SERVICING AND STORMWATER MANAGEMENT REPORT - 347 FRANKTOWN ROAD

Project No.: CCO-22-0025

Prepared for:

Dr. Neel Chadha
727 Bunchberry Way,
Ottawa, ON, K1T 0J8,

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, ON K0A 1L0

March 25, 2022

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Dr. Neel Chadha to prepare this Servicing and Stormwater Management Report in support of the site plan approval for the proposed Phase 1 development at 347 Franktown Road within the Town of Carleton Place.

The main purpose of this report is to demonstrate that the proposed development has access to sufficient public services in accordance with the recommendations and guidelines provided by the Town of Carleton Place (Town), the Mississippi Valley Conservation Authority (MVCA) and the Ministry of the Environment, Conservation and Parks (MECP). This report will address access to water, sanitary and storm servicing for the development, ensuring that existing services will adequately service the proposed development.

1.2 Site Description

The property is located at 347 Franktown Road in the Town of Carleton Place. The subject land covers approximately 2.80 ha and is located between the proposed second phase of Coleman Street Subdivision and Franktown Road. The proposed Phase 1 development is proposed within 1.21 ha of the property.

The existing site is currently undeveloped, consisting of wooded and grassed areas. Adjacent lots to the north and south are also undeveloped. Coleman Street Subdivision Phase 2 flanks the eastern portion of the property and existing commercial and residential developments along Franktown Road are located to the west.

The Phase 1 development proposes a retirement home on the northwest portion of the property. Future development will include a Senior's apartment building in Phase 2, a medical clinic in Phase 3, and townhouses in Phase 4. Phases 1-3 will be separated from the Townhouse blocks (Phase 4) by a public ROW. The future ROW will connect the proposed development to the lands to the north and eventually to the Coleman subdivision via the lands to the south. Based on consultation with the Town of Carleton Place, separate Development Permit applications will be submitted for each phase of the proposed development. This report will provide a servicing and stormwater management strategy for Phase 1 in conformance with the Conceptual Servicing Report, available under a separate cover.

2.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted with the Town regarding the proposed site on May 21st, 2021. The notes from this meeting can be found in Appendix 'B'. Background documents available under separate cover include:

- JLR Watermain Capacity – Future Development_Final (Dated September 16, 2013 completed by J.L. Richards & Associates Ltd.)
- Functional Servicing Report – 347 Franktown Road (Dated August 13, 2021 completed by Mcintosh Perry Consulting Engineers Ltd.)

3.0 WATERMAIN

3.1 Existing Watermain

The following subsections outline the existing water infrastructure within Franktown Road and Coleman Street Subdivision Phase 2.

3.1.1 *Franktown Road*

There is an existing 300 mm diameter watermain, that runs north along Franktown Road, ending in a stub located at Findlay Avenue. Just before the stub there is a hydrant that services the existing commercial development adjacent to the subject site.

3.1.2 *Coleman Street Subdivision*

Although not yet constructed, the infrastructure within the proposed Coleman Street Subdivision Phase 2 is anticipated to be constructed prior to the proposed construction of the subject property. There is a proposed 200 mm diameter watermain that services the subdivision. The design of the Coleman Street Subdivision Phase 2 has taken the future development into account with stubs extending westward from the subdivision located both northeast and southeast of the subject site.

3.2 Proposed Watermain

The existing 200 mm watermain within Coleman Street Subdivision Phase 2 will be extended along the future municipal road to service the proposed development. The Phase 1 development will be serviced via a 150 mm water service lateral, as shown by C102. In accordance with the Watermain Capacity – Future Development provided by the Town of Carleton Place, the 200 mm watermain will be connected to the existing 300 mm watermain within Franktown Road. The existing 300 mm watermain within Franktown Road is proposed to be extended in order to connect with the proposed 200 mm watermain.

The Fire Underwriters Survey 1999 (FUS) method was utilized to determine the required fire flow for the proposed Phase 1 development. Due to the various phases of the development, all phases and buildings were evaluated for the worst-case scenario. It was determined that the proposed Phase 1 building was the worst case. Detailed water and fire calculations for Phase 1 can be found in Appendix 'C' of this report. Detailed calculations for Phases 2 through 4 can be found under a separate cover.

The 'C' factor (type of construction) for the FUS calculation was determined to be 1 (ordinary construction). The total floor area ('A' value) for the FUS calculation was determined to be 11,720 m^2. The results of the calculations yielded a required fire flow of 18,000 L/min. A required fire flow of 9,000 L/min was calculated using the Ontario Building Code (OBC) requirements. The detailed calculations for the FUS and OBC can be found in Appendix 'C'.

The water demands for the proposed building have been calculated to adhere to the *Ottawa Design Guidelines – Water Distribution* manual and can be found in Appendix 'C'. ***Table 1***, below, summarizes the design criteria and calculated demands.

Table 1: Water Supply Design Criteria and Water Demands

Water Demand Rate (Residential)	280 L/c/day
1-Bedroom Apartment	1.4 Persons/unit
Residential Peaking Factor (Day)	2.5 x avg. day
Residential Peaking Factor (Hour)	2.2 x max. day
Site Area (ha)	1.21
Average Day Demand (L/s)	0.69
Maximum Daily Demand (L/s)	1.72
Peak Hourly Demand (L/s)	3.79
FUS Fire Flow Requirement (L/s)	300.00
Max Day + Fire Flow (L/s)	301.72

With reference to the Watermain Capacity – Future Development Pg. 18, pressures under peak demand were analyzed and a water model was completed using Bentley's WaterCAD based on those conditions. The results determined that the proposed 200mm watermain can adequately service the proposed development and provide sufficient fire flow since the proposed Hydrant H-1 and H-2 produced available fire flows of 19,005 L/min and 15,893 L/min. Refer to drawing C101 for Hydrant locations. The results are available in Appendix 'C' of this report.

The normal operating pressure range is anticipated to be 449 kPa to 462 kPa and will not be less than 275 kPa (40 psi) or exceed 689 kPa (100 psi). The proposed watermain will meet the minimum required 20 psi (140 kPa) at the ground level under maximum day demand and fire flow conditions. ***Table 2***, below, summarizes the water pressure at junctions per scenario.

Table 2: Water Pressure at Junctions per Scenario

Junction	Average Day (psi)	Peak Hourly (psi)	Max. Day + Fire Flow (psi)
J-1	66.65	66.36	67.51
J-2	66.83	65.60	66.37
J-3	66.65	65.44	66.12
J-4	66.65	65.43	66.12
J-5	65.11	64.94	65.36
J-6	67.07	66.87	67.63

In order to provide the required fire flow for the worst case but also for all other cases, two private hydrants have been proposed within the site. The proposed hydrants have been placed to ensure a maximum distance of 45 m to the proposed development. Location details are shown on the Site Servicing Plan included with the report. A hydrant summary can be seen in ***Table 3***, below.

Table 3: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m	Fire Hydrant(s) within 150m	Combined Fire Flow (L/min.)
347 Franktown Road	18,000	2	0	>18,000

4.0 SANITARY DESIGN

4.1 Existing Sanitary Sewer

Although not yet constructed, Coleman Street Subdivision Phase 2 has a proposed 200 mm diameter sanitary sewer with stubs located to the northeast and southeast of the subject site.

4.2 Proposed Sanitary Sewer

The proposed 200 mm sanitary sewer stub within Coleman Street Subdivision is proposed to be extended along the future municipal road to service the subject property. A 200 mm diameter service lateral will be connected from the proposed building to the proposed 200 mm diameter sanitary sewer extension.

The peak design flow was calculated for the proposed site using the Ottawa Sewer Design Guidelines (SDG). Design criteria used in the sanitary demand calculation can be seen in ***Table 4***, below.

Table 4: Sanitary Design Criteria

1-Bedroom	1.4 persons/unit
Average Daily Demand	280 L/day/person
Residential Peaking Factor	3.51
Extraneous Flow Allowance	0.33 L/s/ha

Table 5¸ below, summarizes the estimated wastewater flow from the proposed Phase 1 development. Refer to Appendix 'D' for detailed calculations.

Table 5: Summary of Estimated Sanitary Flow

Average Dry Weather Flow	0.79 L/s
Peak Dry Weather Flow	2.54 L/s
Peak Wet Weather Flow	2.87 L/s

Based on the calculation provided in the Coleman Street Subdivision Phase 2 Servicing Report and the results shown in ***Table 5***, above, it is anticipated that there will be no downstream capacity concerns. Flow from the subject site has been accounted for in the Coleman Street Subdivision design, as demonstrated by the calculation sheet included in Appendix 'D'.

Further downstream of Coleman Street Subdivision Phase 2 a sanitary sewer upgrade is to take place as per "CCO-18-0360-01 - Offsite Sanitary Servicing Memo_Rev1" (See Appendix 'D' for full memorandum). Flows from the subject site were taken into consideration in the memorandum at a rate of 60 pp/ha which

corresponds to a flow rate of 4.24 L/s. The proposed Phase 1 development will result in a flow rate of 2.87 L/s. Phases 1 through 4 will have a combined flow of 7.28 L/s. However, based on the capacity shown for the proposed sanitary sewer upgrade in the memorandum, the additional 3.04 L/s of flow can be accommodated and therefore no capacity issues are anticipated given the upgrade is completed. Sanitary sizing calculations can be found in Appendix 'D'.

5.0 STORM DESIGN

5.1 Existing Storm Sewer

There is no existing storm infrastructure within the subject property. Stormwater runoff currently sheet drains to the southeast where it is collected by the existing creek.

5.2 Proposed Storm Sewer

The proposed development will be serviced by a new storm network that will outlet to the existing creek located to the southeast. This creek is being regraded in order to accommodate storm flows from Coleman Street Subdivision Phase 2. In its reconstruction flows from the subject site will also be considered. Unrestricted runoff will sheet flow off site and restricted flow within Phase 1 will be stored as required and released to the proposed storm sewer network at the allowable release rate. A combination of roof storage and surface storage will be utilized to meet the SWM criteria provided by the Town of Carleton Place.

6.0 STORMWATER MANAGEMENT

6.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through positive drainage away from the building and towards the adjacent ROW's. The quantitative and qualitative properties of the storm runoff for both the pre & post development flows are further detailed below. The proposed development will result in higher runoff coefficient. The post-development 5 and 100-year flows will be restricted to the pre-development 5 and 100-year flows.

6.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \quad \text{(L/s)}$$

Where C = Runoff coefficient

I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)

A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any stormwater management facility sized using this method is anticipated to function as intended.

The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel	0.60

Undeveloped and Grass	0.20

As per the *City of Ottawa - Sewer Design Guidelines*, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

The time of concentration (Tc) used for pre-development and post-development shall be calculated using a Tc of 10 minutes.

6.3 Pre-Development Drainage

The existing site drainage limits are demonstrated on the Pre-Development Drainage Area Plan. A summary of the Pre-Development Runoff Calculations can be found in ***Table 6,*** *below.*

Table 6: Pre- Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (5-Year)	Runoff Coefficient (100-Year)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
A1	1.21	0.20	0.25	69.82	149.58

See CCO-22-0025 - *PRE* in Appendix 'E' and Appendix 'G' for calculations.

6.4 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-22-0025 - *POST* in Appendix 'F' of this report for more details. A summary of the Post-Development Runoff Calculations can be found in ***Table 7***¸ below.

Table 7: Post Development Flow Rate

Drainage Area	Area (ha)	Runoff Coefficient (5-Year)	Runoff Coefficient (100-Year)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
B101	0.23	0.90	1.00	60.43	115.06
B102	0.27	0.69	0.77	54.73	105.37
B103	0.35	0.53	0.61	54.68	106.69
B104	0.19	0.66	0.74	35.98	69.43
B105	0.15	0.72	0.81	32.29	62.03
Total	**1.21**			**238.12**	**458.58**

See Appendix 'G' for calculations. Runoff for area B101 – B104 will be restricted before outletting to the existing creek located to the southeast. The flow will be controlled through the use of roof drains for area B1 as well as

inlet control device for areas B102 to B104. Runoff from areas B105 will leave the site unrestricted. Quantity and quality control will be further detailed in Sections 6.5 and 6.6.

6.5 Quantity Control

The total post-development runoff for this site has been restricted to match the 5-year and 100-year pre-development flow rates calculated with a combined C value. (See Appendix 'B' for pre-consultation notes). These values create the following allowable release rate and storage volumes for the development site.

Table 8: **Allowable Release Rate Summary**

Drainage Area	Area (ha)	Runoff Coefficient 5-Year	Runoff Coefficient 100-Year	Required Restricted Flow 5-Year (L/s)	Required Restricted Flow 100-Year (L/s)
A1	1.22	0.20	0.25	69.82	149.58

See Appendix 'G' for calculations.

Reducing site flows will be achieved using a flow restriction and will create the need for onsite storage. Runoff from area B101 to B104 will be restricted as shown in ***Table 9***, below.

Table 9: **Post-Development Restricted Runoff Summary**

Drainage Area	Post Development Unrestricted Flow (L/s)		Post Development Restricted Flow (L/s)		
	5-Year	100-Year	5-Year	100-Year	
B101	60.43	115.06	5.28	9.12	Restricted – Roof Drains
B102	54.73	105.37	12.75	12.88	Restricted – ICD
B103	54.68	106.69	1.78	1.95	Restricted – ICD
B104	35.98	69.43	17.34	17.96	Restricted - ICD
B105	32.29	62.03	32.29	62.03	Unrestricted
Total	**238.12**	**458.58**	**69.44**	**103.95**	

See Appendix 'G' for calculations.

Runoff from area B101 will be restricted using roof drains before discharging to the proposed storm sewer, downstream of MH101. Emergency roof scuppers will be installed to ensure ponding does not exceed the proposed ponding limit.

Runoff from area B102 will be restricted by an ICD located within CBMH3. This will backup stormwater runoff from the site above the CB structures within the parking lot. The area will pond to elevations of 134.78 and 134.84 for the 5-year and 100-year storms, respectively. Flows exceeding the 100-year rate will be directed towards the swale northwest of the proposed building before reaching finished floor elevation.

Drainage from area B103 will be directed into a swale, where it will discharge into a depressed surface storage area. An ICD within CB4 will then restrict the flow leaving the area to the allowable release rate. The area will pond to elevations of 134.03 and 134.41 for the 5-year and 100-year storms, respectively. In the event of flows exceeding the 100-year rate, stormwater will overflow the storage area into the swale before reaching finished floor elevation and exit the site to the northeast.

Drainage from area B104 will be restricted with an ICD located within CB101-2. The area will pond to elevations of 134.55 and 134.76 for the 5-year and 100-year storms, respectively. Flows exceeding the 100-year rate will discharge to the east towards the future public road.

A storage summary can be seen in ***Table 10***, below.

Table 10: Storage Summary

Drainage Area	Storage Required (m^3)	Storage Available (m^3)	Storage Required (m^3)	Storage Available (m^3)
	5-Year		100-Year	
B101	49.77	60.85	96.83	104.31
B102	29.98	30.77	75.51	79.57
B103	61.30	62.27	135.83	137.73
B104	11.19	11.23	34.41	35.10
B105	N/A	N/A	N/A	N/A

6.6 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. BMP's at this site will be implemented at the lot level. Lot level BMP's typically include temporary retention of the parking lot runoff, minimizing ground slopes and maximizing landscaped areas.

A quality treatment unit has been sized to provide a TSS removal rate of 80% as per the Mississippi Valley Conservation Authority (MVCA) requirements. The Oil and Grit Separator (OGS) will provide a water quality of at least 80% TSS. The OGS Unit shall be placed downstream of the restriction unit to provide the required water quality treatment for the site runoff before discharging to the existing creek southeast of the site.

7.0 EROSION AND SEDIMENT CONTROL

7.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catchbasins and filter fabric is to be placed under the grates of all existing catchbasins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures are to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the *Site Grading, Drainage and Sediment & Erosion Control Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

7.2 Permanent Measures

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

8.0 SUMMARY

- A new 3,360 m^2 retirement home is proposed to be constructed as part of the Phase 1 development at 347 Franktown Road, Carleton Place.
- A new 200mm water main will be extended from the proposed Phase 2 of Coleman Subdivision to Franktown Road.
- The FUS method estimated fire flow indicated 18,000 L/min is required for the proposed development.
- Based on boundary conditions provided by the Town, the proposed 200 mm watermain and two private hydrants are capable of meeting daily and fire flow demands.
- A new 200mm sewer main will be installed and connected to the proposed stub at phase 2 of Coleman Subdivision
- The development is anticipated to have a peak wet weather flow of 2.87 L/s. A proposed 200 mm diameter sanitary main will collect and outlet flow to the proposed 200 mm diameter sanitary stub located within Phase 2 of Coleman Street Subdivision. Based on the sanitary analysis conducted in the Coleman Street Subdivision Phase 2 Servicing Report, the subdivisions sanitary network has sufficient capacity for the subject site's flow.
- A new storm system will be installed on-site to capture storm runoff and restrict flows to pre-development rates. The new storm system will discharge to the existing creek southeast of the site.
- Storage for the 5 and 100-year storm events will be provided via roof storage and surface storage.

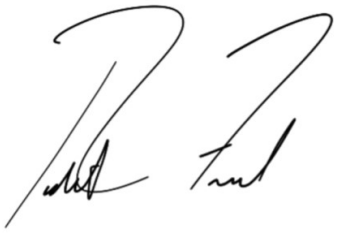
9.0 RECOMMENDATION

Based on the information presented in this report, we recommend that Town of Carleton Place approve this Servicing and Stormwater Management Report in support of the proposed development at 347 Franktown Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.



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10.0 STATEMENT OF LIMITATIONS

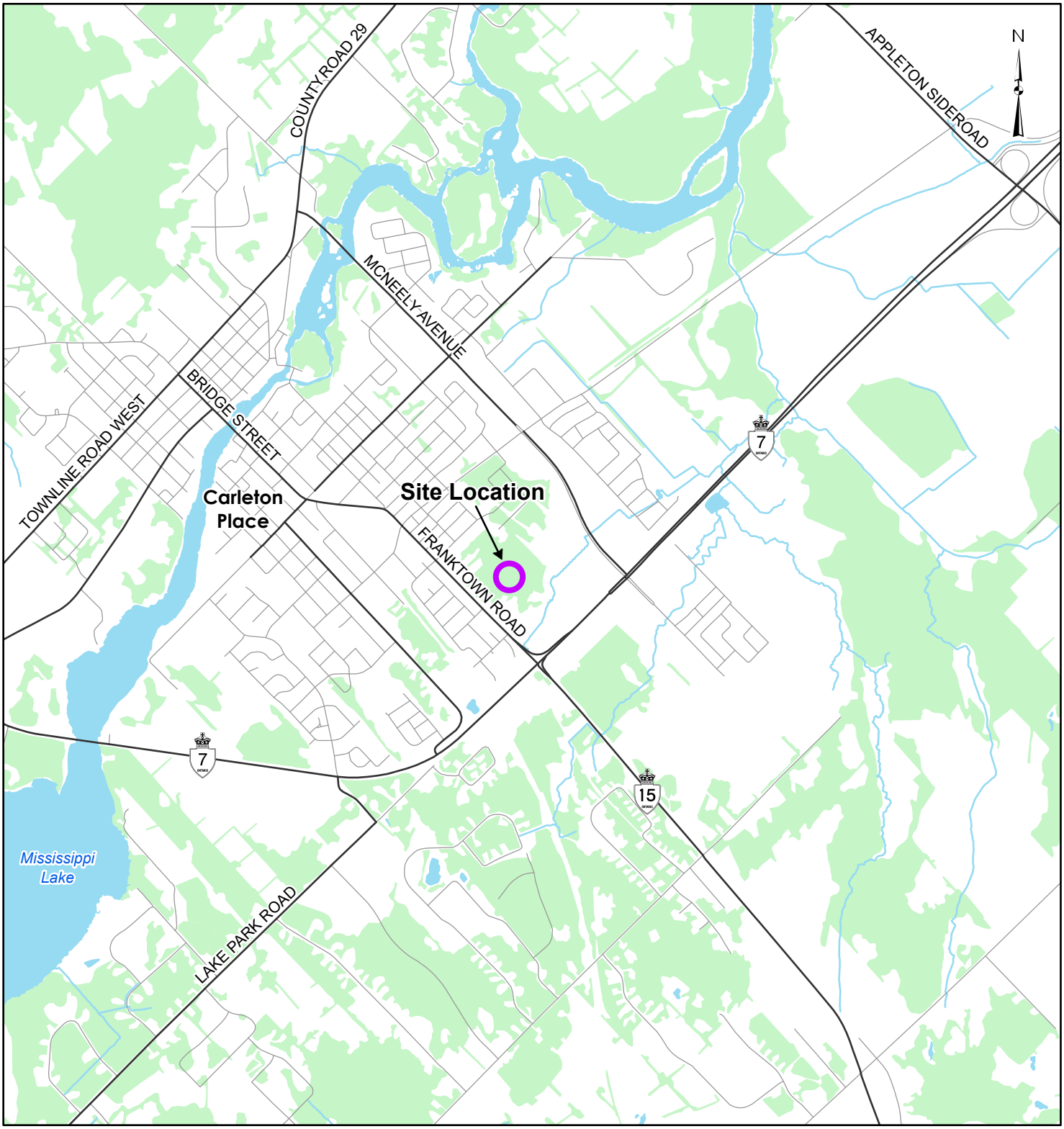
This report was produced for the exclusive use of Dr. Neel Chadha. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Parks and Climate Change, Town of Carleton Place and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
SITE LOCATION PLAN

McINTOSH PERRY



LEGEND

- Site Location
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

1,000 500 0 1,000

Scale 1:30,000 Metres

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.

CLIENT: DR. NEEL CHADHA

PROJECT: 347 FRANKTOWN ROAD

TITLE: SITE LOCATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: CCO-22-0025	FIGURE: 1
Date	Aug., 09, 2021
GIS	EU
Checked By	NV

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APPENDIX B
TOWN OF CARLETON PLACE PRE-CONSULTATION NOTES

McINTOSH PERRY

TOWN OF CARLETON PLACE
175 Bridge St. Carleton Place K7C 2V8
jbowes@carletonplace.ca

PRE-CONSULTATION FOR DEVELOPMENT PERMIT APPROVAL

Section 70.2 of the Planning Act, RSO 1990, as amended

A meeting with the Planning and Development staff is required prior to the submission of any development application. At this meeting an approval stream and submission requirements will be determined.

Date: May 21, 2021 **Time:** 10:30am

CONTACT INFORMATION

Name/Title:	Mailing Address and Postal Code:	(P)Phone # / (F)Fax # / (E) Email Address
Applicant/Agent Ben Clare, McIntosh Perry		(P):
		(F):
		(E): b.clare@mcintoshperry.com
Property Owner(s) Neel Chadha (purhcaser)		(P):
		(F):
		(E): neelchadha@gmail.com

LEGAL DESCRIPTION

Municipal Address: lands associated with 347 Franktown Road - subject to severance

Legal Description: CON 11 SW 1/2 PT LOT 15 RP;26R3022 PT PART 1

Lot Front (m):	Lot Depth (m):	Lot Area (m²):
15m	300+/-m	3.1ha

Official Plan Designation:	Development Permit Designation:
Residential	Residential

Previous Applications (if any): Currently subject to consent application B21-043 - lot addition/consolidation

PROPOSED APPLICATION

Applicant proposes the development of a four phase retirement villa over the entirety of the site.

Phase 1 to include a four story / 152 unit retirement home

Phase 2 includes a 4-story / 70 unit apartment building with indoor underground parking

Phase 3 includes a 1 story / 2 unit commercial plaza with complementary uses to the retirement home

Phase 4 includes 18 street townhomes - possibly free hold

Will also include 1 municipal road (north-south orientation) on eastern portion of the site.

CLASS OF DEVELOPMENT PERMIT REQUIRED

Class	Comment
Class 1 ⬠	
Class 1A ⬠	
Class 2 ⬠	
Class 3 ☑	Site plan respecting Phase 1 and if needed variations to standards (ie frontage)
Other ☑	DPA to change use from Residential to Institutional - holding provisions on future phases

POTENTIAL SUPPORTING STUDIES AND REPORTS

Technical reports/plans or studies may be required to assist in the review process of a Development Permit Application. The identified studies or reports are required prior to the submission of an application for Development Permit.

Study requirements for DP3

- ☐ Archaeological Assessment
- ☐ Building Materials Samples
- ☑ Building Shadow Impact Assessment Study
- ☑ Coloured Perspective Drawings
- ☑ Site Plan
- ☐ Construction Traffic Management Plan
- ☑ Cost Estimate for External Works
- ☑ Environmental Impact Statement
  - ☑ Butternut? YES or NO
- ☐ Environmental Site Assessment
- ☑ Servicing Report
- ☐ Heritage Impact Assessment Report
- ☐ Illumination and Traffic Signal Plan
- ☑ Landscape Plan
- ☐ Natural Heritage Evaluation
- ☐ Noise Attenuation Study
- ☐ Parking and Loading Study
- ☐ Pavement Marking and Signage Plan
- ☑ Photographs of Existing Context
- ☑ Planning Rationale Report
- ☐ Reference Plan for Land Conveyances
- ☐ Sight-line Study
- ☐ Source Water Protection
- ☑ Transportation/Traffic Impact Study
- ☑ Tree Inventory
- ☑ Tree Preservation Plan
- ☑ Urban Design Brief
- ☑ Utilities Plan
- ☐ Others (as required by the Town)
- ☑ Grading & Drainage
- ☐ Hydrogeological Study
- ☑ Stormwater Management
- ☐ MDS Calculation

NOTES

Note: The project will also require a subdivision application to divide the site and dedicate the municipal ROW. This may come first, or after the development of Phase 1. Phases 2-4 cannot occur until access is demonstrated on an open and public road.

The proponent is suggesting that the development of the site include the construction of Phase 1 as detailed in the attached plan in the short-term. It is also suggested that the entire vision of the site be circulated at time of application to ensure transparancy of full build out. Holding provisions to be used to further regulate future phases.

Density in excess of 70 units/ha without an OPA will be a challenge. Suggest DPA to identify the proposed use as Intitutional vs conventional residential to demonstrate uniqueness of proposal compared to other sites.

Applicant to evaluate extent of area to include as Institutional vs. Res.

DPA and DP3 applications can be filed concurrently, and can be presented and circulated jointly.

The utility plan and cost estimate of site works are requirements of approval, but will not be required at the time of application submission given that these are typically completed as the detailed civil engineering design is advanced.

That scoped versions of the tree inventory and tree conservation report will be acceptable provided they satisfy the requirements of Section 3.44 of the Development Permit By-law, including compensation requirements for trees with a minimum 200mm caliper, and hackberry trees.

SIGNATURES

This form must be signed by the future applicant and by the Director of Development Services or his/her designate and a copy should accompany the application for a Development Permit.

Signature: _____ **Date:** _____

Owner/Applicant

Signature: _____ **Date:** June 11, 2021

Director of Development Services/Designate

Draft 2 - disucssions purposes May 21, 2021

CARLETON PLACE RETIREMENT HOME, SENIOR'S APARTMENT BUILDING, COMMERCIAL PLAZA & TOWNHOUSE DEVELOPMENT

347 FRANKTOWN ROAD, CARLETON PLACE ON

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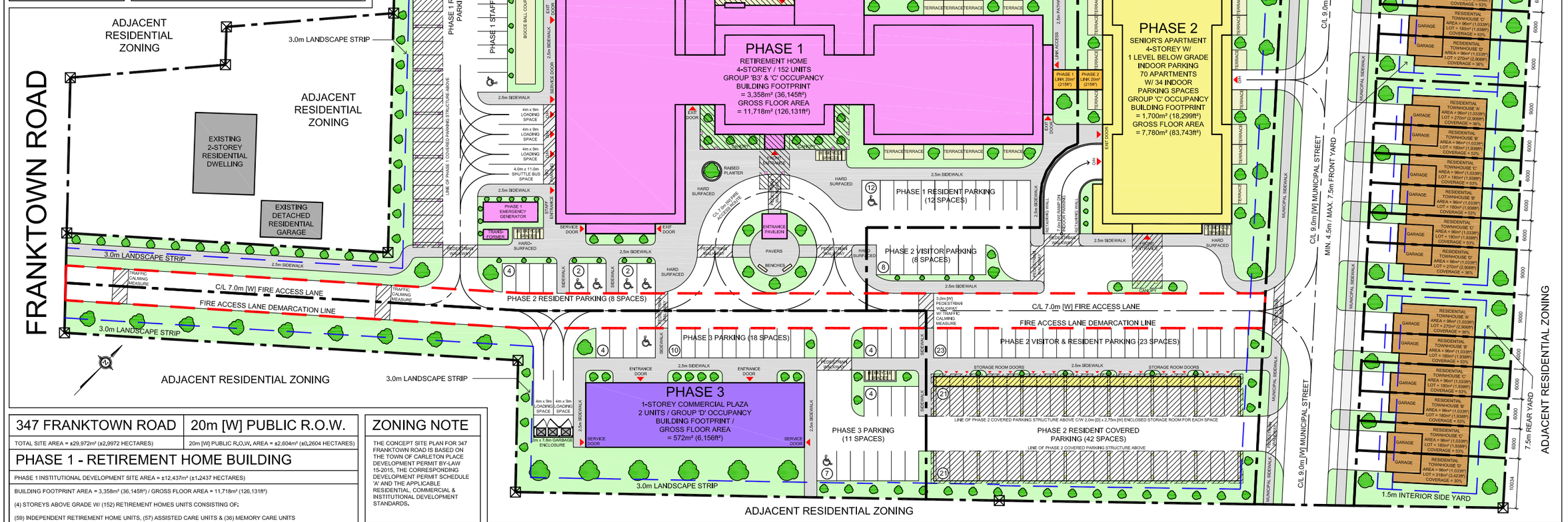
613-256-5213

CONCEPT SITE PLAN

DRAWING A1.0
ISSUE NO. 02
MAY 18th, 2021

SCALE 1:800 (0 4m 8m 16m 32m)



347 FRANKTOWN ROAD	20m [W] PUBLIC R.O.W.
TOTAL SITE AREA = ±29,972m² (±2,9972 HECTARES)	20m [W] PUBLIC R.O.W. AREA = ±2,604m² (±0,2604 HECTARES)

PHASE 1 - RETIREMENT HOME BUILDING

PHASE 1 INSTITUTIONAL DEVELOPMENT SITE AREA = ±12,437m² (±1,2437 HECTARES)

BUILDING FOOTPRINT AREA = 3,358m² (36,145ft²) / GROSS FLOOR AREA = 11,718m² (126,131ft²)

(4) STOREYS ABOVE GRADE W/ (152) RETIREMENT HOMES UNITS CONSISTING OF:

(59) INDEPENDENT RETIREMENT HOME UNITS, (57) ASSISTED CARE UNITS & (36) MEMORY CARE UNITS

PHASE 2 - SENIOR'S APARTMENT BUILDING

PHASE 2 RESIDENTIAL DEVELOPMENT SITE AREA = ±7,031m² (±0,7031 HECTARES)

BUILDING FOOTPRINT AREA = 1,700m² (18,299ft²) / GROSS FLOOR AREA (INCLUDING BELOW GRADE) = 7,780m² (83,743ft²)

(4) STOREYS ABOVE GRADE + (1) LEVEL INDOOR PARKING BELOW GRADE W/ (70) SENIOR APARTMENTS CONSISTING OF:

(14) GROUND FLOOR UNITS, (19) 2nd FLOOR UNITS, (19) 3rd FLOOR UNITS & (18) 4th FLOOR UNITS

PHASE 3 - COMMERCIAL PLAZA BUILDING

PHASE 3 COMMERCIAL DEVELOPMENT SITE AREA = ±3,984m² (±0,3984 HECTARES)

BUILDING FOOTPRINT / GROSS FLOOR AREA = 572m² (6,156ft²)

(1) STOREY ABOVE GRADE W/ (2) COMMERCIAL UNITS CONSISTING OF:

(2) COMMERCIAL UNITS EACH @ 286m² (3,078ft²)

PHASE 4 - TOWNHOUSE DEVELOPMENT

PHASE 4 TOWNHOUSE DEVELOPMENT SITE AREA = ±3,916m² (±0,3916 HECTARES)

TOWNHOUSE FOOTPRINT = 96m² (1,033ft²) / GROSS FLOOR AREA = 192m² (2,066ft²)

(2) STORIES ABOVE GRADE W/ ATTACHED GARAGE

(3) TOWNHOUSE BLOCKS EACH CONSISTING OF (6) TOWNHOUSES = (18) TOWNHOUSES

ZONING NOTE

THE CONCEPT SITE PLAN FOR 347 FRANKTOWN ROAD IS BASED ON THE TOWN OF CARLETON PLACE DEVELOPMENT PERMIT BY-LAW 15-2015, THE CORRESPONDING DEVELOPMENT PERMIT SCHEDULE 'A' AND THE APPLICABLE RESIDENTIAL, COMMERCIAL & INSTITUTIONAL DEVELOPMENT STANDARDS.

PHASE 1 ZONING INFORMATION

PHASE 1:	SECTION 6,3,14,2 - DISCRETIONARY USE - RETIREMENT HOME (SUBJECT TO THE SECTION 9 - INSTITUTIONAL DEVELOPMENT STANDARDS & SECTIONS 13 & 14 - DESIGN STANDARDS)		
MIN. LOT AREA:	NIL	PROPOSED:	±12,437m² PHASE 1 SITE
MAX. LOT COVERAGE:	35%	PROPOSED	3,358m² (PHASE 1 BUILDING) 20m² (PHASE 1 LINK) 3,378m² (TOTAL PHASE 1) = 27% (3,378m² / 12,437m²)
MIN. LOT FRONTAGE:	15,0m	PROPOSED:	LOT FRONTAGE T.B.D.
FRONT YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	FRONT YARD T.B.D.
MAX. EXTERIOR SIDE YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	EXTERIOR SIDE YARD T.B.D.
MIN. INTERIOR SIDE YARD:	3,0m	PROPOSED:	INTERIOR SIDE YARD T.B.D.
REAR YARD DEPTH:	9,0m	PROPOSED:	REAR YARD T.B.D.
MIN. LANDSCAPE OPEN SPACE IN REAR YARD:	N/A	PROPOSED:	N/A
MAX. BUILDING HEIGHT:	22,0m	PROPOSED:	18,05m (AVERAGE GRADE TO ½ OF SLOPED ROOF)

PHASE 2 ZONING INFORMATION

PHASE 2:	SECTION 6,3,9 - SENIOR'S APARTMENT BUILDING		
MIN. LOT AREA:	NIL	PROPOSED:	±7,031m² PHASE 2 SITE
MAX. LOT COVERAGE:	60%	PROPOSED	1,700m² (PHASE 2 BUILDING) 20m² (PHASE 2 LINK) 1,720m² (TOTAL PHASE 2) = 24% (1,720m² / 7,031m²)
MIN. LOT FRONTAGE:	15,0m	PROPOSED:	LOT FRONTAGE T.B.D.
FRONT YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	FRONT YARD T.B.D.
MAX. EXTERIOR SIDE YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	EXTERIOR SIDE YARD T.B.D.
MIN. INTERIOR SIDE YARD:	3,0m	PROPOSED:	INTERIOR SIDE YARD T.B.D.
REAR YARD DEPTH:	7,5m	PROPOSED:	REAR YARD T.B.D.
MIN. LANDSCAPE OPEN SPACE IN REAR YARD:	20% OF LOT AREA	PROPOSED:	REAR YARD T.B.D.
MAX. BUILDING HEIGHT:	14,0m (OR 4 STORIES)	PROPOSED:	4 STORIES

PHASE 3 ZONING INFORMATION

PHASE 3:	SECTION 7,3 - COMMUNITY COMMERCIAL		
MIN. LOT AREA:	NIL	PROPOSED:	±3,984m² PHASE 3 SITE
MAX. LOT COVERAGE:	60%	PROPOSED	572m² (PHASE 3 BUILDING) = 14% (572m² / 3,984m²)
MIN. LOT FRONTAGE:	15,0m	PROPOSED:	LOT FRONTAGE T.B.D.
FRONT YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	FRONT YARD T.B.D.
MAX. EXTERIOR SIDE YARD:	MIN. 4,5m MAX. 7,5m	PROPOSED:	EXTERIOR SIDE YARD T.B.D.
MIN. INTERIOR SIDE YARD:	3,0m	PROPOSED:	INTERIOR SIDE YARD T.B.D.
REAR YARD DEPTH:	7,5m	PROPOSED:	REAR YARD T.B.D.
MIN. LANDSCAPE OPEN SPACE IN REAR YARD:	20% OF LOT AREA	PROPOSED:	REAR YARD T.B.D.
MAX. BUILDING HEIGHT:	11,0m	PROPOSED:	<11,0m

PHASE 1 PARKING INFORMATION

(44) PARKING SPACES REQUIRED & CONSISTING OF:

(36) SPACES - 152 UNITS @ 0,25 SPACES / UNIT (RETIREMENT HOME RATE)
(6) SPACES - ±600m² OF MEDICAL, HEALTH & PERSONAL SERVICE @ 1 SPACE / 100m²

(58) PARKING SPACES PROVIDED & CONSISTING OF:

(24) RESIDENT COVERED, (20) RESIDENT UNCOVERED & (14) STAFF PARKING

PHASE 2 PARKING INFORMATION

(106) PARKING SPACES REQUIRED & CONSISTING OF:

(88) SPACES - 70 UNITS @ 1,25 SPACES / UNIT (APARTMENT BUILDING PARKING RATE)
(18) SPACES - 70 UNITS @ 0,25 SPACES / UNIT (VISITOR PARKING RATE)

(107) PARKING SPACES PROVIDED & CONSISTING OF:

(34) INDOOR, (42) RESIDENT COVERED, (13) RESIDENT UNCOVERED & (18) VISITOR

PHASE 3 PARKING INFORMATION

(29) SPACES REQUIRED - 572m² GFA @ 1 SPACE / 20m² GFA

(29) PARKING SPACES PROVIDED

(1) LOADING SPACE REQUIRED - 1 SPACE FOR 250m² TO 1,000m² GFA

(2) LOADING SPACES PROVIDED @ 4,0m [W] x 9,0m [D]

SYMBOL LEGEND

- DENOTES PROPERTY LINE
- DENOTES MUNICIPAL YARD SETBACKS
- DENOTES FIRE ACCESS DEMARCATION LINE
- DENOTES PROPOSED PHASE 1 BUILDING
- DENOTES PROPOSED PHASE 2 BUILDING
- DENOTES PROPOSED PHASE 3 BUILDING
- DENOTES PROPOSED PHASE 4 TOWNHOUSE
- DENOTES PROPOSED PHASE 1 & 2 LINK
- DENOTES PROPOSED AMENITY AREA
- DENOTES ROOF / CANOPY AREA
- DENOTES PEDESTRIAN WALKWAY
- DENOTES BUILDING ENTRANCE

G Planning for Building Code Compliance

(For large projects)

The following are some of the more common items that are typically non-compliant or missing at the plans review stage. This checklist should be used as a guideline only and does not contain all the building code requirements and other applicable laws. Drawings and documentation submitted should contain enough information to verify compliance with all parts of the 2012 Ontario Building Code.

- ✓ OBC Data Matrix
  - ❖ Usually supplied by architect but should be provided for all new construction including additions and renovations (ensure exiting and washroom requirements are also included).

- ✓ Designer Requirements
  - ❖ Ensure the proper designer is taking responsibility for their drawings and any on-site review
  - ❖ Designer requirements can be found in Division C Part 3
  - ❖ Architect and/or Engineer review requirements can be found in Division C Part 1

- ✓ Grading Plan - Must be supplied to show:
  - ❖ Top of slab to verify that floor drain and storm are set to an elevation to ensure gravity drainage to Municipal services at street level
  - ❖ Existing grade and proposed grade to verify drainage away from building will not affect neighbouring properties

- ✓ Site Plan – Must be supplied to show:
  - ❖ Fire routes & fire hydrants
  - ❖ Spatial separations
  - ❖ Number of streets for classification (defined as a percentage)

- ✓ Barrier Free Construction
  - ❖ Required for all new construction except as listed in 3.8.1.1 of the Ontario Building Code
  - ❖ Parking and barrier free path of travel
  - ❖ Barrier free bathroom dimensions
  - ❖ Hardware

- ✓ Building Classification
  - ❖ Ensure enough information is provided to classify the building where it may not be clear (such as providing a list of materials being stored on site)
  - ❖ Identify use of rooms and tenant classification that may occupy portions of the building

- ✓ Architectural/Mechanical/Electrical/Structural Drawings
  - ❖ Provide door schedule, identifying rated doors and exit hardware
  - ❖ Emergency systems (ex: fire alarm, exit signage & emergency lighting)
  - ❖ Identify location of janitorial supplies, service rooms, electrical rooms (regulated under the Electrical Act), fire dampers, etc.
  - ❖ Identify types of materials to be used in above grade mechanical rough-in and plenum spaces in compliance with the type of construction under the building classification in 3.2.2.
  - ❖ Structural loads (based on climate data and Part 4)

- ✓ Fire Separations
  - ❖ Roofs, floors, walls, exits, between tenants, doors, load bearing walls, etc.
  - ❖ Ensure the proper use of the tables in SB2 and SB3 are used

- ✓ Additional Documents – To verify materials or processes not covered under the Ontario Building Code, for example, EIFS, fabric type roofs, composite decking etc.
  - ❖ CCMC report, Minister Rulings and/or BMEC (Building Materials Evaluation Commission)
  - ❖ Manufacturers details and installation guidelines
  - ❖ Other Federal or Provincial approvals

TOWN OF CARLETON PLACE
URBAN FOREST COMMITTEE
GUIDELINES & STANDARDS FOR TREE PLANTING AND CONSERVATION PLANS

The Town shall require Conservation Plans and Tree Planting plans for all development including residential, commercial, and industrial uses.

Tree Conservation Plan:

The conservation plan will have a preliminary assessment by a qualified professional (certified arborist, registered professional forester or other qualified professional), which will determine stands of trees or individual trees on the property which warrant protection. This plan should consider such matters as:

- The existing health of the tree, grouping of trees or woodlot, hackberry and the quality of such and
- Its degree of sensitivity to grade changes, drainage disruption, changes in water table or any other factors, which may affect the trees.
- Measures that can be taken to protect the trees (tree wells)
- If trees can not be protected, why not
- Opportunities for tree planting to mitigate loss of tree or forest cover.

The conservation plan will identify how these trees will be protected both above and below ground, as it is important to protect the root systems from soil compaction. The following measures will be undertaken to protect these trees:

1. The identified tree or trees to be protected will be fenced off, a minimum, to the drip line (furthest point of extension of branches) to protect the roots from soil compaction.
2. Above ground utilities shall avoid, where possible, the crowns of the trees.
3. Below ground utilities shall avoid where possible damaging the root system of trees. If utilities are to be placed below ground they are to be placed directly under the tree so not to damage the fine root hairs of the extended root system.
4. Tree roots that will be damaged must be cut cleanly to avoid ragged edges so they will heal properly. If exposed they must be moistened immediately and covered with moist material.
5. No equipment, trucks and storage of supplies shall be inside the fenced area.
6. No grading shall take place around the protected tree or trees.

In short the professional should be asking these questions:

1. Are there trees that can be protected due to size, rareness or they are a healthy stand that would add to the community.
2. If trees are going to be protected how will this be done during construction and after the project is complete.
3. If trees cannot be protected why not.
4. If trees cannot be protected what is the mitigating measure going to be for lose of trees. I.e. enhanced tree-planting program.

Tree Planting Plan:

The Planting plan will identify where additional trees are to be planted, which species and size of trees to be planted and how these trees will be planted and maintained.

The planting plan will identify:

1. *Where trees will be planted:*
   - The site plan must identify where trees will be planted.
   - At least one tree shall be planted for each residential lot developed unless a large number of trees have been removed for the development then an enhanced tree planting program will be undertaken.
   - Industrial and commercial development site plans shall incorporate multiple trees.
   - Prior to planting the developer must identify the location of underground utilities; present, planned and potential future locations.

2. *Species and size of trees to be Planted*
   - trees will be from seed from plant hardiness zone 4b, 4a or 5a or seed zones 35 and 36.
   - the developer will plant a 60 mm (2.5 ins) caliper deciduous tree or a conifer tree minimum height 2.0 m.
   - to avoid monocultures at least 4 deciduous and 1 conifer species will be selected from the list (Table 1) and approved by town staff.

A. Table 1

Species of Tree for planting by Developers

	Deciduous	**Conifer**
Larger Trees for Larger Lots	Sugar Maple (Acer *saacharum*) Red Maple (*Acer rubrum*) Silver maple (Acer saccharium) Red Oak (*Quercus rubra*) Bur Oak (*Quercus macrocarpa*) Hackberry (*Celtis occidentalis*) Freeman Maple (Acer *x fremanii)* Basswood *(*Tilia americana) Bitternut Hickory *(Carya cordiformis*	White Pine (*Pinus strobes*) White Spruce (*Picea glaoca*) Norway Spruce (Picea *abies*) Blue Spruce(developers are encouraged to use this species on the harder sites i.e. Hwy 7)
Medium Sized Trees	White Birch (Betula *papyrifera)* Little Leaf Linden (*Tilia cordata)(*developers are encouraged to use this species on the harder site i.e. Hwy 7) Honey Locust (Gleditisia *triacanthos)*	Eastern White Cedar (*Thuja occidentalis*) Tamarack (Larix *laricina*)
Smaller Trees for Smaller Lots	Showy Mountain Ash *(Sorbus decora)* Serviceberry (*Amelanchier*) Crabapple (*Malus*) Nannyberry (Viburnum lentago)	

3. Tree Planting

The International Society of Arborists, the Canadian Nursery Trades Association or Landscape Ontario standards of planting and maintenance are to be followed:

- Excavate to a depth 200mm deeper then the height of the root ball, with a width 750 mm greater than the root ball.
- Loosen the planting hole to a depth of 200mm
- Loosen burlap and cut away minimum at least 50% of the burlap without disturbing the root ball (if in a wire basket cut away as much of the wire basket while the tree is in the hole)
- Place plant material to a depth equal to the depth they were originally growing in the nursery.
- Tamp soil around the root system in layers of 150 mm to eliminate air pockets. When 2/3 of the planting soil has been placed file the hole with water. After the water has penetrated into the soil, complete backfilling.
- Build a 100mm deep saucer around the outer edge of the hole to assist with watering.
- The hardwood trees will be staked following International Society of Arborist standards.
- The trees will be mulched to a depth of 10 mm filling the saucer leaving 50 mm free around the trunk to avoid trunk rot.
- The trees will be watered one week after planting and every 2 weeks thereafter, pending weather conditions, until the area developed is no longer the responsibility of the developer.

Jim McCready R.P.F./ ISACertified Arborist

November 15, 2019

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CCO-22-0025 - 347 Franktown Rd - Phase 1 - Water Demands

Project:	347 Franktown Rd - Phase 1	
Project No.:	CCO-22-0025	
Designed By:	BGS	
Checked By:	RDF	
Date:	August 9, 2021	
Site Area:	1.21	gross ha
Units	1 Bedroom	152 Units
Persons:	212.80	People

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*280*	*L/c/d*
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motel	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	28,000	L/gross ha/d
AVERAGE DAILY DEMAND	**0.69**	**L/s**

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.5 x avg. day*	*L/c/d*
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	1.5 x avg. day	L/gross ha/d
Institutional	1.5 x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	**1.72**	**L/s**

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.2 x max. day*	*L/c/d*
Industrial	1.8 x max. day	L/gross ha/d
Commercial	1.8 x max. day	L/gross ha/d
Institutional	1.8 x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	**3.79**	**L/s**

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

115 Walgreen Road, R.R.3. Carp, ON K0A 1L0 | T. 613-836-2184 | F. 613-836-3742
info@mcintoshperry.com | www.mcintoshperry.com

McINTOSH PERRY

CCO-22-0025 - 347 Franktown Rd - Phase 1 - OBC Fire Calculations

Project:	347 Franktown Rd - Phase 1
Project No.:	CCO-22-0025
Designed By:	BGS
Checked By:	RDF
Date:	August 9, 2021

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Care Occupancies & **Residential**

Building is classified as Group : C (from table 3.2.2.55)

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	**10**	(from Table 1 pg A-31) (Worst case occupancy {B3 / C} 'K' value used)
V	**28,573**	(Total building volume in m^3.)
Stot	**1.0**	(From figure 1 pg A-32)
Q =	**285,730.00 L**	

→

			From Figure 1 (A-32)
Snorth	20	m	0.0
Seast	45	m	0.0
Ssouth	49	m	0.0
Swest	33	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9000 L/min **if Q > 270,000 L**
2378 gpm

McINTOSH PERRY

CCO-22-0025 - 347 Franktown Rd - Phase 1 - Fire Underwriters Survey

Project:	347 Franktown Rd - Phase 1
Project No.:	CCO-22-0025
Designed By:	BGS
Checked By:	RDF
Date:	August 9, 2021

From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
Updated per City of Ottawa Technical Bulletin ISTB-2018-02

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type Ordinary Construction

C 1 **A** **11,720.0** m^2

Caluclated Fire Flow	**23,817.0 L/min**
	24,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From note 2, Page 18 of the Fire Underwriter Survey:

Limited Combustible	-15%

Fire Flow	**20,400.0 L/min**

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Standard Water Supply Sprinklered	-40%

Reduction	**-8,160.0 L/min**

D. INCREASE FOR EXPOSURE (No Rounding)

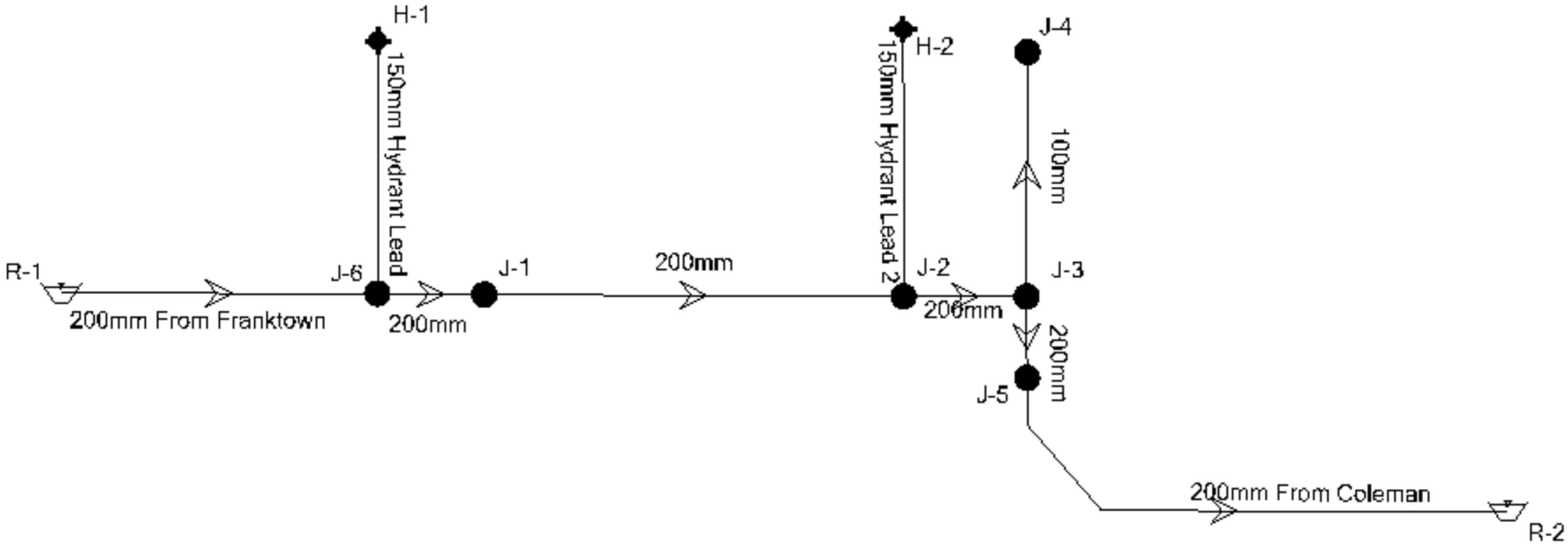
	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	>45	Non-Combustible	98	4	392.0	0%
Exposure 2	3.1 to 10	Non-Combustible	26	4	104.0	20%
Exposure 3	20.1 to 30	Non-Combustible	26	4	104.0	10%
Exposure 4	>45	Non-Combustible	52	4	208.0	0%
					% Increase*	**30%**

Increase*	**6,120.0 L/min**

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	**18,360.0 L/min**
Fire Flow Required**	**18,000.0 L/min**

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min


H-1
150mm Hydrant Lead
H-2
150mm Hydrant Lead 2
J-4
100mm
R-1
J-6
J-1
200mm
J-2
J-3
200mm From Franktown
200mm
200mm
200mm
J-5
200mm From Coleman
R-2

Active Scenario: Average Day - Existing Conditions

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-1	131.50	63.00	66.65	178.45
J-4	131.50	4.80	65.65	177.75
J-3	131.50	0.00	65.65	177.75
J-5	131.50	31.20	65.11	177.37
J-2	131.50	0.00	65.83	177.88
J-6	131.50	0.00	67.07	178.75

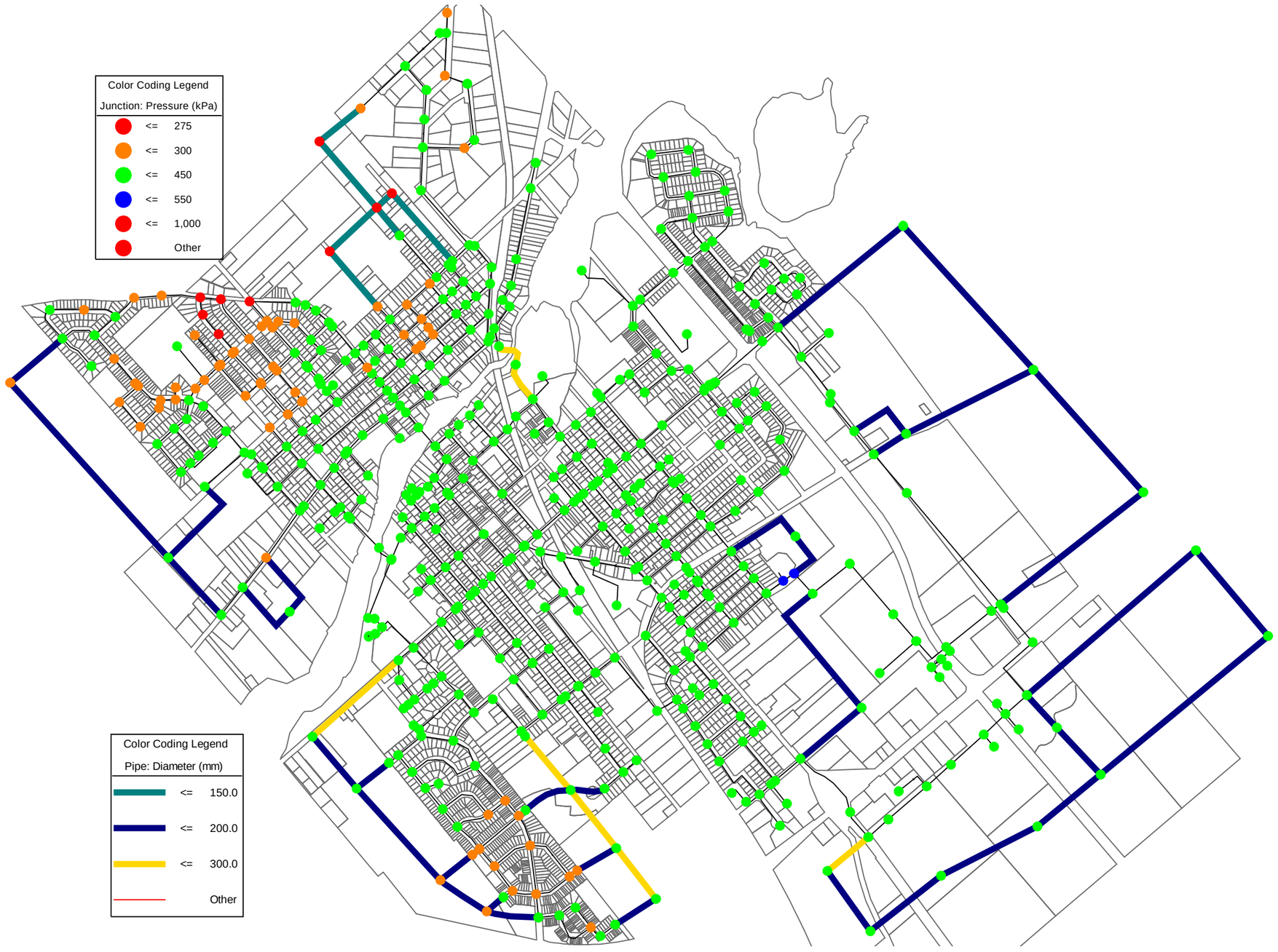
Active Scenario: Peak Hourly - Existing Conditions

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-1	131.50	344.40	66.36	178.25
J-4	131.50	27.00	65.43	177.60
J-3	131.50	0.00	65.44	177.60
J-5	131.50	170.40	64.94	177.25
J-2	131.50	0.00	65.60	177.71
J-6	131.50	0.00	66.87	178.61

Active Scenario: Max Day + Fire Flow - Existing Conditions

Label	Is Fire Flow Run Balanced?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/min)	Fire Flow (Available) (L/min)	Pressure (psi)	Elevation (m)	Demand (L/min)	Pressure (Residual Lower Limit) (psi)
H-2	True	True	18,000.00	19,005.35	65.66	132.00	0.00	20.00
H-1	True	False	18,000.00	15,892.98	66.92	132.00	0.00	20.00
J-1	False	False	18,000.00	(N/A)	67.51	131.50	156.00	20.00
J-4	False	False	18,000.00	(N/A)	66.12	131.50	12.00	20.00
J-3	False	False	18,000.00	(N/A)	66.12	131.50	0.00	20.00
J-5	False	False	18,000.00	(N/A)	65.36	131.50	77.40	20.00
J-2	False	False	18,000.00	(N/A)	66.37	131.50	0.00	20.00
J-6	False	False	18,000.00	(N/A)	67.63	131.50	0.00	20.00

Active Scenario: Peak Hour - Build-out



APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CCO-22-0402 - 347 Franktown Road - Phase 1 - Phase 1 Sanitary Demands

Project:	347 Franktown Road - Phase 1
Project No.:	CCO-22-0025
Designed By:	R.R.R.
Checked By:	N.B.V.
Date:	March 25, 2022

Site Area	1.21	Gross ha		
1 Bedroom	152		1.40	Persons per unit

Total Population	212.80	Persons
Commercial Area	350.00	m^2
Amenity Space	771.00	m^2

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.5	*Check technical bulleting (Either use 1.0 or 1.5)
Residential Peaking Factor	3.51	** Using Harmon Formula =* 1+(14/(4+P^0.5))*0.8
		where P = population in thousands, Harmon's Correction Factor = 0.8
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.06
Wet	0.34
Total	**0.40**

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	213	0.69
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m^2 /d)	1121.00	0.04
Hospital	900	L/(bed/day)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	0.69	L/s
PEAK RESIDENTIAL FLOW	2.42	L/s
AVERAGE ICI FLOW	0.04	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.05	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.05	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	0.79	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	2.54	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	2.87	L/s

** PEAK INDUSTRIAL FLOW PER CITY OF OTTAWA SEWER DESIGN GUIDELINES APPENDIX 4B

SANITARY SEWER DESIGN SHEET

PROJECT:
LOCATION: 347 Franktown Road
CLIENT: Dr Neel Chadha

McINTOSH PERRY

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES 1-BED	2-BED	TH	APT	AREA (ha)	POPULATION IND	CUM	PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha) INSTITUTIONAL IND	CUM	COMMERCIAL IND	CUM	INDUSTRIAL IND	CUM	PEAK FLOW (L/s)	AREA (ha) IND	CUM	FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
		MH101A	MH102A	152			70	1.92	373.8	374	3.43	5.19	0.42	0.42	0.04	0.04		0.00	0.22	2.38	2.38	0.78	6.20	19.36	145.59	200	0.32	0.597	13.16	67.98
		MH105A	MH102A			12		0.26	32.4	32	3.68	0.48	0.00	0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.57	19.36	87.61	200	0.32	0.597	18.79	97.06
		MH102A	MH103A			12		0.28	32.4	439	3.40	6.04	0.42	0.42		0.00		0.00	0.20	0.70	0.70	0.23	6.48	19.36	87.61	200	0.32	0.597	12.88	66.52
		MH106A	MH103A				96	0.95	134.4	134	3.56	1.94				0.00		0.00	0.00	0.95	0.95	0.31	2.25	19.36	87.61	200	0.32	0.597	17.10	88.35
		MH103A	MH104A						0.0	573	3.35	7.79		0.42		0.00		0.00	0.20	0.00	0.00	0.00	7.99	19.36	12.90	200	0.32	0.597	11.37	58.72
		MH104A	MH207A						0.0	573	3.35	7.79		0.42		0.00		0.00	0.20	0.00	0.00	0.00	7.99	19.36	35.74	200	0.32	0.597	11.37	58.72

Design Parameters:

Residential

1-BED	1.4	p/p/u
TH/SD	2.7	p/p/u
2-BED	1.4	p/p/u
Apt	2.3	p/p/u
Other	60	p/p/Ha

ICI Areas

			Peak Factor
INST	28,000	L/Ha/day	1.5
COM	28,000	L/Ha/day	1.5
IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5)*0.8)
where P = population in thousands

Designed: RRR
Checked: NBV
Project No.: CCO-22-0025

No.	Revision	Date
1.	ISSUED FOR REVIEW	2022-03-25

Sheet No: 1 of 1

McINTOSH PERRY

MEMORANDUM

To: Robin Daigle, E.I.T.

From: Tyler Ferguson, P.Eng.

Date: May 4th, 2021

Re: Conceptual Sanitary Servicing – Coleman Central Subdivision Phase 2 & Additional Lands

---

MP has reviewed the *Nu Globe Sanitary Capacity Memorandum* from the Town of Carleton Place dated September 6th, 2018. The memo has detailed the sanitary sewer capacities downstream of the Coleman Central Subdivision (Phases 1 & 2).

Prior to the development of the Coleman Central Subdivision, there was an available capacity of 20.81 L/s within the section of sewer running across the Independent Grocer property (MH100a to MH 301 on the attached plan from the Town's Memo). The total flow generated by Phase 1 of the Coleman Central Subdivision, including the future commercial lands (areas R1 and C1), was calculated to be 17.97 L/s per the latest *Final Servicing Report*. Therefore, the remaining capacity in this section of sewer (from MH100a to MH301) is 2.84 L/s.

Based on the current Draft Plan for Coleman Central Phase 2 (5.20), the sanitary flows were calculated to be 7.39 L/s, which would leave the above-noted section of pipe deficient by 4.55 L/s.

The additional lands along Franktown Road have a measured area of 13.07 hectares and will generate an approximate flow of 15.24 L/s assuming a population of 60 p/p/ha. On a combined basis, Phase 2 of Coleman Central and the additional Franktown Road lands will generate flows of 22.63 L/s and leave the Independent Grocer pipe deficient by 19.79 L/s.

The following upgrades would be required from MH101 to MH301 in order for the proposed development(s) to be serviced:

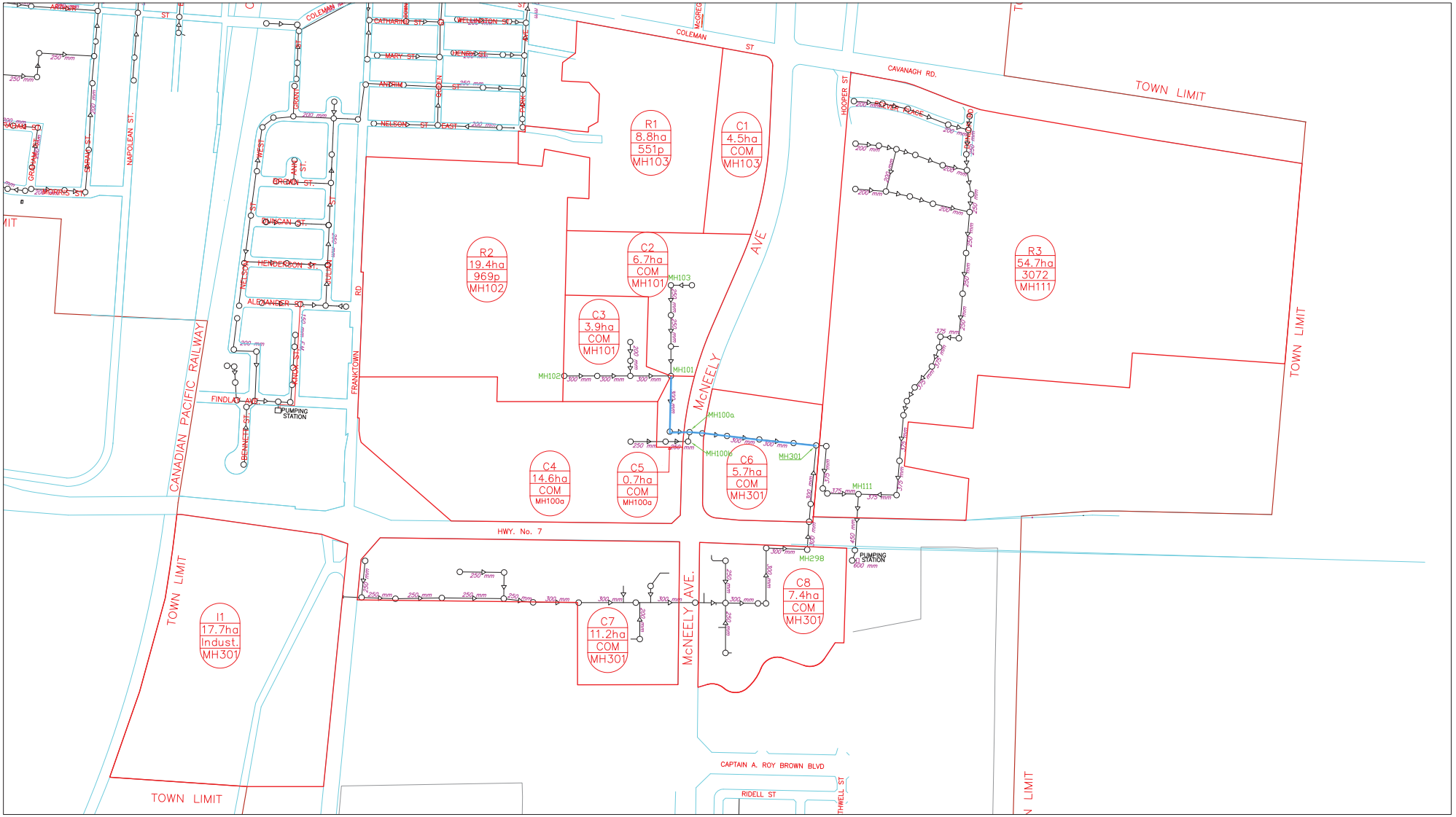
Pipe	Pipe Size	Length	Required Pipe Size
MH101 - MH101b	300mm	111.60	375mm
MH101b - MH100a	300mm	39.60	375mm
MH100a - MH100c	300mm	40.00	375mm
MH100c - MH100d	300mm	62.50	450mm
MH100d - MH100e	300mm	65.00	450mm
MH100e - MH301	300mm	100.00	450mm

The required pipe sizes are based on the assumption that sanitary drainage area C4 (commercial lands north of Highway 7) is developed. The upgrades proposed are required for any property that gets developed along Highway 7 past the current development limit (Thruway Restaurant). Any future development along the north side of Highway 7 would need to be included in the future cost sharing agreement.

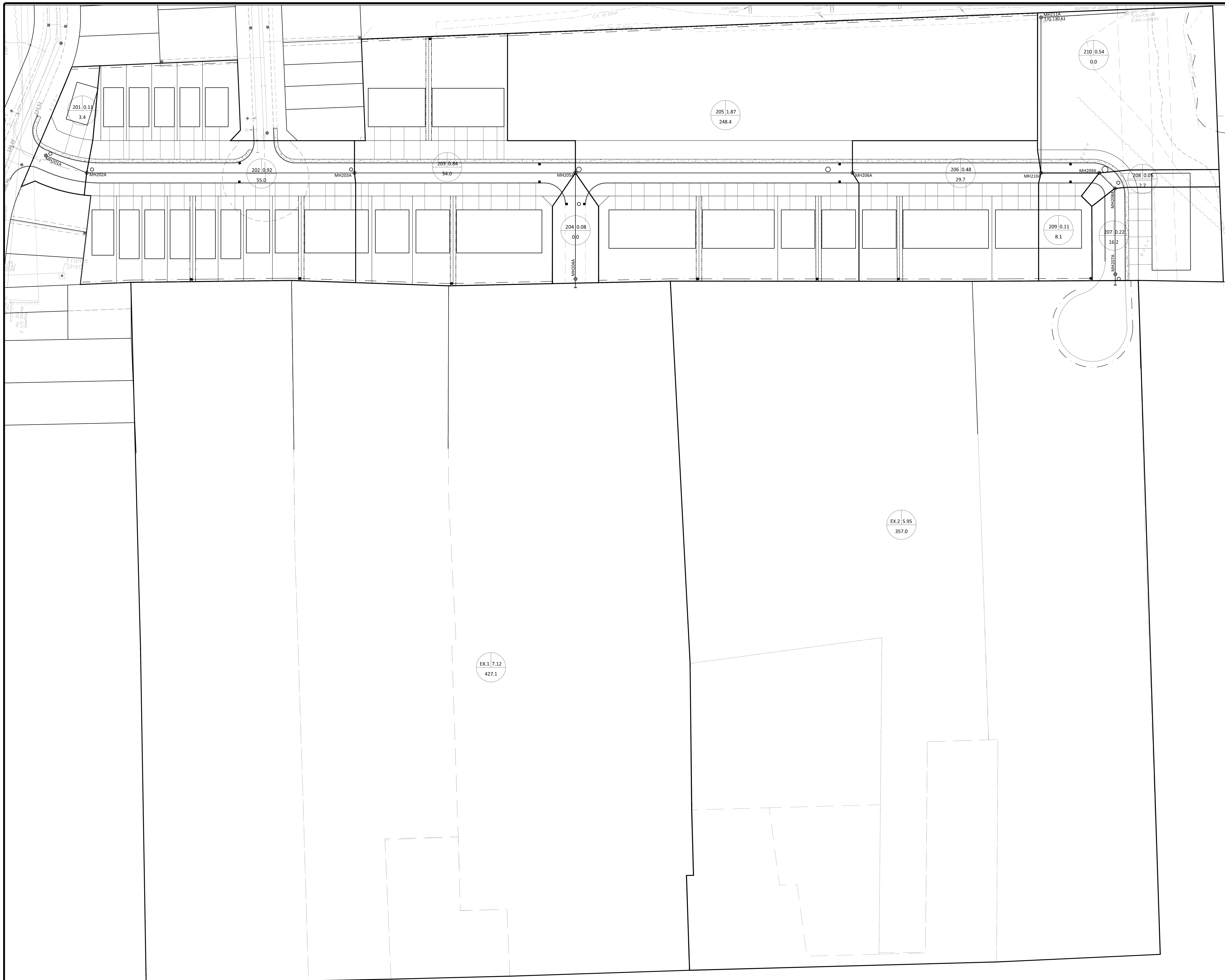
Based on the current developed areas, the sanitary sewers downstream of MH301 are not required to be upgraded with the addition of Coleman Central Phase 2 and the additional lands along Franktown Road. However, when sanitary drainage areas C4-2 and I1 (industrial lands south of Highway 7 and west of Franktown Road) are developed in the future, additional upgrades downstream of MH301 may be required. At this time, we have assumed that this will be completed by others as those properties are developed in the future. We have also assumed there is remaining capacity in the downstream pump station.

Should you have any questions or concerns, please do not hesitate to contact the undersigned.

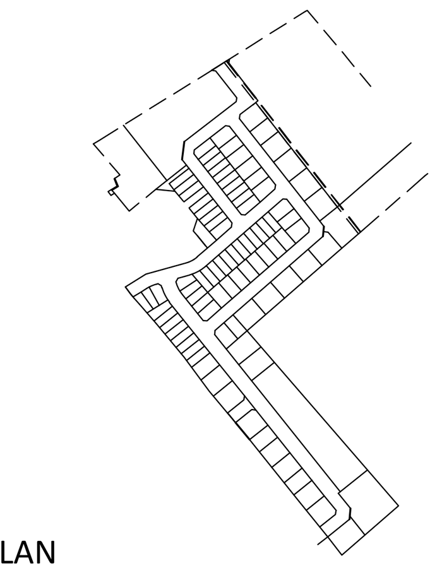
u:\ottawa\01 project - proposals\2018 jobs\cco\cco-18-0360-01 cavanagh_nuglobe subdivision ph 2_carleton place\civil\03 - servicing\offsite sanitary sewer\cco-18-0360-01 - offsite sanitary servicing memo.docx



Option One - No New McNeely Crossing



LOCATION PLAN



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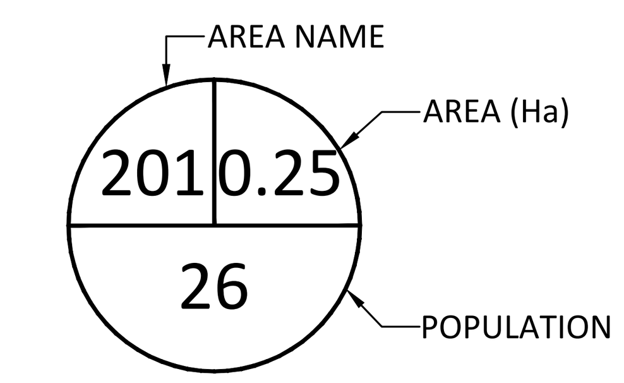

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No.	Revisions	Date
1	ISSUED FOR REVIEW	APR. 27, 2021

Check and verify all dimensions before proceeding with the work

Do not scale drawings

SCALE 1 : 500

0 10 20 30 40 50 Metres

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115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp:

Client:
NUGLOBE DEVELOPMENTS LTD

Project:
COLEMAN STREET SUBDIVISON - PHASE 2

Drawing Title:
SANITARY DRAINAGE PLAN

Scale: 1:500	Project Number: CP-18-0360-01	
Drawn By: N.B.V.		
Checked By: T.D.F.	Drawing Number: 501	
Designed By: N.B.V.		

SANITARY SEWER DESIGN SHEET

PROJECT: Offsite Sanitary - Coleman Central Subdivsion Phase 2
LOCATION: Carleton Place
CLIENT: Cavanagh Developments Ltd.

McINTOSH PERRY

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW	AREA (ha)						PEAK FLOW	AREA (ha)		FLOW	DESIGN FLOW	CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
				SF	SD	TH	APT	(ha)	IND	CUM		(L/s)	INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		(L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
													IND	CUM	IND	CUM	IND	CUM												
	EX-1							7.12	427.2											7.12										
	EX-2							5.95	357.0											5.95										
Coleman Phase 2	201 - 210	102	102b	14	10	50	68	5.20	366.0	1150.2	3.76	17.52								5.20	18.27	5.12	22.63	53.70	60.00	300	0.28	0.736	31.06	57.85
		102b	102c						0.0	1150.2	3.76	17.52								0.00	18.27	5.12	22.63	51.12	66.20	300	0.26	0.701	28.49	55.72
	C3	102c	101						0.0	1150.2	3.76	17.52			3.90	3.90			3.41	3.90	22.17	6.21	27.14	50.04	81.30	300	0.25	0.686	22.90	45.76
	R1, C1, C2		101	35	38	61	77	8.88	563.4	563.4	3.95	9.01			11.07	11.07			9.69	19.95	19.95	5.59	24.28							
	C5	101	101b						0.0	1713.6	3.64	25.25			0.70	15.67			13.71	0.70	42.82	11.99	50.95	89.97	111.60	375	0.24	0.789	39.02	43.37
		101b	100a						0.0	1713.6	3.64	25.25			0.00	15.67			13.71	0.00	42.82	11.99	50.95	91.92	39.60	375	0.25	0.806	40.97	44.57
	C4	100a	100c						0.0	1713.6	3.64	25.25			14.60	30.27			26.49	14.60	57.42	16.08	67.81	105.07	40.00	375	0.33	0.922	37.26	35.46
	C6	100c	100d						0.0	1713.6	3.64	25.25			5.70	35.97			31.47	5.70	63.12	17.67	74.39	112.87	62.50	450	0.14	0.687	38.47	34.09
		100d	100e						0.0	1713.6	3.64	25.25			0.00	35.97			31.47	0.00	63.12	17.67	74.39	140.48	65.00	450	0.22	0.856	66.09	47.04
		100e	301						0.0	1713.6	3.64	25.25			0.00	35.97			31.47	0.00	63.12	17.67	74.39	132.68	100.00	450	0.20	0.808	58.29	43.93

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	2.7
APT	2.3	p/p/u	COM	28,000	L/Ha/day	2.7
Other	60	p/p/Ha	IND	35,000	L/Ha/day	2.7

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5)*1)
   where P = population in thousands

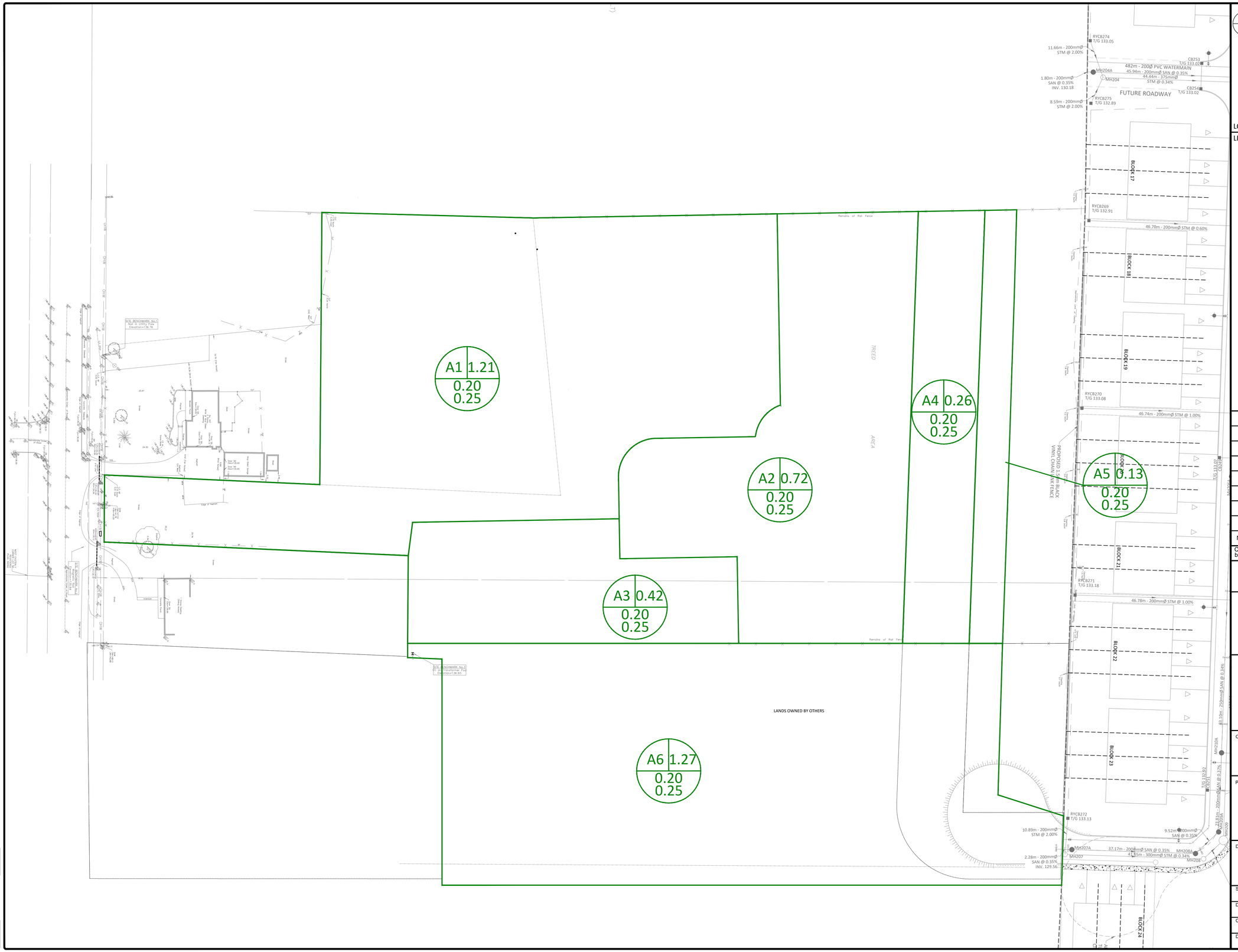
Designed: NBV
Checked: TDF
Project No.: CCO-18-0360-01

No.	Revision	Date
1	Issued For Review	2021-04-27

Sheet No: 1 of 1

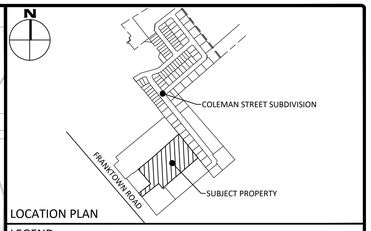
APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY

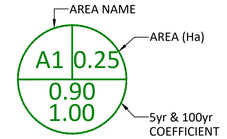


N

LOCATION PLAN



LEGEND



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No.	Revisions	Date
	ISSUED FOR REVIEW	MAR. 25, 2022
2	ISSUED FOR REVIEW	MAR. 04, 2022
1	ISSUED FOR REVIEW	AUG. 13, 2021

Check and verify all dimensions before proceeding with the work

Do not scale drawings

SCALE 1 : 150

0 5 10 15 Metres

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115 Walgreen Road, RR3, Carp, ON K0A 1L0
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www.mcintoshperry.com

Stamp:

Client:
DR NEEL CHADHA
727 BUNCHBERRY WAY
OTTAWA, ON K1T 0J8

Project:
347 FRANKTOWN ROAD
CARLETON PLACE, ONTARIO

Drawing Title:
PRE-DEVELOPMENT DRAINAGE AREA PLAN

Scale: 1:500	Project Number: CCO-22-0025
Drawn By: N.V	
Checked By: R.F	Drawing Number: PRE
Designed By: N.V	

FILENAME: I:\Ottawa\01 Project - Proposals\2022 Jobs\CCO\CCO-22-0025 Chadha_347 Franktown Rd\Drawings\CCO-22-0025 Presentation.dwg
LAST SAVED: Friday, March 25, 2022 LAST SAVED BY: F Valenti
LAST PLOTTED: Friday, March 25, 2022 CB FILE USED: —

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY

B103 0.35
0.53
0.61

B102 0.25
0.90
1.00

B101 0.23
0.90
1.00

B105 0.15
0.72
0.81

B104 0.25
0.66
0.74

RETIREMENT HOME
PHASE 1
4-STOREY
152 UNITS
AREA = 3360m²
F.F.L. = 135.15
U.S.F. =

4TH FLOOR OUTLINE
2ND FLOOR ROOF TERRACE
3RD FLOOR ROOF TERRACE

SENIOR'S APARTMENT
PHASE 2
4-STOREY
70 UNITS
AREA = 1700m²
F.F.L. = 134.60
U.S.F. =

3RD FLOOR ROOF TERRACE
4TH FLOOR OUTLINE

MEDICAL CLINIC
PHASE 3
2-STOREY
AREA = 572m²
F.F.L. =134.70
U.S.F. =

CONDOMINIUM BUILDING
4-STOREY - 48 UNITS
AREA = 929m²
F.F.L. = 133.80
U.S.F. =

LANDS OWNED BY OTHERS
CONDOMINIUM BUILDING
4-STOREY - 48 UNITS
AREA = 929m²
F.F.L. = 133.80
U.S.F. =

TOWNHOUSE BLOCK
PHASE 4
6 UNITS
AREA = 576m²
F.F.L. =133.40
U.S.F. =

TOWNHOUSE BLOCK
PHASE 4
6 UNITS
AREA = 576m²
F.F.L. = 133.55
U.S.F. =

TOWNHOUSE BLOCK
PHASE 4
6 UNITS
AREA = 576m²
F.F.L. = 133.70
U.S.F. =

TOWNHOUSE BLOCK
6 UNITS
AREA = 566m²
F.F.L. = 133.60
U.S.F. =

PROPOSED 1.50m BLOCK RETAINING WALL

COVERED PARKING
COVERED PARKING
COVERED PARKING

UNDERGROUND PARKING LIMITS
GARBAGE ENCLOSURE
PARKING GARAGE ACCESS

SNOW STORAGE AREA
593.21 m2

7.0m WIDE ACCESS LANE

PHASE 1
PHASE 2
PHASE 1
PHASE 3
PHASE 2
PHASE 3

CBMH2
T/G 134.55
CBMH3
T/G 134.55
DC
CB101-1
T/G 134.66
CB101-3
T/G 134.61
MH101
MH105A
MH102A
MH102
MH103A
MH103
MH104A
MH104
MH105
MH106A
MH108
MH207A
MH207
MH208A
MH208
MH106
MH210A
MH209
MH210
CB4
T/G 133.45
CB6
T/G 134.45
LCB
T/G 134.38
RYCB274
T/G 133.05
CB253
T/G 133.07
MH204A
MH204
CB254
T/G 133.02
RYCB275
T/G 132.89
RYCB269
T/G 132.91
RYCB270
T/G 133.08
RYCB271
T/G 133.18
RYCB272
T/G 133.13
RYCB273
T/G 132.92
MH210
T/G 133.07

11.66m - 200mmØ STM @ 2.00%
482m - 200Ø PVC WATERMAIN
45.94m - 200mmØ SAN @ 0.35%
44.44m - 375mmØ STM @ 0.34%
1.80m - 200mmØ SAN @ 0.35% INV. 130.18
8.59m - 200mmØ STM @ 2.00%
46.70m - 200mmØ STM @ 0.60%
46.74m - 200mmØ STM @ 1.00%
46.78m - 200mmØ STM @ 1.00%
83.09m - 250mmØ SAN @ 0.34%
23.81m - 200mmØ SAN @ 0.37%
10.89m - 200mmØ STM @ 2.00%
9.52m - 200mmØ SAN @ 0.35%
37.17m - 200mmØ SAN @ 0.35%
41.65m - 300mmØ STM @ 0.34%
2.28m - 200mmØ SAN @ 0.35% INV. 129.56

BLOCK 17
BLOCK 18
BLOCK 19
BLOCK 20
BLOCK 21
BLOCK 22
BLOCK 23
BLOCK 24

FRANKTOWN ROAD
COLEMAN STREET SUBDIVISION
SUBJECT PROPERTY

N

LOCATION PLAN

LEGEND

AREA NAME
AREA (Ha)
5yr & 100yr COEFFICIENT

FOR REVIEW ONLY
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No.	Revisions	Date
	ISSUED FOR REVIEW	MAR. 25, 2022
2	ISSUED FOR REVIEW	MAR. 04, 2022
1	ISSUED FOR REVIEW	AUG. 09, 2021

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 150
0 5 10 15 Metres

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Tel: 613-836-2184 Fax: 613-836-3742
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Stamp:

Client:
DR NEEL CHADHA
727 BUNCHBERRY WAY
OTTAWA, ON K1T 0J8

Project:
347 FRANKTOWN ROAD
CARLETON PLACE, ONTARIO

Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:500
Drawn By:	N.V
Checked By:	R.F
Designed By:	N.V

Project Number: CCO-22-0025
Drawing Number: POST

FILENAME: U:\Ottawa\01 Project - Proposals\2022 Jobs\CCO\CCO-22-0025 Chadha_347 Franktown Rd\Drawings\CCO-22-0025 Presentation.dwg
LAST SAVED: Friday, March 25, 2022 LAST SAVED BY: F.Valenti
LAST PLOTTED: Friday, March 25, 2022 5:19 PM EDT

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CCO-22-0025 - Franktown - Runoff Calculations

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 5-Year	C_{AVG} 100-Year
A1	1.21	0.00	0.90	0.00	0.60	12,053.00	0.20	0.20	0.25

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)			
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	
A1	1.21	0.20	0.25	10	76.8	104.2	178.6	51.47	69.82	149.58	**Phase 1**
Total	**1.21**							**51.47**	**69.82**	**149.58**	

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 2/5-Year	C_{AVG} 100-Year
B101	0.23	2,317.92	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B102	0.27	1,914.00	0.90	0.00	0.60	835.00	0.20	0.69	0.77
B103	0.35	1,683.00	0.90	0.00	0.60	1,865.00	0.20	0.53	0.61
B104	0.19	1,233.90	0.90	0.00	0.60	659.10	0.20	0.66	0.74
B105	0.15	1,151.19	0.90	0.00	0.60	393.90	0.20	0.72	0.81

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)			
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	
B101	0.23	0.90	1.00	10	76.8	104.2	178.6	44.54	60.43	115.06	**Roof**
B102	0.27	0.69	0.77	10	76.8	104.2	178.6	40.35	54.73	105.37	**Parking**
B103	0.35	0.53	0.61	10	76.8	104.2	178.6	40.31	54.68	106.69	**Rear Yard**
B104	0.19	0.66	0.74	10	76.8	104.2	178.6	26.53	35.98	69.43	**Private Road**
B105	0.15	0.72	0.81	10	76.8	104.2	178.6	23.80	32.29	62.03	**Front Unrestricted**
Total	**1.21**							**175.52**	**238.12**	**458.58**	

CCO-22-0025 - Franktown - Runoff Calculations

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr) 5-Year	I (mm/hr) 100-Year	Q (L/s) 5-Year	Q (L/s) 100-Year
A1	1.21	0.20	0.25	10	104.2	178.6	**69.82**	**149.58**
Total	**1.21**							

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	
B101	60.43	115.06	5.28	9.12	49.77	96.83	60.85	104.31	**Roof**
B102	54.73	105.37	12.75	12.88	28.98	75.51	30.77	79.57	**Parking**
B103	54.68	106.69	1.78	1.95	61.30	135.83	62.27	137.73	**Rear Yard**
B104	35.98	69.43	17.34	17.96	11.19	34.41	11.23	35.10	**Private Road**
B105	32.29	62.03	32.29	62.03	x	x	x	x	**Front Unrestricted**
Total	**238.12**	**458.58**	**69.44**	**103.95**	**151.24**	**342.57**	**165.12**	**356.71**	

CCO-22-0025 - Franktown - B101 Roof Storage

Storage Requirements for Area B101

5-Year Storm Event

Tc (min)	I (mm/hr)	B101 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	60.43	5.28	55.15	33.09
20	70.3	40.74	5.28	35.46	42.55
30	53.9	31.27	5.28	25.99	46.79
40	44.2	25.62	5.28	20.34	48.83
50	37.7	21.84	5.28	16.56	49.67
60	32.9	19.11	5.28	13.83	49.77
70	29.4	17.03	5.28	11.75	49.37
80	26.6	15.40	5.28	10.12	48.60
90	24.3	14.09	5.28	8.81	47.55
100	22.4	12.99	5.28	7.71	46.29

Maximum Storage Required 5-Year (m^3) =	49.77

100-Year Storm Event

Tc (min)	I (mm/hr)	B1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	115.06	9.12	105.94	63.56
20	120.0	77.29	9.12	68.17	81.81
30	91.9	59.20	9.12	50.08	90.14
40	75.1	48.42	9.12	39.30	94.33
50	64.0	41.21	9.12	32.09	96.27
60	55.9	36.02	9.12	26.90	96.83
70	49.8	32.08	9.12	22.96	96.45
80	45.0	28.99	9.12	19.87	95.38

Maximum Storage Required 100-Year (m^3) =	96.83

5-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1738.44	0.035	60.85
		Total	60.85

Storage Available (m^3) =	60.85
Storage Required (m^3) =	49.77

100-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1738.44	0.060	104.31
		Total	104.31

Storage Available (m^3) =	104.31
Storage Required (m^3) =	96.83

**Storage area is 75% of the total roof area*

Roof Drain Flow (B101)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drains	12	
	5-Year	100-Year
Rooftop Storage (m^3)	60.85	104.31
Storage Depth (m)	0.035	0.060
Flow (Per Roof Drain) (L/s)	0.44	0.76
Total Flow (L/s)	5.28	9.12

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Accutrol Weirs, See attached sheets

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

2 roof drains during a 5 year storm
elevation of water = 30mm
Flow leaving 2 roof drains = (2 x 0.36 L/s) = 0.72 L/s

2 roof drains during a 100 year storm
elevation of water = 45mm
Flow leaving 2 roof drains = (2 x 0.54 L/s) = 1.08 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	2.28
	0.25	20	3.00
	0.32	25	3.84
	0.38	30	4.56
5-Year	**0.44**	**35**	**5.28**
	0.50	40	6.00
	0.57	45	6.84
	0.63	50	7.56
	0.69	55	8.28
100-Year	**0.76**	**60**	**9.12**
	0.82	65	9.84
	0.88	70	10.56
	0.95	75	11.40
	1.01	80	12.12
	1.07	85	12.84
	1.13	90	13.56
	1.20	95	14.40
	1.26	100	15.12
	1.32	105	15.84
	1.39	110	16.68
	1.45	115	17.40
	1.51	120	18.12
	1.58	125	18.96
	1.64	130	19.68
	1.70	135	20.40
	1.76	140	21.12
	1.83	145	21.96
	1.89	150	22.68

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

CCO-22-0025 - Franktown - B102 Storage Calculations

Storage Requirements for Area B102

5-Year Storm Event

Tc (min)	I (mm/hr)	B102 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	54.73	12.75	41.98	25.19
15	83.6	43.89	12.75	31.14	28.03
20	70.3	36.90	12.75	24.15	28.98
25	60.9	31.99	12.75	19.24	28.86
30	53.9	28.33	12.75	15.58	28.04
35	48.5	25.49	12.75	12.73	26.74
40	44.2	23.21	12.75	10.46	25.10

Maximum Storage Required 5-Year (m^3) =	28.98

100-Year Storm Event

Tc (min)	I (mm/hr)	B102 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	105.37	12.88	92.49	55.49
15	142.9	84.33	12.88	71.44	64.30
20	120.0	70.79	12.88	57.90	69.48
25	103.8	61.28	12.88	48.40	72.60
30	91.9	54.21	12.88	41.33	74.39
35	82.6	48.73	12.88	35.85	75.28
40	75.1	44.35	12.88	31.46	75.51

Maximum Storage Required 100-Year (m^3) =	75.51

5-Year Storm Event Storage Summary

Water Elev. (m) =		134.78		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
134.55	131.87	2.88	0.23	30.8

Storage Available (m^3) =	30.8
Storage Required (m^3) =	29.0

*Storage Calculated in AutoCAD

100-Year Storm Event Storage Summary

Water Elev. (m) =		134.84		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
134.55	131.87	2.94	0.29	79.6

Storage Available (m^3) =	79.6
Storage Required (m^3) =	75.5

*Storage Calculated in AutoCAD

CCO-22-0025 - Franktown - B102 Orifce Calculations

For Orifice Flow, C= 0.60
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	131.87			
center of crest elevation	131.90			
orifice width / weir length	60 mm			
orifice height				
orifice area (m^2)	0.003	0.000		

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	
	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	Q [l/s]	
134.55	2.65	0.012							12.23	
134.56	2.66	0.012							12.26	
134.57	2.67	0.012							12.28	
134.58	2.68	0.012							12.30	
134.59	2.69	0.012							12.32	
134.60	2.70	0.012							12.35	
134.61	2.71	0.012							12.37	
134.62	2.72	0.012							12.39	
134.63	2.73	0.012							12.42	
134.64	2.74	0.012							12.44	
134.65	2.75	0.012							12.46	
134.66	2.76	0.012							12.48	
134.67	2.77	0.013							12.51	
134.68	2.78	0.013							12.53	
134.69	2.79	0.013							12.55	
134.70	2.80	0.013							12.57	
134.71	2.81	0.013							12.60	
134.72	2.82	0.013							12.62	
134.73	2.83	0.013							12.64	
134.74	2.84	0.013							12.66	
134.75	2.85	0.013							12.69	
134.76	2.86	0.013							12.71	
134.77	2.87	0.013							12.73	
134.78	**2.88**	**0.013**							**12.75**	5-Year
134.79	2.89	0.013							12.77	
134.80	2.90	0.013							12.80	
134.81	2.91	0.013							12.82	
134.82	2.92	0.013							12.84	
134.83	2.93	0.013							12.86	
134.84	**2.94**	**0.013**							**12.88**	100-Year
134.85	2.95	0.013							12.91	

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.8%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

CCO-22-0025 - Franktown - B103 Storage Calculations

Storage Requirements for Area B103

5-Year Storm Event

Tc (min)	I (mm/hr)	B103 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
140	17.3	9.06	1.78	7.28	61.19
145	16.8	8.82	1.78	7.04	61.24
150	16.4	8.59	1.78	6.81	61.28
155	15.9	8.37	1.78	6.59	61.29
160	15.6	8.16	1.78	6.39	61.30
165	15.2	7.97	1.78	6.19	61.28
170	14.8	7.78	1.78	6.01	61.26

Maximum Storage Required 5-Year (m^3) =	61.30

100-Year Storm Event

Tc (min)	I (mm/hr)	B103 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
270	17.3	10.33	1.95	8.38	135.79
275	17.0	10.18	1.95	8.23	135.81
280	16.8	10.04	1.95	8.08	135.82
285	16.6	9.89	1.95	7.94	135.83
290	16.3	9.76	1.95	7.81	135.82
295	16.1	9.62	1.95	7.67	135.81
300	15.9	9.50	1.95	7.54	135.78

Maximum Storage Required 100-Year (m^3) =	135.83

5-Year Storm Event Storage Summary

Water Elev. (m) =		134.03		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
133.45	131.87	1.86	0.58	62.3

Storage Available (m^3) =	62.3
Storage Required (m^3) =	61.3

*Storage Calculated in AutoCAD

100-Year Storm Event Storage Summary

Water Elev. (m) =		134.41		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
133.45	131.87	2.24	0.96	137.7

Storage Available (m^3) =	137.7
Storage Required (m^3) =	135.8

*Storage Calculated in AutoCAD

CCO-22-0025 - Franktown - B103 Orifce Calculations

For Orifice Flow, C= 0.60
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	132.16			
center of crest elevation	132.17			
orifice width / weir length	25 mm			
orifice height				
orifice area (m^2)	0.000	0.000		

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	
	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	Q [l/s]	
134.00	1.83	0.002							1.76	
134.01	1.84	0.002							1.77	
134.02	1.85	0.002							1.77	
134.03	**1.86**	**0.002**							**1.78**	5-Year
134.04	1.87	0.002							1.78	
134.05	1.88	0.002							1.79	
134.06	1.89	0.002							1.79	
134.07	1.90	0.002							1.80	
134.08	1.91	0.002							1.80	
134.09	1.92	0.002							1.81	
134.10	1.93	0.002							1.81	
134.11	1.94	0.002							1.82	
134.12	1.95	0.002							1.82	
134.13	1.96	0.002							1.83	
134.14	1.97	0.002							1.83	
134.15	1.98	0.002							1.83	
134.16	1.99	0.002							1.84	
134.17	2.00	0.002							1.84	
134.33	2.16	0.002							1.92	
134.34	2.17	0.002							1.92	
134.35	2.18	0.002							1.93	
134.36	2.19	0.002							1.93	
134.37	2.20	0.002							1.93	
134.38	2.21	0.002							1.94	
134.39	2.22	0.002							1.94	
134.40	2.23	0.002							1.95	
134.41	**2.24**	**0.002**							**1.95**	100-Year
134.42	2.25	0.002							1.96	
134.43	2.26	0.002							1.96	
134.44	2.27	0.002							1.96	
134.45	2.28	0.002							1.97	
134.46	2.29	0.002							1.97	
134.47	2.30	0.002							1.98	
134.48	2.31	0.002							1.98	
134.49	2.32	0.002							1.99	
134.50	2.33	0.002							1.99	
134.51	2.34	0.002							1.99	
134.52	2.35	0.002							2.00	
134.53	2.36	0.002							2.00	
134.54	2.37	0.002							2.01	

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.8%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

CCO-22-0025 - Franktown - B104 Storage Calculations

Storage Requirements for Area B103

5-Year Storm Event

Tc (min)	I (mm/hr)	B104 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	35.98	17.34	18.64	11.19
15	83.6	28.86	17.34	11.52	10.36
20	70.3	24.26	17.34	6.92	8.30
25	60.9	21.03	17.34	3.69	5.53
30	53.9	18.62	17.34	1.28	2.31
35	48.5	16.76	17.34	-0.59	-1.23
40	44.2	15.26	17.34	-2.08	-5.00

Maximum Storage Required 5-Year (m^3) =	11.19

100-Year Storm Event

Tc (min)	I (mm/hr)	B104 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	69.43	17.96	51.46	30.88
15	142.9	55.56	17.96	37.60	33.84
20	120.0	46.64	17.96	28.68	34.41
25	103.8	40.38	17.96	22.41	33.62
30	91.9	35.72	17.96	17.76	31.96
35	82.6	32.11	17.96	14.14	29.70
40	75.1	29.22	17.96	11.25	27.01

Maximum Storage Required 100-Year (m^3) =	34.41

5-Year Storm Event Storage Summary

Water Elev. (m) =		134.55		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
134.07	131.87	2.87	0.48	11.1

Storage Available (m^3) =	11.2
Storage Required (m^3) =	11.2

*Storage Calculated in AutoCAD

100-Year Storm Event Storage Summary

Water Elev. (m) =		134.76		
T/G	INV. (out)	Head (m)	Depth (m)	Volume (m^3)
134.07	131.87	3.08	0.69	35.1

Storage Available (m^3) =	35.1
Storage Required (m^3) =	34.4

*Storage Calculated in AutoCAD

CCO-22-0025 - Franktown - B104 Orifce Calculations

For Orifice Flow, C= 0.60
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	131.64			
center of crest elevation	131.68			
orifice width / weir length	70 mm			
orifice height				
orifice area (m^2)	0.004	0.000		

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	
	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	H [m]	Q [m^3]	Q [l/s]	
134.40	2.73	0.017							16.88	
134.41	2.74	0.017							16.91	
134.42	2.75	0.017							16.95	
134.43	2.76	0.017							16.98	
134.44	2.76	0.017							17.01	
134.45	2.77	0.017							17.04	
134.46	2.78	0.017							17.07	
134.47	2.79	0.017							17.10	
134.48	2.80	0.017							17.13	
134.49	2.81	0.017							17.16	
134.50	2.82	0.017							17.19	
134.51	2.83	0.017							17.22	
134.52	2.84	0.017							17.25	
134.53	2.85	0.017							17.28	
134.54	2.86	0.017							17.31	
134.55	**2.87**	**0.017**							**17.34**	5-Year
134.56	2.88	0.017							17.37	
134.57	2.89	0.017							17.40	
134.58	2.90	0.017							17.43	
134.59	2.91	0.017							17.46	
134.60	2.92	0.017							17.49	
134.61	2.93	0.018							17.52	
134.62	2.94	0.018							17.55	
134.63	2.95	0.018							17.58	
134.64	2.96	0.018							17.61	
134.65	2.97	0.018							17.64	
134.66	2.98	0.018							17.67	
134.67	2.99	0.018							17.70	
134.68	3.00	0.018							17.73	
134.69	3.01	0.018							17.76	
134.70	3.02	0.018							17.79	
134.71	3.03	0.018							17.82	
134.72	3.04	0.018							17.85	
134.73	3.05	0.018							17.88	
134.74	3.06	0.018							17.91	
134.75	3.07	0.018							17.94	
134.76	**3.08**	**0.018**							**17.96**	100-Year

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir flow calculated in Bentley's FlowMaster - Trapezoidal Channel at 0.8%, 3:1 side slopes, roughness coeff. Of 0.035
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1	**72**	**2.50**	7	5

Therefore, a Tc of 10 can be used

Tc= (3.26(1.1-c)L^0.5/S^0.33)

c= Blanced Runoff Coefficient

L= Length of drainage area

S= Average slope of watershed

STORM SEWER DESIGN SHEET

PROJECT: CCO-22-0025
LOCATION: 347 Franktown
CLIENT: Dr Neel Chadha

McINTOSH PERRY

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW										SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Phase	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																					DIA	W	H			(L/s)	(%)
Phase 1	B101	Roof	Prop 675mm	0.90	0.23	0.21	0.21	10.00	0.24	10.24	104.19	122.14	178.56	60.43				60.43	62.04	17.50	250			1.00	1.224	1.61	2.60%
	B102	LCB1	CBMH2	0.69	0.27	0.19	0.19	10.00	0.13	10.13	104.19	122.14	178.56	54.73				54.73	100.88	10.97	300			1.00	1.383	46.15	45.74%
		CBMH2	CNMH3			0.00	0.19	10.13	0.43	10.56	103.50	121.32	177.36	54.37				54.37	100.88	35.64	300			1.00	1.383	46.51	46.11%
		CBMH3	MH101			0.00	0.19	10.00	0.35	10.35	104.19	122.14	178.56	54.73				54.73	100.88	29.18	300			1.00	1.383	46.15	45.74%
	B104	CB6	CB101	0.66	0.19	0.12	0.12	10.00	0.04	10.04	104.19	122.14	178.56	35.98				35.98	48.39	3.15	200			2.00	1.492	12.40	25.63%
		CB101	TEE (375mm)			0.00	0.12	10.04	0.06	10.10	104.01	121.92	178.24	35.92				35.92	48.39	5.48	200			2.00	1.492	12.47	25.77%
		TEE (375mm)	MH101			0.00	0.12	10.10	0.09	10.19	103.69	121.55	177.68	35.81				35.81	182.91	9.13	375			1.00	1.604	147.10	80.42%
	B105	CB7	Prop 675mm	0.72	0.15	0.11	0.11	10.00	0.18	10.18	104.19	122.14	178.56	32.29				32.29	48.39	16.46	200			2.00	1.492	16.10	33.27%
	Phase 2	MH101	MH102	0.75	0.72	0.54	0.54																				
Phase 1, 2, 3	Phase 3			0.76	0.42	0.32	1.49	10.00	2.88	12.88	104.19	122.14	178.56	432.31				432.31	539.93	169.31	825			0.13	0.978	107.62	19.93%
	B103	CB4	LCB5	0.53	0.35	0.19	0.19	10.00	0.24	10.24	104.19	122.14	178.56	54.68				54.68	129.34	16.53	375			0.50	1.134	74.66	57.72%
		LCB5	MH109			0.00	0.19	10.24	1.12	11.36	102.93	120.65	176.37	54.01				54.01	129.34	76.18	375			0.50	1.134	75.32	58.24%
	Muncipal Road	MH109	MH102	0.87	0.26	0.23	0.41																				
	Phase 4			0.69	0.13	0.09	0.50	10.00	1.69	11.69	104.19	122.14	178.56	146.18				146.18	148.72	92.02	450			0.25	0.906	2.54	1.71%
	Heafey Lands	MH102	MH103	0.69	1.27	0.88	2.87	10.00	1.36	11.36	104.19	122.14	178.56	832.32				832.32	842.96	89.13	975			0.13	1.094	10.64	1.26%
*All flow assumed to go upstream of MH103 for Heafey Lands																											
	Heafy Lands	MH108	MH103			0.00	0.00	10.00	2.07	12.07	104.19	122.14	178.56	0.00				0.00	129.34	140.68	375			0.50	1.134	129.34	100.00%
		MH103	MH104			0.00	2.87	11.36	0.22	11.57	97.53	114.29	167.03	779.07				779.07	842.96	14.20	975			0.13	1.094	63.89	7.58%
		MH104	MH105			0.00	2.87	11.57	0.48	12.06	96.55	113.14	165.34	771.28				771.28	842.96	31.79	975			0.13	1.094	71.68	8.50%
		MH105	MH106			0.00	2.87	12.06	0.45	12.51	94.44	110.66	161.70	754.44				754.44	842.96	29.35	975			0.13	1.094	88.52	10.50%
		MH106	MH107			0.00	2.87	12.51	0.64	13.14	92.59	108.48	158.49	739.61				739.61	842.96	41.79	975			0.13	1.094	103.35	12.26%
		MH107	POND			0.00	2.87	13.14	0.49	13.64	90.08	105.53	154.16	719.58				719.58	842.96	32.33	975			0.13	1.094	123.38	14.64%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed:

Checked:

Project No.:

No.	Revision	Date
1.	ISSUED FOR REVIEW	2022-03-25

Date: 2015-05-21

Sheet No: 1 of 1