70 West 176.43	180.38
CBMH #39	1200 mm	701.010	North 179.54 West 179.47	180.92
CBMH #40	1200 mm	701.010	North 179.71 South 179.64	180.92
MH #41 (PUMP STA)	1500 mm	701.011	North 180.15 South West 174.76	181.52

**SANITARY STRUCTURE TABLE
BLOCK 4**

Structure ID	Size	OPSD	Pipe Inverts	T/G
MH#11	1200mm	701.010	South 176.27 North 176.22	179.32
MH#12	1200mm	701.010	South 176.40 West 176.35	180.60
MH#24	1200mm	701.010	East 176.89 West 176.86	179.44
MH#25	1200mm	701.010	West 176.90 East 176.85	179.34
MH#26	1200mm	701.010	South 177.16 East 177.21 North 177.13	181.26
MH#27	1200mm	701.010	West 177.32 East 177.27	181.24
MH#28	1200mm	701.010	North 177.33 West 177.28	181.27

Site Plan Approved
Town of Collingwood
Date: MAR 07 2016
Signed: *Nancy Jones*

- THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
- THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
- DO NOT SCALE THE DRAWINGS.
- ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

GEODETIC BENCHMARK
GEODETIC BENCHMARK 72U313 HAVING AN ELEVATION OF 179.633, TABLET IN WEST FOUNDATION OF FORMER KAUFMAN FURNITURE BUILDING.

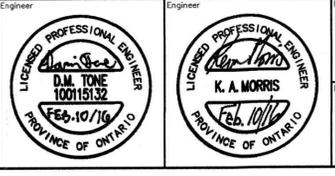
TEMPORARY BENCHMARKS

TBM#1 ELEV. 180.72
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH KARI CRESCENT.

TBM#2 ELEV. 180.52
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH DAWSON DRIVE.

TBM#3 ELEV. 180.28
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET, 145m EAST OF DAWSON DRIVE INTERSECTION.

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
0	FIRST SUBMISSION	07/22/2015
1	SECOND SUBMISSION	10/16/2015
2	ISSUED FOR APPROVAL	12/17/2015
3	RE-ISSUED FOR FINAL APPROVAL	02/10/2016



**BALMORAL VILLAGE
TOWN OF COLLINGWOOD**

Project: **GENERAL SERVICING PLAN - NORTH-WEST**

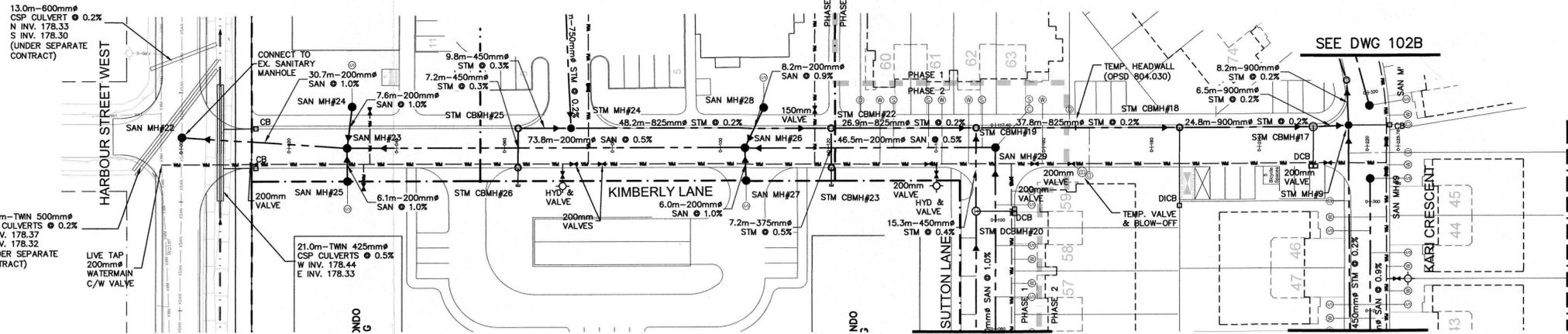
Drawing: **362-4007**

Scale: 1:500 Date: 09/29/15 Check By: S.W. Project: 362-4007 Drawing: 101A

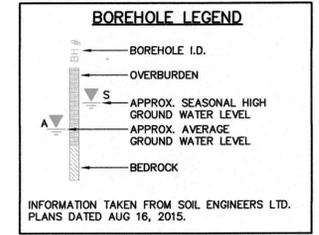
CROZIER & ASSOCIATES
Consulting Engineers

THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CROZIER.CA
INFO@CROZIER.CA

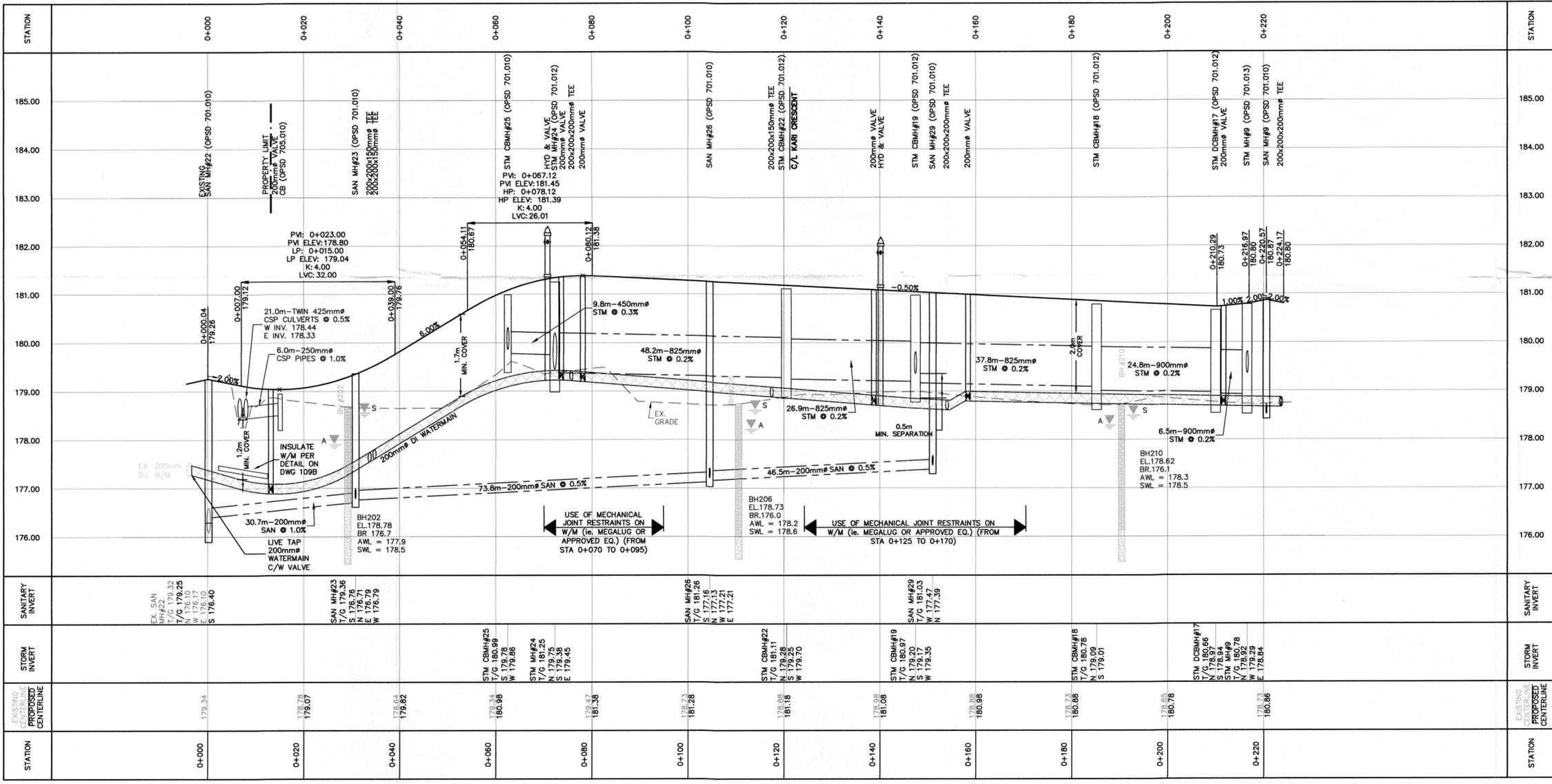
J:\300\362 - Black Ash Creek Village\Balmoral Village\CAD\CIVIL\362-4007-101-GEN.dwg, 101A, 2/11/2016 9:03:43 AM, s.west



NOTE: WATER SERVICES CROSSING STORM SEWER TO BE INSTALLED BELOW STORM SEWER WITH MIN. 0.5m SEPARATION. COVER TO BE MINIMUM 1.7m AT CURB STOP.



NOTE: FOR ALL MAIN SEWERS AND SERVICES WITH LESS THAN THE MIN. COVER (1.7m W/M, 1.5m STORM), PLACE INSULATION AS REQUIRED. SEE DETAIL ON DWG 109B.



Town Approval
Site Plan Approved
 Town of Collingwood
 Date: MAR 07 2016
 Signed: Nancy [Signature]

- THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
- THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
- DO NOT SCALE THE DRAWINGS.
- ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

GEODETIC BENCHMARK
 GEODETIC BENCHMARK 720313 HAVING AN ELEVATION OF 179.633, TABLET IN WEST FOUNDATION OF FORMER KAUFMAN FURNITURE BUILDING.

TEMPORARY BENCHMARKS

BM#1
 T/NT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH KARI CRESCENT. ELEV. 180.72

BM#2
 T/NT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH DAWSON DRIVE. ELEV. 180.52

BM#3
 T/NT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET, 145m EAST OF DAWSON DRIVE INTERSECTION. ELEV. 180.28

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
0	FIRST SUBMISSION	07/22/2015
1	SECOND SUBMISSION	10/16/2015
2	ISSUED FOR APPROVAL	12/17/2015
3	RE-ISSUED FOR FINAL APPROVAL	02/10/2016

Engineer: **D.M. TONE**
 LICENSED PROFESSIONAL ENGINEER
 100115132
 FEB 10/16
 PROVINCE OF ONTARIO

Engineer: **K.A. MORRIS**
 LICENSED PROFESSIONAL ENGINEER
 FEB 10/16
 PROVINCE OF ONTARIO

Project: **BALMORAL VILLAGE TOWN OF COLLINGWOOD**

Drawing: **PLAN AND PROFILE KIMBERLY LANE - STA 0+000 TO 0+220**

Scale: V = 1:50, H = 1:500

Date: 09/29/15

Check By: D.T./K.M.

CROZIER & ASSOCIATES
 Consulting Engineers

THE HARBOUR EDGE BUILDING,
 40 HOLLING STREET, SUITE 301,
 COLLINGWOOD, ON L9Y 4R3
 705 446-3510 T
 705 446-3520 F
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA

Drawn By: S.W./J.O. Design By: S.W. Project: **362-4007**

Date: 09/29/15 Check By: D.T./K.M. Drawing: **102D**

APPENDIX B – *Demand and Fire Flow Calculations*



File: 183-4877
Date: 2019.09.13
By: GC
Check By:

Balmoral Block 2 - Water Design Criteria

Developed Site Area	0.86 ha
Number of Residential Units	132 units
Person Per Residential Unit	1.9 persons/unit
Residential Population	251 persons
<u>Domestic Water Design Flows</u>	
Residential (per Town of Collingwood Engineering Standards)	450 L/C-day
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	1.31 L/sec
Max Day Peak Factor (Per Town of Collingwood Engineering Standards)	2.00
Max Day Demand Flow	2.61 L/sec
Peak Hour Factor (Per Town of Collingwood Engineering Standards)	4.50
Peak Hour Flow	5.88 L/sec

**Fire Protection Volume Calculation Summary
Balmoral Block 2 Apartments**

**WATER SUPPLY FOR PUBLIC FIRE PROTECTION (1999)
FIRE UNDERWRITER'S SURVEY**

Unit Block #	Total Floor Area (m ²)	Flow (L/min)	Reduction (L/min)	Exposure Surcharge (L/min)	Required Flow (L/min)	Required Storage Volume (m ³)	Required Flow (L/s)
Building 1 5-Storey Unit	10,850	18,000	-5,400	7,200	20,000	5,400	333

**OFFICE OF FIRE MARSHAL
Part 3 of OBC**

Unit Block #	K	Volume (m ³)	S _{Tot}	Required Flow (L/min)	Required Storage (OBC) (m ³)	Required Flow (L/s)
Building 1 5-Storey Unit	16	58,900	1.00	9,000	942	150

SUMMARY:

- | | |
|--|----------------|
| 1) Fire Flow required per FUS | 333 L/s |
| 2) Fire flow required per Fire Marshal (OBC) | 150 L/s |

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

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

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

where

- F = the required fire flow in litres per minute
- C = 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 masonry walls, combustible floor and interior)
 - = 0.8 for non-combustible construction (unprotected metal structural components)
 - = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
- A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings 5 number of floors 3100 sq.m. floor area 10850 sq.m. total floor area	Ordinary construction 0.8 C
---	--------------------------------

Therefore F= 18,000 L/min (rounded to nearest 1000 L/min)
("Value obtained in No. 1")

Fire flow determined above shall not exceed:
 30,000 L/min for wood frame construction
 30,000 L/min for ordinary construction
 25,000 L/min for non-combustible construction
 25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction 0 L/min reduction

"Value obtained in No. 2" 18,000

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Buildings will not have sprinklers (typical 30% reduction)
-5,400 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

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

Exposed buildings

Name	Distance			
North	Adjacent Dwelling	45	5%	900
South	Adjacent Dwelling	20	15%	2,700
East	Adjacent Dwelling	35	5%	900
West	Adjacent Dwelling	20	15%	2,700
7,200 L/min Surcharge				

Determine Required Fire Flow

No. 2	18,000		
No. 3	-5,400 reduction		
No. 4	<u>7,200</u> surcharge		
Required Flow:	19,800 L/min		
Rounded to nearest 1000l/min:	20,000 L/min	or	333.3 L/s 5,283 USGPM

Determine Required Fire Storage Volume

Flow from above	20,000 L/min	
Required duration	4.50 hours	
Therefore:	5,400,000 Litres or 5,400 cu.m.	is the required storage volume

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

**Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)
K = water supply coefficient
V = total building volume in cubic metres
S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 16 Group C building with non-combustible construction (Table 1)
V = 58900 Total building volume in cubic meters (19.0 m tall)
S_{TOT} = 1 S_{TOT} Need Not Exceed 2.0

Q = 942400 L/s

Based on ranges listed in Table 2, the required minimum water supply flow rate is **9000 L/min**
150 L/s

APPENDIX C

Sanitary Flow Rate Calculations



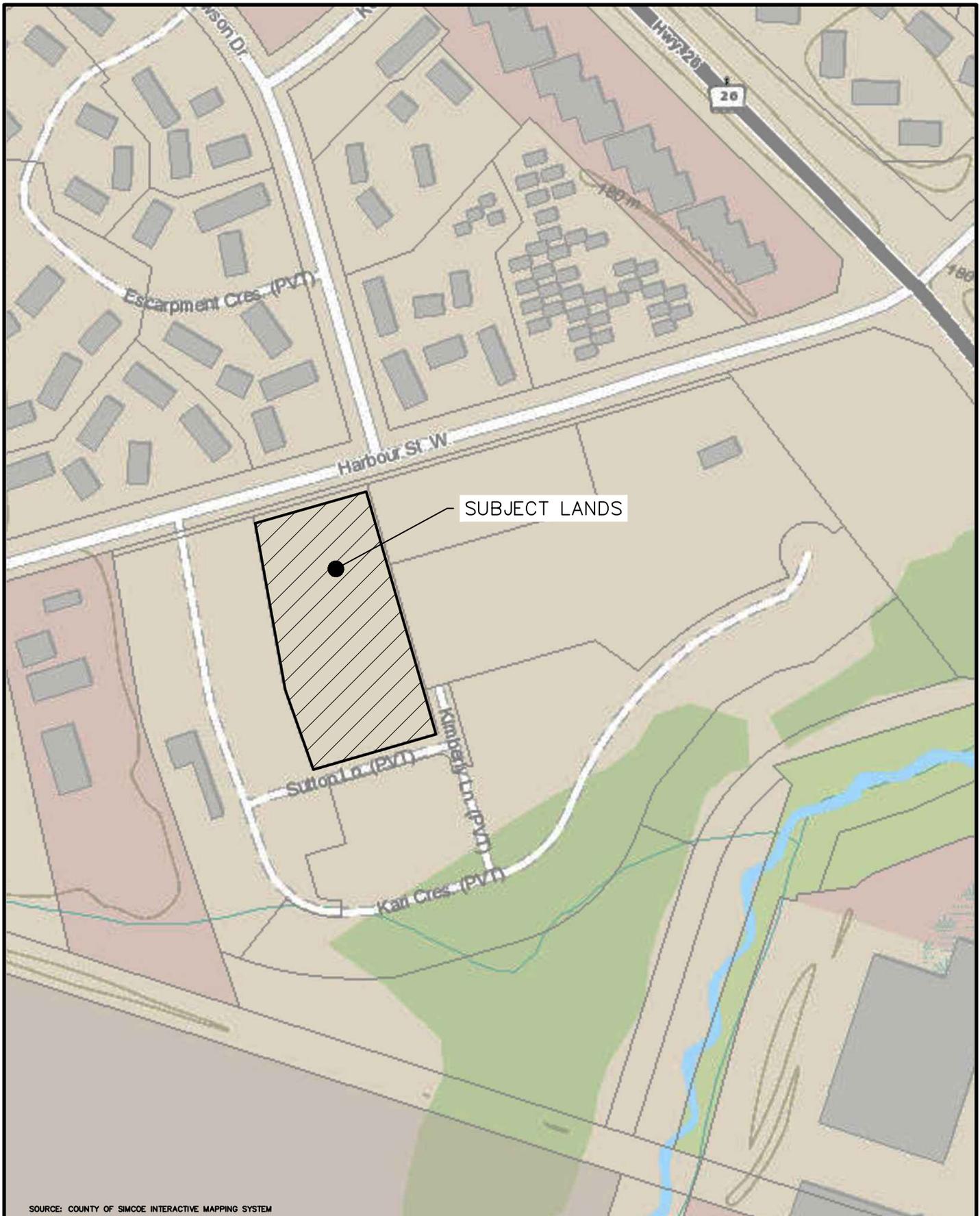
File: 183-4877
Date: 2020.01.08
By: GC
Check By: KM

Balmoral Block 2 - Sanitary Design Criteria

Developed Site Area (Roads + Residences)	0.86 ha
Number of Residential Units	132 units
Person Per Residential Unit	1.90 persons/unit
Residential Population	251 persons
Commercial Space	0.19 ha
<u>Unit Sewage flows</u>	
Residential (Per MOE Design Standards 2008)	450 L/C-day
Infiltration (typical)	0.23 L/s/ha
<u>Total Design Sewage Flows</u>	
Infiltration/Inflow Residential	0.20 L/sec
Average Daily Residential Flow	1.31 L/sec
Residential Peak Factor (Harmon Formula)	4.1
Total Peak Daily Flow	5.57 L/sec

LIST OF FIGURES

- Figure 1:** Site Location
- Figure 2:** Royal Windsor Site Plan (KNYMH, 2019)
- Figure 3:** Site Servicing Plan
- Figure 4:** Approved Storm Area Drainage Plan (CFCA, 2016)
- Figure 5:** Storm Area Comparisons
- Figure 6:** Sediment Control Plan



SOURCE: COUNTY OF SIMCOE INTERACTIVE MAPPING SYSTEM

Legend

 = SUBJECT LANDS

Project

ROYAL WINDSOR at BALMORAL VILLAGE

Drawing

SITE LOCATION PLAN

 **CROZIER**
CONSULTING ENGINEERS

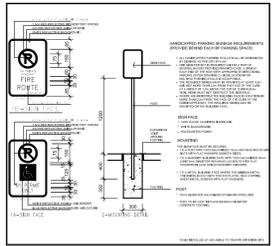
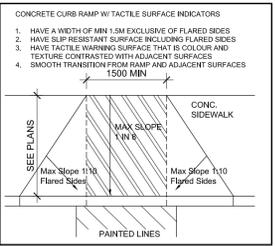
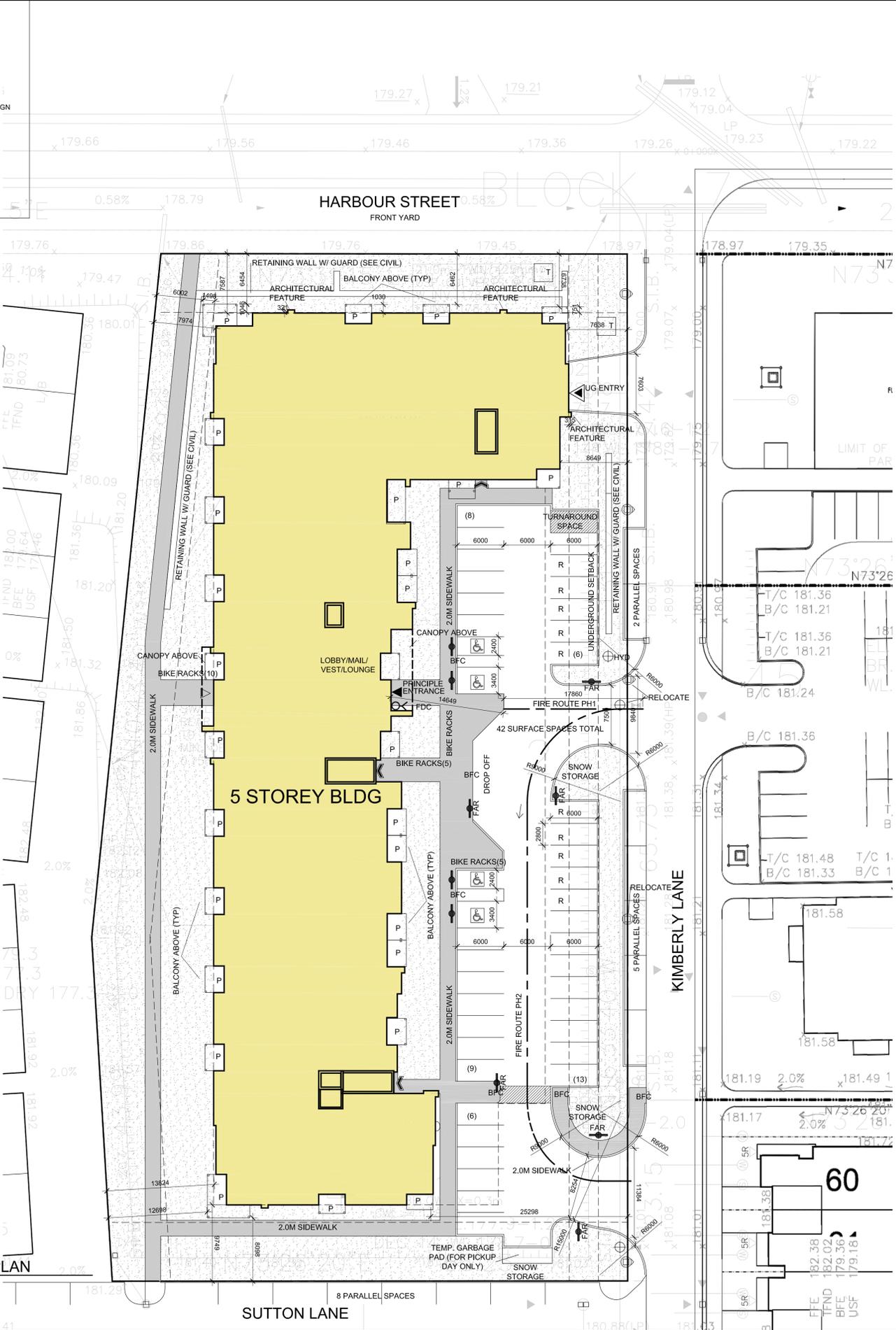
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CROZIER.CA
INFO@CROZIER.CA

Drawn By	J.P.	Design By	G.C.	Project	183-4877
Scale	N.T.S.	Date	JAN/08/2020	Check By	K.M.

FIG. 1

NOTES:
 THE OWNER IS REQUIRED TO REMOVE SNOW OFF SITE AND MAINTAIN REQUIRED PARKING UNENCUMBERED BY SNOW DURING MAJOR SNOW EVENTS.
 THE OWNER IS REQUIRED TO REMOVE SNOW AND ICE FROM ALL EXIT PATHS AND STAIRS.
 SNOW WILL BE REMOVED FROM SITE BY PRIVATE COMPANY.
 DRIVEWAYS ARE TO BE 1.2 CLEAR OF UTILITY STRUCTURES AND HYDRANTS.
 BUILDER TO VERIFY LOCATION OF ALL HYDRANTS, STREET LIGHTS, TRANSFORMERS, AND OTHER SERVICES.
 IF MINIMUM DIMENSION IS NOT MAINTAINED, BUILDER IS TO RELOCATE AT HIS OWN EXPENSE.
 BUILDER TO VERIFY SERVICE CONNECTION ELEVATIONS PRIOR TO CONSTRUCTING FOUNDATIONS.
 PRIOR TO THE COMMENCEMENT OF ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOWANCE, THE OWNER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM THE ENGINEERING SERVICE DEPARTMENT, TOWN OF COLLINGWOOD, FOR THE PURPOSE OF VEHICULAR ACCESS TO THE PROPERTY, (ENTRANCE PERMIT), AND SERVICING EXCAVATIONS (ROAD ALLOWANCE PERMIT) WITHIN THE THE PROPERTY, (ENTRANCE PERMIT), AND SERVICING.
 PARKING STALL DELINEATION TO BE 100MM WIDE WHITE OR YELLOW MARKINGS.
 VISITOR PARKING TO BE MARKED WITH A PAINTED V,
 RESIDENT PARKING TO BE MARKED WITH PAINTED NUMBERS.
 ALL REFUSE WILL BE STORED INTERNALLY.
 WASTE TO BE COLLECTED BY PRIVATE SERVICE.

- LEGEND**
- ◀ APARTMENT PRINCIPAL/VISITOR ENTRY
 - ◀ APARTMENT EXIT DOOR
 - ◀ UNDERGROUND PARKING GARAGE ENTRY
 - ◀ UNDERGROUND SERVICE ENTRY
 - R RESIDENT PARKING SPACE
 - P PATIO @ GRADE
 - BFC BARRIER FREE CURB
 - VF VERTICAL ACCESSIBLE PARKING SIGN
 - ♿ PAINTED BARRIER FREE PARKING SYMBOL AS PER MUNICIPAL STANDARDS
 - STOP SIGN
 - HYDRANT
 - SIAMESE CONNECTION
 - FIRE ACCESS ROUTE SIGN
 - STREETLIGHT
 - TRANSFORMER
 - CONCRETE SIDEWALK
 - LANDSCAPE
 - SOD



3 PLAN DETAIL
 SP1 BF CURB CUT 1:50

4 DETAIL
 SP1 SIGNAGE 1:50

132 UNITS TOTAL
 122 UG SPACES +27 TANDEM
 42 SURFACE SPACES
 164 TOTAL SPACES (164 REQ'D)
 19 PARALLEL STREET SPACES (BONUS)
 T = SURFACE TENANT SPACE

R4-4 (H-18) ZONE AS AMENDED

ZONING BY-LAW SUMMARY
 TOWN OF COLLINGWOOD ZONING BYLAW 2010-040
 OFFICIAL PLAN DESIGNATION "RESIDENTIAL MIXED USE"
132 UNITS

GENERAL INFORMATION:		
ZONING	LOT AREA	MINOR VARIANCE NO
R4-4 (H-18) AS AMENDED	8595.73M ²	0.8601HA
MINOR VARIANCE NO D13118 CONSENT NO D10118		
TABLE 6.3.1.3 - RESIDENTIAL FOURTH DENSITY (R4) PROVISIONS		
USE	REQUIRED FOR APARTMENT	PROVIDED
MIN LOT AREA	NIL	8595.7 m ² (0.859 HA)
MIN LOT FRONTAGE	30.0M	59.91M
MIN FRONT YARD	7.5M	7.5M
MIN EXTERIOR SIDE YARD	7.5M	7.5M
MIN INTERIOR SIDE YARD	7.5M	7.5M
MIN REAR YARD	7.5M	9.7M
MAX HEIGHT	18M (SUPERCEDED BELOW BY VARIANCE) HEIGHT IS VERTICAL DISTANCE MEASURED FROM GRADE TO HIGHEST POINT OF ROOF DECK SURFACE OR TOP OF RIDGE OF SLOPED ROOF (GRADE IS AVERAGE LEVEL OF PROPOSED OR FINISHED GROUND AT ALL WALLS)	19M (PER VARIANCE) 5 STORIES
MAX LOT COVERAGE	40% (SUPERCEDED BELOW BY VARIANCE)	36% (3088M ²)
MIN LANDSCAPED OPEN SPACE	40%	41% (355M ²)
DENSITY	133 UNITS	132 UNITS
UNDERGROUND PARKING SETBACK	FRONT YARD - HALF OF THAT REQUIRED FOR THE MAIN BUILDING OR MAIN USE SUPERCEDED BELOW BY VARIANCE	7.5M
UNDERGROUND PARKING DEPTH	ANY PORTION MUST BE 0.6M BELOW EXISTING GRADE	0.6M
ENTRANCE WIDTH GC 5.3	ENTRANCE WIDTH FOR GROUP OR CLUSTER DWELLINGS = 7.5M	7.5M
RESIDENTIAL FOURTH DENSITY EXCEPTION FOUR - R4-4 ZONE THE FOLLOWING EXEMPTIONS SHALL APPLY		
PARKING	1 SPACE PER UNIT PLUS AN ADDITIONAL 0.25 SPACES PER UNIT FOR VISITOR PARKING (SUPERCEDED BELOW BY VARIANCE)	122 UG 183 TOTAL 42 SURFACE 165 SPACES (1.25 PER)
PARKING	THE REQUIRED PARKING MAY BE LOCATED ON AN ABUTTING LOT	19 STREET (OFF PROPERTY)
PARKING	THE MINIMUM FRONT YARD SETBACK FOR AN UNDERGROUND PARKING GARAGE IS NIL	19 STREET (OFF PROPERTY)
MINOR VARIANCE NOP D13118		
MAX COVERAGE	42%	
MAX HEIGHT	19.0M	
PARKING	DECREASE THE PARKING FROM 162 SPACES TO 153 SPACES, THUS A DECREASE OF 9 SPACES.	
GENERAL CONDITIONS EXEMPTIONS		
ENCROACHMENTS	ARCHITECTURAL FEATURES 0.6M UNENCLOSED PORCH 1.5M BUT NOT CLOSER THAN 1.2M TO LOT LINE. UP TO 3.0M SETBACK IN REAR YARD	
	ENCLOSED BALCONY 1.5M BUT NOT CLOSER THAN 1.2M TO LOT LINE CANOPY MAY PROJECT HALFWAY INTO A REQUIRED YARD	
PARKING AISLE SIZE GREATER THAN 7 0DEGREES	6.0M	6.0M
PARKING SPACE SIZE (PERPENDICULAR)	6.0M X 2.8M	6.0M X 2.8M
PARKING SPACE SIZE (PARALLEL)	7.0M X 2.8M	7.0M X 2.8M
BF PARKING SPACE SIZE (PERPENDICULAR)	6.0M X 4.5M	AODA SUPERCEDES
BF PARKING SPACE SIZE (PARALLEL)	7.0M X 4.5M	
BF PARKING QUANTITY	1-25 -1 26-50 -2 51-100 -3 OVER 100 -2% = 3.4 REQ'D	4 SPACES
LOADING SPACE REQUIRED	NONE	NONE
BICYCLE SPACES	ANY GROUP OR CLUSTER RESIDENTIAL 0.5SPACES PER UNIT TO A MAX OF 20 SPACES	20

1 SITE PLAN
 SP1 SITE PLAN 1/4" = 1'-0"

CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS BEFORE PROCEEDING WITH WORK.
 ALL DRAWINGS MAY BE SUBJECT TO CHANGE DUE TO COMMENTS FROM MUNICIPAL DEPARTMENTS AND OTHER AGENCIES WITH AUTHORITY.
 ALL DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECTS AND MUST BE RETURNED AT THE COMPLETION OF THE WORK.
 THE CONTRACTOR WORKING FROM DRAWINGS NOT SPECIFICALLY MARKED FOR CONSTRUCTION MUST ASSUME FULL RESPONSIBILITY AND BEAR COSTS FOR ANY CORRECTIONS OR DAMAGES RESULTING FROM HIS OR HER WORK.

KEY TO DETAIL LOCATION

No.	DETAIL NUMBER
Circle No.	DRAWING SHEET NUMBER

DRAWING SETS ISSUED	No.	DATE (DD.MM.YY)	BY
CONCEPT 1 - 133 UNITS	1.	13.06.19	MB
CONCEPT 2 - 132 UNITS	2.	27.06.19	MB
PRE-CONSULTATION	3.	09.07.19	MB
SITE PLAN APPROVAL	4.	06.01.20	MB

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

REVISIONS TO DRAWING	No.	DATE (DD.MM.YY)	BY
NOT FOR CONSTRUCTION			

BUILDING PERMIT NUMBER:
 NOT FOR CONSTRUCTION WITHOUT PERMIT

KNYMH
 ARCHITECTURE • SOLUTIONS

KNYMH INC.
 1006 SKYVIEW DRIVE • SUITE 101
 BURLINGTON, ONTARIO • L7P 0V1
 T 905.639.6595
 F 905.639.0394
 www.knymh.com info@knymh.com

ONTARIO ASSOCIATION OF ARCHITECTS

PRZEMYSŁAW MYŚKOWSKI
 LICENCE 7384

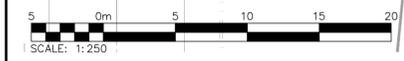
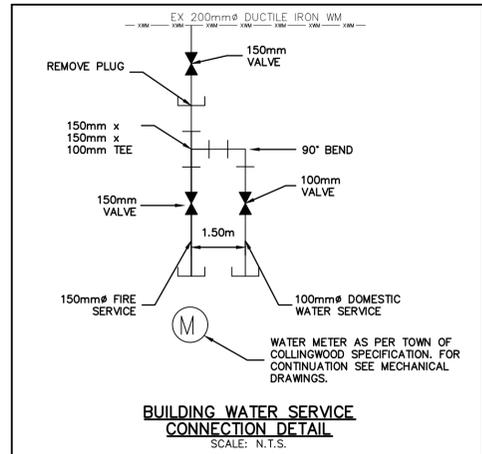
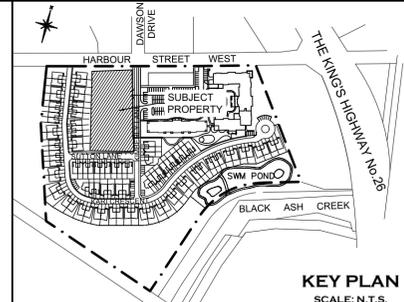
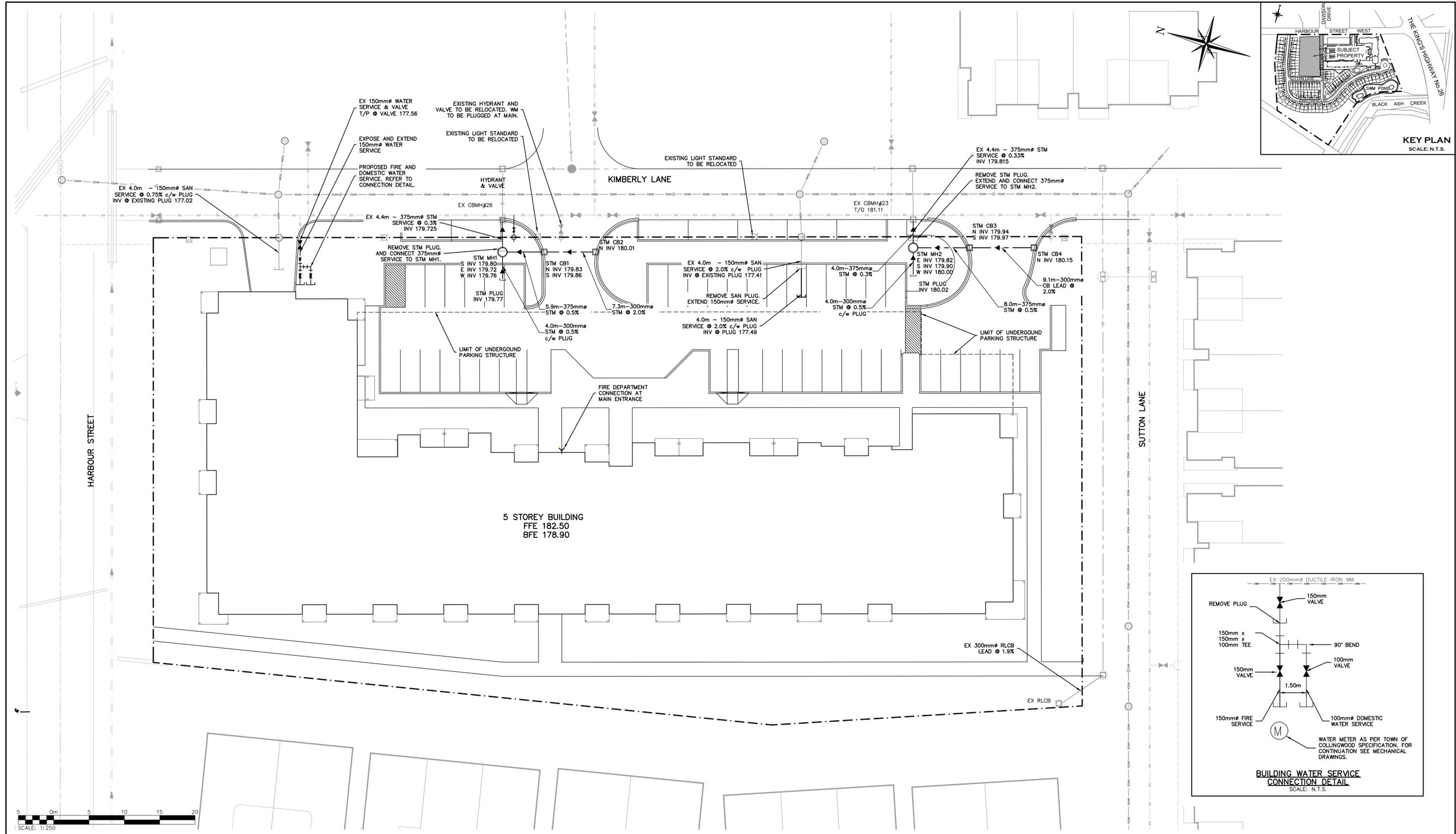
ROYAL WINDSOR AT BALMORAL VILLAGE

KIMBERLY LANE
 COLLINGWOOD, ONTARIO

DRAWING SHEET TITLE:
SITE PLAN

DRAWING SCALE: 1:200
 PROJECT NUMBER: 19029

DRAWN BY: CHECKED BY:
 DRAWING VERSION: 001
 PLOT DATE: January 7, 2020
 DRAWING SHEET NUMBER: SP1



1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

GEODEIC BENCHMARK	
GEODEIC BENCHMARK 72U313 HAVING AN ELEVATION OF 179.633, TABLET IN WEST FOUNDATION OF FORMER KAUFMAN FURNITURE BUILDING.	
TEMPORARY BENCHMARKS	
TBM#1	ELEV. 180.72
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH KARI CRESCENT.	
TBM#2	ELEV. 180.52
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH DAWSON DRIVE.	
TBM#3	ELEV. 180.28
T/NUT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET, 145m EAST OF DAWSON DRIVE INTERSECTION.	

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st SUBMISSION	01/08/2020

Engineer	Project
	ROYAL WINDSOR AT BALMORAL VILLAGE TOWN OF COLLINGWOOD
Drawing	GENERAL SITE SERVICING PLAN

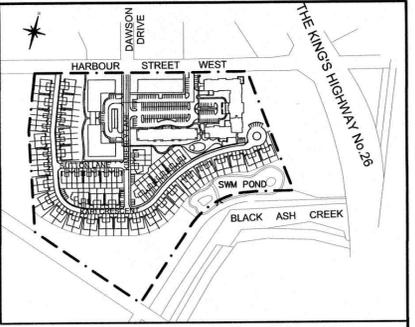
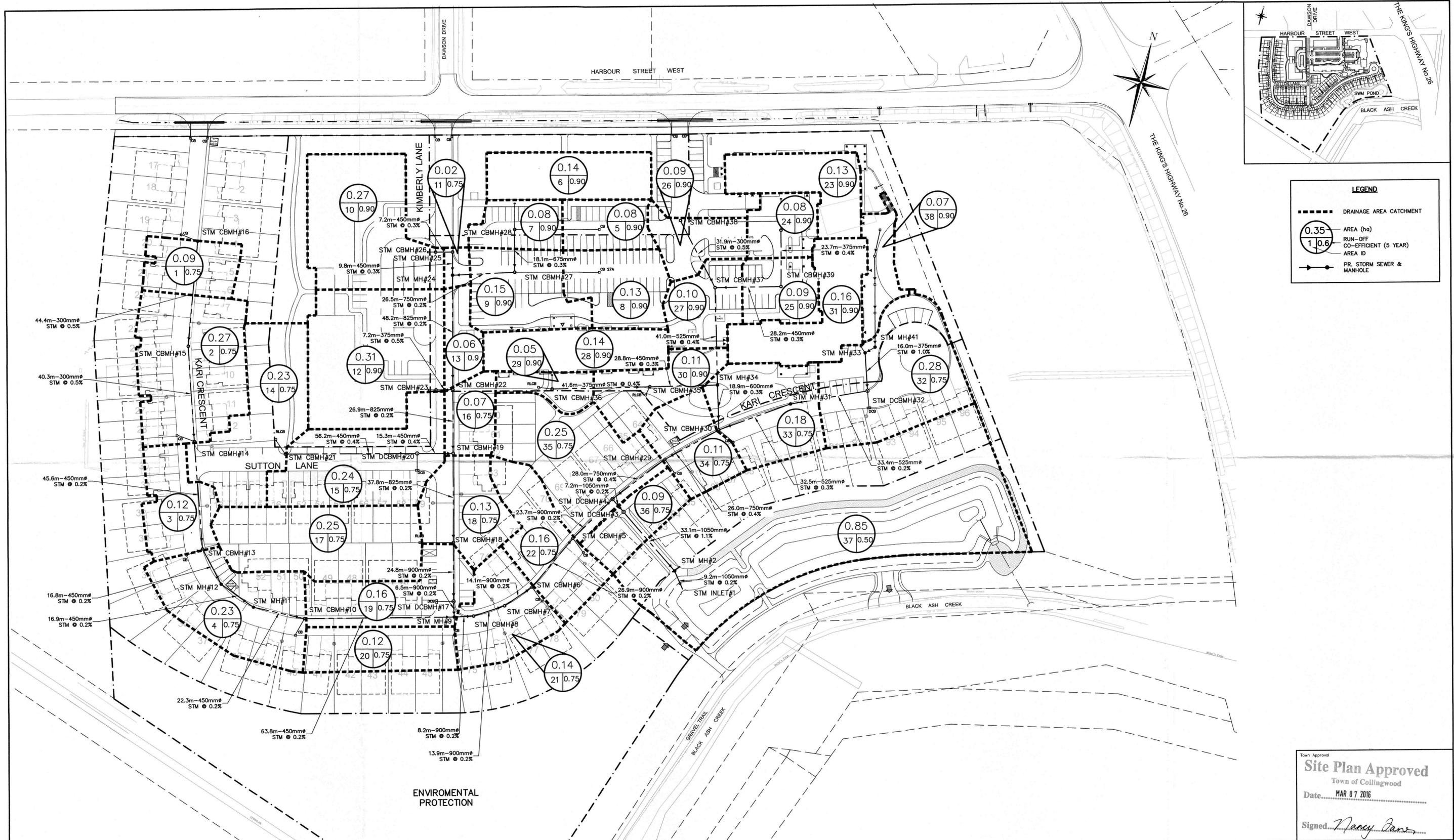
DRAFT
 FOR DISCUSSION PURPOSES ONLY

PROFESSIONAL ENGINEER
 PROVINCE OF ONTARIO

CROZIER
CONSULTING ENGINEERS

THE HARBOUREDGE BUILDING,
 40 HURON STREET, SUITE 301,
 COLLINGWOOD, ON L9Y 4R3
 705 446-3510 F
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA

Drawn By	J.P.	Design By	J.O.	Project	183-4877	
Check By	G.C.	Check By	K.M.	Scale	1:250	
					Drawing	C102



LEGEND

- DRAINAGE AREA CATCHMENT
- 0.35 AREA (ha)
- 1 0.6 RUN-OFF CO-EFFICIENT (5 YEAR)
- AREA ID
- PR. STORM SEWER & MANHOLE

ENVIRONMENTAL PROTECTION

Town Approval
Site Plan Approved
 Town of Collingwood
 Date: MAR 07 2016
 Signed: *Nancy Lane*

1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

GEODETIC BENCHMARK
 GEODETIC BENCHMARK 720313 HAVING AN ELEVATION OF 179.633, TABLET IN WEST FOUNDATION OF FORMER KAUFMAN FURNITURE BUILDING.

TEMPORARY BENCHMARKS

IBM#1
 1/4"UT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH KARI CRESCENT. ELEV. 180.22

IBM#2
 1/4"UT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH DAWSON DRIVE. ELEV. 180.52

IBM#3
 1/4"UT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET, 145m EAST OF DAWSON DRIVE INTERSECTION. ELEV. 180.28

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
0	FIRST SUBMISSION	07/22/2015
1	SECOND SUBMISSION	10/16/2015
2	ISSUED FOR APPROVAL	12/17/2015
3	RE-ISSUED FOR FINAL APPROVAL	02/10/2016

Engineer
D.M. TONE
 10015132
 FEB-10/16
 PROVINCE OF ONTARIO

Engineer
K. A. MORRIS
 FEB-10/16
 PROVINCE OF ONTARIO

Project
BALMORAL VILLAGE
TOWN OF COLLINGWOOD

Drawing
STORM DRAINAGE AREA PLAN

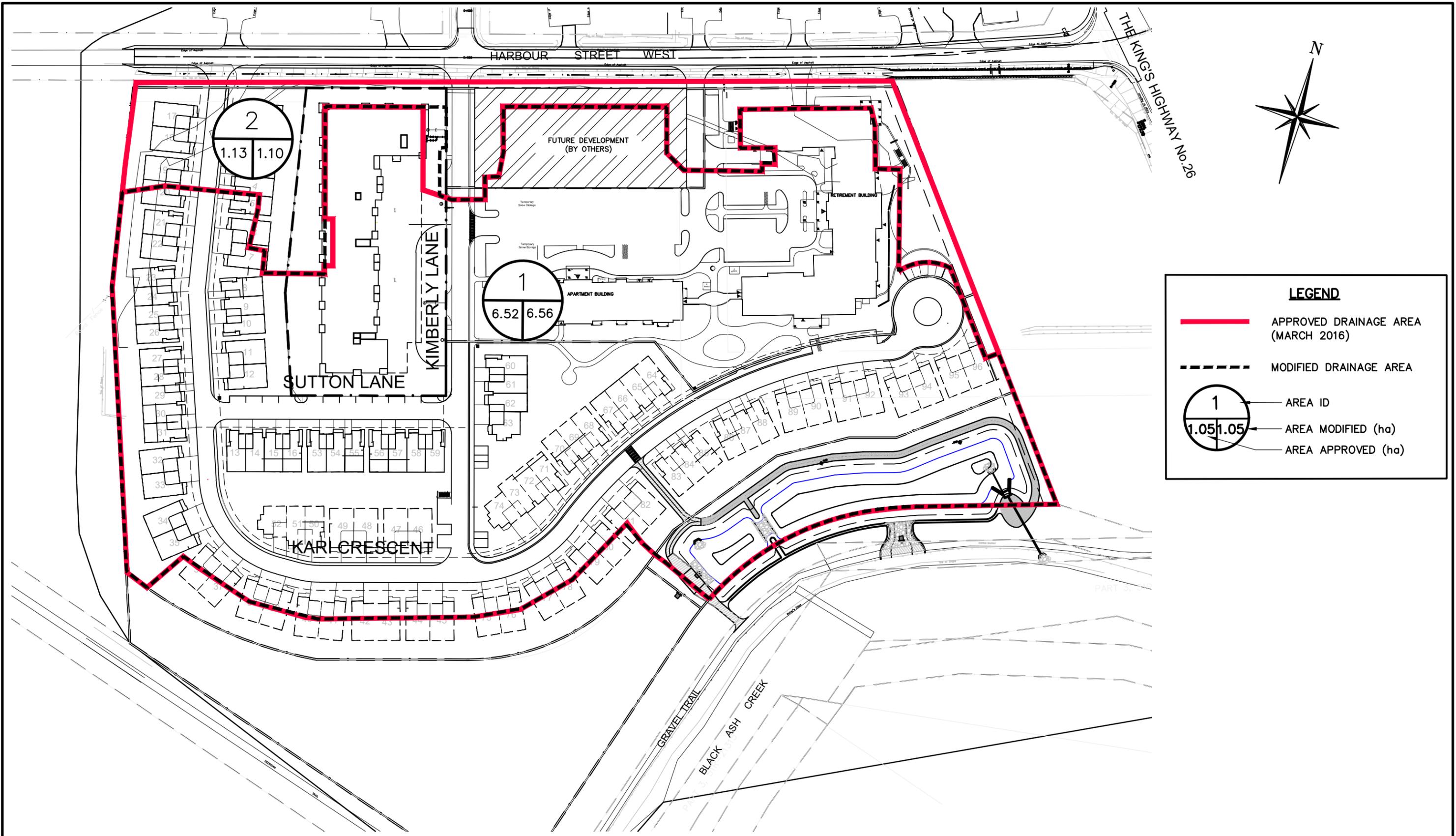
Drawn By: J.O. Design By: S.W. Project: **362-4007**

Scale: 1:750 Date: 09/29/15 Check By: D.T. Drawing: **105**

CROZIER & ASSOCIATES
 Consulting Engineers

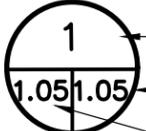
THE HARBOUREDGE BUILDING,
 40 HURON STREET, SUITE 301,
 COLLINGWOOD, ON L9Y 4R3
 705 446-3510 T
 705 446-3520 F
 WWW.CFCROZIER.CA
 WWW.PROFCROZIER.CA

J:\3001362 - Black Ash Creek Village\4007-Balmoral Village\4007-105-STM.dwg, 105, 2/17/2016 9:11:02 AM, swwest



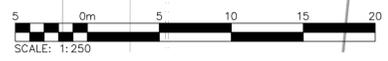
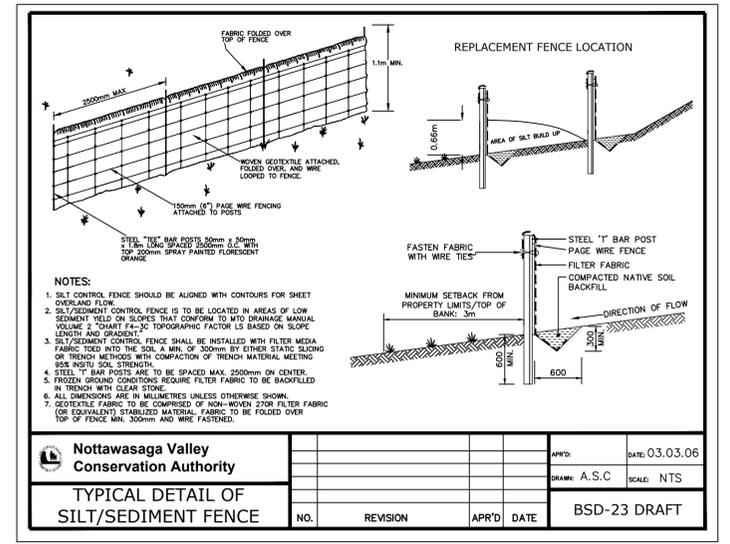
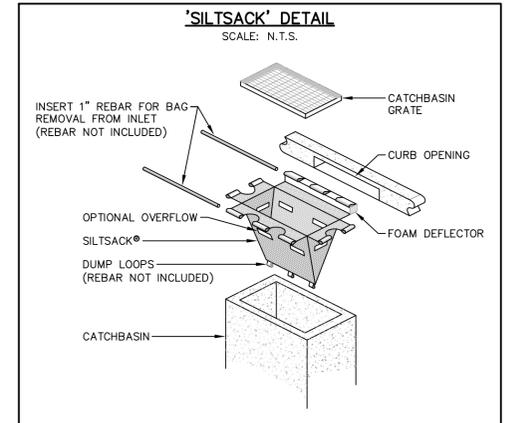
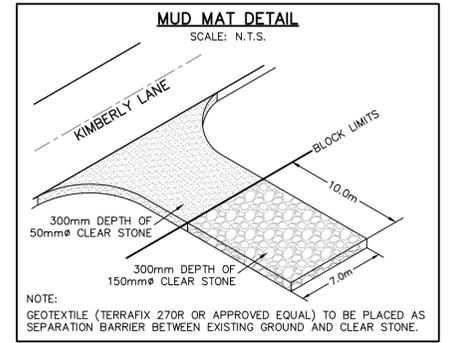
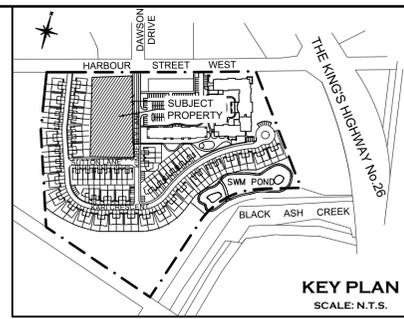
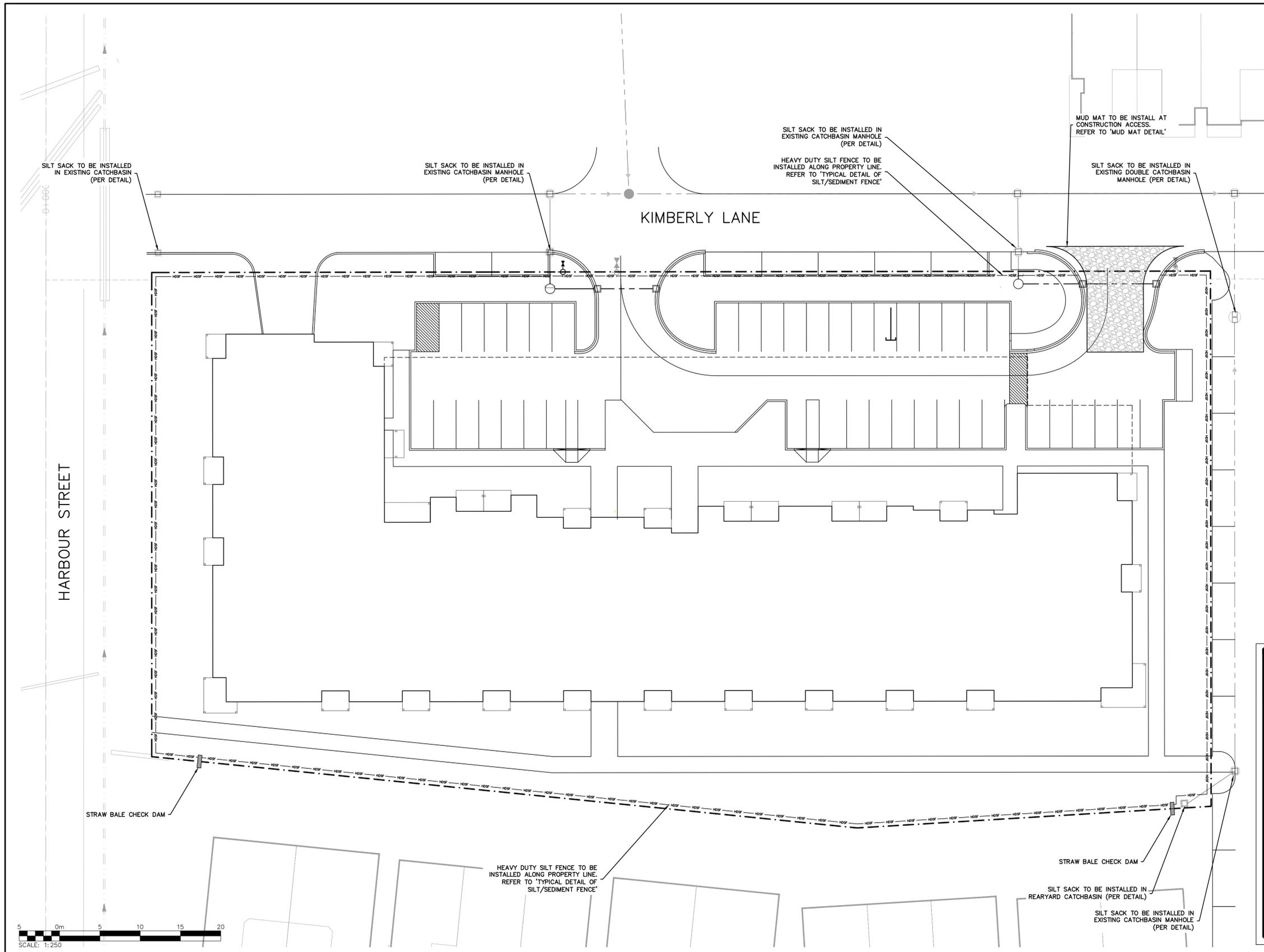
LEGEND

- APPROVED DRAINAGE AREA (MARCH 2016)
- MODIFIED DRAINAGE AREA



 AREA ID
 AREA MODIFIED (ha)
 AREA APPROVED (ha)

BALMORAL TOWN OF COLLINGWOOD		 CROZIER & ASSOCIATES Consulting Engineers	THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705-446-3510 T 705-446-3520 F WWW.CROZIER.CA INFO@CROZIER.CA
STORM AREA COMPARISONS			Drawn By: J.O. Design By: G.C. Project: 183-4877 Scale: 1:1500 Date: 01/08/2020 Check By: K.M. Drawing: FIG 5



1. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.

3. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

4. DO NOT SCALE THE DRAWINGS.

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

GEODETIC BENCHMARK
GEODETIC BENCHMARK 72U313 HAVING AN ELEVATION OF 179.633, TABLET IN WEST FOUNDATION OF FORMER KAUFMAN FURNITURE BUILDING.

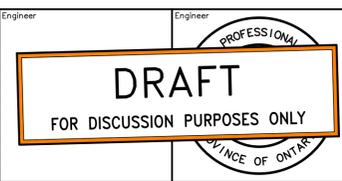
TEMPORARY BENCHMARKS

TBM#1 T/NUIT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH KARI CRESCENT. ELEV. 180.72

TBM#2 T/NUIT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET AT THE INTERSECTION WITH DAWSON DRIVE. ELEV. 180.52

TBM#3 T/NUIT OF HYDRANT LOCATED ON NORTH SIDE OF HARBOUR STREET, 145m EAST OF DAWSON DRIVE INTERSECTION. ELEV. 180.28

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR 1st SUBMISSION	01/08/2020



Project: **ROYAL WINDSOR AT BALMORAL VILLAGE TOWN OF COLLINGWOOD**

Drawing: **SEDIMENT CONTROL PLAN**

Nottawasaga Valley Conservation Authority

CROZIER CONSULTING ENGINEERS

Drawn By: J.P. Design By: J.O. Project: **183-4877**

Check By: G.C. Check By: K.M. Scale: 1:250 Drawing: **C104**

DATE: 03.03.06
DRAWN: A.S.C. SCALE: N.T.S.
NO. REVISION APR'D DATE BSD-23 DRAFT