2668867 Ontario Inc.

155 Dun Skipper Drive

Design Brief

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155 Dun Skipper Drive

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Prepared By:
Arcadis Professional Services (Canada) Inc.
333 Preston Street, Suite 500
Ottawa, Ontario K1S 5N4
Canada
Phone: 613 241 3300

Prepared For:
2668867 Ontario Inc.
C/o Mr. Omkar Atwal

4836 Bank Street
Ottawa Ontario K1X 1G6

Our Ref:
148290-6.04.03

_____
Ryan Magladry, C.E.T
Associate Principal
Practice Lead, Land Engineering

_____
Demetrius Yannoulopoulos, P. Eng
Principal – Practice Lead, Land Engineering

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1 Introduction

1.1 Scope

Arcadis Professional Services (Canada) Inc. (Arcadis, formerly IBI Group) has been retained by 2668867 Ontario Inc. to prepare the necessary engineering plans, specifications and documents to support the proposed amended Site Plan Application for the subject property in accordance with the policies set out by the Planning and Development Branch of the City of Ottawa. This Brief will present a detailed grading and servicing scheme to support the Phase 2 site plan adjustment and will include sections on-site grading, water supply, wastewater management, minor and major stormwater management, and erosion and sediment control.

1.2 Subject Site

The proposed development is part of the previously approved Leitrim Home Hardware site, which is located at the southwest corner of the Bank Street and Dun Skipper Drive intersection. The approved site plan is approximately 2.5 hectares in size and is also bounded by the Idone subdivision to the south and east. Please refer to **Figure 1.1** below for more information regarding the site location.

Figure 1.1 Subject Site Location

The subject property consists of a Home Hardware building (Building A) and three other proposed buildings (Building B-D) with two vehicular accesses. The approved site plan is included in **Appendix A.** Although the subject site will eventually include four buildings, the property owner plans to phase the site development. The first phase includes only Building A, associated parking, and vehicular connection to both Bank Street and Dun Skipper Drive. Please refer to 119351-001 Site Servicing Plan for Phase 1 limits, included in **Appendix A**. Phase 1 was fully constructed in 2022. The previous site plan identified Building B as a 500-bed hotel, while the new site plan changed

it to a mixed use apartment building (1-bed: 87 units; 2-bed: 36 units; 3-bed: 18 units) with commercial area on the ground floor.

A site plan of the proposed development is included in **Appendix A**.

1.3 Previous Studies

Design of this project has been undertaken in accordance with the following reports:

- Design Brief – Bank Street Development, 4836 Bank Street prepared by IBI Group, April 2019, Revised April 2020

An engineering pre-consultation with the City of Ottawa was held in October 2023 regarding the proposed development. Notes from this meeting is included in **Appendix A**.

1.4 Geotechnical Considerations

Paterson Group Inc. was retained to prepare a geotechnical investigation for the site. The objectives of the investigation were to prepare a report to:

- Determine the subsoil and groundwater conditions at the site by means of test pits and boreholes
- To provide geotechnical recommendations pertaining to the design of the proposed development including construction considerations

The geotechnical investigation report PG2934-1 Dated October 4, 2024 confirmed that the site consists of fill underlain by glacial till. The fill generally consists of silty sand with some gravel. The glacial till underlying the fill consists of compact to very dense, brown to grey silty sand with gravel, cobbles and boulders.

The report contains recommendations which include but are not limited to the following:

- Fill used for grading beneath the proposed development to meet OPSS Granular 'A' or Granular 'B' Type II placed in lifts no greater than 300 mm compacted to 98% SPMDD
- Pavement Structures as identified below

Table 1-1 Pavement Structure – Car Only Parking Areas on Podium Deck

Local Road – Parking Areas	Thickness
12.5 Asphaltic Concrete	50 mm
OPSS Granular A Base	200 mm
Thermal Break	Depends on grade of insulation

Table 1-2 Pavement Structure – Access Lanes, Fire Routes and Heavy Truck Parking Areas on Podium Deck

Local Road	Thickness
12.5 Asphaltic Concrete	40 mm
19.0 Asphaltic Concrete	50 mm
OPSS Granular A Base	300 mm
Thermal Break	Depends on grade of insulation

Table 1-3 Pavement Structure – Car Only Parking Areas on Overburden

Local Road – Parking Areas	Thickness
12.5 Asphaltic Concrete	50 mm
OPSS Granular A Base	150 mm
OPSS Granular B Type II Subbase	300 mm

Table 1-4 Pavement Structure – Access Lanes, Fire Routes and Heavy Truck Parking Areas on Overburden

Local Road	Thickness
12.5 Asphaltic Concrete	40 mm
19.0 Asphaltic Concrete	50 mm
OPSS Granular A Base	150 mm
OPSS Granular B Type II Subbase	450 mm

The report contains recommendations which include but are not limited to the following:

- Pipe bedding and cover: The pipe bedding for water and pipes placed on a relatively dry, undisturbed subgrade surface should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located upon silty clay the thickness of the bedding material should be increased to a minimum of 300 mm of OPSS Granular A. The bedding layer should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A. The bedding and cover materials should be placed in maximum 300 mm thick lifts compacted to a minimum of 99% of the material's SPMDD.
- The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level.

2 Water Supply

2.1 Existing Conditions

As previously noted, the proposed development is located west of Bank Street and south of Dun Skipper Drive. The subject site is flanked on both the north and east sides by existing watermains. Existing 400mm diameter watermains are included in both Bank Street and Dun Skipper Drive. Both watermains fall within the City of Ottawa's pressure district Zone 4C which will provide the water supply to the site. As part of Phase 1, a 200mm watermain has been built to connect to the existing 400mm watermain in Bank Street and Dun Skipper Drive, to create a looped system to service the site.

2.2 Design Criteria

2.2.1 Water Demands

Water demands have been calculated for the development using consumption rates from Table 4.2 of the Ottawa Design Guidelines – Water Distribution. Buildings A, C and D are one or two-storey retail buildings. Building B was identified as a 4-storey hotel with an estimated 500 beds, while the proposed site plan changed to an apartment building (1-bed: 87 units; 2-bed: 36 units; 3-bed: 18 units) with commercial area on the ground floor. A summary of the water consumption rates is as follows:

- Commercial Shopping Center — 2500 l/1000m^2/day
- Other Commercial — 28,000 l/gross ha/day
- Residential — 280 l/cap/day
- 2 Bedroom Apartment — 2.1 persons/unit
- 1 Bedroom Apartment — 1.4 persons/unit
- ICI Average Day Demand — 28,000 l/gross ha/day
- ICI peak Daily Demand — 42,000 l/gross ha/day
- ICI Peak Hour Demand — 75,600 l/gross ha/day

A watermain demand calculation sheet is included in **Appendix B** and the total water demands are summarized as follows:

- Average Day — 0.96 l/s
- Maximum Day — 2.26 l/s
- Peak Hour — 4.89 l/s

2.2.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 480 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines and Fire Underwriters Survey (FUS) 2020 are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 150 kPa (22 psi) during a fire flow event.
Maximum Pressure	In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rates

The subject site plan contains 3 storage buildings (Building A, C & D) and an apartment building with partial commercial ground floor (Building B). Calculations using the Fire Underwriter Survey (FUS) method were conducted to determine the fire flow requirement for Building 'A' in the approved Home Hardware site plan. Results of the calculations show a fire demand of 11,000 l/min (183.3 l/s) for Building 'A'. A copy of the FUS calculations is included in **Appendix B**.

The proposed Building B will fall under Group C and D, residential and commercial shops/Stores occupancy and combustibility. The sprinkler system will be designed and installed in accordance with NFPA-13 requirements. The sprinkler system will be supplied from the city water connection and the demand will be calculated using the hazard classification plus the appropriate inside/outside hose allowances.

Calculations using the Fire Underwriting Survey (FUS version 2020) were conducted to determine the fire flow requirement for the site. Results of the analysis provides a maximum fire flow rate of 10,000 l/min (166.7 l/s) for Building B. Therefore, 11,000 l/min (183.3 l/s) is used for fire flow in the hydraulic analysis. A copy of the FUS calculations is included in **Appendix B**.

2.2.4 Boundary Conditions

The City of Ottawa has provided hydraulic boundary conditions at two locations, one at the existing main on Dun Skipper Drive at the entrance to the site and the other is on the existing Bank Street main at the Bank Street entrance. Boundary conditions have been supplied for the 2019 existing conditions and for the future SUC zone reconfiguration. HGL under basic day scenario is higher in pre-SUC condition while peak hour and max day is lower. Therefore, the existing condition Max HGL is used for the basic day analysis to determine the maximum pressure as it represents the highest HGL elevation. For the peak hour and max day plus fire analysis the existing condition is used in the analysis as these represent the lowest HGL elevations. A copy of the boundary conditions is included in **Appendix B** and summarized as follows:

Table 2-1 Hydraulic Boundary Conditions – Dun Skipper Dr. (Pre-SUC Pressure Zone Reconfiguration)

Criteria	Hydraulic Head (m)	Pressure (psi)
Max HGL (Basic Day)	154.6	78.3
Peak Hour	143.9	63.1
Max Day + Fire Flow (11,000 L/m)	125.1	36.3

Ground elevation: 99.5 m

Table 2-2 Hydraulic Boundary Conditions – Bank Street (Pre-SUC Pressure Zone Reconfiguration)

Criteria	Hydraulic Head (m)	Pressure (psi)
Max HGL (Basic Day)	154.6	79.1
Peak Hour	143.9	63.9
Max Day + Fire Flow (11,000 L/m)	124.6	36.4

Ground elevation: 99.0 m

Table 2-3 Hydraulic Boundary Conditions – Dun Skipper Dr. (Post-SUC Pressure Zone Reconfiguration)

Criteria	Hydraulic Head (m)	Pressure (psi)
Max HGL (Basic Day)	147.3	67.9
Peak Hour	144.6	64.1
Max Day + Fire Flow (11,000 L/m)	140.2	57.8

Ground elevation: 99.5 m

Table 2-4 Hydraulic Boundary Conditions – Bank Street (Post-SUC Pressure Zone Reconfiguration)

Criteria	Hydraulic Head (m)	Pressure (psi)
Max HGL (Basic Day)	147.3	68.7
Peak Hour	144.3	64.5
Max Day + Fire Flow (11,000 L/m)	139.2	57.2

Ground elevation: 99.0 m

2.2.5 Hydraulic Model

A computer model for the subject site has been developed using the InfoWater Pro program by Autodesk. The model includes the existing watermain and boundary condition at Dun Skipper Drive and Bank Street.

2.3 Proposed Water Plan

2.3.1 Proposed Water Plan

In order to provide additional reliability to the system in case of a watermain break, two connections to the City's watermain system were proposed and constructed in Phase 1. One proposed connection is to the existing 400 mm watermain within the Dun Skipper Drive right of way and the other proposed connection is to the 400 mm watermain in Bank Street. The approved water plan, Drawing 119351-001 Site Servicing Plan, is included in **Appendix B**. The proposed fire hydrant layout also includes an unobstructed path of no more than 45m between the hydrant and Siamese connections as required by the Ontario Building Code. Refer to the general plan of services **Drawing C-001** for detailed watermain layout for the proposed development.

2.3.2 Hydraulic Analysis

The hydraulic model was run under basic day conditions to determine the maximum pressure for the site. The minimum pressure for the site is determined in the peak hour analysis using the provided boundary condition. The site are serviced by two connections to the existing 400 mm watermains on Dun Skipper Drive and Bank Street. All watermains are 200 mm diameter except for the 150 mm diameter stubs which services Buildings 'A', 'B' and 'D". There are three fire hydrants, represented by nodes TH-010, TH-030 and T-150 in the model. Nodes TH-010 and TH-030 are adjacent to Buildings 'A' and 'D' with a fire demand of 11,000 l/min, which have been built in Phase 1. Node T-150 is adjacent to Buildings 'B' with a fire demand of 10,000 l/min. An existing hydrant on Dun Skipper Drive also provides fire protection to Building 'B' and is represented by Node S15-300 in the water model. Results of the analysis for the site are summarized in Section 2.3.2. Water model schematic and detailed model results are included in **Appendix B**.

The main level finished floor elevation for Building B will be approximately 100.85m. Under peak hour condition, the hydraulic head is 143.89m. The head difference to the main level is 43.04m which converts to a water pressure inside the building is 422 kPa, which exceeds the minimum requirement of 276 kPa per the City guidelines.

The minimum pressures of 276kPa are not achieved when the floor levels are higher than 14.90m under the peak hour conditions. Therefore, the pressures are not achieved at elevation 115.75m. The 5th floor elevation is approximately 114.95m and the 6th floor elevation is approximately 118.25m. The minimum pressures are not provided for levels higher than 5th floor. Therefore, booster pumps are required and shall be designed by a qualified mechanical engineer at building permit stage.

2.3.3 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions. Results of the hydraulic model are included in **Appendix B** and summarized as follows:

- Basic Day (Max HGL) Pressure Range (kPa) 510.54 – 542.39
- Peak Hour (Min HGL) Pressure Range (kPa) 405.64 – 437.53
- Fire Flow @ 11,000 L/min Residual Pressure (kPa) 168.21 – 199.61
- Residual Pressure @ 150 kPa Available Fire Flow (l/s) 209.22 – 330.22

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure	No nodes in basic day scenario exceed 552 kPa (80 psi), therefore no pressure reducing control is required for the buildings in this development.
Minimum Pressure	All nodes in the model exceed the minimum value of 276 kPa (40 psi). Considering this is a 9-storey apartment building, the water pressure at the 6th to 9th levels drop below the minimum pressure. Therefore, booster pumps are required for the proposed building.
Fire Flow	The minimum design fire flow under maximum day conditions with minimum system pressure of 150 kPa is 209.22 l/s for retail which exceeds the requirement of 183.3 l/s (11,000 l/min) from Section 2.3.3.

3 Wastewater Disposal

3.1 Existing Conditions

The subject site is located within the Leitrim Development Area where sanitary flows ultimately outlet to the Leitrim Sanitary Pumping Station. As part of the adjacent downstream developments, the outlet sanitary sewer system for the subject site was completed. A 200mm diameter sanitary sewer in Dun Skipper Drive was constructed as part of the Pathways Phase 1 project. That sewer (at MH1A) was also sized for the upstream Idone commercial lands. To service Building A (Home Hardware) in Phase 1, a 200mm diameter sanitary sewer has been built within the site. A copy of the sanitary sewer design sheet and drainage area plan for the approved overall site 119351-400 can be found in **Appendix C.**

3.2 Design Criteria

The sanitary sewers for the subject site will be based on the City of Ottawa design criteria. It should be noted that the sanitary sewer design for this study incorporates the latest City of Ottawa design parameters identified in Technical Bulletin ISTB-2018-01. Some of the key criteria will include the following:

- Average commercial flow = 28,000 l/s/ha
- Peak ICI flow factor = 1.5 if ICI area is > 20% total area
  1.0 if ICI area is ≤ 20% total area
- Inflow and Infiltration Rate = 0.33 l/s/ha
- Minimum Full Flow Velocity = 0.60 m/s
- Maximum Full Flow Velocity = 3.0 m/s
- Minimum Pipe Size = 250 mm diameter (for ICI lands per OSDG)

3.3 Recommended Wastewater Plan

The on-site sanitary system will consist of a network of 200mm PVC sewers installed at normal depth and slope and will provide a single service connection to each commercial building. The sewers have been designed using the criteria noted above in Section 3.2 and outlet via a connection to the sanitary sewer (*EXMH6138A*) within the Dun Skipper Drive right of way. The Dun Skipper sanitary sewer was designed assuming 4.07 Ha of commercial lands from the subject site, including upstream Idone commercial property, with a total flow of 4.67 l/s. As noted previously, Building B was originally approved as a 500-bed hotel. The proposed new building will include less units (141 units in total) and less building area. This site generates approximately 6.23 l/s. The minor (1.56 l/s) increase in flow to MH 6138A has negligible impact on the system as it has over 76% spare capacity up to MH 6136A.

A copy of the sanitary sewer design sheet can be found in **Appendix C.** Please refer to the General Plan of Services **Drawing C-001** for further details.

4 Site Stormwater Management

4.1 Existing Conditions

The 2016 Updated Serviceability Report recommended that the subject site and the upstream Idone commercial site be serviced with a 1350 mm diameter minor storm sewer. That sewer was constructed in 2017 as part of the downstream Pathway Phase 1 development and is presently terminated near the north-east corner on the subject site.

As noted previously, the subject development will be sub phased. The first phase has been fully constructed, which include Building A, associated parking, and vehicular connection to both Bank Street and Dun Skipper Drive. A 750 mm diameter storm sewer was built near the Dun Skipper Drive driveway access, and extended throughout the site to the upstream Idone commercial site. Phase 2 will only include Building B and associated parking.

4.2 Design Criteria

IBI Group completed the municipal infrastructure design for the Pathways Phase 1 development. That design included a review of the allowable flow from the subject site including the adjacent Idone commercial property. The "Pathways" design assumed that the allowable minor storm release rate for the two commercial sites was 760 l/s and that the 1:100 year storm event would be self-contained with no overflow to adjacent properties. The emergency overflow for events greater than the 1:100 year event would be directed to Bank Street.

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

- Design Storm — 1:2 year return (Ottawa)
- Rational Method Sewer Sizing — 1:2 year return (Ottawa)
- Initial Time of Concentration — 10 minutes
- Runoff Coefficients
  - Landscaped Areas — C = 0.20
  - Asphalt/Concrete — C = 0.90
  - Roof — C = 0.90
- Pipe Velocities — 0.80 m/s to 6.0 m/s
- Minimum Pipe Size — 250 mm diameter (200 mm CB Leads)

4.3 Proposed Minor System

Using the criteria identified in Section 4.2, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated Storm Sewer Drainage Area plan (drawing 119351-500) for the overall site are both included in **Appendix D**. The overall Site Servicing Plan (drawing 119351-001), depicting all on-site storm sewers can be found in **Appendix A**.

The proposed minor storm sewers will range in size between 250 mm diameter and 450 mm diameter in Phase 2. The minor storm sewer outlet will be via the 750 mm diameter pipe which ultimately connects to the existing 1350 mm diameter storm sewer in Dun Skipper Drive.

The 1350 mm diameter storm sewer in Dun Skipper Drive ultimately outlets to the Findlay Creek Village SWMF. This facility provides 80% TSS removal, as such no additional on-site stormwater quality control is required within the subject lands.

A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in **Appendix D**. The General Plan of Services, depicting all on-site storm sewers can be found in **Appendix A**.

4.4 Stormwater Management

The subject site will be limited to a release rate established using the criteria described in section 4.2. This will be achieved through a combination of inlet control devices (ICD's) at inlet locations and surface storage.

Flows generated that are in excess of the site's allowable release rate will be stored on site in strategic surface storage areas or by the use of roof top storage and gradually released into the minor system so as not to exceed the site's allocation.

The maximum surface retention depth located within the developed areas will be limited to 300mm during a 1:100 year event as shown on the ponding and grading plans located in **Appendix D.**

Overland flow routes will be provided in the grading to permit emergency overland flow, in excess of the 100-year event, from the site.

At certain locations within the site, the opportunity to store runoff is limited due to grading constraints and building geometry. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties or in areas where ponding stormwater is undesirable. The area west of building D (Drainage Area MH6136), will flow uncontrolled to the Dun Skipper right-of-way. This uncontrolled area – 0.01 hectares in total, have an average C value of 0.5 (x1.25 as per City Comment). Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 3.10 l/s runoff (refer to Section 4.5 for the calculation). Another uncontrolled area along north and east property side, adjacent to Building B (Drainage Area UNRES) – 0.05 hectares in total, have an average C value of 0.9 (x1.25, maximum 1.0 as per City Comment). Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 24.82 l/s runoff (refer to Section 4.5 for the calculation).

The site grading and ponding has been designed to control water generated during the 1:100-year event, with no overflow leaving the site. Please refer to the SWM calculations in **Appendix D**.

4.5 Inlet Control

The allowable 2-year post-development release rate for the 2.49 Ha site can be calculated as follows:

$\mathbf{Q_{allowable}}$	= 760 L/s as per IBI Pathways Phase 1 Report – EXT 4 drainage area
Total Area EXT 4	= 4.04 Ha
Subject Land share	= 62% of EXT4 release rate (2.5 Ha / 4.04 Ha = 0.62)
$\mathbf{Q_{allowable\ subject\ land}}$	= 468.42 **L/s**

As noted in Section 4.4, the landscaped area along the west property line will drain offsite uncontrolled.

Based on a 100-year event, the flow from the 0.01 Ha uncontrolled area MH6136 can be determined as:

$Q_{uncontrolled}$ = **2.78** x **C** x i_{100yr} x **A** where:

C = Average runoff coefficient of uncontrolled area = 0.50

i_{100yr} = Intensity of 100-year storm event (mm/hr)

= 1735.688 x $(T_c + 6.014)^{0.820}$ = 178.56 mm/hr; where T_c = 10 minutes

A = Uncontrolled Area = 0.01 Ha

Therefore, the uncontrolled release rate can be determined as:

$Q_{uncontrolled}$ = **2.78** x **1.25C** x i_{100yr} x **A**

= 2.78 x 1.25 x 0.50 x 178.56 x 0.01

= **3.10 L/s**

The flow from the uncontrolled area UNRES to the north and east side of Building B can be determined as:

$Q_{uncontrolled}$ = **2.78** x **C** x i_{100yr} x **A**

= 2.78 x 1.0 x 178.56 x 0.05

= **24.82 L/s**

The maximum allowable release rate from the remainder of the site can then be determined as:

$Q_{max\ allowable}$ = $Q_{restricted}$ – $Q_{uncontrolled}$

= 468.42 L/s – 3.10 L/s – 24.82 L/s

= **440.49 L/s**

Based on the flow allowance at the various inlet locations, a combination of various sizes of inlet control devices (ICDs) were chosen for the design. The design of the inlet control devices is unique to each drainage area and is determined based on several factors, including hydraulic head and allowable release rate. The inlet control devices were sized according to the manufacturer's design charts. The restrictions will cause the on-site catch basins and manholes to surcharge, generating surface ponding in the parking and landscaped areas. Ponding locations and elevations are summarized on the Ponding Plan **Drawing C-600**, and included in **Appendix D**.

4.6 On-Site Detention

Any excess storm water up to the 100-year event is to be stored on-site to avoid surcharging the downstream municipal storm sewer system. Detention will be provided in parking and landscape areas and building rooftops, where feasible. As previously noted, the volume of storage is dependent on the characteristics of each individual drainage area and the ICDs were chosen accordingly. It should be noted that 0.30m of vertical separation has been provided from all maximum ponding elevations to lowest building openings. Stormwater management and on-site underground storage volume calculations, and manufacturers spec sheets are included in **Appendix D**.

4.6.1 Site Inlet Control

The following Table summarizes the on-site storage requirements during 1:100-year events.

Table 4-1 Post-Development Storage Summary Table

Drainage Area	ICD Structure Location	Tributary Area (Ha)	Restricted Flow (L/s)	Storage Required (m^3)	Storage Provided (m^3)		
			100-year	100-year	Surface	Underground	Total
MH9/MH9B	*MH8*	*0.14*	*10*	*44.84*	*20.64*	*10.07*	30.71
MH8	*CB1*	*0.17*	*16*	*43.02*	*50.59*	*5.58*	56.17
MH5B	*CB16*	*0.01*	*6*	*1.56*	*0.31*	*0.00*	0.31
MH5A	*CB17*	*0.09*	*9*	*25.47*	*0.84*	*5.10*	5.94
CB20	**CB20**	**0.12**	**15**	**30.02**	**12.51**	**0.00**	**12.51**
MH22	**MH22**	**0.06**	**6**	**4.00**	**2.87**	**46.61**	**49.48**
CB24	**CB24**	**0.10**	**15**	**22.31**	**0.00**	**0.00**	**0.00**
CB25	**CB25**	**0.02**	**6**	**2.36**	**0.27**	**0.00**	**0.27**
MH21	**MH21**	**0.24**	**33**	**81.05**	**11.79**	**96.68**	**108.47**
MH1D	**CB10**	**0.11**	**45**	**8.77**	**6.81**	**0.00**	**6.81**
CBMH2	*CBMH2*	*0.08*	*20*	*11.83*	*6.21*	*0.00*	6.21
CBMH1C	*CB7*	*0.08*	*30*	*7.30*	*6.97*	*0.00*	6.97
CBMH1B	*CB6*	*0.07*	*20*	*9.01*	*13.66*	*0.00*	13.66
CBMH1A	*CB5*	*0.06*	*15*	*8.87*	*3.41*	*0.00*	3.41
MH1B	**CB8**	**0.17**	**47**	**22.66**	**24.90**	**1.60**	**26.5**
MH10A	*CB4*	*0.03*	*6*	*5.42*	*10.62*	*0.00*	10.62
MH10B	*CBMH1*	*0.08*	*20*	*11.83*	*0.00*	*0.00*	0
MH1A	**CB9**	**0.15**	**43**	**19.23**	**10.83**	**0.00**	**10.83**
CBMH20	**CBMH20**	**0.10**	**15**	**32.84**	**131.62**	**0.00**	**131.62**
TOTAL		**1.88**	**377**	**392.39**	**314.85**	**165.64**	**480.49**

** Existing (italic) and future (bold) drainage areas are grey hatched.*

4.6.2 Roof Inlet Controls

The proposed buildings will have roof inlet controls that help to control the amount of stormwater being released into the system. The restricted flow rate for the proposed building is shown below.

Table 4-2 Post-Development Roof Storage Summary Table

Roof Area	Tributary Area	100-Year Storm		
		Restricted Flow (L/s)	Required Storage (m^3)	Storage Provided (m^3)
Building A	*0.30*	*27.0*	*89.56*	*90.00*

Building B	**0.19**	**20.0**	**52.35**	**57.00**
Building C	**0.05**	**8.0**	**10.68**	**13.50**
Building D	**0.05**	**8.0**	**10.68**	**11.25**
TOTAL	**0.62**	**63.0**	**163.27**	**171.75**

** Existing (italic) and future (bold) drainage areas are grey hatched.*

4.6.3 Overall Release Rate

As noted above, the site uses new inlet control devices to restrict the 100 year storm event to the criteria approved by the City of Ottawa. Restricted stormwater will be contained onsite by utilizing surface ponding, in structure/pipe and rooftop storage. In the 100 year event, there will be no off-site overflow.

The sum of restrictions on the site, rooftops and uncontrolled flows is 467.92 l/s (377 l/s + 63.00 l/s + 3.10 L/s +24.82 l/s), which is less than the allowable release of 468.42 l/s noted in section 4.6.

4.7 Underground Storage

Due to the site's constraints and the stormwater management plan, underground storage was deemed the best option to contain the 100-year storm event on site. The table below summarizes underground storage, and additional information about the underground storage structures is found in **Appendix D.**

Table 4-3 Underground Storage Summary Table

Storage Name	Structure Type	Storage Provided (m^3)
MH22	Clear Stone Gallery	43.01
MH21	Stormtech SC-310 or approved equivalent Plus the storage pipe and structures	88.64

The overall site plan was approved in 2022, and 100+20% stressed test analysis was not provided. Building B follows the overall site plan design standards, and 0.3m free board are provided throughout the site. The site grading and ponding has been designed to control water generated during the 1:100-year event, with no overflow leaving the site.

As noted in Section 4.4, the 1350 mm diameter storm sewer in Dun Skipper Drive ultimately outlets to the Findlay Creek Village SWMF. This facility provides 80% TSS removal, as such no additional on-site stormwater quality control is required within the subject lands.

4.8 Interim conditions

During interim conditions, flows from future development lands at the site's southeast corner will be directed into the dry pond, including the areas from phases 1 & 2 that drain towards the future lands. The total area is calculated to be 0.57 ha, with an average C of 0.56. Refer to Interim Storm Drainage Area Plan C-501 for details. The roof

area of the proposed Building B will be restricted to a flow rate of 20 L/s. Roof area storage is summarized in Table 4-4.

Table 4-4 Post-Development Roof Storage Summary Table

Roof Area	Tributary Area	100-Year Storm		
		Restricted Flow (L/s)	Required Storage (m^3)	Storage Provided (m^3)
Building A	*0.30*	*27.0*	*89.56*	*90.00*
Building B	**0.19**	**20.0**	**52.35**	**57.00**
TOTAL	**0.49**	**47.0**	**141.91**	**147.00**

** Building A is the existing Home Hardware building.*

The permanent ICD will be installed for CBMH20, with a release rate of 15 L/s. Table 4-5 below provides detailed calculations for the storage required during interim conditions for a 100-year event. Table 4.6 summarizes the on-site storage requirements during 1:100-year events.

Table 4-5 100-Year Storage Calculation for Interim Conditions

Drainage Area	CBMH20	Interim Conditions			
Area (Ha)	0.57				
C =	0.56	Restricted Flow Q_r (L/s) =		15.00	
100-Year Ponding					
T_c Variable	***i_{100yr}***	***Peak Flow $Q_p=2.78xCi_{100yr}A$***	***Q_r***	***Q_p-Q_r***	***Volume 100yr***
(min)	***(mm/hour)***	***(L/s)***	***(L/s)***	***(L/s)***	***(m^3)***
49	64.91	57.60	15.00	42.60	125.23
50	63.95	56.75	15.00	41.75	125.25
51	63.03	55.93	15.00	40.93	**125.26**
52	62.14	55.14	15.00	40.14	125.24
53	61.28	54.37	15.00	39.37	125.21
	Storage (m^3)				
	Overflow	**Required**	**Surface**	**Sub-surface**	**Balance**
	29.75	155.01	173.14	0.00	0.00

Table 4-6 Post-Development Storage Summary Table for Interim Conditions

Drainage Area	ICD Structure Location	Tributary Area (Ha)	Restricted Flow (L/s)	Storage Required (m^3)	Storage Provided (m^3)		
			100-year	100-year	Surface	Underground	Total
MH9/MH9B	*MH8*	*0.14*	*10*	*44.84*	*20.64*	*10.07*	30.71
MH8	*CB1*	*0.17*	*16*	*43.02*	*50.59*	*5.58*	56.17

MH5B	*CB16*	*0.01*	*6*	*1.56*	*0.31*	*0.00*	0.31
MH5A	*CB17*	*0.09*	*9*	*25.47*	*0.84*	*5.10*	5.94
CB20	**CB20**	**0.12**	**15**	**30.02**	**12.51**	**0.00**	**12.51**
MH22	**MH22**	**0.06**	**6**	**4.00**	**2.87**	**46.61**	**49.48**
CB24	**CB24**	**0.10**	**15**	**22.31**	**0.00**	**0.00**	**0.00**
CB25	**CB25**	**0.02**	**6**	**2.36**	**0.27**	**0.00**	**0.27**
MH21	**MH21**	**0.24**	**33**	**81.05**	**11.79**	**96.68**	**108.47**
CBMH2	*CBMH2*	*0.08*	*20*	*11.83*	*6.21*	*0.00*	6.21
CBMH1C	*CB7*	*0.08*	*30*	*7.30*	*6.97*	*0.00*	6.97
CBMH1B	*CB6*	*0.07*	*20*	*9.01*	*13.66*	*0.00*	13.66
CBMH1A	*CB5*	*0.06*	*15*	*8.87*	*3.41*	*0.00*	3.41
MH10A	*CB4*	*0.03*	*6*	*5.42*	*10.62*	*0.00*	10.62
MH10B	*CBMH1*	*0.08*	*20*	*11.83*	*0.00*	*0.00*	0
CBMH20	**CBMH20**	**0.53**	**15**	**128.26**	**173.14**	**0.00**	**173.14**
TOTAL		**1.88**	**242**	**437.15**	**313.83**	**164.04**	**477.87**

** Existing drainage areas are grey hatched.*

During interim conditions, the total restrictions on the site, rooftops and uncontrolled flows is 316.92 l/s (242 l/s + 47.00 l/s + 3.10 L/s +24.82 l/s), which is less than the allowable release of 468.42 l/s noted in section 4.6. The interim site grading and ponding have been designed to control water generated during the 1:100-year event, with no overflow leaving the site. Interim Grading Plan C-201, Interim Storm Drainage Area Plan C-501 and Interim Ponding Plan C-601 are included in **Appendix D**.

5 Grading and Roads

5.1 Site Grading

The existing grades within portions of the proposed development lands vary significantly due to the existing topography of the site. The grading plan will require the balancing of various requirements including but not limited to geotechnical constraints, minimum/maximum slopes, overland routing of stormwater, all to ensure the site is graded in accordance with municipal and accessibility standards.

Refer to the grading plan provided in **Appendix E**.

In order to meet the stringent stormwater management criteria, every effort was made to reduce uncontrolled discharge from the site. In landscape areas where typical 2-7% grading cannot be met, 3:1 maximum terracing has been utilized to tie the proposed grading into existing.

5.2 Road Network

No public roads are proposed through the site. A minimum 9.0m wide drive aisle has been provided, as shown on the Site Plan in **Appendix A.** An internal Fire route has been shown where fire truck access is required, as determined by the site architect.

There are a total of 387 parking stalls provided, including 160 parking stalls for Building A & D, 194 for Building B and 33 for Building C. A total of 7 barrier-free parking stalls are provided for the proposed Building B.

Pedestrian access facilities are provided in the unsecured area of the site nearest to Bank Street and Dun Skipper Drive, which provide access to the building.

A bicycle parking facility has been proposed adjacent to each building entrance where feasible.

Earthbin (or similar approved type) garbage facilities have been provided throughout.

Noise attenuation features and indoor noise clause provisions will not be required for commercial use lands for road noise generated by the adjacent roads.

6 Source Controls

6.1 General

Since an end of pipe treatment facility is already provided for the development lands, stormwater site management for the subject lands will focus on site level or source control management of runoff. Such controls or mitigative measures are proposed for this development not only for final development but also during construction and build out. Some of these measures are:

- Flat site grading where possible
- Vegetation planting
- Groundwater recharge in landscaped areas

6.2 Lot Grading

Where possible, all of the proposed blocks within the development will make use of gentle surface slopes on hard surfaces such as asphalt and concrete. In accordance with local municipal standards, all grading will be between 0.5 and 5.0 percent for hard surfaces and 2.0 and 7.0 percent for all landscaped areas. Significant grade changes will be accomplished through the use of terracing (3:1 max slope), ramps and/or retaining walls. All street and parking lot catch basins shall be equipped with 3.0m subdrains on opposite sides of a curbside catch basin running parallel to the curb, and with 3.0m subdrains extending out from all 4 sides of parking lot catch basins.

6.3 Vegetation

As with most site plans, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along roadsides and within the individual blocks provides opportunities to re-create lost vegetation.

6.4 Groundwater Recharge

Groundwater recharge targets have not been identified for this site. Perforated sub-drain systems will be implemented at capture locations in all vegetated areas. This will promote increased infiltration during low flow events before water is collected by the storm sewer system.

7 Conveyance Controls

7.1 Generals

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- Vegetated swales
- Catch basin sumps and manhole sumps

7.2 Catch basins and Maintenance Hole Sumps

All catch basins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both rear yard and street catch basins will be to OPSD 705.02. All storm sewer maintenance holes serving local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

8 Sediment and Erosion Control Plan

8.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to possibly introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These may include:

- Until the local storm sewer is constructed, groundwater in construction trenches shall be pumped into a filter mechanism prior to release to the environment
- Vegetated swale sediment capture filter socks will remain on open surface structures such as maintenance holes and catch basins until these structures are commissioned and put into use
- Silt fence on the site perimeter will be installed

8.2 Trench Dewatering

Any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed, including sediment removal and disposal and material replacement as needed. It should be noted that that the contractor will be responsible for the design and management of the trap(s).

8.3 Seepage Barriers

In order to further reduce sediment loading to the stormwater management facility, seepage barriers will be installed on any surface water courses at appropriate locations that may become evident during construction. These barriers will be Light Duty Straw Bale Barriers per OPSD 219.100 and Heavy-Duty Silt Fence Barriers per OPSD 219.130; locations are shown on the Sediment and Erosion Control Plan included in **Appendix E**. They are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

8.4 Surface Structure Filters

All catch basins, and to a lesser degree, manholes, convey surface water to sewers. Until streets are asphalted and curbed, all catch basins and manholes will be constructed with sediment capture inserts or equivalent located between the structure frame and cover. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

9 Conclusion

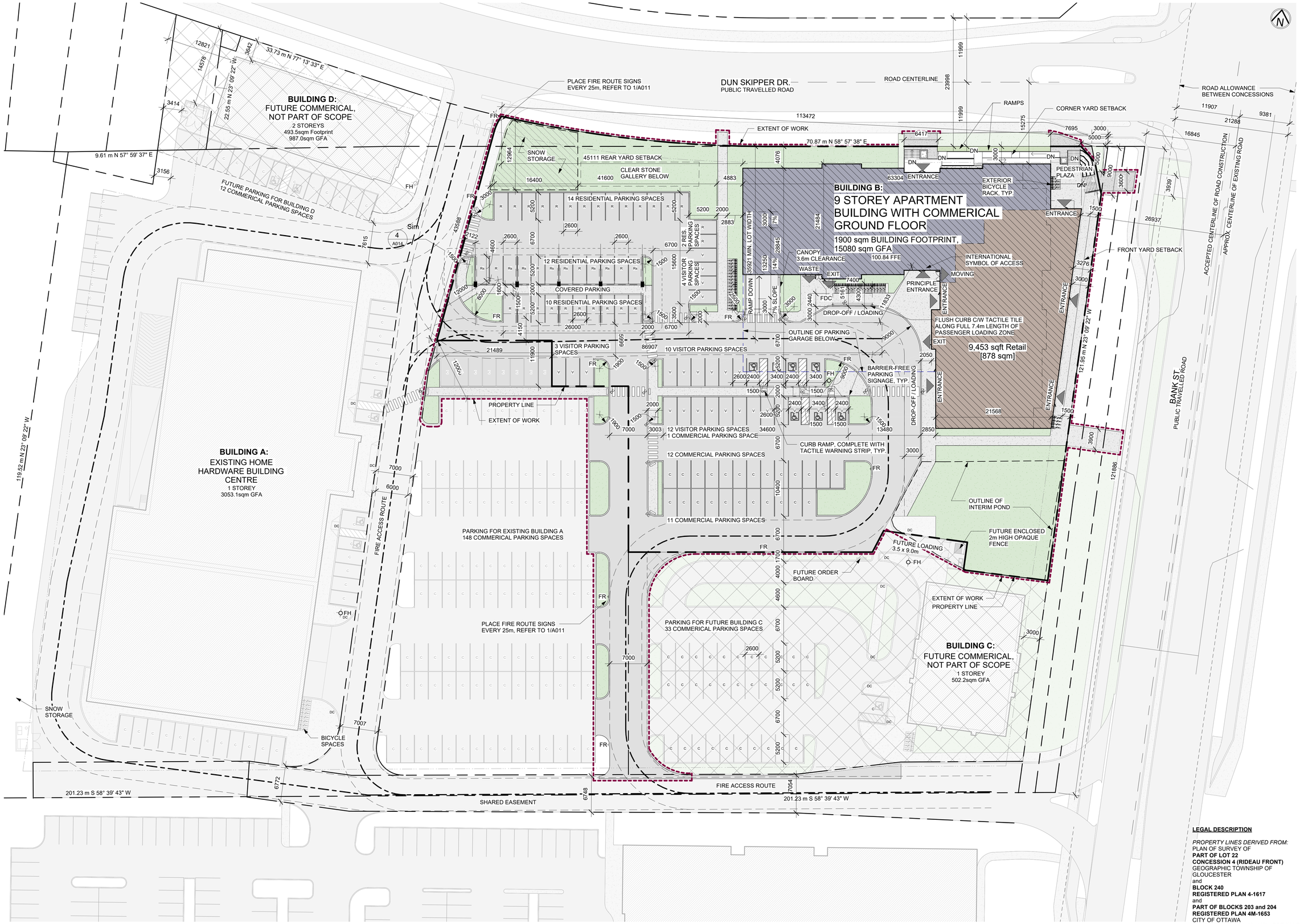
This report and the accompanying working drawings clearly indicate that the proposed development meets the requirements of the stakeholder regulators, including the City of Ottawa, provincial MECP and SNC. The proposed development is in general conformance with the recommendations of both the 2016 Updated Serviceability Report and the Pathways Phase 1 design.

There is a reliable water supply available adjacent to the proposed development; a wastewater outlet is available adjacent to the site; local storm sewers have been installed adjacent to the site and an expansion to the existing Findlay Creek Village Stormwater Facility has been constructed to collect and treat runoff from the subject site.

Based on the information provided within this report, the plans prepared for the subject development can be serviced to meet City of Ottawa requirements.

Appendix A

- **Site Plan**
- **Site Servicing Plan 148290-C-001**
- **AOV Legal Plan**
- **Site Servicing Plan 119351-C-001**
- **Pre-Consultation City Comments**
- **Study and Plan Identification List**



1 SITE PLAN
1 : 300

DO NOT SCALE DRAWINGS

CHECK AND VERIFY ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK.

DRAWINGS NOT TO BE USED FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY THE CONSULTANT.

THESE DRAWINGS HAVE BEEN DESIGNED IN COMFORMANCE WITH THE ONTARIO BUILDING CODE.

Revisions

Revision Number	Revision Date	Revision Description
1	2024-02-20	MINOR VARIANCE
2	2024-12-09	MINOR VARIANCE r1
3	2025-02-24	MINOR VARIANCE r1b
4	2025-03-07	SITE PLAN CONTROL r1
5	2025-04-24	SITE PLAN CONTROL r2
6	2025-06-03	SITE PLAN CONTROL r3
7	2025-07-16	SITE PLAN CONTROL r4

LEGEND

- SOD
- CONCRETE SIDEWALK
- ASPHALT
- FIRE HYDRANT
- FIRE DEPT. CONNECTION
- TACTILE STRIP
- D.C. DEPRESSED CURB
- ENTRANCE/EXIT
- CROSSWALK

OWNER
2668867 ONTARIO INC.
4836 BANK STREET, OTTAWA, K1X1G6

APPLICANT
ALISON CLARKE, THE STIRLING GROUP
DEVELOPMENT INITIATIVES INC
1650 PROVIDENCE CRESCENT, KINGSTON,
ON, K7P0H8

Alexander Wilson Architect Inc
Admiralty Place
103-20 Gore Street
Kingston Ontario, K7L 2L1
t: 613.545.3744 ext 213
f: 613.545.1411

Stamp

Project
155 DUN SKIPPER DRIVE
SENIORS APARTMENTS

155 DUN SKIPPER DRIVE

Drawing
SITE PLAN

Drawn By	AW	Checked By	-
Scale	1 : 300	Date	2025-07-16 10:12:03 AM
Project No.	2330	Revision	7
Drawing No.	A010		

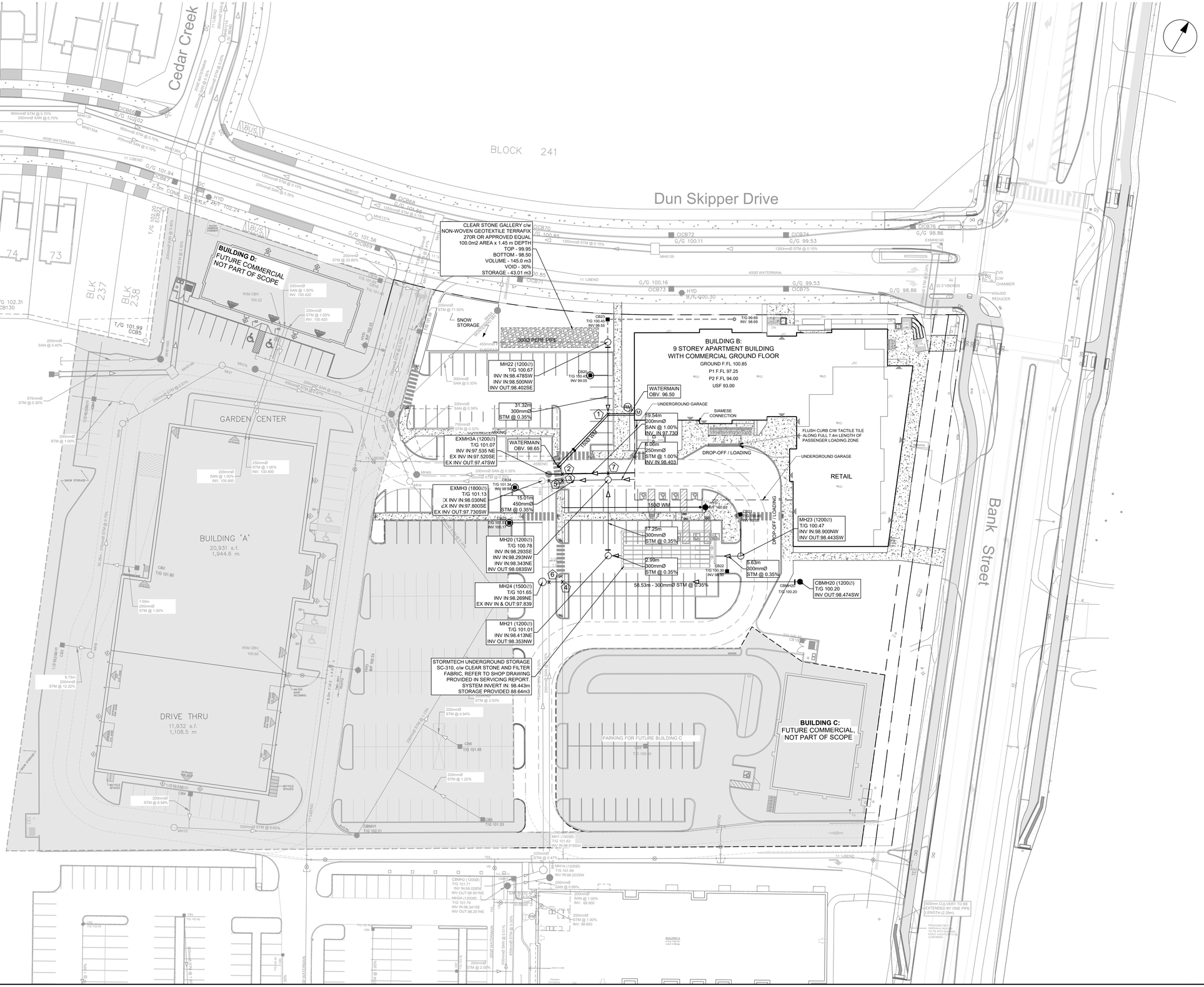
1:1

LEGAL DESCRIPTION

PROPERTY LINES DERIVED FROM:
PLAN OF SURVEY OF
PART OF LOT 22
CONCESSION 4 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF
GLOUCESTER
and
BLOCK 240
REGISTERED PLAN 4-1617
and
PART OF BLOCKS 203 and 204
REGISTERED PLAN 4M-1653
CITY OF OTTAWA
BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

PROPERTY PIN: 043285555

APPLICATION NUMBER D07-12-24-0169
PLAN NUMBER: 19213



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Arcadis Professional Services (Canada) Inc.
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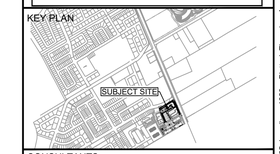
ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN



CONSULTANTS

1:400

SEAL

LICENSED PROFESSIONAL ENGINEER
L.D. 45. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **D.G.Y.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE

GENERAL PLAN OF SERVICES

SHEET NUMBER	ISSUE
C-001	5

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D07-12-24-0169

Tomm

19213

SCALE CHECK
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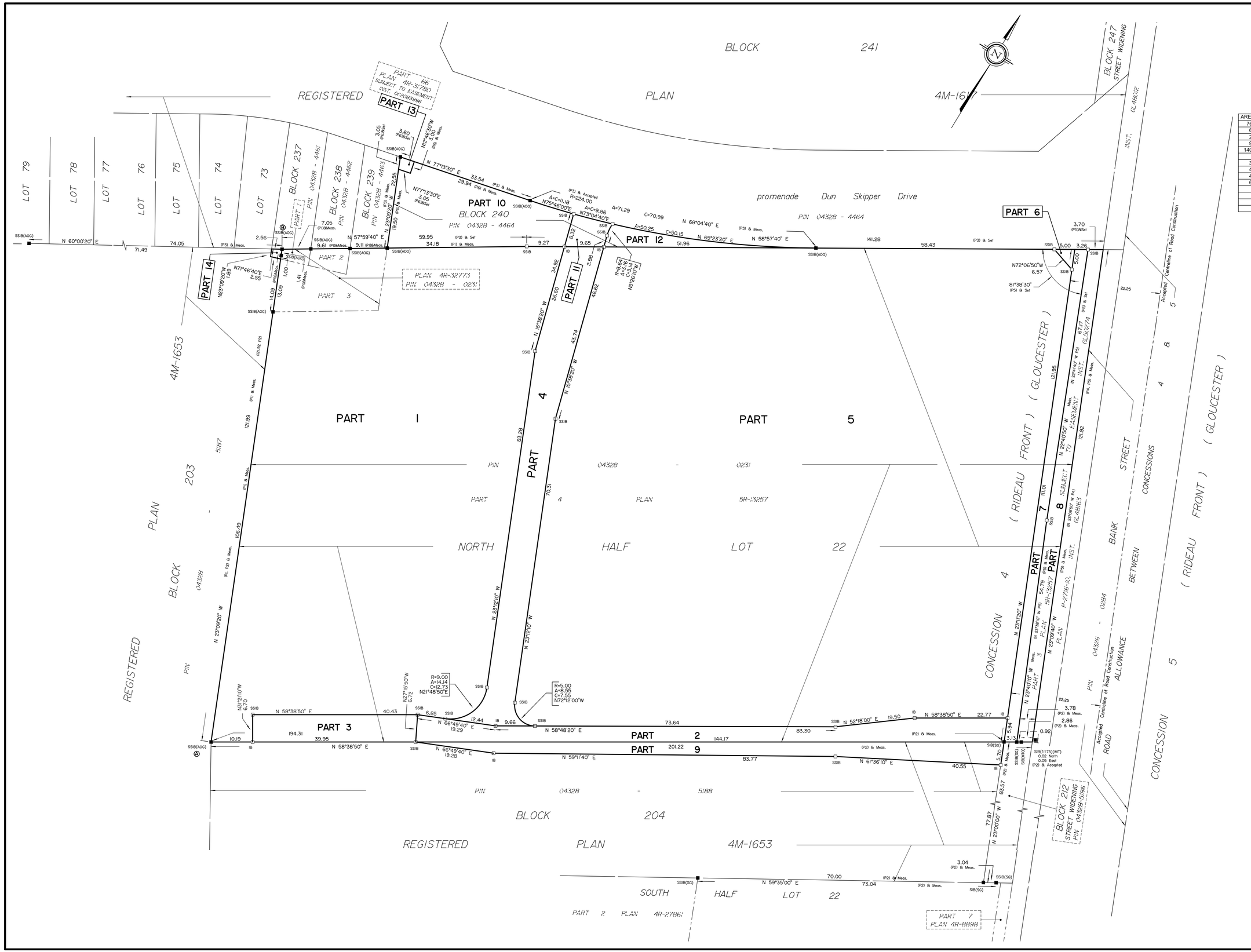


I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE:_____

_____
T. HARTWICK
ONTARIO LAND SURVEYOR

PLAN 4R-

RECEIVED AND DEPOSITED

DATE: _____

_____
REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4.

SCHEDULE

AREA (sqm)	PART	LOT / BLOCK	CONCESSION / PLAN	PIN
7621.5	1	PART OF 22	4 (RIDEAU FRONT)	ALL OF 04328-0231
647.5	2			
269.4	3			
967.7	4			
14006.8	5			
12.4	6			
353.7	7			
483.2	8			
477.6	9	PART OF 204	4M-1653	PART OF 04328-5188
653.4	10	ALL OF 240	4M-1617	ALL OF 04328-4464
66.6	11			
99.8	12			
10.0	13			
5.4	14	PART OF 203	4M-1653	PART OF 04328-5187

Part 8: Subject to easement, Inst. GL50274.
Part 13: Subject to easement, Inst. OC2083996.

PLAN OF SURVEY OF
PART OF 22
CONCESSION 4 (RIDEAU FRONT)
Geographic Townsgip of Gloucester
and
BLOCK 240
REGISTERED PLAN 4M-1617
and
PART OF BLOCKS 203 and **204**
REGISTERED PLAN 4M-1653
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 400

16 12 8 4 0 8 16 Metres

Metric

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

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the __ day of _____ 2020.

_____ Date

_____
T. Hartwick
Ontario Land Surveyor

Notes & Legend

—□—	Denotes	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
(WIT)	"	Witness
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	"	Measured
(P1)	"	Plan 4R-32773
(P2)	"	Registered Plan 4M-1653
(P3)	"	Registered Plan 4M-1617
(P4)	"	Plan 4R-29630
(P5)	"	Plan 5R-13257
(P6)	"	Plan 4R-31780

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99996.

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations on reference points A and B, shown hereon, having a bearing of N 23°09'20" W and are referenced to Specified Control Points 01919760735 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

For bearing comparisons, a rotation of 0°40'40" counter-clockwise was applied to bearings on plan (P5).

Coordinates are derived from Can-Net 2016 Real Time Network GPS observations referenced to Specified Control Points 01919760735 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

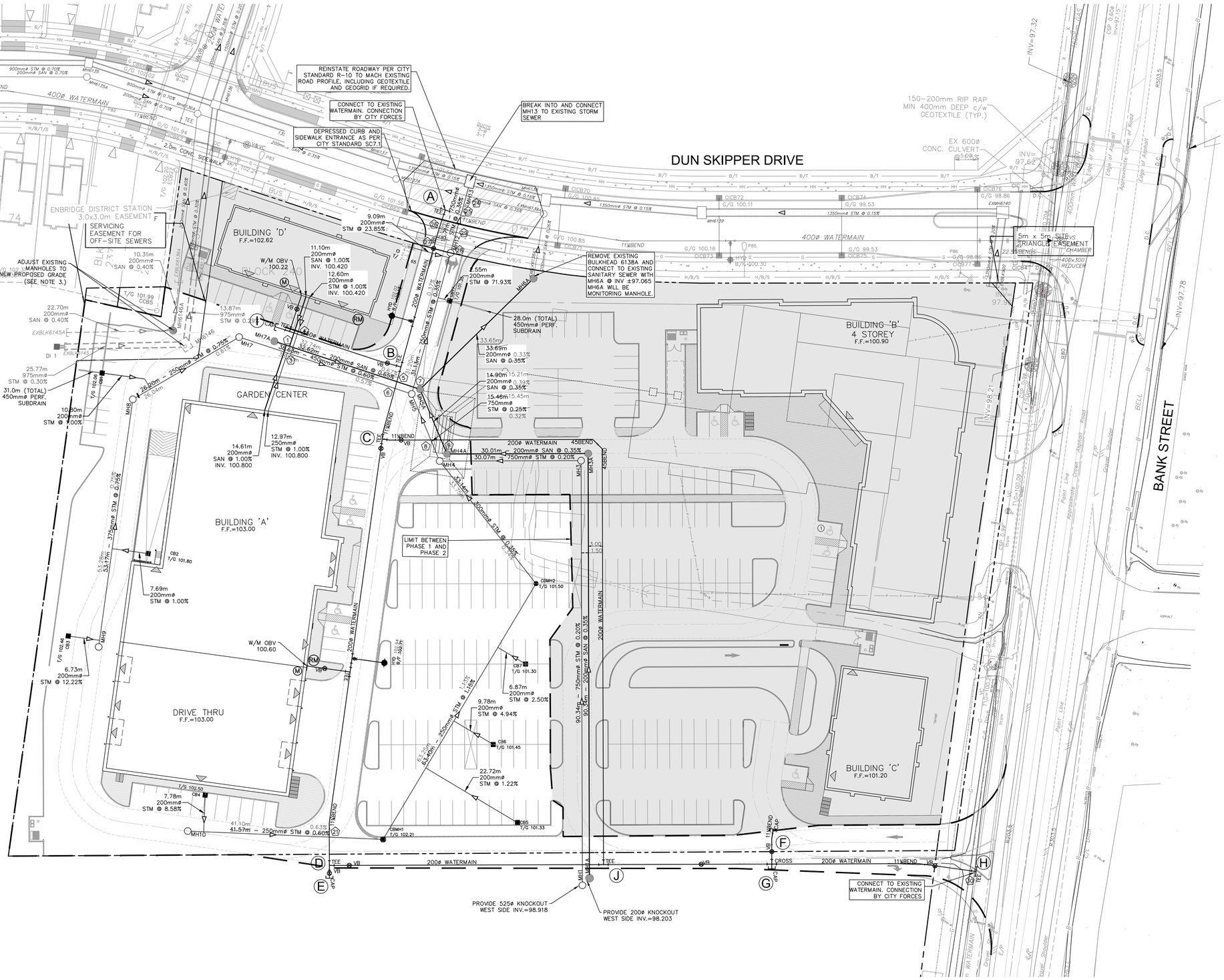
. 01919760735	Northing	5026903.34	Easting	376968.72
. 01919871649	Northing	5007189.87	Easting	372435.05
. Point A	Northing	5019079.47	Easting	376200.08
. Point B	Northing	5019191.65	Easting	376152.10

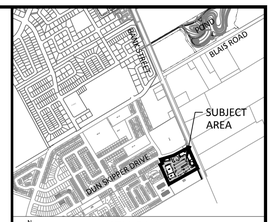
Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

11

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. 18835-20 Atwd Pt L1 22 C4 RF GL R D7 | N





KEY PLAN
(NTS)

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR H.A. KEN SHIPMAN SURVEYING LTD.
3. 0 EXISTING SANITARY MANHOLE - MH6146A AS-BUILT F/C = 102.019 TO BE ADJUSTED TO ±102.160
   EXISTING STORM MANHOLE - MH61646 AS-BUILT F/C = 102.018 TO BE ADJUSTED TO ±102.24.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10	RELOCATED SEWERS AND WM IN PHASE 2	JIM	2023:03:24
9	RECORD DRAWINGS (PHASE 1)	JIM	2022:08:19
8	ADD PHASING	JIM	2020:06:23
7	REVISED AS PER CITY COMMENTS	JIM	2020:04:20
6	REVISED AS PER CITY COMMENTS	JIM	2020:04:02
5	ISSUED FOR TENDER	JIM	2020:03:18
4	REVISED AS PER CITY COMMENTS	JIM	2020:03:13
3	REVISED AS PER CITY COMMENTS	JIM	2019:12:09
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	JIM	2019:10:11
1	ISSUED FOR SPA	JIM	2019:04:15

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
BANK STREET DEVELOPMENT
4836 BANK STREET

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2023/03/24
PROVINCE OF ONTARIO

Drawing Title
SITE SERVICING PLAN

Scale
1 : 400

Design	Date
SEL	FEB. 2019
Drawn: DPS	Checked: JIM
Project No. 119351	Drawing No. 001

D07-12-19-0092

#17977

Appendix B

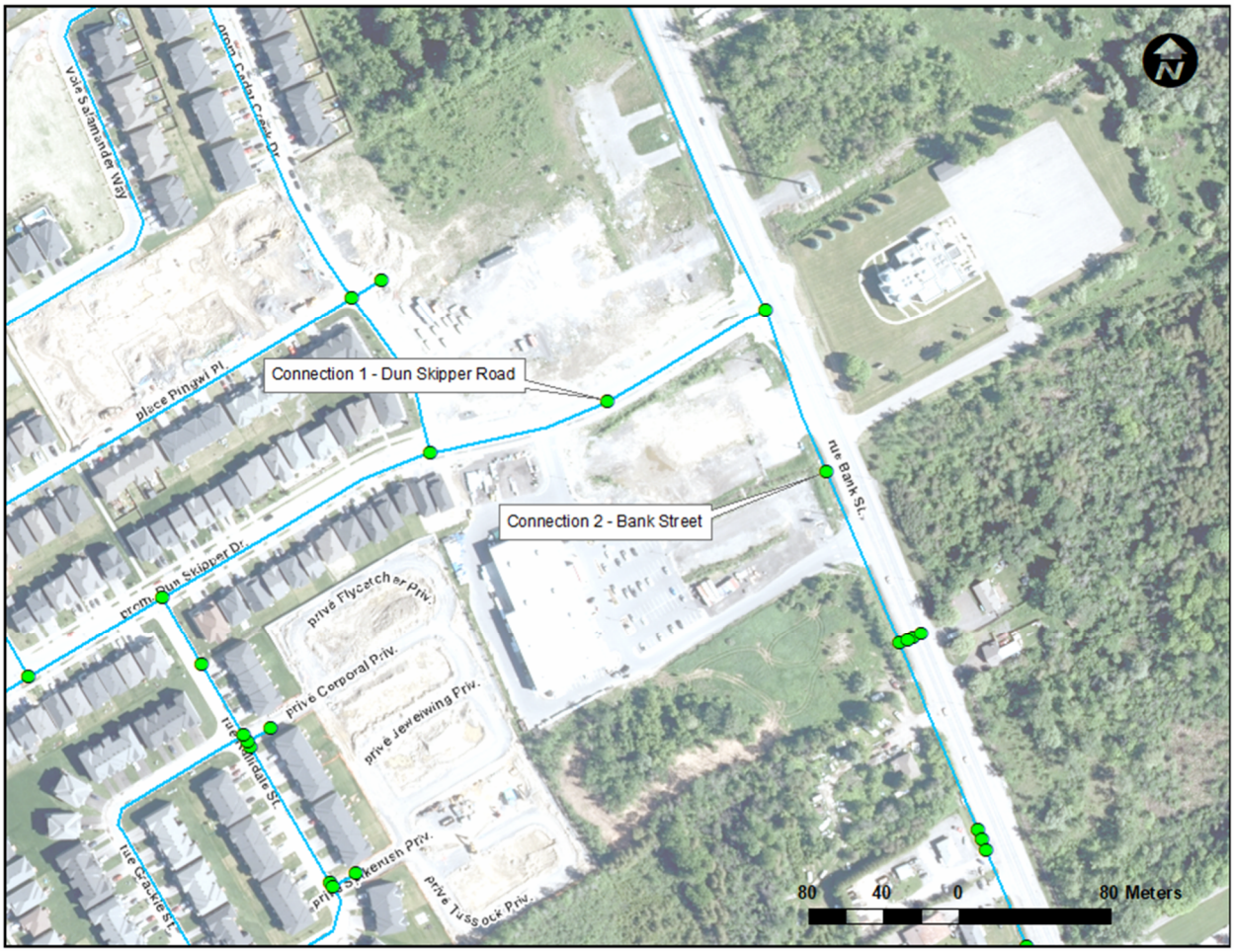
- **Watermain Boundary Conditions**
- **Water Demand Calculations**
- **FUS Calculations**
- **Water Model Results**

Boundary Conditions
155 Dun Skipper Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	58	0.97
Maximum Daily Demand	138	2.30
Peak Hour	299	4.98
Fire Flow Demand #1	11,000	183.33

Location



Results

Existing Condition (Pre- SUC Pressure Zone Reconfiguration)

Connection 1 – Dun Skipper Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	78.3
Peak Hour	143.9	63.1
Max Day plus Fire Flow 1	125.1	36.3
Ground Elevation =	99.5	m

Connection 1 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.6	79.1
Peak Hour	143.9	63.9
Max Day plus Fire Flow 1	124.6	36.4
Ground Elevation =	99.0	m

Future Condition (Post- SUC Pressure Zone Reconfiguration)

Connection 1 – Dun Skipper Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.3	67.9
Peak Hour	144.6	64.1
Max Day plus Fire Flow 1	140.2	57.8
Ground Elevation =	99.5	m

Connection 1 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.3	68.7
Peak Hour	144.3	64.5
Max Day plus Fire Flow 1	139.2	57.2
Ground Elevation =	99.0	m

Notes

1. Any connection to a watermain 400 mm or larger should be approved by DWS as per the Water Design Guidelines Section 2.4 Review by Drinking Water Services.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

IBI GROUP

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : **4836 Bank Street**
LOCATION : **Leitrim Development Area - City of Ottawa**
DEVELOPER : **Leitrim Home Hardware**

FILE: 119351.5.7.3
DATE PRINTED: 22-Apr-25
DESIGN: LME
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS 1-BED	RESIDENTIAL UNITS 2-BED	RESIDENTIAL UNITS 3-BED	HOTEL BEDS	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL INST. (ha.)	NON-RESIDENTIAL RETAIL (m^2)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY ` Res.	MAXIMUM HOURLY ` Non-res.	MAXIMUM HOURLY ` Total	FIRE DEMAND (l/min)
T-120																	
(Building A and D)							3,490	0.00	0.10	0.10	0.00	0.15	0.15	0.00	0.27	0.27	
T-150																	
(Building B Revised)	87	36	18				878	0.82	0.025	0.85	2.05	0.04	2.09	4.51	0.07	4.58	10,000
T-160																	
(Building C)							502	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.04	0.04	
Fire Nodes																	
TH-110, TH-030																	11,000
TH-020, TH-040																	10,000
TOTAL										**0.96**			**2.26**			**4.89**	

ASSUMPTIONS

RESIDENTIAL DENSITIES

1 Bedroom Units 1.4 p / p / u
2 Bedroom Units 2.1 p / p / u
3 Bedroom Units 3.1 p / p / u

AVG. DAILY DEMAND

- Hotel (Table 4.2) 225 l / cap / day
- Retail (Shopping Centre) 2,500 l / 1000m^2 / day

MAX. DAILY DEMAND

- Hotel (Table 4.2) 338 l / cap / day
- Retail (Shopping Centre) 3,750 l / 1000m^2 / day

MAX. HOURLY DEMAND

- Hotel (Table 4.2) 608 l / cap / day
- Retail (Shopping Centre) 6,750 l / 1000m^2 / day

FIRE FLOW

- Hotel 10,000 l / min
- Retail 11,000 l / min

ARCADIS IBI GROUP
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
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WATERMAIN DEMAND CALCULATION SHEET
155 Dun Skipper Dr, Seniors Departments | 2668867 Ontario Inc.
148290-6.0 | Rev #2 | 2025-04-22
Prepared By: WZ | Checked By: RM

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	1 bedroom UNITS	2 bedroom UNITS	3 bedroom UNITS	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
Building B	87	36	18	253.20		0.0878		0.821	0.025	0.85	2.05	0.04	2.09	4.51	0.07	4.58	10,000
TOTAL	**87**	**36**	**18**	**253.20**		**0.09**				**0.85**			**2.09**			**4.58**	

ASSUMPTIONS

POPULATION DENSITY		WATER DEMAND RATES		PEAKING FACTORS			FIRE DEMANDS	
1 Bedroom Units	1.4 persons/unit	Residential	280 l/cap/day	Maximum Daily			Single Family	10,000 l/min (166.7 l/s)
				Residential	2.5 x avg. day			
2 Bedroom Units	2.1 persons/unit			Commercial	1.5 x avg. day		Semi Detached &	
		Commercial Shopping Center	2,500 L/(1000m2)/day	Maximum Hourly			Townhouse	10,000 l/min (166.7 l/s)
3 Bedroom Units	3.1 persons/unit			Residential	2.2 x max. day			
				Commercial	1.8 x max. day		Medium Density	15,000 l/min (250 l/s)

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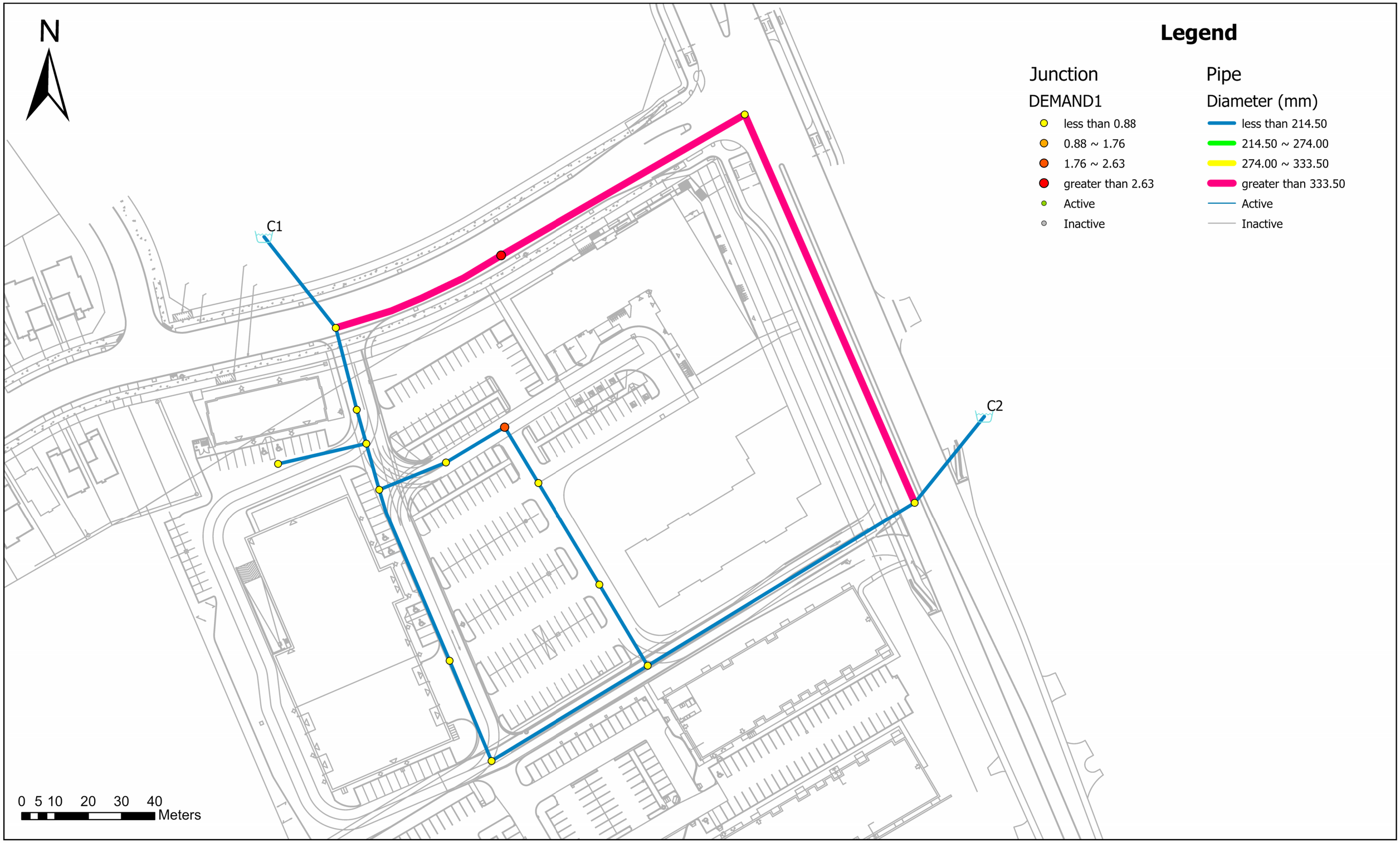
FIRE UNDERWRITERS SURVEY
155 Dun Skipper Dr, Seniors Departments | 2668867 Ontario Inc.
148290-6.0 | Rev #1 | 2024-11-26
Prepared By: WZ | Checked By: RM

STEP	Contents	Description		Adjustment Factor		Result	
1	**Building A (9-storey)**	1st Floor Area	1900	Height 2.8m	1	1900	m2
		2nd Floor Area	1900	Height 2.8m	1	1900	m2
		3rd Floor Area	1680	Height 2.8m	0.5	840	m2
		4th Floor Area	1680	Height 2.8m	0.5	840	m2
		5th Floor Area	1680	Height 2.8m	0.5	840	m2
		6th Floor Area	1665	Height 2.8m	0.5	833	m2
		7th Floor Area	1665	Height 2.8m	0.5	833	m2
		8th Floor Area	1665	Height 2.8m	0.5	833	m2
		9th Floor Area	1672	Height 2.8m	0.5	836	m2
	Total Effective Floor Area	(Storage space exceeding 3m in height, floor area X 3)				**6726.8**	m2
2	**Type of Construction**	**Type V** Wood Frame	1.5	Type II Noncombustible Construction	0.8		
		Type III Ordinary Construction	1.0				
		Type II Noncombustible Construction	0.8				
		Type I Fire Resistive Construction	0.6				
3	**Required Fire Flow**	RFF = 220C√A, rounded to nearest 1000 L/min				**14000**	L/min
4	**Occupancy and Contents**	Noncombustible Contents	-25%	Combustible - Residential/Commercial	0%	0	L/min
		Limited Conbustible Contents	-15%				
		Combustible Contents	0%				
		Free Burning Contents	15%				
		Rapid Burning Contents	25%				
	Fire Flow					**14000**	L/min
5	**Automatic Sprinkler Protection**	Automatic Sprinkler Conforming to NFPA 13	-30%	Yes	-30%	-4200	L/min
		Standard Water Supply for both the system and Fire Department Hose Lines	-10%	Yes	-10%	-1400	L/min
		Fully Supervised System	0%	No			
	Total Sprinkler Adjustment					**-5600**	L/min
6	**Exposure Adjustment**	Based on **Table 6** Exposure Adjustement Charges for Subject Building					
	North	Separation (m)	>30	With unprotected opening	0%	0	L/min
		Length X Height Factor (m.storeys)	0				
		Construction Type	Type II				
	South	Separation (m)	21.9	With unprotected opening	10%	1400	L/min
		Length X Height Factor (m.storeys)	108				
		Construction Type	Type II				
	East	Separation (m)	>30	With unprotected opening	0%	0	L/min
		Length X Height Factor (m.storeys)	0				
		Construction Type	Type II				
	West	Separation (m)	>30	With unprotected opening	0%	0	L/min
		Length X Height Factor (m.storeys)	0				
		Construction Type	Type II				
	Total Exposure Adjustment					**1400**	L/min
7	**Total Required Fire Flow**					**9800**	L/min
		Rounded to Nearest 1000 L/min				**10000**	L/min
						167	L/s

Notes 1. Fire flow calculation are based on Fire Underwriters Survey version 2020.

2. If any vertical opening in the building are unprotected (e.g. interconnected floor spaces, elevators etc.), consider the two largest adjoining floor area plus 50% of all floors immediately above them up to a maximum of eight.

Junctions and Pipes Layouts



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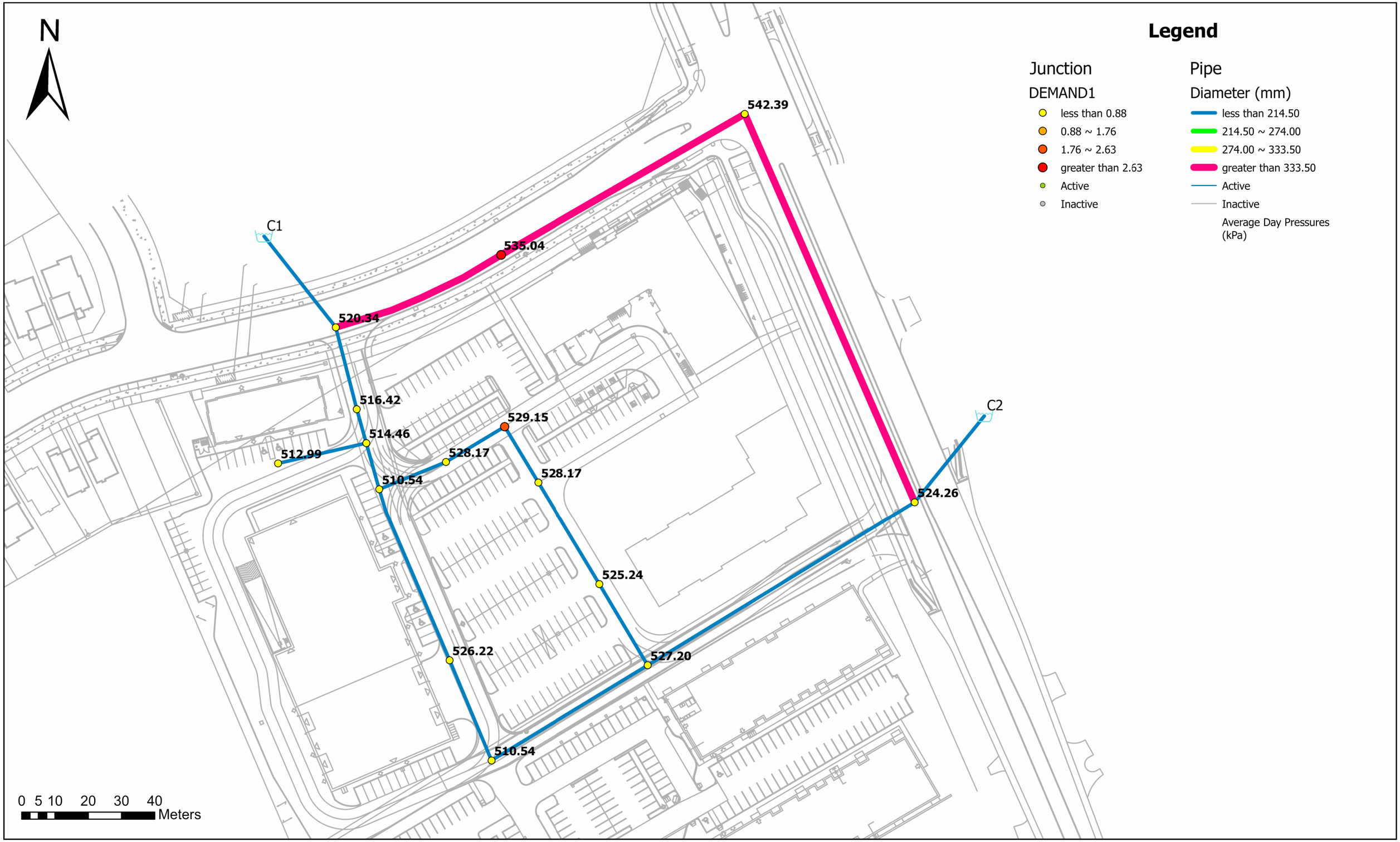
Average Day Pressure (kPa)



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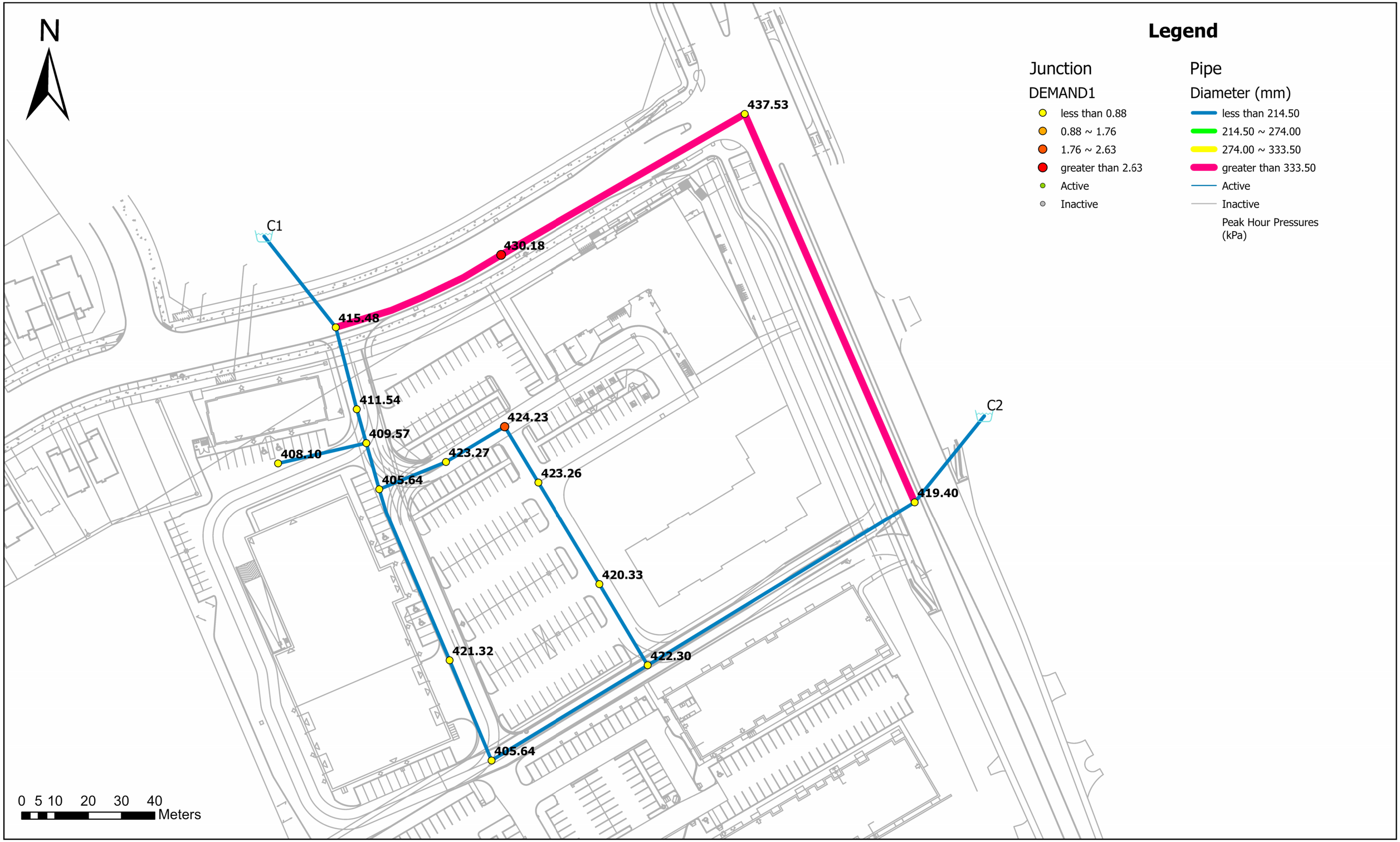
Average Day Results

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1		B-200	0.68	99.25	154.60	542.39	3.45
2		S15-300	2.34	100.00	154.60	535.04	2.85
3		T-100	0.00	101.50	154.60	520.34	0.00
4		T-110	0.00	102.10	154.60	514.46	0.59
5		T-120	0.10	102.25	154.60	512.99	2.02
6		T-130	0.00	102.50	154.60	510.54	2.86
7		T-140	0.00	102.50	154.60	510.54	13.76
8		T-150	0.85	100.60	154.60	529.15	3.86
9		T-160	0.01	101.00	154.60	525.24	2.85
10		T-170	0.00	100.80	154.60	527.20	2.13
11		T-180	0.00	101.10	154.60	524.26	0.01
12		TH-010	0.00	101.90	154.60	516.42	0.42
13		TH-020	0.00	100.70	154.60	528.17	3.22
14		TH-030	0.00	100.90	154.60	526.22	20.65
15		TH-040	0.00	100.70	154.60	528.17	3.78

Peak Hour Pressure (kPa)



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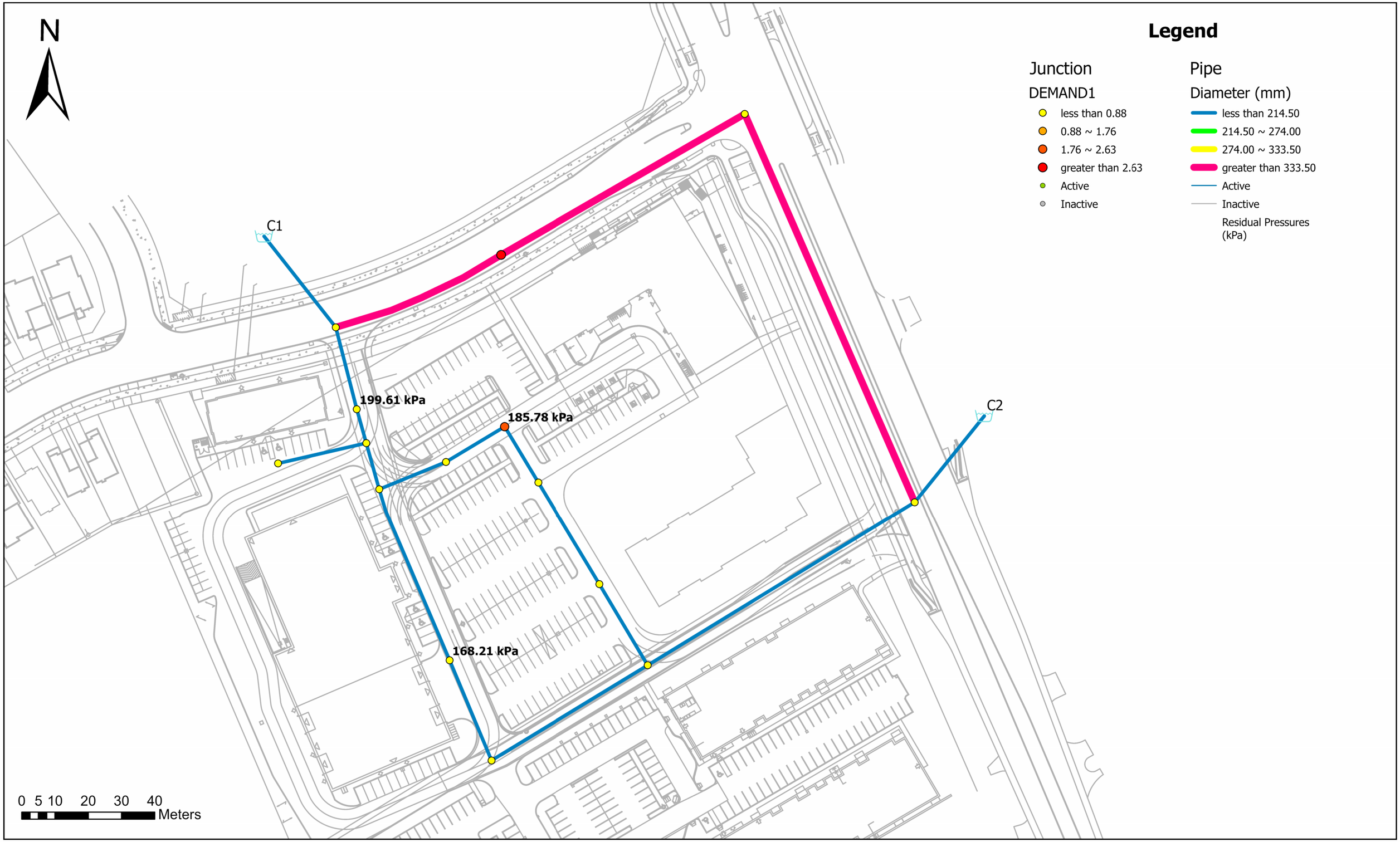
Peak Hour Results

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1		B-200	1.02	99.25	143.90	437.53	1.41
2		S15-300	6.31	100.00	143.90	430.18	1.20
3		T-100	0.00	101.50	143.90	415.48	0.00
4		T-110	0.00	102.10	143.90	409.57	0.12
5		T-120	0.27	102.25	143.90	408.10	0.64
6		T-130	0.00	102.50	143.90	405.65	0.66
7		T-140	0.00	102.50	143.90	405.65	4.50
8		T-150	4.58	100.60	143.89	424.23	0.81
9		T-160	0.04	101.00	143.89	420.33	0.56
10		T-170	0.00	100.80	143.90	422.30	0.42
11		T-180	0.00	101.10	143.90	419.40	0.00
12		TH-010	0.00	101.90	143.90	411.54	0.08
13		TH-020	0.00	100.70	143.89	423.27	0.73
14		TH-030	0.00	100.90	143.90	421.32	6.91
15		TH-040	0.00	100.70	143.89	423.26	0.73

Max day + Fire Flow



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Max Day + Fire Flow Results

		ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Hydrant Available Flow (L/s)	Hydrant Pressure at Available Flow (kPa)
1	☐	T-150	2.09	237.93	124.88	166.67	185.80	224.35	150.0
2	☐	TH-010	0.00	226.12	124.98	183.33	199.62	330.25	150.0
3	☐	TH-030	0.00	235.02	124.88	183.33	168.23	209.24	150.0

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Water Age (hrs)
1		2107	S15-300	B-200	84.75	393.00	120.00	83.06	0.68	0.12	0.02
2		791	B-200	T-180	127.53	393.00	120.00	82.38	0.68	0.18	0.06
3		P13	T-100	TH-010	25.45	204.00	110.00	18.24	0.56	0.06	0.00
4		P15	TH-010	T-110	10.56	204.00	110.00	18.24	0.56	0.03	0.01
5		P17	T-110	T-120	27.22	155.00	100.00	0.15	0.01	0.00	0.02
6		P19	T-130	T-110	14.44	204.00	110.00	-18.09	0.55	0.03	0.02
7		P21	T-130	TH-020	21.69	204.00	110.00	10.01	0.31	0.02	0.03
8		P23	T-130	TH-030	55.80	204.00	110.00	8.08	0.25	0.03	0.03
9		P25	TH-030	T-140	32.64	204.00	110.00	8.08	0.25	0.02	0.09
10		P27	T-150	TH-020	20.64	204.00	110.00	-10.01	0.31	0.02	0.04
11		P29	TH-040	T-150	19.63	204.00	110.00	-7.92	0.24	0.01	0.06
12		P31	TH-040	T-160	35.83	204.00	110.00	7.92	0.24	0.02	0.09
13		P33	T-160	T-170	28.39	204.00	110.00	7.90	0.24	0.01	0.13
14		P35	T-140	T-170	55.09	204.00	110.00	8.08	0.25	0.03	0.12
15		P39	T-170	T-180	94.13	204.00	110.00	15.98	0.49	0.18	0.17
16		P41	T-100	S15-300	54.54	393.00	120.00	86.57	0.71	0.08	0.00
17		P43	C2	T-180	1.00	204.00	110.00	-98.36	3.01	0.06	0.13
18		P45	C1	T-100	1.00	204.00	110.00	104.81	3.21	0.06	0.00

Appendix C

- **Sanitary Sewer Design Sheet**
- **Sanitary Drainage Area Plan 148290-C-400**
- **Sanitary Sewer Design Sheet 119351**
- **Sanitary Drainage Area Plan 119351-C-400**

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

155 Dun Skipper Drive
City of Ottawa
2668867 Ontario Inc.

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	1-BED	2-BED	3-BED		IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM			IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
EXISTING PHASE 1		*BLDG D*	*MH7A-MH5A*							*0.0*	*0.0*	*3.80*	*0.00*			*0.05*	*0.05*			*1.50*	*0.02*	*0.05*	*0.05*	*0.02*	*0.00*	*0.00*	*0.04*	*34.22*	*11.10*	*200*	*1.00*	*1.055*	*34.18*	*99.88%*
		BLDG A	*MH7A-MH5A*							*0.0*	*0.0*	*3.80*	*0.00*			*0.30*	*0.30*			*1.50*	*0.15*	*0.30*	*0.30*	*0.10*	*0.00*	*0.00*	*0.24*	*34.22*	*14.61*	*200*	*1.00*	*1.055*	*33.97*	*99.28%*
		MH7A	*MH5A*							*0.0*	*0.0*	*3.80*	*0.00*			*1.01*	*1.01*			*1.50*	*0.49*	*1.01*	*1.01*	*0.33*	*0.00*	*0.00*	*0.82*	*28.05*	*32.74*	*200*	*0.67*	*0.865*	*27.22*	*97.06%*
Future		BLDG C	MH1A-MH3A							*0.0*	0.0	3.80	0.00			0.05	0.05			1.50	0.02	0.05	0.05	0.02	0.00	0.00	0.04	34.22	50.00	200	1.00	1.055	34.18	99.88%
Phase 2		BLDG B	MH3A			87	36	18		*253.2*	253.2	3.49	2.86			0.19	0.19			1.50	0.09	0.19	0.19	0.06	0.00	0.00	3.02	34.22	19.54	200	1.00	1.055	31.20	91.18%
External		*MH1A*	*MH3A*	*1.54*		*180*				*252.0*	*505.2*	*3.38*	*5.53*			*0.86*	*0.86*			*1.50*	*0.42*	*0.86*	*0.86*	*0.29*	*0.00*	*0.00*	*6.23*	*19.66*	*92.55*	*200*	*0.33*	*0.606*	*13.42*	*68.28%*
		MH3A	*MH4A*							*0.0*	*505.2*	*3.38*	*5.53*			*0.42*	*1.29*			*1.50*	*0.63*	*0.42*	*1.29*	*0.43*	*0.00*	*0.00*	*6.58*	*21.37*	*30.45*	*200*	*0.39*	*0.659*	*14.79*	*69.20%*
		MH4A	*MH5A*							*0.0*	*505.2*	*3.38*	*5.53*			*0.02*	*1.31*			*1.50*	*0.64*	*0.02*	*1.31*	*0.43*	*0.00*	*0.00*	*6.60*	*21.49*	*15.21*	*200*	*0.39*	*0.663*	*14.89*	*69.30%*
		MH5A	*MH6A*							*0.0*	*505.2*	*3.38*	*5.53*			*0.17*	*2.49*			*1.50*	*1.21*	*0.17*	*2.49*	*0.82*	*0.00*	*0.00*	*7.56*	*19.56*	*33.65*	*200*	*0.33*	*0.603*	*12.00*	*61.35%*

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
1-BED	1.4	p/p/u	INST	28,000	L/Ha/day	
2-BED	2.1	p/p/u	COM	28,000	L/Ha/day	
3-BED	3.1	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

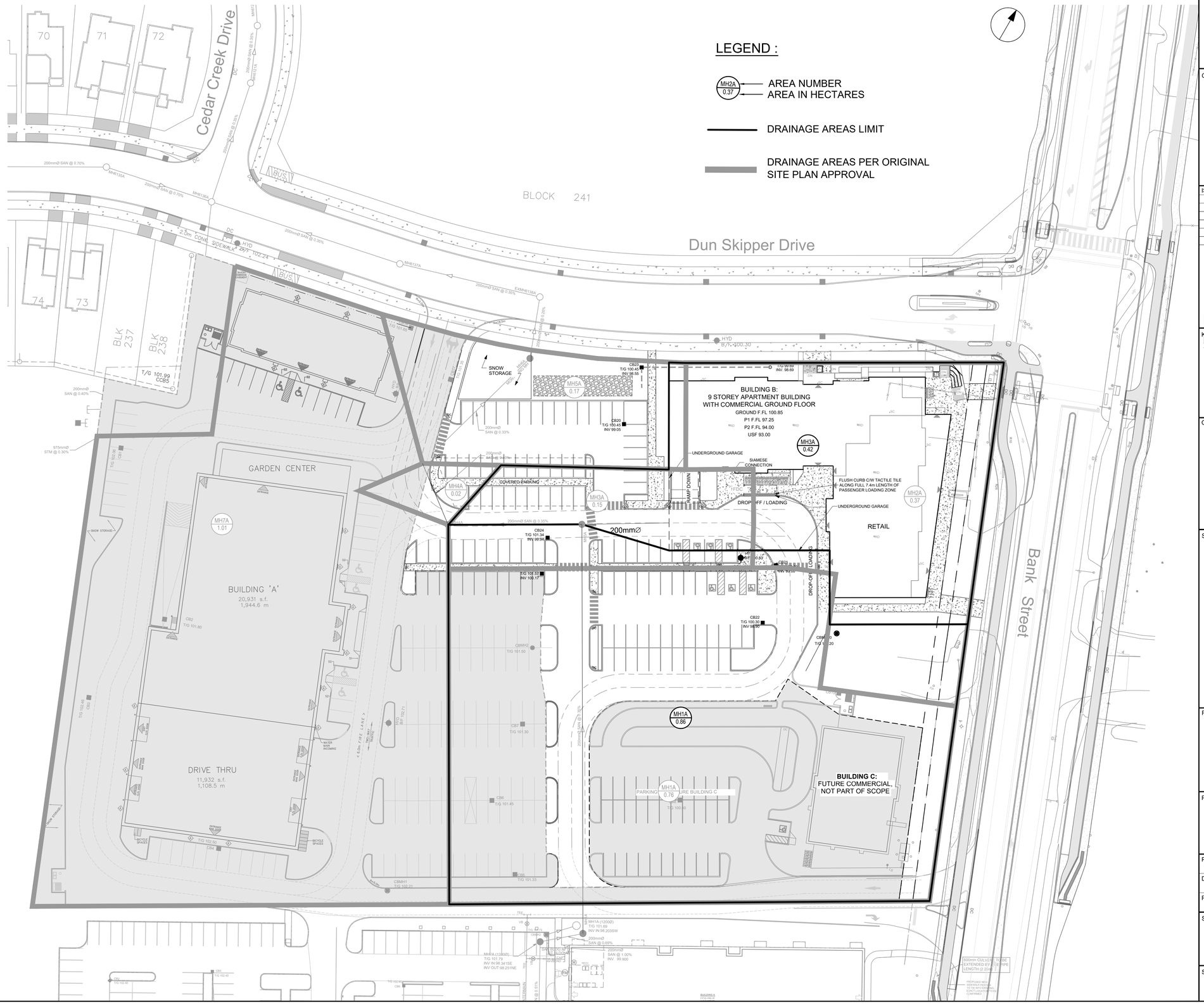
Designed: WZ

Checked: RM

Dwg. Reference: 148590-400

No.	Revision	Date
1	Submission No. 1	2024-11-26
2	Submission No. 2	2025-02-18
3	Submission No. 3	2025-04-22

File Reference:	Date:	Sheet No:
148590-6.04.04	2024-11-26	1 of 1



CLIENT

2668867 Ontario Inc.

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Arcadis Professional Services (Canada) Inc.
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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN

CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
L.I.D. #5 Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS
333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE

SANITARY DRAINAGE AREA PLAN

SHEET NUMBER	ISSUE
C-400	5

File Location: C:\DARoot\Jobs\3e80\basic2094\acad\Rev\52733\4194\ds4\files\b.7\d902471-15a4-4e64-8244-beb3a5f9697e\Project Files\7.03_Design\04_Civil\Sheets\C-400 SANITARY DRAINAGE AREA PLAN.dwg Last Saved: August 14, 2025, by mlinsen4626 Plotted: Thursday, August 14, 2025 7:58:00 PM by acessuser

D07-12-24-0169

SCALE CHECK 1 in 19213 10mm

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

4836 Bank Street
CITY OF OTTAWA
Home Hardware

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM		IND	CUM							L/s	(%)
		BLDG D	MH7A-MH5A							0.0	0.0	3.80	0.00			0.05	0.05			1.50	0.02	0.05	0.05	0.02	0.00	0.00	0.04	34.22	11.10	200	1.00	1.055	34.18	99.88%
		BLDG A	MH7A-MH5A							0.0	0.0	3.80	0.00			0.30	0.30			1.50	0.15	0.30	0.30	0.10	0.00	0.00	0.24	34.22	14.61	200	1.00	1.055	33.97	99.28%
		MH7A	MH5A							0.0	0.0	3.80	0.00			1.01	1.01			1.50	0.49	1.01	1.01	0.33	0.00	0.00	0.82	27.59	32.62	200	0.65	0.851	26.76	97.01%
		BLDG C	MH1A-MH2A							0.0	0.0	3.80	0.00			0.06	0.06			1.50	0.03	0.06	0.06	0.02	0.00	0.00	0.05	34.22	12.70	200	1.00	1.055	34.17	99.86%
Idone Commercial		MH1A	MH2A							0.0	0.0	3.80	0.00			2.35	2.35			1.50	1.14	2.35	2.35	0.78	0.00	0.00	1.92	20.24	83.16	200	0.35	0.624	18.32	90.53%
		BLDG B	MH2A-MH3A							0.0	0.0	3.80	0.00			0.22	0.22			1.50	0.11	0.22	0.22	0.07	0.00	0.00	0.18	34.22	17.46	200	1.00	1.055	34.04	99.48%
		MH2A	MH3A							0.0	0.0	3.80	0.00			0.37	2.72			1.50	1.32	0.37	2.72	0.90	0.00	0.00	2.22	20.24	12.25	200	0.35	0.624	18.02	89.03%
		MH3A	MH4A							0.0	0.0	3.80	0.00			0.15	2.87			1.50	1.40	0.15	2.87	0.95	0.00	0.00	2.34	20.24	68.50	200	0.35	0.624	17.90	88.43%
		MH4A	MH5A							0.0	0.0	3.80	0.00			0.02	2.89			1.50	1.40	0.02	2.89	0.95	0.00	0.00	2.36	20.24	14.90	200	0.35	0.624	17.88	88.35%
		MH5A	MH6A							0.0	0.0	3.80	0.00			0.17	4.07			1.50	1.98	0.17	4.07	1.34	0.00	0.00	3.32	20.24	33.69	200	0.35	0.624	16.92	83.59%

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	
APT	1.8	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

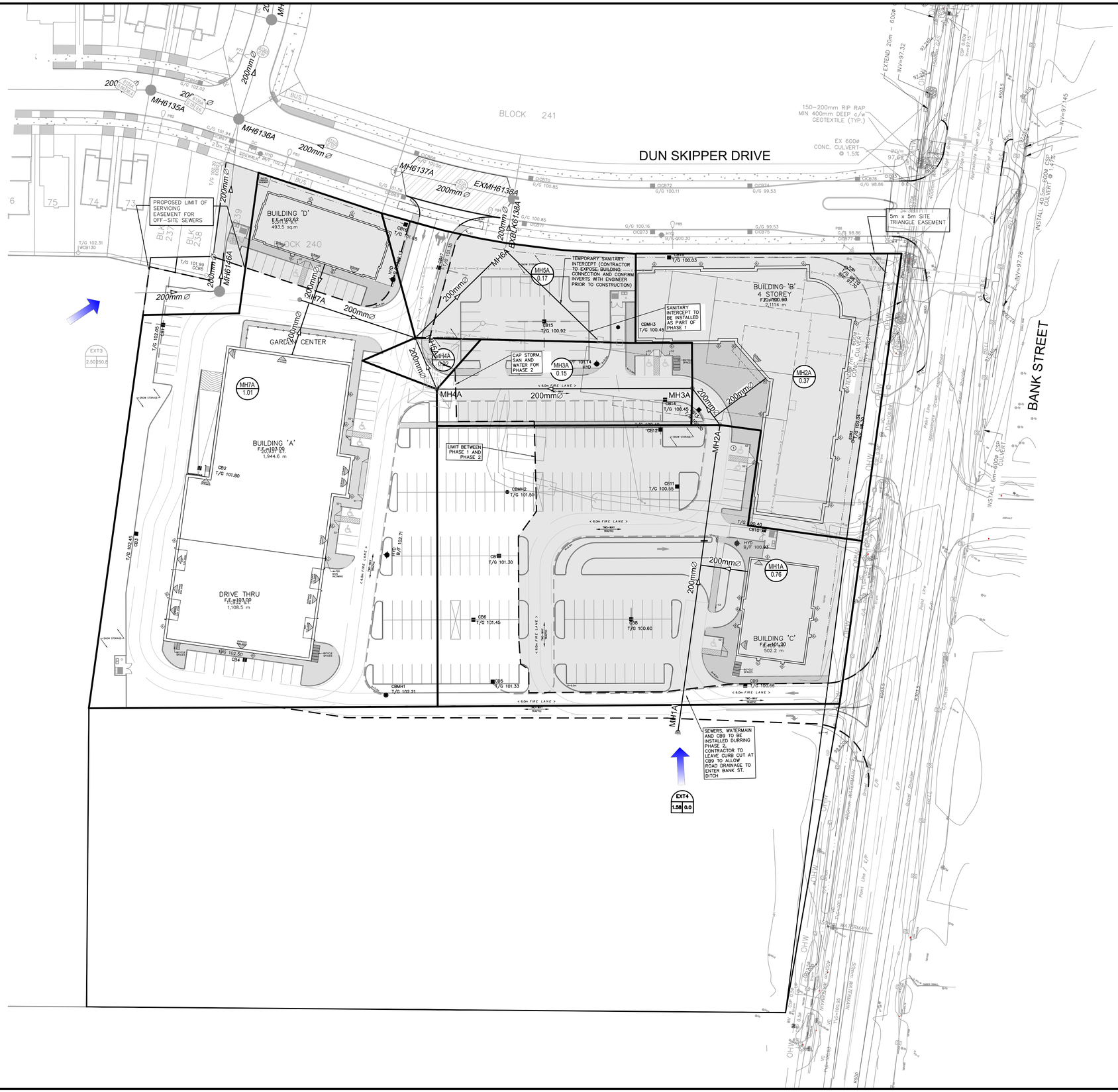
Designed: SEL

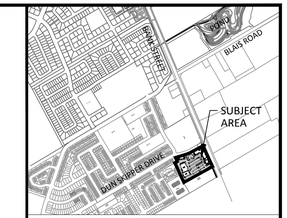
Checked: JIM

Dwg. Reference: 119351-501

No.	Revision	Date
1.	Report Name (Master Servicing Study, Adequacy of Public Services, Servicing Brief, ect) - Submission No. 1	2019-03-30

File Reference:		Date:	Sheet No:
119351.5.7.1		2019-03-30	1 of 1





KEY PLAN
(NTS)

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR H.A. KEN SHIPMAN SURVEYING LTD.

LEGEND :

- 6115A / 0.81|43.2 — EXISTING AREA NUMBER; EXISTING POPULATION; EXISTING AREA IN HECTARES
- FUTURE FLOW DIRECTION
- MH2A / 0.37 — EXISTING AREA NUMBER; EXISTING AREA IN HECTARES
- MH2A / 0.37 — AREA NUMBER; AREA IN HECTARES

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	ADD PHASING	JIM	2020:06:23
4	REVISED AS PER CITY COMMENTS	JIM	2020:04:20
3	REVISED AS PER CITY COMMENTS	JIM	2019:12:09
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	JIM	2019:10:11
1	ISSUED FOR SPA	JIM	2019:04:15

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

BANK STREET DEVELOPMENT

4836 BANK STREET

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2020/06/23
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale
1 : 500

Design	Date
SEL	FEB. 2019
Drawn	**Checked**
DPS	JIM
Project No.	**Drawing No.**
119351	400

D07-12-19-0092

#17977

Appendix D

- Storm Sewer Design Sheet
- Storm Water Management Sheet
- Storm Drainage Area Plan 148290-C-500
- Interim Storm Drainage Area Plan 148290-C-501
- Ponding Plan 148290-C-600
- Interim Ponding Plan 148290-C-601
- Stormtech Underground Chamber Specifications
- Orifice Sizing Calculations
- As-built Design Sheets 119351 & 137175 Pathways Block 204
- Storm Water Management Sheet 119351
- Storm Drainage Area Plan 119351-C-500
- Ponding Plan 119351-C-600

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

155 Dun Skipper Drive
City of Ottawa
2668867 Ontario Inc.

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.25	C= 0.30	C= 0.40	C= 0.50	C= 0.55	C= 0.65	C= 0.81	C= 0.75	C= 0.90	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
EXISTING PHASE 1	*MH9*	*CB3*	*MH9-MH8*								*0.12*			*0.25*	*0.25*	*10.00*	*0.11*	*10.11*	*76.81*	*104.19*	*122.14*	*178.56*	*19.22*	*26.07*	*30.56*	*44.68*		*19.22*	*34.22*	*6.73*	*200*			*1.00*	*1.055*	*15.00*	*43.84%*
	MH9B	*CB2*	*MH9-MH8*									*0.02*		*0.05*	*0.05*	*10.00*	*0.12*	*10.12*	*76.81*	*104.19*	*122.14*	*178.56*	*3.84*	*5.21*	*6.11*	*8.94*		*3.84*	*34.22*	*7.69*	*200*			*1.00*	*1.055*	*30.37*	*88.77%*
		MH9	*MH8*											*0.00*	*0.30*	*10.12*	*0.64*	*10.76*	*76.34*	*103.56*	*121.39*	*177.46*	*22.92*	*31.09*	*36.45*	*53.28*		*22.92*	*158.48*	*53.17*	*375*			*0.75*	*1.390*	*135.56*	*85.54%*
	MH8	*CB1*	*MH8-MH7*								*0.17*			*0.35*	*0.35*	*10.00*	*0.17*	*10.17*	*76.81*	*104.19*	*122.14*	*178.56*	*27.22*	*36.93*	*43.29*	*63.29*		*27.22*	*34.22*	*10.80*	*200*			*1.00*	*1.055*	*6.99*	*20.44%*
		MH8	*MH7*											*0.00*	*0.65*	*10.76*	*0.45*	*11.21*	*74.01*	*100.35*	*117.61*	*171.91*	*48.45*	*65.70*	*77.00*	*112.55*		*48.45*	*48.63*	*26.20*	*250*			*0.61*	*0.960*	*0.18*	*0.36%*
	MH7	*BLDG D*	*MH7-MH5*									*0.05*		*0.13*	*0.13*	*10.00*	*0.20*	*10.20*	*76.81*	*104.19*	*122.14*	*178.56*	*9.61*	*13.03*	*15.28*	*22.34*		*9.61*	*34.22*	*12.60*	*200*			*1.00*	*1.055*	*24.61*	*71.92%*
	MH7A	*BLDG A*	*MH7-MH5*									*0.30*		*0.75*	*0.75*	*10.00*	*0.18*	*10.18*	*76.81*	*104.19*	*122.14*	*178.56*	*57.65*	*78.21*	*91.68*	*134.03*		*57.65*	*62.04*	*12.97*	*250*			*1.00*	*1.224*	*4.39*	*7.07%*
		MH7	*MH5*											*0.00*	*1.53*	*11.21*	*0.47*	*11.68*	*72.44*	*98.19*	*115.07*	*168.17*	*110.86*	*150.27*	*176.11*	*257.37*		*110.86*	*225.20*	*38.55*	*450*			*0.57*	*1.372*	*114.34*	*50.77%*
	MH10A	*CB4*	*MH10-CBMH1*									*0.03*		*0.08*	*0.08*	*10.00*	*0.12*	*10.12*	*76.81*	*104.19*	*122.14*	*178.56*	*5.76*	*7.82*	*9.17*	*13.40*		*5.76*	*34.22*	*7.78*	*200*			*1.00*	*1.055*	*28.45*	*83.15%*
	MH10B	*MH10*	*CBMH1*									*0.08*		*0.20*	*0.28*	*10.12*	*0.71*	*10.83*	*76.34*	*103.55*	*121.38*	*177.44*	*21.01*	*28.50*	*33.41*	*48.84*		*21.01*	*49.16*	*41.40*	*250*			*0.63*	*0.970*	*28.16*	*57.27%*
	CBMH1A	*CB5*	*CBMH1-CBMH2*									*0.06*		*0.15*	*0.15*	*10.00*	*0.36*	*10.36*	*76.81*	*104.19*	*122.14*	*178.56*	*11.53*	*15.64*	*18.34*	*26.81*		*11.53*	*34.22*	*22.72*	*200*			*1.00*	*1.055*	*22.69*	*66.30%*
	CBMH1B	*CB6*	*CBMH1-CBMH2*									*0.07*		*0.18*	*0.18*	*10.00*	*0.15*	*10.15*	*76.81*	*104.19*	*122.14*	*178.56*	*13.45*	*18.25*	*21.39*	*31.27*		*13.45*	*34.22*	*9.78*	*200*			*1.00*	*1.055*	*20.76*	*60.69%*
	CBMH1C	*CB7*	*CBMH1-CBMH2*									*0.08*		*0.20*	*0.20*	*10.00*	*0.15*	*10.15*	*76.81*	*104.19*	*122.14*	*178.56*	*15.37*	*20.86*	*24.45*	*35.74*		*15.37*	*34.22*	*9.59*	*200*			*1.00*	*1.055*	*18.84*	*55.07%*
		CBMH1	*CBMH2*											*0.00*	*0.80*	*10.83*	*0.81*	*11.64*	*73.74*	*99.98*	*117.18*	*171.28*	*59.04*	*80.05*	*93.82*	*137.13*		*59.04*	*65.96*	*63.25*	*250*			*1.13*	*1.302*	*6.92*	*10.49%*
	CBMH2	*CBMH2*	*MH4*									*0.08*		*0.20*	*1.00*	*11.64*	*0.70*	*12.34*	*71.02*	*96.24*	*112.78*	*164.81*	*71.08*	*96.32*	*112.87*	*164.94*		*71.08*	*58.89*	*33.75*	*300*			*0.34*	*0.807*	*-12.19*	*-20.70%*
PHASE 2	MH22	CB23	MH22	0.06										0.04	0.04	10.00	0.08	10.08	76.81	104.19	122.14	178.56	3.20	4.34	5.09	7.45		3.20	34.22	5.20	200			1.00	1.055	31.01	90.64%
	CB20	CB20	MH22-MH20									0.12		0.30	0.30	10.00	0.06	10.06	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	3.93	200			1.00	1.055	11.16	32.61%
		MH22	MH20											0.00	0.34	10.08	0.64	10.72	76.49	103.76	121.63	177.81	26.16	35.48	41.59	60.80		26.16	59.68	31.32	300			0.35	0.818	33.53	56.18%
	ROOF B	BLDG B	MH20									0.19		0.48	0.48	10.00	0.08	10.08	76.81	104.19	122.14	178.56	36.51	49.53	58.06	84.88		36.51	62.04	6.06	250			1.00	1.224	25.53	41.15%
	MH21-1	CB21	MH23									0.12		0.30	0.30	10.00	0.14	10.14	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	9.04	200			1.00	1.055	11.16	32.61%
	MH21-2	CB22	MH23-MH21									0.12		0.30	0.30	10.00	0.05	10.05	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	3.16	200			1.00	1.055	11.16	32.61%
		MH23	U/G Chamber											0.00	0.60	10.14	0.11	10.26	76.26	103.44	121.26	177.26	45.79	62.12	72.81	106.44		45.79	59.68	5.63	300			0.35	0.818	13.89	23.27%
		U/G Chamber	MH21											0.00	0.60	10.26	0.06	10.32	75.83	102.85	120.56	176.24	45.53	61.76	72.40	105.83		45.53	59.68	2.99	300			0.35	0.818	14.15	23.71%
		MH21	MH20											0.00	0.60	10.26	0.35	10.61	75.83	102.85	120.56	176.24	45.53	61.76	72.40	105.83		45.53	59.68	17.25	300			0.35	0.818	14.15	23.71%
		MH20	MH3											0.00	1.42	10.72	0.23	10.95	74.15	100.54	117.83	172.23	105.12	142.54	167.06	244.19		105.12	175.96	15.01	450			0.35	1.072	70.84	40.26%
	CB24	CB24	MH3-MH4									0.10		0.25	0.25	10.00	0.02	10.02	76.81	104.19	122.14	178.56	19.22	26.07	30.56	44.68		19.22	34.22	1.08	200			1.00	1.055	15.00	43.84%
	CBMH20	CBMH20	MH1-MH3		0.10									0.08	0.08	10.00	1.19	11.19	76.81	104.19	122.14	178.56	6.41	8.69	10.19	14.89		6.41	59.68	58.53	300			0.35	0.818	53.28	89.27%
	ROOF C, MH1B	BLDG C	MH1-MH3									0.16		0.40	0.40	10.00	0.68	10.68	76.81	104.19	122.14	178.56	30.75	41.71	48.90	71.48		30.75	62.04	50.00	250			1.00	1.224	31.29	50.44%
	CB25	CB25	MH1-MH3									0.02		0.05	0.05	10.00	0.11	10.11	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	34.22	7.07	200			1.00	1.055	30.37	88.77%
EXISTING	*External 2.78AC=3.03*	*MH1*	*MH3*							***1.35***		0.32		*3.84*	*4.38*	*11.19*	*1.34*	*12.53*	*72.51*	*98.29*	*115.19*	*168.34*	*317.39*	*430.22*	*504.19*	*736.87*		*317.39*	*506.25*	*89.13*	*750*			*0.19*	*1.110*	*188.86*	*37.31%*
	MH1A, MH1B	*MH3*	*MH4*											*0.00*	*6.05*	*12.53*	*0.39*	*12.92*	*68.28*	*92.49*	*108.36*	*158.32*	*412.79*	*559.10*	*655.05*	*957.05*		*412.79*	*592.21*	*30.43*	*750*			*0.26*	*1.299*	*179.42*	*30.30%*
		MH4	*MH5*											*0.00*	*7.05*	*12.92*	*0.18*	*13.10*	*67.15*	*90.94*	*106.53*	*155.64*	*473.15*	*640.73*	*750.62*	*1,096.60*		*473.15*	*660.70*	*15.45*	*750*			*0.32*	*1.449*	*187.55*	*28.39%*
		CB17	*MH5-MH12*									*0.09*		*0.23*	*0.23*	*10.00*	*0.04*	*10.04*	*76.81*	*104.19*	*122.14*	*178.56*	*17.29*	*23.46*	*27.50*	*40.21*		*17.29*	*34.22*	*2.55*	*200*			*1.00*	*1.055*	*16.92*	*49.45%*
		CB16	*MH5-MH12*		*0.01*									*0.01*	*0.01*	*10.00*	*0.14*	*10.14*	*76.81*	*104.19*	*122.14*	*178.56*	*0.64*	*0.87*	*1.02*	*1.49*		*0.64*	*34.22*	*9.09*	*200*			*1.00*	*1.055*	*33.58*	*98.13%*
		MH5	*MH12*											*0.00*	*8.81*	*13.10*	*0.34*	*13.44*	*66.65*	*90.25*	*105.72*	*154.45*	*587.19*	*795.07*	*931.41*	*1,360.66*		*587.19*	*705.11*	*31.20*	*750*			*0.37*	*1.546*	*117.92*	*16.72%*
		MH12	*EX 1350 SEWER*											*0.00*	*8.81*	*13.44*	*0.16*	*13.59*	*65.73*	*88.98*	*104.23*	*152.25*	*579.03*	*783.89*	*918.24*	*1,341.34*		*579.03*	*747.54*	*15.69*	*750*			*0.41*	*1.639*	*168.51*	*22.54%*
													TOTAL	8.81	TRUE																						

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 = 732.951 / (TC+6.199)^0.810] 2 YEAR
[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: WZ
Checked: RM
Dwg. Reference: 148590-500

No.	Revision	Date
1	Submission No. 1	2024-11-26
2	Submission No. 2	2025-02-18
3	Submission No. 3	2025-04-22

File Reference:	Date:	Sheet No:
148590-6.04.04	2024-11-26	1 of 1

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

155 Dun Skipper Drive
City of Ottawa
2668867 Ontario Inc.

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.25	C= 0.30	C= 0.40	C= 0.50	C= 0.56	C= 0.65	C= 0.81	C= 0.75	C= 0.90	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
EXISTING PHASE 1	*MH9*	*CB3*	*MH9-MH8*								*0.12*			*0.25*	*0.25*	*10.00*	*0.11*	*10.11*	*76.81*	*104.19*	*122.14*	*178.56*	*19.22*	*26.07*	*30.56*	*44.68*		*19.22*	*34.22*	*6.73*	*200*			*1.00*	*1.055*	*15.00*	*43.84%*
	MH9B	*CB2*	*MH9-MH8*									*0.02*		*0.05*	*0.05*	*10.00*	*0.12*	*10.12*	*76.81*	*104.19*	*122.14*	*178.56*	*3.84*	*5.21*	*6.11*	*8.94*		*3.84*	*34.22*	*7.69*	*200*			*1.00*	*1.055*	*30.37*	*88.77%*
		MH9	*MH8*											*0.00*	*0.30*	*10.12*	*0.64*	*10.76*	*76.34*	*103.56*	*121.39*	*177.46*	*22.92*	*31.09*	*36.45*	*53.28*		*22.92*	*158.48*	*53.17*	*375*			*0.75*	*1.390*	*135.56*	*85.54%*
	MH8	*CB1*	*MH8-MH7*								*0.17*			*0.35*	*0.35*	*10.00*	*0.17*	*10.17*	*76.81*	*104.19*	*122.14*	*178.56*	*27.22*	*36.93*	*43.29*	*63.29*		*27.22*	*34.22*	*10.80*	*200*			*1.00*	*1.055*	*6.99*	*20.44%*
		MH8	*MH7*											*0.00*	*0.65*	*10.76*	*0.45*	*11.21*	*74.01*	*100.35*	*117.61*	*171.91*	*48.45*	*65.70*	*77.00*	*112.55*		*48.45*	*48.63*	*26.20*	*250*			*0.61*	*0.960*	*0.18*	*0.36%*
	MH7	*BLDG D*	*MH7-MH5*									*0.05*		*0.13*	*0.13*	*10.00*	*0.20*	*10.20*	*76.81*	*104.19*	*122.14*	*178.56*	*9.61*	*13.03*	*15.28*	*22.34*		*9.61*	*34.22*	*12.60*	*200*			*1.00*	*1.055*	*24.61*	*71.92%*
	MH7A	*BLDG A*	*MH7-MH5*									*0.30*		*0.75*	*0.75*	*10.00*	*0.18*	*10.18*	*76.81*	*104.19*	*122.14*	*178.56*	*57.65*	*78.21*	*91.68*	*134.03*		*57.65*	*62.04*	*12.97*	*250*			*1.00*	*1.224*	*4.39*	*7.07%*
		MH7	*MH5*											*0.00*	*1.53*	*11.21*	*0.47*	*11.68*	*72.44*	*98.19*	*115.07*	*168.17*	*110.86*	*150.27*	*176.11*	*257.37*		*110.86*	*225.20*	*38.55*	*450*			*0.57*	*1.372*	*114.34*	*50.77%*
	MH10A	*CB4*	*MH10-CBMH1*									*0.03*		*0.08*	*0.08*	*10.00*	*0.12*	*10.12*	*76.81*	*104.19*	*122.14*	*178.56*	*5.76*	*7.82*	*9.17*	*13.40*		*5.76*	*34.22*	*7.78*	*200*			*1.00*	*1.055*	*28.45*	*83.15%*
	MH10B	*MH10*	*CBMH1*									*0.08*		*0.20*	*0.28*	*10.12*	*0.71*	*10.83*	*76.34*	*103.55*	*121.38*	*177.44*	*21.01*	*28.50*	*33.41*	*48.84*		*21.01*	*49.16*	*41.40*	*250*			*0.63*	*0.970*	*28.16*	*57.27%*
	CBMH1A	*CB5*	*CBMH1-CBMH2*									*0.06*		*0.15*	*0.15*	*10.00*	*0.36*	*10.36*	*76.81*	*104.19*	*122.14*	*178.56*	*11.53*	*15.64*	*18.34*	*26.81*		*11.53*	*34.22*	*22.72*	*200*			*1.00*	*1.055*	*22.69*	*66.30%*
	CBMH1B	*CB6*	*CBMH1-CBMH2*									*0.07*		*0.18*	*0.18*	*10.00*	*0.15*	*10.15*	*76.81*	*104.19*	*122.14*	*178.56*	*13.45*	*18.25*	*21.39*	*31.27*		*13.45*	*34.22*	*9.78*	*200*			*1.00*	*1.055*	*20.76*	*60.69%*
	CBMH1C	*CB7*	*CBMH1-CBMH2*									*0.08*		*0.20*	*0.20*	*10.00*	*0.15*	*10.15*	*76.81*	*104.19*	*122.14*	*178.56*	*15.37*	*20.86*	*24.45*	*35.74*		*15.37*	*34.22*	*9.59*	*200*			*1.00*	*1.055*	*18.84*	*55.07%*
		CBMH1	*CBMH2*											*0.00*	*0.80*	*10.83*	*0.81*	*11.64*	*73.74*	*99.98*	*117.18*	*171.28*	*59.04*	*80.05*	*93.82*	*137.13*		*59.04*	*65.96*	*63.25*	*250*			*1.13*	*1.302*	*6.92*	*10.49%*
	CBMH2	*CBMH2*	*MH4*									*0.08*		*0.20*	*1.00*	*11.64*	*0.70*	*12.34*	*71.02*	*96.24*	*112.78*	*164.81*	*71.08*	*96.32*	*112.87*	*164.94*		*71.08*	*58.89*	*33.75*	*300*			*0.34*	*0.807*	*-12.19*	*-20.70%*
PHASE 2	MH22	CB23	MH22	0.06										0.04	0.04	10.00	0.08	10.08	76.81	104.19	122.14	178.56	3.20	4.34	5.09	7.45		3.20	34.22	5.20	200			1.00	1.055	31.01	90.64%
	CB20	CB20	MH22-MH20									0.12		0.30	0.30	10.00	0.06	10.06	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	3.93	200			1.00	1.055	11.16	32.61%
		MH22	MH20											0.00	0.34	10.08	0.64	10.72	76.49	103.76	121.63	177.81	26.16	35.48	41.59	60.80		26.16	59.68	31.32	300			0.35	0.818	33.53	56.18%
	ROOF B	BLDG B	MH20									0.19		0.48	0.48	10.00	0.08	10.08	76.81	104.19	122.14	178.56	36.51	49.53	58.06	84.88		36.51	62.04	6.06	250			1.00	1.224	25.53	41.15%
	MH21-1	CB21	MH23									0.12		0.30	0.30	10.00	0.14	10.14	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	9.04	200			1.00	1.055	11.16	32.61%
	MH21-2	CB22	MH23-MH21									0.12		0.30	0.30	10.00	0.05	10.05	76.81	104.19	122.14	178.56	23.06	31.28	36.67	53.61		23.06	34.22	3.16	200			1.00	1.055	11.16	32.61%
		MH23	U/G Chamber											0.00	0.60	10.14	0.11	10.26	76.26	103.44	121.26	177.26	45.79	62.12	72.81	106.44		45.79	59.68	5.63	300			0.35	0.818	13.89	23.27%
		U/G Chamber	MH21											0.00	0.60	10.26	0.06	10.32	75.83	102.85	120.56	176.24	45.53	61.76	72.40	105.83		45.53	59.68	2.99	300			0.35	0.818	14.15	23.71%
		MH21	MH20											0.00	0.60	10.26	0.35	10.61	75.83	102.85	120.56	176.24	45.53	61.76	72.40	105.83		45.53	59.68	17.25	300			0.35	0.818	14.15	23.71%
		MH20	MH3											0.00	1.42	10.72	0.23	10.95	74.15	100.54	117.83	172.23	105.12	142.54	167.06	244.19		105.12	175.96	15.01	450			0.35	1.072	70.84	40.26%
	CB24	CB24	MH3-MH4									0.10		0.25	0.25	10.00	0.02	10.02	76.81	104.19	122.14	178.56	19.22	26.07	30.56	44.68		19.22	34.22	1.08	200			1.00	1.055	15.00	43.84%
	CBMH20	CBMH20	MH1-MH3					0.57						0.89	0.89	10.00	1.19	11.19	76.81	104.19	122.14	178.56	68.15	92.46	108.39	158.45	15.00	15.00	59.68	58.53	300			0.35	0.818	44.68	74.87%
	CB25	CB25	MH1-MH3									0.02		0.05	0.05	10.00	0.11	10.11	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	34.22	7.07	200			1.00	1.055	30.37	88.77%
EXISTING	*External 2.78AC=3.03*	*MH1*	*MH3*							***1.35***				*3.04*	*3.98*	*11.19*	*1.34*	*12.53*	*72.51*	*98.29*	*115.19*	*168.34*	*288.60*	*391.20*	*458.47*	*670.04*		*288.60*	*506.25*	*89.13*	*750*			*0.19*	*1.110*	*217.65*	*42.99%*
	MH1A, MH1B	*MH3*	*MH4*											*0.00*	*5.65*	*12.53*	*0.39*	*12.92*	*68.28*	*92.49*	*108.36*	*158.32*	*385.68*	*522.39*	*612.03*	*894.20*		*385.68*	*592.21*	*30.43*	*750*			*0.26*	*1.299*	*206.52*	*34.87%*
		MH4	*MH5*											*0.00*	*6.65*	*12.92*	*0.18*	*13.10*	*67.15*	*90.94*	*106.53*	*155.64*	*446.50*	*604.63*	*708.33*	*1,034.81*		*446.50*	*660.70*	*15.45*	*750*			*0.32*	*1.449*	*214.21*	*32.42%*
		CB17	*MH5-MH12*									*0.09*		*0.23*	*0.23*	*10.00*	*0.04*	*10.04*	*76.81*	*104.19*	*122.14*	*178.56*	*17.29*	*23.46*	*27.50*	*40.21*		*17.29*	*34.22*	*2.55*	*200*			*1.00*	*1.055*	*16.92*	*49.45%*
		CB16	*MH5-MH12*		*0.01*									*0.01*	*0.01*	*10.00*	*0.14*	*10.14*	*76.81*	*104.19*	*122.14*	*178.56*	*0.64*	*0.87*	*1.02*	*1.49*		*0.64*	*34.22*	*9.09*	*200*			*1.00*	*1.055*	*33.58*	*98.13%*
		MH5	*MH12*											*0.00*	*8.41*	*13.10*	*0.34*	*13.44*	*66.65*	*90.25*	*105.72*	*154.45*	*560.73*	*759.25*	*889.44*	*1,299.35*		*560.73*	*705.11*	*31.20*	*750*			*0.37*	*1.546*	*144.38*	*20.48%*
		MH12	*EX 1350 SEWER*											*0.00*	*8.41*	*13.44*	*0.16*	*13.59*	*65.73*	*88.98*	*104.23*	*152.25*	*552.94*	*748.56*	*876.87*	*1,280.89*		*552.94*	*747.54*	*15.69*	*750*			*0.41*	*1.639*	*194.60*	*26.03%*
													TOTAL	8.41	TRUE																						

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 = 732.951 / (TC+6.199)^0.810] 2 YEAR
[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: WZ

Checked: RM

Dwg. Reference: 148590-500

No.	Revision	Date
1	Submission No. 1	2024-11-26
2	Submission No. 2	2025-02-18
3	Submission No. 3	2025-04-22

File Reference:	Date:	Sheet No:
148590-6.04.04	2024-11-26	1 of 1

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: 155 Dun Skipper
DATE: 2025-04-22
FILE: 148590-6.04.04
REV #: 3
DESIGNED BY: WZ
CHECKED BY: RM

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = $732.951 / (T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = $998.071 / (T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = $1735.688 / (T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate
Taken from City of Ottawa approved Design Brief "Pathways at Findlay Creek" (D07-16-13-0023) drainage area EXT 4

EXT 4 Release Rate	760.00	L/s
Area EXT 4 $_{TOTAL}$ =	4.04	Ha
Area Subject Lands	2.49	
Perscentage Share of release rate	62%	
Q_{TOTAL} =	468.42	L/s

Uncontrolled Release ($Q_{uncontrolled}$ = 2.78*C*i_{100yr}*$A_{uncontrolled}$)
For Drainage Area MH6136

C =	0.625	
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.01	Ha
$Q_{uncontrolled}$ =	3.10	L/s

Uncontrolled Release ($Q_{uncontrolled}$ = 2.78*C*i_{100yr}*$A_{uncontrolled}$)
For Drainage Area UNRES

C =	1.00	
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.05	Ha
$Q_{uncontrolled}$ =	24.82	L/s

Maximum Allowable Release Rate ($Q_{max\ allowable}$ = $Q_{restricted}$ - $Q_{uncontrolled}$)

$Q_{max\ allowable}$ =	440.49	L/s

MODIFIED RATIONAL METHOD (100-Year & 5-Year Ponding & 2-Year Ponding)

Drainage Area	MH9/MH9B	*Drainage Area Plan - MH9/MH9B*			
Area (Ha)	0.14				
C =	0.98	Restricted Flow Q_r (L/s)=	10.00		
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
30	91.87	34.86	10.00	24.86	44.75
32	87.89	33.35	10.00	23.35	44.83
33	86.03	32.65	10.00	22.65	**44.84**
34	84.27	31.98	10.00	21.98	44.83
36	80.96	30.72	10.00	20.72	44.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	44.84	20.64	10.07	14.13

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
54.91	0.375	0.110	6.06
6.73	0.200	0.031	0.21
7.69	0.200	0.031	0.24
			6.51

overflows to: CB1

Drainage Area	MH9/MH9B				
Area (Ha)	0.14				
C =	0.78	Restricted Flow Q_r (L/s)=	10.00		
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
13	90.63	27.51	10.00	17.51	13.66
15	83.56	25.37	10.00	15.37	13.83
16	80.46	24.43	10.00	14.43	**13.85**
17	77.61	23.56	10.00	13.56	13.83
19	72.53	22.02	10.00	12.02	13.70

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.85	20.64	10.07	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
CB2 (600mm x 600mm)	1.80	0.36	0.65
CBMH10 (1200mm round)	2.00	1.13	2.26
			3.56

overflows to: CB1

Drainage Area	MH9/MH9B				
Area (Ha)	0.140				
C =	0.78	Restricted Flow Q_r (L/s)=	10.00		
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
10	76.81	23.32	10.00	13.32	7.99
11	73.17	22.21	10.00	12.21	8.06
12	69.89	21.22	10.00	11.22	**8.08**
13	66.93	20.32	10.00	10.32	8.05
15	61.77	18.75	10.00	8.75	7.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.08	20.64	10.07	0.00

overflows to: CB1

Drainage Area	*CB1*	*Drainage Area Plan - MH8*			
Area (Ha)	0.17				
C =	0.94	Restricted Flow Q_r (L/s)=	16.00		
100-Year Ponding					
T_c Variable (min)	*i_{100yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 100yr (m^3)*
21	116.30	50.01	16.00	34.01	42.85
23	109.68	47.17	16.00	31.17	43.01
24	106.68	45.87	16.00	29.87	**43.02**
25	103.85	44.66	16.00	28.66	42.99
27	98.66	42.43	16.00	26.43	42.81

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
14.13	57.15	50.59	5.58	0.98

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
31.00	0.450	0.159	4.93
			4.93

overflows to: CB17

Drainage Area	*CB1*				
Area (Ha)	0.17				
C =	0.75	Restricted Flow Q_r (L/s)=	16.00		
5-Year Ponding					
T_c Variable (min)	*i_{5yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 5yr (m^3)*
7	123.30	42.42	16.00	26.42	11.10
9	109.79	37.77	16.00	21.77	11.76
10	104.19	35.85	16.00	19.85	**11.91**
11	99.19	34.12	16.00	18.12	11.96
13	90.63	31.18	16.00	15.18	11.84

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	11.91	50.59	5.58	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
			0.65

overflows to: CB17

Drainage Area	*CB1*				
Area (Ha)	0.165				
C =	0.75	Restricted Flow Q_r (L/s)=	16.00		
2-Year Ponding					
T_c Variable (min)	*i_{2yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 2yr (m^3)*
7	90.66	31.19	16.00	15.19	6.38
9	80.87	27.82	16.00	11.82	6.38
10	76.81	26.42	16.00	10.42	**6.25**
11	73.17	25.17	16.00	9.17	6.05
13	66.93	23.03	16.00	7.03	5.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.25	50.59	5.58	0.00

overflows to: CB17

Drainage Area	*CB16*	*Drainage Area Plan - MH5B*			
Area (Ha)	0.010				
C =	0.38	Restricted Flow Q_r (L/s)=	6.00		
100-Year Ponding					
T_c Variable (min)	*i_{100yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 100yr (m^3)*
-6	57497.20	599.41	16.00	583.41	-210.03
-4	977.56	10.19	16.00	-5.81	1.39
-3	702.38	7.32	16.00	-8.68	**1.56**
-2	555.31	5.79	16.00	-10.21	1.23
0	398.62	4.16	16.00	-11.84	0.00

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.56	0.31	0.00	1.25

overflows to: CB17

Drainage Area	*CB16*				
Area (Ha)	0.010				
C =	0.30	Restricted Flow Q_r (L/s)=	6.00		
5-Year Ponding					
T_c Variable (min)	*i_{5yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 5yr (m^3)*
7	123.30	1.03	6.00	-4.97	-2.09
9	109.79	0.92	6.00	-5.08	-2.75
10	104.19	0.87	6.00	-5.13	**-3.08**
11	99.19	0.83	6.00	-5.17	-3.41
13	90.63	0.76	6.00	-5.24	-4.09

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	-3.08	0.31	0.00	0.00

overflows to: CB17

Drainage Area	*CB16*				
Area (Ha)	0.010				
C =	0.30	Restricted Flow Q_r (L/s)=	6.00		
2-Year Ponding					
T_c Variable (min)	*i_{2yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 2yr (m^3)*
7	90.66	0.76	6.00	-5.24	-2.20
9	80.87	0.67	6.00	-5.33	-2.88
10	76.81	0.64	6.00	-5.36	**-3.22**
11	73.17	0.61	6.00	-5.39	-3.56
13	66.93	0.56	6.00	-5.44	-4.24

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	0.31	0.00	0.00

overflows to: CB17

Drainage Area	*CB17*	*Drainage Area Plan - MH5A*			
Area (Ha)	0.090				
C =	1.00	Restricted Flow Q_r (L/s)=	9.00		
100-Year Ponding					
T_c Variable (min)	*i_{100yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 100yr (m^3)*
22	112.88	28.24	9.00	19.24	25.40
24	106.68	26.69	9.00	17.69	25.47
25	103.85	25.98	9.00	16.98	**25.47**
26	101.18	25.32	9.00	16.32	25.45
28	96.27	24.09	9.00	15.09	25.35

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.24	27.71	0.84	5.10	21.77

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
28.00	0.450	0.159	4.45
			4.45

overflows to: MH22

Drainage Area	*CB17*				
Area (Ha)	0.090				
C =	0.90	Restricted Flow Q_r (L/s)=	9.00		
5-Year Ponding					
T_c Variable (min)	*i_{5yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 5yr (m^3)*
10	104.19	23.46	9.00	14.46	8.68
12	94.70	21.32	9.00	12.32	8.87
13	90.63	20.41	9.00	11.41	**8.90**
14	86.93	19.58	9.00	10.58	8.88
16	80.46	18.12	9.00	9.12	8.75

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.90	0.84	5.10	2.96

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
			0.65

overflows to: MH22

Drainage Area	*CB17*				
Area (Ha)	0.090				
C =	0.90	Restricted Flow Q_r (L/s)=	9.00		
2-Year Ponding					
T_c Variable (min)	*i_{2yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 2yr (m^3)*
7	90.66	20.42	9.00	11.42	4.79
9	80.87	18.21	9.00	9.21	4.97
10	76.81	17.29	9.00	8.29	**4.98**
11	73.17	16.48	9.00	7.48	4.93
13	66.93	15.07	9.00	6.07	4.74

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.98	0.84	5.10	0.00

overflows to: MH22

Drainage Area	CB20		
Area (Ha)	0.120		
C =	1.00	Restricted Flow Q_r (L/s)=	15.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
17	132.63	44.24	15.00	29.24	29.83
19	123.87	41.32	15.00	26.32	30.01
20	119.95	40.02	15.00	25.02	**30.02**
21	116.30	38.80	15.00	23.80	29.98
23	109.68	36.59	15.00	21.59	29.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	30.02	12.51	0.00	17.51

overflows to: MH22

Drainage Area	CB20		
Area (Ha)	0.120		
C =	0.90	Restricted Flow Q_r (L/s)=	15.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
7	123.30	37.02	15.00	22.02	9.25
9	109.79	32.96	15.00	17.96	9.70
10	104.19	31.28	15.00	16.28	**9.77**
11	99.19	29.78	15.00	14.78	9.76
13	90.63	27.21	15.00	12.21	9.52

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.77	12.51	0.00	0.00

overflows to: MH22

Drainage Area	CB20		
Area (Ha)	0.120		
C =	0.90	Restricted Flow Q_r (L/s)=	15.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	27.22	15.00	12.22	5.13
9	80.87	24.28	15.00	9.28	5.01
10	76.81	23.06	15.00	8.06	**4.84**
11	73.17	21.97	15.00	6.97	4.60
13	66.93	20.09	15.00	5.09	3.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.84	12.51	0.00	0.00

overflows to: MH22

Drainage Area	MH22			
Area (Ha)	0.060	Restricted Flow ICD $_{Actual}$ (L/s)=	6.00	50% reduction for sub-surface storage
C =	0.31	Restricted Flow $Q_{r\ for\ swm\ calc}$ (L/s)=	3.00	

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
13	155.11	8.08	3.00	5.08	3.97
14	148.72	7.75	3.00	4.75	3.99
15	142.89	7.45	3.00	4.45	**4.00**
16	137.55	7.17	3.00	4.17	4.00
18	128.08	6.68	3.00	3.68	3.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
39.28	43.28	2.87	46.61	0.00

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
33.40	0.250	0.049	1.64
23.23	0.300	0.071	1.64
		TOTAL	3.28

overflows to: Dun Skipper Drive

Drainage Area	MH22		
Area (Ha)	0.060		
C =	0.25	Restricted Flow Q_r (L/s)=	3.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
7	123.30	5.14	3.00	2.14	0.90
9	109.79	4.58	3.00	1.58	0.85
10	104.19	4.34	3.00	1.34	**0.81**
11	99.19	4.14	3.00	1.14	0.75
13	90.63	3.78	3.00	0.78	0.61

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.96	3.77	2.87	46.61	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB23 (600mm x 600mm)	0.89	0.36	0.32
Clear Stone Gallery	1.45	100	43.01
		TOTAL	43.33

overflows to: Dun Skipper Drive

Drainage Area	MH22		
Area (Ha)	0.060		
C =	0.25	Restricted Flow Q_r (L/s)=	3.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	3.78	3.00	0.78	0.33
9	80.87	3.37	3.00	0.37	0.20
10	76.81	3.20	3.00	0.20	**0.12**
11	73.17	3.05	3.00	0.05	0.03
13	66.93	2.79	3.00	-0.21	-0.16

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.12	2.87	46.61	0.00

overflows to: Dun Skipper Drive

Drainage Area	CB24		
Area (Ha)	0.100		
C =	1.00	Restricted Flow Q_r (L/s)=	15.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
13	155.11	43.12	15.00	28.12	21.93
15	142.89	39.72	15.00	24.72	22.25
16	137.55	38.24	15.00	23.24	**22.31**
17	132.63	36.87	15.00	21.87	22.31
19	123.87	34.44	15.00	19.44	22.16

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	22.31	0.00	0	22.31

overflows to: MH21

Drainage Area	CB24		
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	15.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
7	123.30	30.85	15.00	15.85	6.66
9	109.79	27.47	15.00	12.47	6.73
10	104.19	26.07	15.00	11.07	**6.64**
11	99.19	24.82	15.00	9.82	6.48
13	90.63	22.68	15.00	7.68	5.99

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.64	0.00	0.00	6.64

overflows to: MH21

Drainage Area	CB24		
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	15.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	22.68	15.00	7.68	3.23
9	80.87	20.23	15.00	5.23	2.83
10	76.81	19.22	15.00	4.22	**2.53**
11	73.17	18.31	15.00	3.31	2.18
13	66.93	16.75	15.00	1.75	1.36

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	0.00	0.00	2.53

overflows to: MH21

Drainage Area	CB25		
Area (Ha)	0.020		
C =	1.00	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
8	199.20	11.08	6.00	5.08	2.44
9	188.25	10.47	6.00	4.47	2.41
10	178.56	9.93	6.00	3.93	**2.36**
11	169.91	9.45	6.00	3.45	2.27
13	155.11	8.62	6.00	2.62	2.05

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.36	0.27	0.00	2.09

overflows to: MH21

Drainage Area	CB25		
Area (Ha)	0.020		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
8	116.11	5.81	6.00	-0.19	-0.09
9	109.79	5.49	6.00	-0.51	-0.27
10	104.19	5.21	6.00	-0.79	**-0.47**
11	99.19	4.96	6.00	-1.04	-0.68
12	94.70	4.74	6.00	-1.26	-0.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	0.27	0.00	0.00

overflows to: MH21

Drainage Area	CB25		
Area (Ha)	0.020		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	4.28	6.00	-1.72	-0.83
9	80.87	4.05	6.00	-1.95	-1.05
10	76.81	3.84	6.00	-2.16	**-1.29**
11	73.17	3.66	6.00	-2.34	-1.54
12	69.89	3.50	6.00	-2.50	-1.80

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	0.27	0.00	0.00

overflows to: MH21

Drainage Area	MH21			
Area (Ha)	0.240	Restricted Flow ICD $_{Actual}$ (L/s)=	33.00	50% reduction for sub-surface storage
C =	1.00	Restricted Flow $Q_{r\ for\ swm\ calc}$ (L/s)=	16.50	

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
33	86.03	57.40	16.50	40.90	80.99
34	84.27	56.22	16.50	39.72	81.03
35	82.58	55.10	16.50	38.60	**81.05**
36	80.96	54.02	16.50	37.52	81.04
38	77.93	52.00	16.50	35.50	80.93

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
24.40	105.45	11.79	96.68	0.00

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
8.30	0.200	0.031	0.26
3.10	0.200	0.031	0.10
8.62	0.300	0.071	0.61
		TOTAL	0.97

overflows to: CBMH20

Drainage Area	MH21		
Area (Ha)	0.240		
C =	0.90	Restricted Flow Q_r (L/s)=	16.50

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
16	80.46	48.31	16.50	31.81	30.54
18	74.97	45.02	16.50	28.52	30.80
19	72.53	43.55	16.50	27.05	**30.84**
20	70.25	42.18	16.50	25.68	30.82
22	66.15	39.72	16.50	23.22	30.65

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	30.84	11.79	96.68	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB21 (600mm x 600mm)	1.40	0.36	0.50
CB22 (600mm x 600mm)	1.40	0.36	0.50
MH21 (1200mm)	3.40	1.13	3.84
MH23 (1200mm)	1.97	1.13	2.23
Underground Chamber			88.64
		TOTAL	95.72

overflows to: CBMH20

Drainage Area	MH21		
Area (Ha)	0.240		
C =	0.90	Restricted Flow Q_r (L/s)=	16.50

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
11	73.17	43.94	16.50	27.44	18.11
13	66.93	40.19	16.50	23.69	18.48
14	64.23	38.57	16.50	22.07	**18.54**
15	61.77	37.09	16.50	20.59	18.53
17	57.42	34.48	16.50	17.98	18.34

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	18.54	11.79	96.68	0.00

overflows to: CBMH20

Drainage Area	CBMH2			
Area (Ha)	0.080			
C =	1.00	Restricted Flow Q_r (L/s)=	20.00	

Drainage Area Plan - CBMH2

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	47.07	20.00	27.07	11.37
9	188.25	41.87	20.00	21.87	11.81
10	178.56	39.71	20.00	19.71	**11.83**
11	169.91	37.79	20.00	17.79	11.74
13	155.11	34.50	20.00	14.50	11.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	11.83	6.21	0.00	5.62

overflows to: CB10

Drainage Area	CBMH2		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	40.73	20.00	20.73	1.24
3	166.09	33.24	20.00	13.24	2.38
4	152.51	30.53	20.00	10.53	**2.53**
5	141.18	28.26	20.00	8.26	2.48
7	123.30	24.68	20.00	4.68	1.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	6.21	0.00	0.00

Drainage Area	CBMH2		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	18.15	20.00	-1.85	-0.78
9	80.87	16.19	20.00	-3.81	-2.06
10	76.81	15.37	20.00	-4.63	**-2.78**
11	73.17	14.65	20.00	-5.35	-3.53
13	66.93	13.40	20.00	-6.60	-5.15

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	6.21	0.00	0.00

Drainage Area	CB10			
Area (Ha)	0.110			
C =	1.00	Restricted Flow Q_r (L/s)=	45.00	

Drainage Area Plan - MH1D

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	87.47	45.00	42.47	7.65
4	262.41	80.24	45.00	35.24	8.46
5	242.70	74.22	45.00	29.22	**8.77**
6	226.01	69.11	45.00	24.11	8.68
8	199.20	60.92	45.00	15.92	7.64

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.62	14.38	6.81	0.00	7.57

overflows to: CBMH20

Drainage Area	CB10		
Area (Ha)	0.110		
C =	0.90	Restricted Flow Q_r (L/s)=	45.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
0	230.48	63.43	45.00	18.43	0.00
2	182.69	50.28	45.00	5.28	0.63
3	166.09	45.71	45.00	0.71	**0.13**
4	152.51	41.97	45.00	-3.03	-0.73
6	131.57	36.21	45.00	-8.79	-3.16

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.13	6.81	0.00	0.00

overflows to: CBMH20

Drainage Area	CB10		
Area (Ha)	0.110		
C =	0.90	Restricted Flow Q_r (L/s)=	45.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	24.95	45.00	-20.05	-8.42
9	80.87	22.26	45.00	-22.74	-12.28
10	76.81	21.14	45.00	-23.86	**-14.32**
11	73.17	20.14	45.00	-24.86	-16.41
13	66.93	18.42	45.00	-26.58	-20.73

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	6.81	0.00	0.00

overflows to: CBMH20

Drainage Area	CB7		
Area (Ha)	0.080		
C =	1.00	Restricted Flow Q_r (L/s)=	30.00

Drainage Area Plan - CBMH1C

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	63.62	30.00	33.62	6.05
5	242.70	53.98	30.00	23.98	7.19
6	226.01	50.26	30.00	20.26	**7.30**
7	211.67	47.07	30.00	17.07	7.17
9	188.25	41.87	30.00	11.87	6.41

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	7.30	6.97	0.00	0.33

overflows to: CB8

Drainage Area	CB7		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	30.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-1	266.98	53.44	30.00	23.44	-1.41
1	203.51	40.73	30.00	10.73	0.64
2	182.69	36.57	30.00	6.57	**0.79**
3	166.09	33.24	30.00	3.24	0.58
5	141.18	28.26	30.00	-1.74	-0.52

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
6.64	7.43	6.97	0.00	0.46

overflows to: CB8

Drainage Area	CB7		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	30.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	18.15	30.00	-11.85	-4.98
9	80.87	16.19	30.00	-13.81	-7.46
10	76.81	15.37	30.00	-14.63	**-8.78**
11	73.17	14.65	30.00	-15.35	-10.13
13	66.93	13.40	30.00	-16.60	-12.95

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	6.97	0.00	0.00

overflows to: CB8

Drainage Area	CB6	Drainage Area Plan - CBMH1B			
Area (Ha)	0.070				
C =	1.00	Restricted Flow Q_r (L/s)=		20.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
5	242.70	47.23	20.00	27.23	8.17
7	211.67	41.19	20.00	21.19	8.90
8	199.20	38.76	20.00	18.76	**9.01**
9	188.25	36.63	20.00	16.63	8.98
11	169.91	33.06	20.00	13.06	8.62

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.01	13.66	0.00	0.00

overflows to: CB8

Drainage Area	CB6				
Area (Ha)	0.070				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
0	230.48	40.37	20.00	20.37	0.00
2	182.69	32.00	20.00	12.00	1.44
3	166.09	29.09	20.00	9.09	**1.64**
4	152.51	26.71	20.00	6.71	1.61
6	131.57	23.04	20.00	3.04	1.10

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.64	13.66	0.00	0.00

overflows to: CB8

Drainage Area	CB6				
Area (Ha)	0.070				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	15.88	20.00	-4.12	-1.73
9	80.87	14.16	20.00	-5.84	-3.15
10	76.81	13.45	20.00	-6.55	**-3.93**
11	73.17	12.81	20.00	-7.19	-4.74
13	66.93	11.72	20.00	-8.28	-6.46

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	13.66	0.00	0.00

overflows to: CB8

Drainage Area	CB5	Drainage Area Plan - CBMH1A			
Area (Ha)	0.060				
C =	1.00	Restricted Flow Q_r (L/s)=		15.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	35.31	15.00	20.31	8.53
9	188.25	31.40	15.00	16.40	8.86
10	178.56	29.78	15.00	14.78	**8.87**
11	169.91	28.34	15.00	13.34	8.80
13	155.11	25.87	15.00	10.87	8.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.87	3.41	0.00	5.46

overflows to: CB8

Drainage Area	CB5				
Area (Ha)	0.060				
C =	0.90	Restricted Flow Q_r (L/s)=		15.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	30.55	15.00	15.55	0.93
3	166.09	24.93	15.00	9.93	1.79
4	152.51	22.89	15.00	7.89	**1.89**
5	141.18	21.19	15.00	6.19	1.86
7	123.30	18.51	15.00	3.51	1.47

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.89	3.41	0.00	0.00

overflows to: CB8

Drainage Area	CB5				
Area (Ha)	0.060				
C =	0.90	Restricted Flow Q_r (L/s)=		15.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	13.61	15.00	-1.39	-0.58
9	80.87	12.14	15.00	-2.86	-1.54
10	76.81	11.53	15.00	-3.47	**-2.08**
11	73.17	10.98	15.00	-4.02	-2.65
13	66.93	10.05	15.00	-4.95	-3.86

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	3.41	0.00	0.00

overflows to: CB8

Drainage Area	CB8	Drainage Area Plan - MH1B			
Area (Ha)	0.170				
C =	1.00	Restricted Flow Q_r (L/s)=		47.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
6	226.01	106.81	47.00	59.81	21.53
8	199.20	94.14	47.00	47.14	22.63
9	188.25	88.97	47.00	41.97	**22.66**
10	178.56	84.39	47.00	37.39	22.43
12	162.13	76.62	47.00	29.62	21.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.79	28.45	24.90	1.60	1.95

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
6.00	0.450	0.159	0.95
			0.95

overflows to: MH1A

Drainage Area	CB8				
Area (Ha)	0.170				
C =	0.90	Restricted Flow Q_r (L/s)=		47.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	86.56	47.00	39.56	2.37
3	166.09	70.64	47.00	23.64	4.26
4	152.51	64.87	47.00	17.87	**4.29**
5	141.18	60.05	47.00	13.05	3.91
7	123.30	52.45	47.00	5.45	2.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.29	24.90	1.60	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB8 (600mm x 600mm)	1.80	0.36	0.65
			0.65

Drainage Area	CB8				
Area (Ha)	0.170				
C =	0.90	Restricted Flow Q_r (L/s)=		47.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	38.56	47.00	-8.44	-3.54
9	80.87	34.40	47.00	-12.60	-6.80
10	76.81	32.67	47.00	-14.33	**-8.60**
11	73.17	31.12	47.00	-15.88	-10.48
13	66.93	28.47	47.00	-18.53	-14.46

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	24.90	1.60	0.00

Drainage Area	CB4	Drainage Area Plan - MH10A			
Area (Ha)	0.030				
C =	1.00	Restricted Flow Q_r (L/s)=		6.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
9	188.25	15.70	6.00	9.70	5.24
11	169.91	14.17	6.00	8.17	5.39
12	162.13	13.52	6.00	7.52	**5.42**
13	155.11	12.94	6.00	6.94	5.41
15	142.89	11.92	6.00	5.92	5.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.42	10.62	0.00	0.00

overflows to: CBMH1

Drainage Area	CB4				
Area (Ha)	0.030				
C =	0.90	Restricted Flow Q_r (L/s)=		6.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
3	166.09	12.47	6.00	6.47	1.16
5	141.18	10.60	6.00	4.60	1.38
6	131.57	9.88	6.00	3.88	**1.40**
7	123.30	9.26	6.00	3.26	1.37
9	109.79	8.24	6.00	2.24	1.21

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.40	10.62	0.00	0.00

overflows to: CBMH1

Drainage Area	CB4				
Area (Ha)	0.030				
C =	0.90	Restricted Flow Q_r (L/s)=		6.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	6.81	6.00	0.81	0.34
9	80.87	6.07	6.00	0.07	0.04
10	76.81	5.76	6.00	-0.24	**-0.14**
11	73.17	5.49	6.00	-0.51	-0.34
13	66.93	5.02	6.00	-0.98	-0.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	10.62	0.00	0.00

overflows to: CBMH1

Drainage Area	CBMH1	Drainage Area MH10B			
Area (Ha)	0.080				
C =	1.00	Restricted Flow Q_r (L/s)=		20.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	47.07	20.00	27.07	11.37
9	188.25	41.87	20.00	21.87	11.81
10	178.56	39.71	20.00	19.71	**11.83**
11	169.91	37.79	20.00	17.79	11.74
13	155.11	34.50	20.00	14.50	11.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	11.83	0.00	0.00	11.83

overflows to: MH1A

Drainage Area	CBMH1				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	40.73	20.00	20.73	1.24
3	166.09	33.24	20.00	13.24	2.38
4	152.51	30.53	20.00	10.53	**2.53**
5	141.18	28.26	20.00	8.26	2.48
7	123.30	24.68	20.00	4.68	1.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	0.00	0.00	2.53

overflows to: MH1A

Drainage Area	CBMH1				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	18.15	20.00	-1.85	-0.78
9	80.87	16.19	20.00	-3.81	-2.06
10	76.81	15.37	20.00	-4.63	**-2.78**
11	73.17	14.65	20.00	-5.35	-3.53
13	66.93	13.40	20.00	-6.60	-5.15

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	0.00	0.00	0.00

overflows to: MH1A

Drainage Area	MH1A				
Area (Ha)	0.150				
C =	1.00	Restricted Flow Q_r (L/s)=		43.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
5	242.70	101.21	43.00	58.21	17.46
7	211.67	88.27	43.00	45.27	19.01
8	199.20	83.07	43.00	40.07	**19.23**
9	188.25	78.50	43.00	35.50	19.17
11	169.91	70.85	43.00	27.85	18.38

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
13.78	33.01	10.83	0.00	22.18

overflows to: CBMH20

Drainage Area	MH1A				
Area (Ha)	0.160				
C =	0.90	Restricted Flow Q_r (L/s)=		43.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
2	182.69	73.13	43.00	30.13	3.62
4	152.51	61.05	43.00	18.05	4.33
5	141.18	56.52	43.00	13.52	**4.05**
6	131.57	52.67	43.00	9.67	3.48
8	116.11	46.48	43.00	3.48	1.67

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.53	6.58	10.83	0.00	0.00

overflows to: CBMH20

Drainage Area	MH1A				
Area (Ha)	0.150				
C =	0.90	Restricted Flow Q_r (L/s)=		43.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	34.03	43.00	-8.97	-3.77
9	80.87	30.35	43.00	-12.65	-6.83
10	76.81	28.82	43.00	-14.18	**-8.51**
11	73.17	27.46	43.00	-15.54	-10.26
13	66.93	25.12	43.00	-17.88	-13.95

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	10.83	0.00	0.00

overflows to: CBMH20

Drainage Area	CBMH20	Previously CB18, Drainage Area Plan - MH11			
Area (Ha)	0.100				
C =	0.38	Restricted Flow Q_r (L/s)=		15.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	29.82	15.00	14.82	2.67
4	262.41	27.36	15.00	12.36	2.97
5	242.70	25.30	15.00	10.30	**3.09**
6	226.01	23.56	15.00	8.56	3.08
7	211.67	22.07	15.00	7.07	2.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
29.75	32.84	131.62	0.00	0.00

overflows to: offsite

Drainage Area	CBMH20				
Area (Ha)	0.160				
C =	0.30	Restricted Flow Q_r (L/s)=		15.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	27.16	15.00	12.16	0.73
2	182.69	24.38	15.00	9.38	1.13
3	166.09	22.16	15.00	7.16	**1.29**
4	152.51	20.35	15.00	5.35	1.28
5	141.18	18.84	15.00	3.84	1.15

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.29	131.62	0.00	0.00

overflows to: offsite

Drainage Area	CBMH20				
Area (Ha)	0.100				
C =	0.30	Restricted Flow Q_r (L/s)=		15.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
0	167.22	13.95	15.00	-1.05	0.00
1	148.14	12.36	15.00	-2.64	-0.16
2	133.33	11.12	15.00	-3.88	**-0.47**
3	121.46	10.13	15.00	-4.87	-0.88
4	111.72	9.32	15.00	-5.68	-1.36

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	131.62	0.00	0.00

overflows to: offsite

Drainage Area	RA	Drainage Area Plan - MH7A			
Area (Ha)	0.300				
C =	1.00	Restricted Flow Q_r (L/s)=		27.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
25	103.85	86.61	27.00	59.61	89.41
26	101.18	84.38	27.00	57.38	89.52
27	98.66	82.28	27.00	55.28	**89.56**
28	96.27	80.29	27.00	53.29	89.53
29	94.01	78.41	27.00	51.41	89.45

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	89.56	90.00	0.00	0.00

Drainage Area	RA				
Area (Ha)	0.300				
C =	0.90	Restricted Flow Q_r (L/s)=		27.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
13	90.63	68.03	27.00	41.03	32.00
14	86.93	65.25	27.00	38.25	32.13
15	83.56	62.72	27.00	35.72	**32.15**
16	80.46	60.39	27.00	33.39	32.06
17	77.61	58.25	27.00	31.25	31.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	32.15	90.00	0.00	0.00

Drainage Area	RA				
Area (Ha)	0.300				
C =	0.90	Restricted Flow Q_r (L/s)=		27.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	64.14	27.00	37.14	17.83
10	76.81	57.65	27.00	30.65	18.39
11	73.17	54.92	27.00	27.92	**18.43**
12	69.89	52.46	27.00	25.46	18.33
14	64.23	48.21	27.00	21.21	17.82

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	18.43	90.00	0.00	0.00

Drainage Area Plan - MH2A

Drainage Area	RB
Area (Ha)	0.190
C =	1.00
Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
20	119.95	63.36	20.00	43.36	52.03
22	112.88	59.62	20.00	39.62	52.30
23	109.68	57.93	20.00	37.93	**52.35**
24	106.68	56.35	20.00	36.35	52.34
26	101.18	53.44	20.00	33.44	52.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	52.35	57.00	0.00	0.00

Drainage Area	RB
Area (Ha)	0.190
C =	0.90
Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
11	99.19	47.15	20.00	27.15	17.92
13	90.63	43.08	20.00	23.08	18.01
14	86.93	41.33	20.00	21.33	**17.91**
15	83.56	39.72	20.00	19.72	17.75
17	77.61	36.89	20.00	16.89	17.23

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	17.91	57.00	0.00	0.00

Drainage Area	RB
Area (Ha)	0.190
C =	0.90
Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
6	96.64	45.94	20.00	25.94	9.34
8	85.46	40.62	20.00	20.62	9.90
9	80.87	38.45	20.00	18.45	**9.96**
10	76.81	36.51	20.00	16.51	9.91
12	69.89	33.23	20.00	13.23	9.52

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.96	57.00	0.00	0.00

Drainage Area Plan - MH7

Drainage Area	RC
Area (Ha)	0.050
C =	1.00
Restricted Flow Q_r (L/s)=	8.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
12	162.13	22.54	8.00	14.54	10.47
14	148.72	20.67	8.00	12.67	10.64
15	142.89	19.86	8.00	11.86	**10.68**
16	137.55	19.12	8.00	11.12	10.67
18	128.08	17.80	8.00	9.80	10.59

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.68	13.50	1.00	0.00

Drainage Area	RC
Area (Ha)	0.050
C =	0.90
Restricted Flow Q_r (L/s)=	8.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
5	141.18	17.66	8.00	9.66	2.90
7	123.30	15.43	8.00	7.43	3.12
8	116.11	14.53	8.00	6.53	**3.13**
9	109.79	13.74	8.00	5.74	3.10
11	99.19	12.41	8.00	4.41	2.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.13	13.50	0.00	0.00

Drainage Area	RC
Area (Ha)	0.050
C =	0.90
Restricted Flow Q_r (L/s)=	8.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
2	133.33	16.68	8.00	8.68	1.04
4	111.72	13.98	8.00	5.98	1.43
5	103.57	12.96	8.00	4.96	**1.49**
6	96.64	12.09	8.00	4.09	1.47
8	85.46	10.69	8.00	2.69	1.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.49	13.50	0.00	0.00

Drainage Area Plan - MH1C

Drainage Area	RD
Area (Ha)	0.050
C =	1.00
Restricted Flow Q_r (L/s)=	8.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
12	162.13	22.54	8.00	14.54	10.47
14	148.72	20.67	8.00	12.67	10.64
15	142.89	19.86	8.00	11.86	**10.68**
16	137.55	19.12	8.00	11.12	10.67
18	128.08	17.80	8.00	9.80	10.59

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.68	11.25	1.00	0.00

Drainage Area	RD
Area (Ha)	0.050
C =	0.90
Restricted Flow Q_r (L/s)=	8.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
5	141.18	17.66	8.00	9.66	2.90
7	123.30	15.43	8.00	7.43	3.12
8	116.11	14.53	8.00	6.53	**3.13**
9	109.79	13.74	8.00	5.74	3.10
11	99.19	12.41	8.00	4.41	2.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.13	11.25	0.00	0.00

Drainage Area	RD
Area (Ha)	0.050
C =	0.90
Restricted Flow Q_r (L/s)=	8.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
2	133.33	16.68	8.00	8.68	1.04
4	111.72	13.98	8.00	5.98	1.43
5	103.57	12.96	8.00	4.96	**1.49**
6	96.64	12.09	8.00	4.09	1.47
8	85.46	10.69	8.00	2.69	1.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.49	11.25	0.00	0.00

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	1.00
Restricted Flow Q_r (L/s)=	291.58

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
10	178.56	769.41	291.58	477.83	286.70
12	162.13	698.63	291.58	407.05	293.08
13	155.11	668.36	291.58	376.78	**293.89**
14	148.72	640.85	291.58	349.27	293.38
16	137.55	592.70	291.58	301.12	289.08

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	293.89	270.00	0.00	23.89

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	0.80
Restricted Flow Q_r (L/s)=	291.58

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
2	182.69	629.76	291.58	338.18	40.58
4	152.51	525.73	291.58	234.15	56.19
5	141.18	486.67	291.58	195.09	**58.53**
6	131.57	453.54	291.58	161.96	58.31
8	116.11	400.26	291.58	108.68	52.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	58.53	270.00	0.00	0.00

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	0.80
Restricted Flow Q_r (L/s)=	291.58

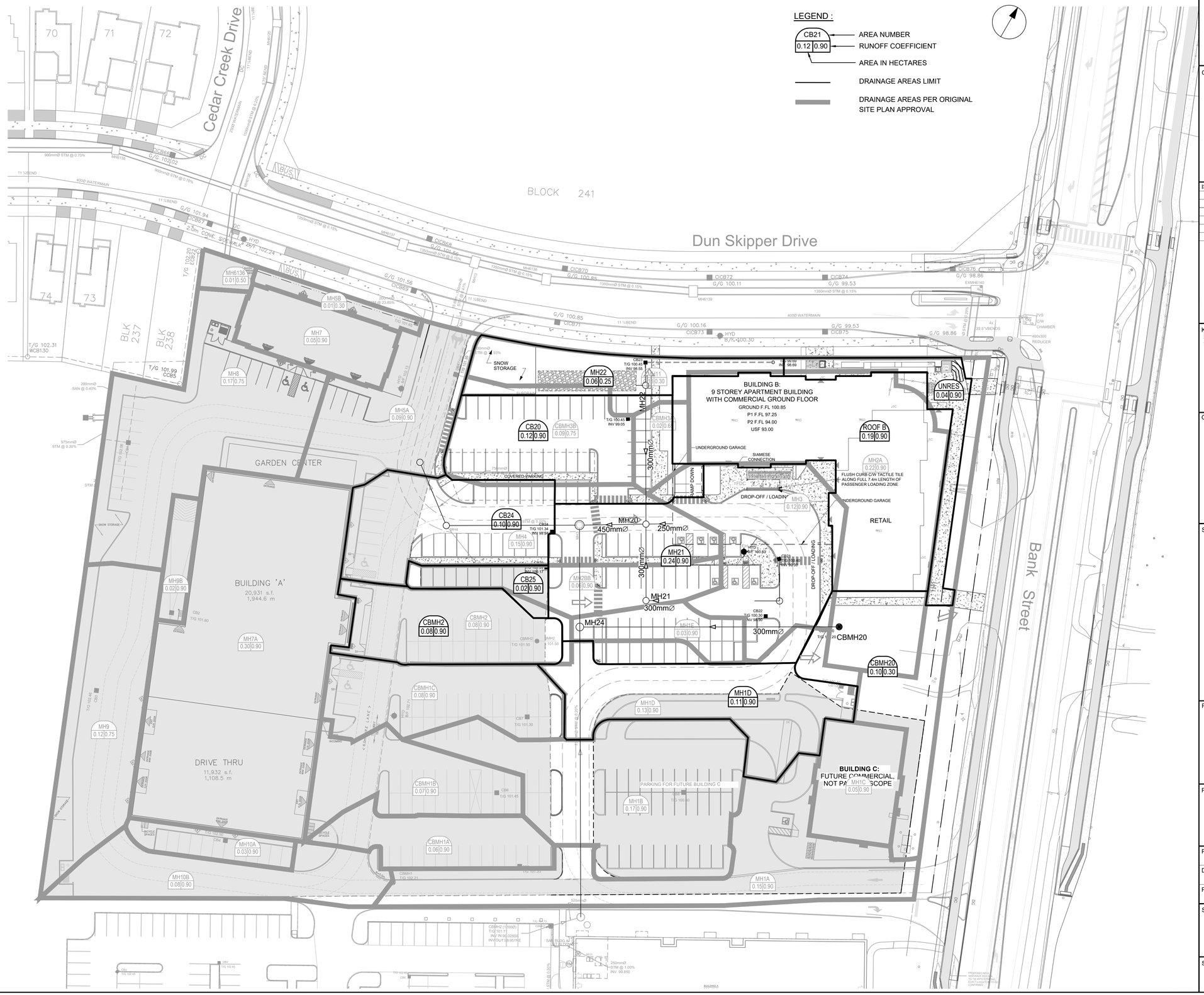
2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
0	167.22	576.45	291.58	284.87	0.00
2	133.33	459.62	291.58	168.04	20.16
3	121.46	418.71	291.58	127.13	**22.88**
4	111.72	385.13	291.58	93.55	22.45
6	96.64	333.13	291.58	41.55	14.96

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	22.88	270.00	0.00	0.00

	Area	Flow
Buildings		63.00
Site		377.00
Uncontrolled	0.06	27.92
External		291.58
	0.060	**759.50**
Allowable		**760.00**
		TRUE



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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN

CONSULTANTS

SEAL

LICENSED PROFESSIONAL ENGINEER
L.I.D. No. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE

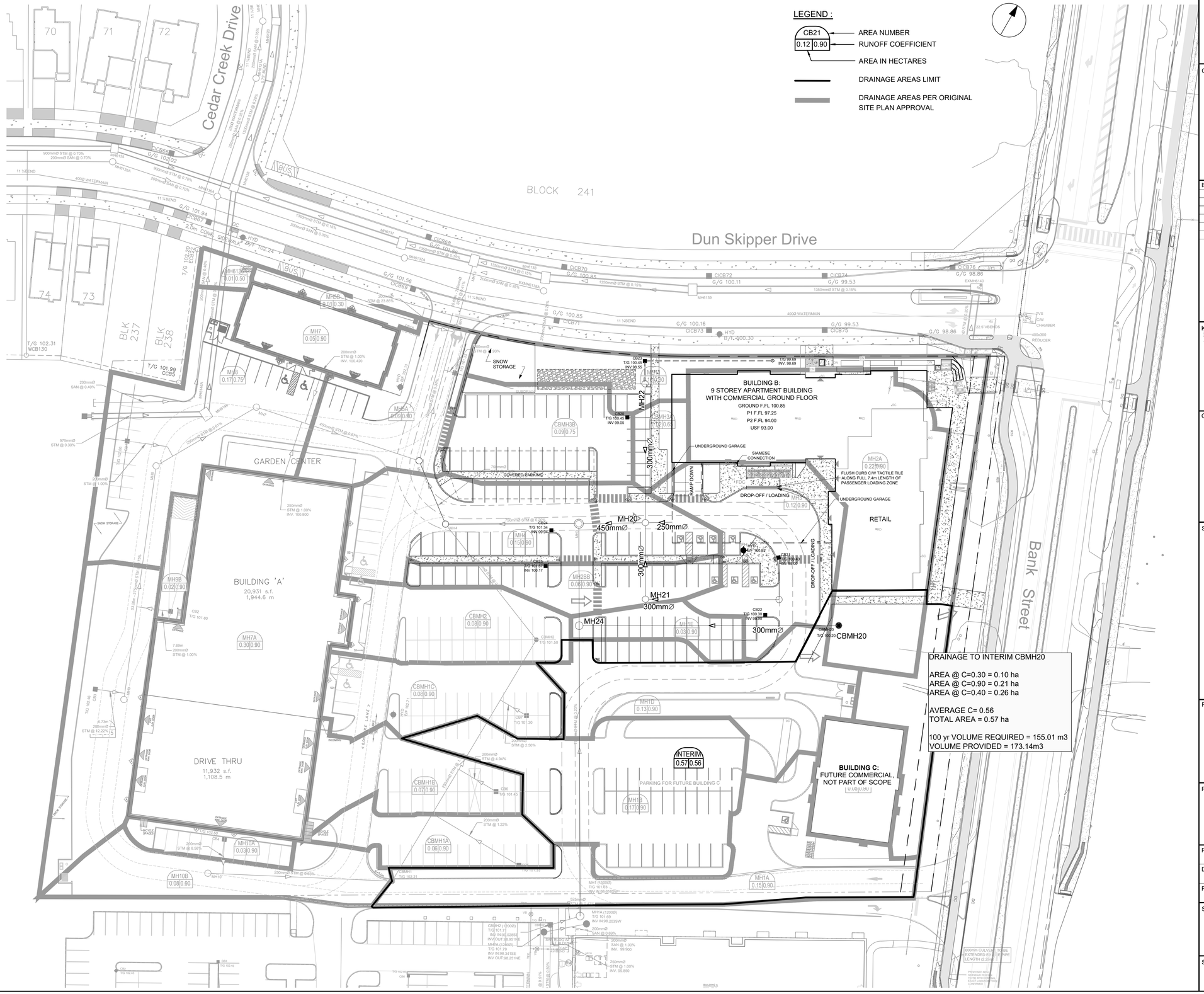
STORM DRAINAGE AREA PLAN

SHEET NUMBER	ISSUE
C-500	5

File Location: C:\DATA\cut\Jobs\Jobs\90\asset\209\42\acad\f6\b82573341941ad\a4\files\b.7\cf\0247-15a4-4d64-9244-be0a3d\96716\Project Files\7.03_Design\04_Civil\Sheets\C-500 STORM DRAINAGE AREA PLAN.dwg Last Saved: August 14, 2025, by mimem4926 Plotted: Thursday, August 14, 2025 7:58:15 PM by acesuser

D07-12-24-0169

SCALE CHECK 1 in 19213 10mm



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SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN

CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE

INTERIM STORM DRAINAGE AREA PLAN

SHEET NUMBER	ISSUE
C-501	5

D07-12-24-0169

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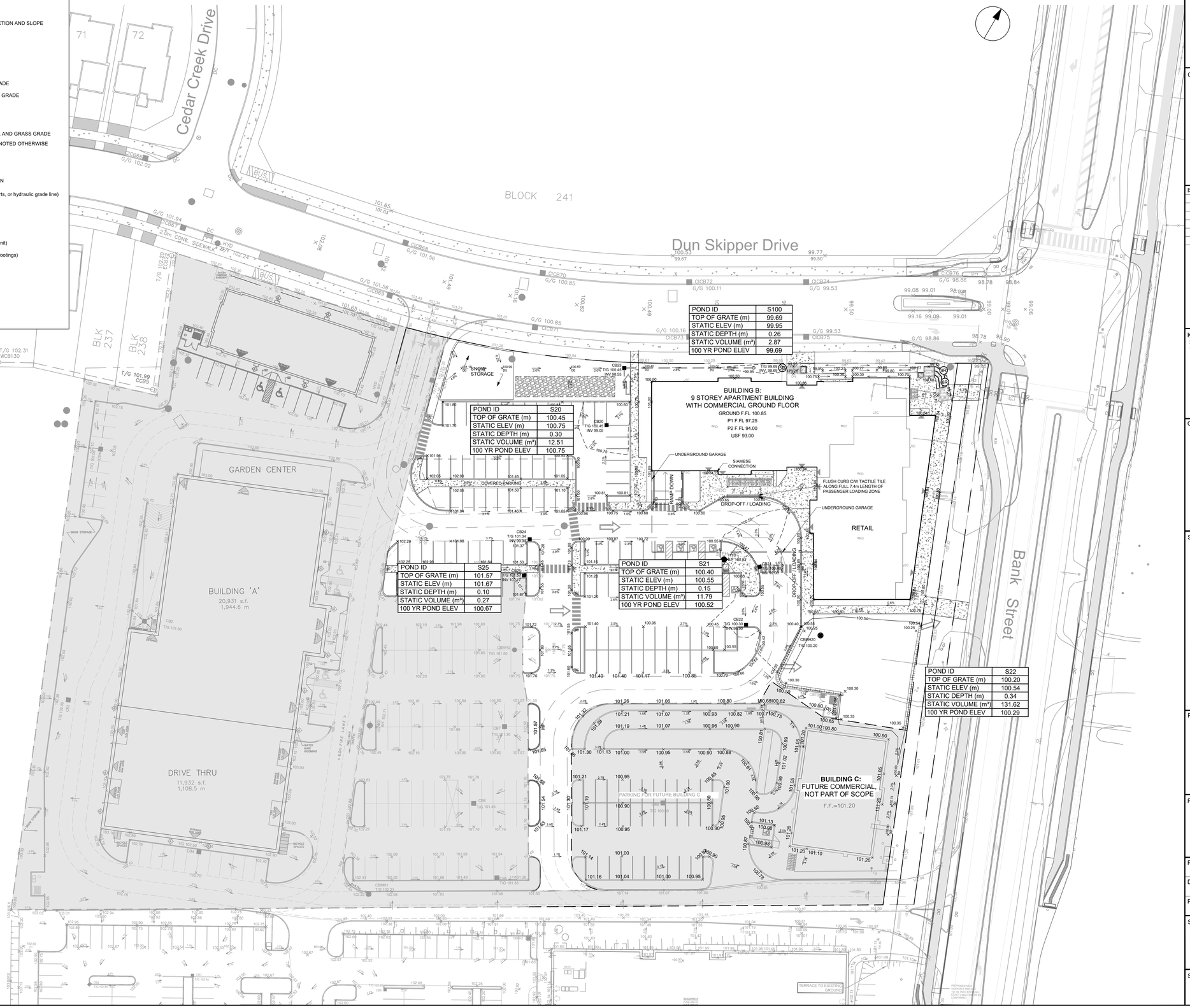
SCALE CHECK 1 in 19213 15mm

GRADING LEGEND

- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH POINT GRADE
- LOT CORNER GRADE C/W EXISTING GRADE
- FULL STATIC PONDING GRADE
- RETAINING WALL C/W TOP OF WALL AND GRASS GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRESSURE REDUCING VALVE
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOTING ELEVATION
- MINIMUM UNDERSIDE OF FOOTING (Based on the higher of the sewer obverts, or hydraulic grade line)
- MINIMUM GARAGE GRADE
- WALKUP UNIT
- WALKOUT UNIT
- NON-STANDARD FOUNDATION (Frost cover not provided for standard unit)
- HIGHBACK UNIT (1.5m frost cover on footings)
- NOISE BARRIER LOCATION
- NOISE BARRIER GATE
- RIP-RAP
- TOWN HOUSE SPLITS
- 2 hr FIREWALL



POND ID	S20
TOP OF GRATE (m)	100.45
STATIC ELEV (m)	100.75
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	12.51
100 YR POND ELEV	100.75

POND ID	S25
TOP OF GRATE (m)	101.57
STATIC ELEV (m)	101.67
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	0.27
100 YR POND ELEV	100.67

POND ID	S21
TOP OF GRATE (m)	100.40
STATIC ELEV (m)	100.55
STATIC DEPTH (m)	0.15
STATIC VOLUME (m³)	11.79
100 YR POND ELEV	100.52

POND ID	S100
TOP OF GRATE (m)	99.69
STATIC ELEV (m)	99.95
STATIC DEPTH (m)	0.26
STATIC VOLUME (m³)	2.87
100 YR POND ELEV	99.69

POND ID	S22
TOP OF GRATE (m)	100.20
STATIC ELEV (m)	100.54
STATIC DEPTH (m)	0.34
STATIC VOLUME (m³)	131.62
100 YR POND ELEV	100.29

CLIENT

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Arcadis Professional Services (Canada) Inc.
formerly IBI Group Professional Services (Canada) Inc.

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN

CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
D. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290

DRAWN BY:	CHECKED BY:
M.M.	R.M.
PROJECT MGR:	APPROVED BY:
R.M.	A.Z.

SHEET TITLE

PONDING PLAN

SHEET NUMBER C-600

ISSUE 5

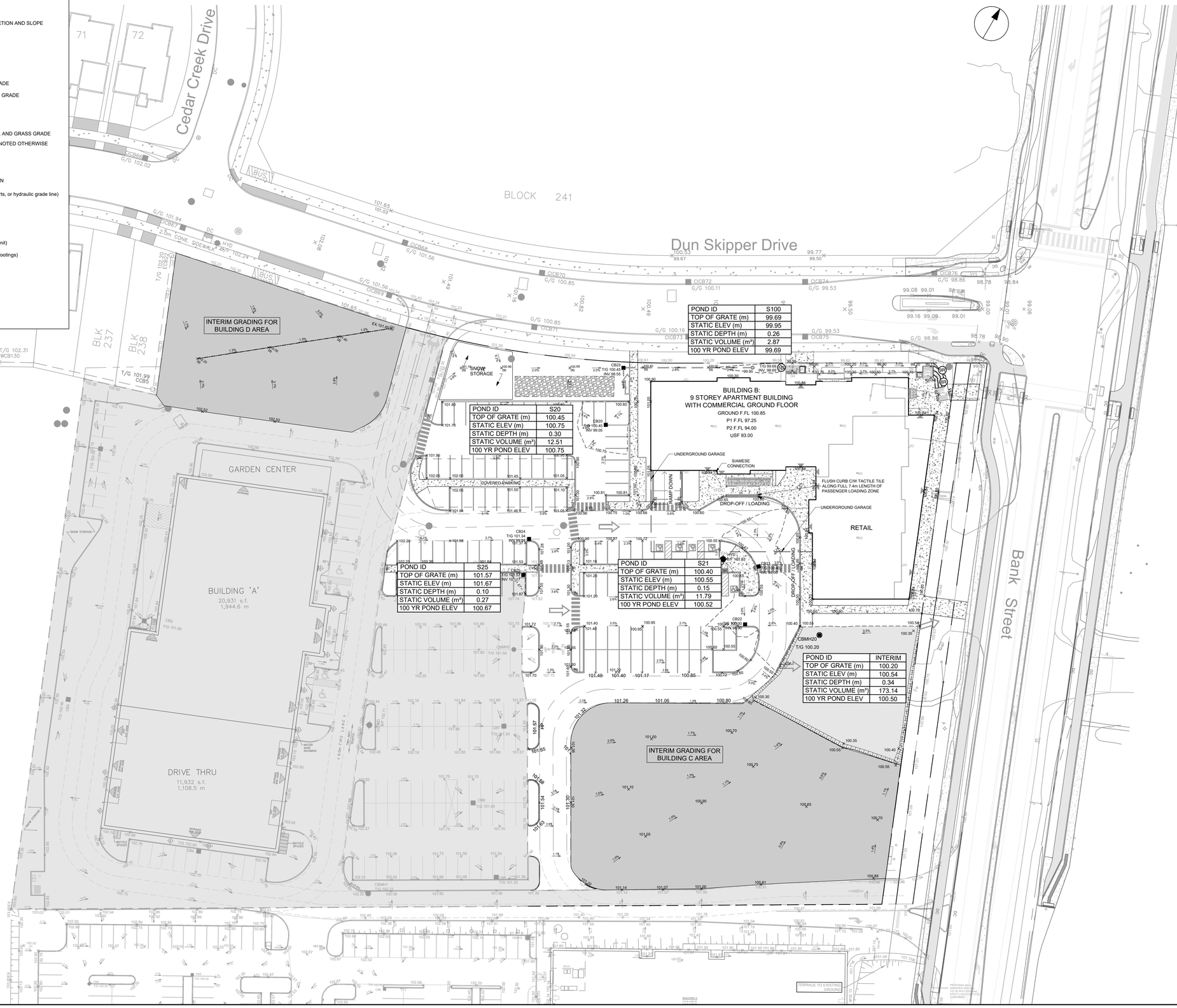
SCALE CHECK 1 in 19213 10mm

D07-12-24-0169

File Location: C:\DARoot\Jobs\3e809aiacc2994cacdf0fa8527334e1941ad4bf8e\b.7bf902471-15a4-4e64-8244-beb3a5f9671e\Project Files\7.03_Design\04_Civil\Sheets\C-600 PONDING PLAN.dwg Last Saved: August 14, 2025, by mihkeim4626 Plotted: Thursday, August 14, 2025 7:58:45 PM by acessuser

GRADING LEGEND

- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH POINT GRADE
- LOT CORNER GRADE C/W EXISTING GRADE
- FULL STATIC PONDING GRADE
- RETAINING WALL C/W TOP OF WALL AND GRASS GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRESSURE REDUCING VALVE
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOTING ELEVATION
- MINIMUM UNDERSIDE OF FOOTING (Based on the higher of the sewer obverts, or hydraulic grade line)
- MINIMUM GARAGE GRADE
- WALKUP UNIT
- WALKOUT UNIT
- NON-STANDARD FOUNDATION (Frost cover not provided for standard unit)
- HIGHBACK UNIT (1.5m frost cover on footings)
- NOISE BARRIER LOCATION
- NOISE BARRIER GATE
- RIP-RAP
- TOWN HOUSE SPLITS
- 2 hr FIREWALL



POND ID	S20
TOP OF GRATE (m)	100.45
STATIC ELEV (m)	100.75
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	12.51
100 YR POND ELEV	100.75

POND ID	S100
TOP OF GRATE (m)	99.69
STATIC ELEV (m)	99.95
STATIC DEPTH (m)	0.26
STATIC VOLUME (m³)	2.87
100 YR POND ELEV	99.69

POND ID	S25
TOP OF GRATE (m)	101.57
STATIC ELEV (m)	101.67
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	0.27
100 YR POND ELEV	100.67

POND ID	S21
TOP OF GRATE (m)	100.40
STATIC ELEV (m)	100.55
STATIC DEPTH (m)	0.15
STATIC VOLUME (m³)	11.79
100 YR POND ELEV	100.52

POND ID	INTERIM
TOP OF GRATE (m)	100.20
STATIC ELEV (m)	100.54
STATIC DEPTH (m)	0.34
STATIC VOLUME (m³)	173.14
100 YR POND ELEV	100.50

CLIENT

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formerly IBI Group Professional Services (Canada) Inc.

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No.	DESCRIPTION	DATE
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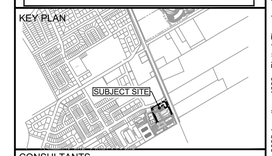
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN



CONSULTANTS

1:400 0 4 12 20m / 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
L.D. (Leo) Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE

INTERIM PONDING PLAN

SHEET NUMBER	ISSUE
C-601	5

File Location: C:\DARoot\Jobs\3e80baeac2094acaf06a8527534e1941ws\files\b.7bf90247-15a4-4e64-8244-beb3a058b671e\Project Files\7.03_Design\04_Civil\Sheets\C-601-INTERIM PONDING PLAN.dwg Last Saved: August 14, 2025, by mitrem4926 Plotted: Thursday, August 14, 2025 7:59:01 PM by acesser

D07-12-24-0169

SCALE CHECK 1 in 10mm

19213

User Inputs

Chamber Model:	SC-310
Outlet Control Structure:	Yes
Project Name:	148290 Dun Skipper
Engineer:	Amy Zhuang
Project Location:	Ontario
Measurement Type:	Metric
Required Storage Volume:	88.00 cubic meters.
Stone Porosity:	30%
Stone Foundation Depth:	200 mm.
Stone Above Chambers:	600 mm.
Design Constraint Dimensions:	(9.01 m. x 22.01 m.)

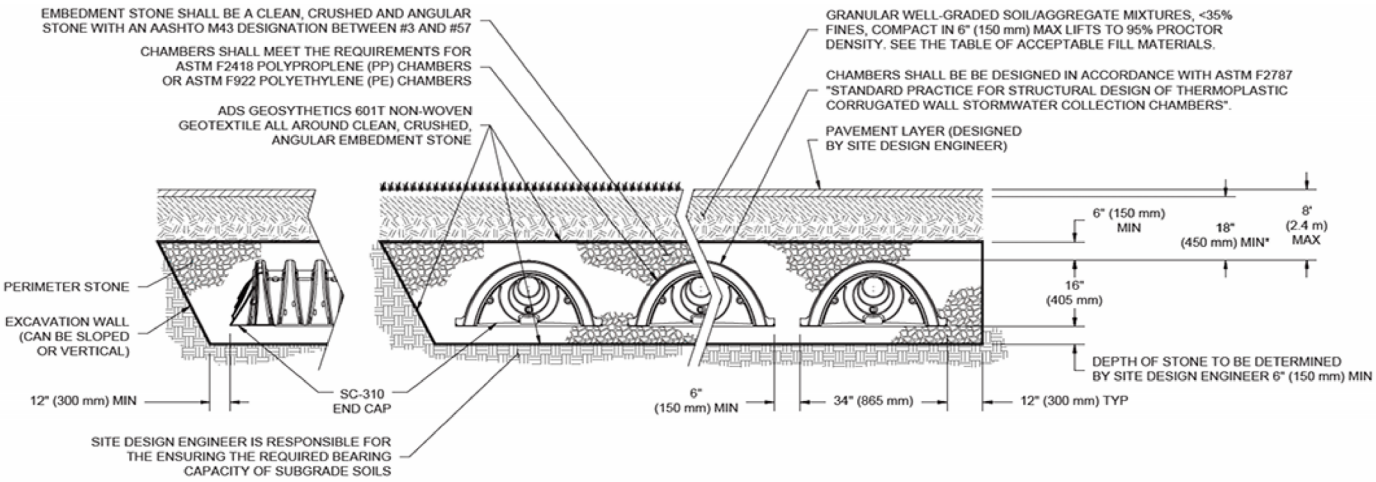
Results

System Volume and Bed Size

Installed Storage Volume:	88.64 cubic meters.
Storage Volume Per Chamber:	0.42 cubic meters.
Number Of Chambers Required:	72
Number Of End Caps Required:	16
Chamber Rows:	8
Maximum Length:	21.51 m.
Maximum Width:	8.77 m.
Approx. Bed Size Required:	186.96 square meters.
Average Cover Over Chambers:	N/A .

System Components

Amount Of Stone Required:	196 cubic meters
Volume Of Excavation (Not Including Fill):	226 cubic meters
Total Non-woven Geotextile Required:	537 square meters
Woven Geotextile Required (excluding Isolator Row):	27 square meters
Woven Geotextile Required (Isolator Row):	30 square meters
Total Woven Geotextile Required:	56 square meters
Impervious Liner Required:	0 square meters



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

ARCADIS IBI GROUP
500-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
ibigroup.com

ORIFICE SIZING
155 Dun Skipper Drive
148290-6.0 | Rev #2 | 2025-02-18
Prepared By: WZ | Checked By: RM

Orifice coefficients	
Cv =	0.60

	Invert (m)	Diameter (mm)	Centre ICD (m)	Max. Pond Elevation (m)	Hydraulic Slope (m)	Target Flow (l/s)	Theoretical Orifice (m)	Theoretical Actual Flow (l/s)	Recommended Orifice (m)	Recommended Actual Flow (l/s)
CB20	99.050	200	99.150	100.750	1.600	15.00	0.067	15.00	0.067	15.00
CB24	99.940	200	100.040	101.340	1.300	15.00	0.070	15.00	0.070	15.00
CB25	100.170	200	100.270	101.670	1.400	6.00	0.044	6.00	0.044	6.00
CBMH20	98.474	300	98.624	100.500	1.876	15.00	0.064	15.00	0.064	15.00
MH21	98.373	300	98.523	100.550	2.027	33.00	0.093	33.00	0.093	33.00
MH22	98.422	300	98.572	100.750	2.178	6.00	0.039	6.00	0.039	6.00
						90.00				**89.99**

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

4836 Bank Street
CITY OF OTTAWA
Home Hardware

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

As-built Sanitary Sewers

4836 Bank Street
CITY OF OTTAWA
Home Hardware

LOCATION				RESIDENTIAL									ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		RES	PEAK	AREA (Ha)						ICI	PEAK	AREA (Ha)		FLOW							DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL															
STREET	AREA ID	FROM MH	TO MH	w/ Units (Ha)	SF	SD	TH	APT	w/o Units (Ha)	IND	CUM	PEAK FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	PEAK FACTOR	FLOW (L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	CAPACITY (L/s)	LENGTH (m)	(mm)	(%)	(full) (m/s)	L/s	(%)
		BLDG D	MH7A-MH5A							0.0	0.0	3.80	0.00			0.05	0.05			1.50	0.02	0.05	0.05	0.02	0.00	0.00	0.04	34.22	11.10	200	1.00	1.055	34.18	99.88%
		BLDG A	MH7A-MH5A							0.0	0.0	3.80	0.00			0.30	0.30			1.50	0.15	0.30	0.30	0.10	0.00	0.00	0.24	34.22	14.61	200	1.00	1.055	33.97	99.28%
		MH7A	MH5A							0.0	0.0	3.80	0.00			1.01	1.01			1.50	0.49	1.01	1.01	0.33	0.00	0.00	0.82	28.05	32.74	200	0.67	0.865	27.22	97.06%
Idone Commercial		MH1A	MH3A							0.0	0.0	3.80	0.00			2.41	2.41			1.50	1.17	2.41	2.41	0.80	0.00	0.00	1.97	19.66	92.55	200	0.33	0.606	17.69	89.99%
		MH3A	MH4A							0.0	0.0	3.80	0.00			0.74	3.15			1.50	1.53	0.74	3.15	1.04	0.00	0.00	2.57	21.37	30.45	200	0.39	0.659	18.80	87.97%
		MH4A	MH5A							0.0	0.0	3.80	0.00			0.02	3.17			1.50	1.54	0.02	3.17	1.05	0.00	0.00	2.59	21.49	15.21	200	0.39	0.663	18.90	87.96%
		MH5A	MH6A							0.0	0.0	3.80	0.00			0.17	4.35			1.50	2.11	0.17	4.35	1.44	0.00	0.00	3.55	19.56	33.65	200	0.33	0.603	16.01	81.85%

Sewer Design and As-built Data									
U/S MH	D/S MH	Design Slope	As-built Slope	Design Length	As-built Length	U/S Invert	As-built U/S Inv	D/S Invert	As-built D/S Invert
BLDG D	MH7A-MH5A	1.00		11.10		100.420		98.828	
BLDG A	MH7A-MH5A	1.00		14.61		100.800		98.835	
MH7A	MH5A	0.65	0.67	32.62	32.740	98.852	98.850	98.640	98.630
MH1A	MH3A	0.35	0.33	90.34	92.550	97.847	97.830	97.535	97.520
MH3A	MH4A	0.35	0.38	30.01	30.450	97.475	97.470	97.370	97.350
MH4A	MH5A	0.35	0.39	14.90	15.210	97.340	97.340	97.288	97.280
MH5A	MH6A	0.35	0.33	33.69	33.650	97.228	97.230	97.110	97.120

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	
APT	1.8	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0

Designed: SEL

Checked: JIM

Dwg. Reference: 119351-501

No.	Revision	Date
1.	Submission No. 1	2019-03-30
2.	Submission No. 2 - Asbuilts	2022-02-22
3.	Submission No. 3 - Idone Commercial Asbuilts	2025-04-17

File Reference:	Date:	Sheet No:
119351.5.7.1	2025-04-17	1 of 1

LICENSED PROFESSIONAL ENGINEER
S. E. LABADIE
100214983
2025-04-17
PROVINCE OF ONTARIO

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

4836 Bank Street
City of Ottawa
Home Hardware

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

As-built Storm Sewers

4836 Bank Street
City of Ottawa
Home Hardware

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW														SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.50	C= 0.55	C= 0.65	C= 0.70	C= 0.75	C= 0.90	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	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) DIA	PIPE SIZE (mm) W	PIPE SIZE (mm) H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	AVAIL CAP (2yr) (%)
		CB3	MH9-MH8								0.12			0.25	0.25	10.00	0.11	10.11	76.81	104.19	122.14	178.56	19.22	26.07	30.56	44.68		19.22	34.22	6.73	200			1.00	1.055	15.00	43.84%
		CB2	MH9-MH8									0.02		0.05	0.05	10.00	0.12	10.12	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	34.22	7.69	200			1.00	1.055	30.37	88.77%
		MH9	MH8											0.00	0.30	10.12	0.64	10.76	76.34	103.56	121.39	177.46	22.92	31.09	36.45	53.28		22.92	158.48	53.17	375			0.75	1.390	135.56	85.54%
		CB1	MH8-MH7								0.17			0.35	0.35	10.00	0.17	10.17	76.81	104.19	122.14	178.56	27.22	36.93	43.29	63.29		27.22	34.22	10.80	200			1.00	1.055	6.99	20.44%
		MH8	MH7											0.00	0.65	10.76	0.45	11.21	74.01	100.35	117.61	171.91	48.45	65.70	77.00	112.55		48.45	48.63	26.20	250			0.61	0.960	0.18	0.36%
		BLDG D	MH7-MH5									0.05		0.13	0.13	10.00	0.20	10.20	76.81	104.19	122.14	178.56	9.61	13.03	15.28	22.34		9.61	34.22	12.60	200			1.00	1.055	24.61	71.92%
		BLDG A	MH7-MH5									0.30		0.75	0.75	10.00	0.18	10.18	76.81	104.19	122.14	178.56	57.65	78.21	91.68	134.03		57.65	62.04	12.97	250			1.00	1.224	4.39	7.07%
		MH7	MH5											0.00	1.53	11.21	0.47	11.68	72.44	98.19	115.07	168.17	110.86	150.27	176.11	257.37		110.86	225.20	38.55	450			0.57	1.372	114.34	50.77%
		CB4	MH10-CBMH1									0.03		0.08	0.08	10.00	0.12	10.12	76.81	104.19	122.14	178.56	5.76	7.82	9.17	13.40		5.76	34.22	7.78	200			1.00	1.055	28.45	83.15%
		MH10	CBMH1											0.00	0.08	10.12	0.71	10.83	76.34	103.55	121.38	177.44	5.73	7.77	9.11	13.32		5.73	49.16	41.40	250			0.63	0.970	43.43	88.35%
		CB5	CBMH1-CBMH2									0.06		0.15	0.15	10.00	0.36	10.36	76.81	104.19	122.14	178.56	11.53	15.64	18.34	26.81		11.53	34.22	22.72	200			1.00	1.055	22.69	66.30%
		CB6	CBMH1-CBMH2									0.07		0.18	0.18	10.00	0.15	10.15	76.81	104.19	122.14	178.56	13.45	18.25	21.39	31.27		13.45	34.22	9.78	200			1.00	1.055	20.76	60.69%
		CB7	CBMH1-CBMH2									0.08		0.20	0.20	10.00	0.15	10.15	76.81	104.19	122.14	178.56	15.37	20.86	24.45	35.74		15.37	34.22	9.59	200			1.00	1.055	18.84	55.07%
		CBMH1	CBMH2									0.08		0.20	0.80	10.83	0.81	11.64	73.74	99.98	117.18	171.28	59.04	80.05	93.82	137.13		59.04	65.96	63.25	250			1.13	1.302	6.92	10.49%
		CBMH2	MH4											0.00	0.80	11.64	0.70	12.34	71.02	96.24	112.78	164.81	56.86	77.06	90.30	131.95		56.86	58.89	33.75	300			0.34	0.807	2.03	3.44%
Idone Commercial		MH1	MH3								1.58	0.99		5.77	5.77	10.28	1.47	11.75	75.75	102.74	120.43	176.04	437.15	592.92	695.01	1,015.97		437.15	506.25	97.97	750			0.19	1.110	69.10	13.65%
		MH3	MH4		0.16				0.02		0.09	0.15		0.73	6.50	11.75	0.39	12.14	70.68	95.77	112.23	163.99	459.68	622.89	729.90	1,066.59		459.68	592.21	30.43	750			0.26	1.299	132.53	22.38%
		MH4	MH5											0.00	7.30	12.14	0.18	12.32	69.46	94.10	110.25	161.10	507.34	687.32	805.33	1,176.72		507.34	660.70	15.45	750			0.32	1.449	153.36	23.21%
		CB17	MH5-MH12									0.09		0.23	0.23	10.00	0.04	10.04	76.81	104.19	122.14	178.56	17.29	23.46	27.50	40.21		17.29	34.22	2.55	200			1.00	1.055	16.92	49.45%
		CB16	MH5-MH12		0.01									0.01	0.01	10.00	0.14	10.14	76.81	104.19	122.14	178.56	0.64	0.87	1.02	1.49		0.64	34.22	9.09	200			1.00	1.055	33.58	98.13%
		MH5	MH12											0.00	9.07	12.32	0.34	12.66	68.92	93.35	109.38	159.81	624.96	846.57	991.89	1,449.26		624.96	705.11	31.20	750			0.37	1.546	80.16	11.37%
		MH12	EX 1350 SEWER											0.00	9.07	12.66	0.16	12.82	67.92	91.99	107.77	157.45	615.91	834.16	977.28	1,427.82		615.91	747.54	15.69	750			0.41	1.639	131.62	17.61%

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 = 732.951 / (TC+6.199)^0.810] 2 YEAR
[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: JEB
Checked: JIM
Dwg. Reference: 119351-500

No.	Revision	Date
1.	- Submission No. 1	2019-03-30
2.	Revised per City Comments	2020-04-20
3.	Submission No. 3 - Asbuilts	2022-02-22
3.	Submission No. 4 - Idone Commercial Asbuilts	2025-04-17

File Reference:	Date:	Sheet No:
119351.5.7.1	2025-04-17	1 of 1

Sewer Design and As-built Data

U/S MH	D/S MH	Design Slope	As-built Slope	Design Length	As-built Length	U/S Invert	As-built U/S Inv	D/S Invert	As-built D/S Invert
CB3	MH9-MH8	1.00		6.73		101.050		100.228	
CB2	MH9-MH8	1.00		7.69		100.350		100.145	
MH9	MH8	0.75	0.75	54.91	53.280	100.067	100.180	99.655	99.780
CB1	MH8-MH7	1.00		10.80		100.650		99.784	
MH8	MH7	0.75	0.61	25.16	26.040	99.750	99.730	99.562	99.570
BLDG D	MH7-MH5	1.00		12.60		100.420		99.356	
BLDG A	MH7-MH5	1.00		12.97		100.800		99.303	
MH7	MH5	0.60	0.57	38.63	38.550	99.162	99.370	98.930	99.149
CB4	MH10-CBMH1	1.00		7.78		101.200		100.532	
MH10	CBMH1	0.60	0.63	41.57	41.400	100.499	100.440	100.250	100.180
CB5	CBMH1-CBMH2	1.00		22.72		99.930		99.653	
CB6	CBMH1-CBMH2	1.00		9.78		100.050		99.568	
CB7	CBMH1-CBMH2	1.00		9.59		99.900		99.228	
CBMH1	CBMH2	1.15	1.13	63.40	63.25	99.795	99.730	99.066	99.015
CBMH2	MH4	0.35	0.34	33.14	33.75	99.016	99.015	98.900	98.900
MH1	MH3	0.20	0.19	90.34	97.97	97.942	97.970	97.764	97.800
MH3	MH4	0.20	0.26	30.07	30.43	97.704	97.730	97.645	97.650
MH4	MH5	0.25	0.32	15.46	15.45	97.849	97.645	97.810	97.595
CB17	MH5-MH12	1.00		2.55		99.950		98.112	
CB16	MH5-MH12	1.00		9.09		100.250		98.081	
MH5	MH12	0.35	0.37	31.13	31.2	97.584	97.590	97.475	97.475
MH12	EX 1350 SEWER	0.35	0.41	15.71	15.69	97.455	97.455	97.400	97.390

LICENSED PROFESSIONAL ENGINEER
S. E. LABADIE
100274983
2025-04-17
PROVINCE OF ONTARIO

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

4840 Bank Street
CITY OF OTTAWA
Block 204 Pathways South Apartments

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units	UNIT TYPES				AREA w/o Units	POPULATION		RES PEAK FACTOR	PEAK FLOW	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MH	TO MH	(Ha)	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM		(L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
		MH 7A	MH 6A	0.70				120		216.0	216.0	3.51	2.46									0.70	0.70	0.23			2.69	26.34	32.07	200	0.59	0.812	23.65	89.80%
		MH 6A	MH 3A	0.52				0		0.0	216.0	3.51	2.46									0.52	1.22	0.40			2.86	26.54	13.30	200	0.60	0.818	23.68	89.23%
		MH 3A	MH 2A	0.32				60		108.0	324.0	3.45	3.62									0.32	1.54	0.51			4.13	24.42	35.34	200	0.51	0.753	20.29	83.08%
		MH 2A	MH 1A	0.00				0		0.0	324.0	3.45	3.62									0.00	1.54	0.51			4.13	28.42	10.18	200	0.69	0.876	24.29	85.46%

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	
APT	1.8	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

Designed: SEL

Checked: JIM

Dwg. Reference: 137175-400

No.	Revision	Date
1.	Submission No. 1 For City Approval	2022-06-03
2.	Submission No. 2 For City Approval	2022-08-22
3.	Revised Services	2023-01-16
4.	Asbuilt Record	2024-02-27

File Reference:	Date:	Sheet No:
137175.6-0.6-04.04.Sanitary	2024-02-27	1 of 1

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

As-built Sanitary Sewers

4840 Bank Street
CITY OF OTTAWA
Block 204 Pathways South Apartments

Sewer Design and As-built Data									
U/S MH	D/S MH	Design Slope	As-built Slope	Design Length	As-built Length	U/S Invert	As-built U/S Inv	D/S Invert	As-built D/S Invert
MH 7A	MH 6A	0.60	0.59	32.05	32.068	98.930	98.920	98.739	98.730
MH 6A	MH 3A	0.60	0.60	13.12	13.296	98.680	98.680	98.601	98.600
MH 3A	MH 2A	0.54	0.51	35.42	35.342	98.534	98.530	98.341	98.350
MH 2A	MH 1A	0.49	0.69	9.77	10.175	98.251	98.260	98.203	98.190

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

1.34 1.51

STORM SEWER DESIGN SHEET

4840 Bank Street
City of Ottawa
Block 204 Pathways South Apartments

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW														SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.67	C= 0.70	C= 0.80	C= 0.82	C= 0.87	C= 0.88	C= 0.89	C= 0.90	C= 1.00	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	CB1 to CB6	MH5	MH6		0.11	0.08	0.15	0.07	0.09					1.07	1.07	10.00	1.08	11.08	76.81	104.19	122.14	178.56	82.29	111.63	130.86	191.31		82.29	143.27	*81.50*	375			*0.61*	1.257	60.98	42.56%
	Bldg B, Bldg C, RYCB1	MH7	MH6	0.05								0.30		0.78	0.78	10.00	0.46	10.46	76.81	104.19	122.14	178.56	59.79	81.10	95.08	138.99		59.79	77.07	*29.13*	300			*0.58*	1.056	17.29	22.43%
		MH6	MH3											0.00	1.85	11.08	0.23	11.32	72.89	98.81	115.80	169.25	134.83	182.78	214.21	313.07		134.83	193.41	*16.56*	450			*0.42*	1.178	58.58	30.29%
	CB9,CB10	MH4	MH3				0.04	0.11						0.34	0.34	10.00	0.68	10.68	76.81	104.19	122.14	178.56	26.09	35.40	41.49	60.66		26.09	79.87	*44.67*	300			*0.63*	1.095	53.78	67.33%
	CB7	MH3	CBMH2								0.03			0.07	2.26	11.32	0.51	11.83	72.10	97.72	114.52	167.37	163.21	221.22	259.25	378.88		163.21	204.17	*38.20*	450			*0.47*	1.244	40.95	20.06%
	CBMH2, Bldg A	CBMH2	MH1							0.16		0.15		0.77	3.03	11.83	0.11	11.93	70.44	95.44	111.83	163.42	213.45	289.23	338.91	495.24		213.45	276.86	*7.88*	525			*0.38*	1.239	63.41	22.90%

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 = 732.951 / (TC+6.199)^0.810] 2 YEAR
[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: SEL
Checked: JIM
Dwg. Reference: 137175-500

No.	Revision	Date
1.	Submission No. 1 For City Comments	2022-06-03
2.	Submission No. 2 For City Comments	2022-08-22
3.	Revised Services	2023-01-16
4.	Asbuilt Record	2024-02-27

File Reference:	Date:	Sheet No:
137175.6-0.6.04.04.Storm	2024-02-27	1 of 1

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

As-built Storm Sewers

4840 Bank Street
City of Ottawa
Block 204 Pathways South Apartments

Sewer Design and As-built Data

U/S MH	D/S MH	Design Slope	As-built Slope	Design Length	As-built Length	U/S Invert	As-built U/S Inv	D/S Invert	As-built D/S Invert
MH5	MH6	0.60	*0.61*	81.56	*81.501*	99.960	*99.970*	99.470	*99.470*
MH7	MH6	0.60	*0.58*	29.05	*29.127*	99.685	*99.710*	99.510	*99.540*
MH6	MH3	0.60	*0.42*	16.11	*16.555*	99.450	*99.430*	99.353	*99.360*
MH4	MH3	0.60	*0.63*	45.00	*44.672*	99.740	*99.760*	99.472	*99.480*
MH3	CBMH2	0.50	*0.47*	38.68	*38.202*	99.221	*99.230*	99.028	*99.050*
CBMH2	MH1	0.47	*0.38*	7.05	*7.878*	98.951	*98.980*	98.918	*98.950*

LICENSED PROFESSIONAL ENGINEER
S. E. LABADIE
100274983
2024-02-27
PROVINCE OF ONTARIO

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: 4836 Bank St
DATE: 2019-10-08
FILE: 119351.5.7
REV #:
DESIGNED BY: JEB
CHECKED BY: JM

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = 732.951 / $(T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = 998.071 / $(T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate
Taken from City of Ottawa approved Design Brief "Pathways at Findlay Creek" (D07-16-13-0023) drainage area EXT 4

EXT 4 Release Rate	760.00	L/s
Area EXT 4 $_{TOTAL}$ =	4.04	Ha
Area Subject Lands	2.49	
Perscentage Share of release rate	62%	
Q_{TOTAL} =	468.42	L/s

Uncontrolled Release ($Q_{uncontrolled}$ = 2.78*C*i_{100yr}*$A_{uncontrolled}$)

C =	0.625	
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.01	Ha
$Q_{uncontrolled}$ =	3.10	L/s

Maximum Allowable Release Rate ($Q_{max\ allowable}$ = $Q_{restricted}$ - $Q_{uncontrolled}$)

$Q_{max\ allowable}$ = 465.31 L/s

MODIFIED RATIONAL METHOD (100-Year & 5-Year Ponding)

Drainage Area	*MH9/MH9B*				
Area (Ha)	0.14				
C =	0.98	Restricted Flow Q_r (L/s)=	10.00		
100-Year Ponding					
T_c Variable (min)	*i_{100yr} (mm/hour)*	*Peak Flow Q_p=2.78xCi$_{100yr}$A (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 100yr (m^3)*
30	91.87	34.86	10.00	24.86	44.75
32	87.89	33.35	10.00	23.35	44.83
33	86.03	32.65	10.00	22.65	**44.84**
34	84.27	31.98	10.00	21.98	44.83
36	80.96	30.72	10.00	20.72	44.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	44.84	20.64	10.07	14.13

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
54.91	0.375	0.110	6.06
6.73	0.200	0.031	0.21
7.69	0.200	0.031	0.24
			6.51

overflows to: CB1

Drainage Area	*MH9/MH9B*				
Area (Ha)	0.14				
C =	0.78	Restricted Flow Q_r (L/s)=	10.00		
5-Year Ponding					
T_c Variable (min)	*i_{5yr} (mm/hour)*	*Peak Flow Q_p=2.78xCi$_{5yr}$A (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 5yr (m^3)*
13	90.63	27.51	10.00	17.51	13.66
15	83.56	25.37	10.00	15.37	13.83
16	80.46	24.43	10.00	14.43	**13.85**
17	77.61	23.56	10.00	13.56	13.83
19	72.53	22.02	10.00	12.02	13.70

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.85	20.64	10.07	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
CB2 (600mm x 600mm)	1.80	0.36	0.65
CBMH10 (1200mm round)	2.00	1.13	2.26
			3.56

overflows to: CB1

Drainage Area	*MH9/MH9B*				
Area (Ha)	0.140				
C =	0.78	Restricted Flow Q_r (L/s)=	10.00		
2-Year Ponding					
T_c Variable (min)	*i_{2yr} (mm/hour)*	*Peak Flow Q_p=2.78xCi$_{2yr}$A (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 2yr (m^3)*
10	76.81	23.32	10.00	13.32	7.99
11	73.17	22.21	10.00	12.21	8.06
12	69.89	21.22	10.00	11.22	**8.08**
13	66.93	20.32	10.00	10.32	8.05
15	61.77	18.75	10.00	8.75	7.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.08	20.64	10.07	0.00

overflows to: CB1

Drainage Area	CB1				
Area (Ha)	0.17				
C =	0.88	Restricted Flow Q_r (L/s)=		16.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
19	123.87	49.72	16.00	33.72	38.44
21	116.30	46.68	16.00	30.68	38.65
22	112.88	45.31	16.00	29.31	**38.68**
23	109.68	44.02	16.00	28.02	38.67
25	103.85	41.68	16.00	25.68	38.52

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
14.13	52.82	50.59	5.58	0.00

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
31.00	0.450	0.159	4.93
			4.93

overflows to: CB17

Drainage Area	CB1				
Area (Ha)	0.17				
C =	0.70	Restricted Flow Q_r (L/s)=		16.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
7	123.30	39.59	16.00	23.59	9.91
9	109.79	35.25	16.00	19.25	10.40
10	104.19	33.46	16.00	17.46	**10.47**
11	99.19	31.85	16.00	15.85	10.46
13	90.63	29.10	16.00	13.10	10.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.47	50.59	5.58	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
			0.65

overflows to: CB17

Drainage Area	CB1				
Area (Ha)	0.165				
C =	0.70	Restricted Flow Q_r (L/s)=		16.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
4	111.72	35.87	16.00	19.87	4.77
6	96.64	31.03	16.00	15.03	5.41
7	90.66	29.11	16.00	13.11	**5.51**
8	85.46	27.44	16.00	11.44	5.49
10	76.81	24.66	16.00	8.66	5.20

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.51	50.59	5.58	0.00

overflows to: CB17

Drainage Area	CB16				
Area (Ha)	0.010				
C =	0.38	Restricted Flow Q_r (L/s)=		6.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
-6	57497.20	599.41	16.00	583.41	-210.03
-4	977.56	10.19	16.00	-5.81	1.39
-3	702.38	7.32	16.00	-8.68	**1.56**
-2	555.31	5.79	16.00	-10.21	1.23
0	398.62	4.16	16.00	-11.84	0.00

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.56	0.31	0.00	1.25

overflows to: CB17

Drainage Area	CB16				
Area (Ha)	0.010				
C =	0.30	Restricted Flow Q_r (L/s)=		6.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-6	10904.38	90.94	6.00	84.94	-30.58
-4	555.75	4.63	6.00	-1.37	0.33
-3	402.34	3.36	6.00	-2.64	**0.48**
-2	319.47	2.66	6.00	-3.34	0.40
0	230.48	1.92	6.00	-4.08	0.00

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.48	0.31	0.00	0.17

overflows to: CB17

Drainage Area	CB16				
Area (Ha)	0.010				
C =	0.30	Restricted Flow Q_r (L/s)=		6.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-7	#NUM!	#NUM!	6.00	#NUM!	#NUM!
-5	632.75	5.28	6.00	-0.72	0.22
-4	387.14	3.23	6.00	-2.77	**0.67**
-3	285.77	2.38	6.00	-3.62	0.65
-1	192.83	1.61	6.00	-4.39	0.26

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.67	0.31	0.00	0.36

overflows to: CB17

Drainage Area	CB17				
Area (Ha)	0.090				
C =	1.00	Restricted Flow Q_r (L/s)=		9.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
22	112.88	28.24	9.00	19.24	25.40
24	106.68	26.69	9.00	17.69	25.47
25	103.85	25.98	9.00	16.98	**25.47**
26	101.18	25.32	9.00	16.32	25.45
28	96.27	24.09	9.00	15.09	25.35

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
1.25	26.73	0.84	5.10	20.79

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
28.00	0.450	0.159	4.45
			4.45

overflows to: CB15

Drainage Area	CB17				
Area (Ha)	0.090				
C =	0.90	Restricted Flow Q_r (L/s)=		9.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
10	104.19	23.46	9.00	14.46	8.68
12	94.70	21.32	9.00	12.32	8.87
13	90.63	20.41	9.00	11.41	**8.90**
14	86.93	19.58	9.00	10.58	8.88
16	80.46	18.12	9.00	9.12	8.75

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.17	9.06	0.84	5.10	3.13

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
			0.65

overflows to: CB15

Drainage Area	CB17				
Area (Ha)	0.090				
C =	0.90	Restricted Flow Q_r (L/s)=		9.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
7	90.66	20.42	9.00	11.42	4.79
9	80.87	18.21	9.00	9.21	4.97
10	76.81	17.29	9.00	8.29	**4.98**
11	73.17	16.48	9.00	7.48	4.93
13	66.93	15.07	9.00	6.07	4.74

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.98	0.84	5.10	0.00

overflows to: CB15

Drainage Area	CB15
Area (Ha)	0.090
C =	0.94

Restricted Flow Q_r (L/s)= 6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
33	86.03	20.18	6.00	14.18	28.08
35	82.58	19.37	6.00	13.37	28.08
36	80.96	18.99	6.00	12.99	**28.06**
37	79.42	18.63	6.00	12.63	28.03
39	76.51	17.95	6.00	11.95	27.96

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
20.79	48.85	66.27	5.10	0.00

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
28.00	0.450	0.159	4.45
			4.45

overflows to: out

Drainage Area	CB15
Area (Ha)	0.090
C =	0.75

Restricted Flow Q_r (L/s)= 6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
13	90.63	17.01	6.00	11.01	8.59
15	83.56	15.68	6.00	9.68	8.71
16	80.46	15.10	6.00	9.10	**8.73**
17	77.61	14.56	6.00	8.56	8.73
19	72.53	13.61	6.00	7.61	8.67

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
3.13	11.86	66.27	5.10	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB3 (600mm x 600mm)	1.80	0.36	0.65
			0.65

overflows to: out

Drainage Area	CB15
Area (Ha)	0.090
C =	0.75

Restricted Flow Q_r (L/s)= 6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
9	80.87	15.18	6.00	9.18	4.95
11	73.17	13.73	6.00	7.73	5.10
12	69.89	13.12	6.00	7.12	**5.12**
13	66.93	12.56	6.00	6.56	5.12
15	61.77	11.59	6.00	5.59	5.03

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.12	66.27	5.10	0.00

overflows to: out

Drainage Area	CBMH3
Area (Ha)	0.020
C =	0.81

Restricted Flow Q_r (L/s)= 6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	12.92	6.00	6.92	1.25
5	242.70	10.96	6.00	4.96	1.49
6	226.01	10.21	6.00	4.21	**1.52**
7	211.67	9.56	6.00	3.56	1.50
9	188.25	8.50	6.00	2.50	1.35

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.52	4.17	0	0.00

overflows to: CB12/13/14

Drainage Area	CBMH3
Area (Ha)	0.020
C =	0.90

Restricted Flow Q_r (L/s)= 6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
0	230.48	11.53	6.00	5.53	0.00
2	182.69	9.14	6.00	3.14	0.38
3	166.09	8.31	6.00	2.31	**0.42**
4	152.51	7.63	6.00	1.63	0.39
6	131.57	6.58	6.00	0.58	0.21

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.42	4.17	0.00	0.00

overflows to: CB12/13/14

Drainage Area	CBMH3
Area (Ha)	0.020
C =	0.90

Restricted Flow Q_r (L/s)= 6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-2	229.26	11.47	6.00	5.47	-0.66
0	167.22	8.37	6.00	2.37	0.00
1	148.14	7.41	6.00	1.41	**0.08**
2	133.33	6.67	6.00	0.67	0.08
4	111.72	5.59	6.00	-0.41	-0.10

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.08	4.17	0.00	0.00

overflows to: CB12/13/14

Drainage Area	CB11
Area (Ha)	0.030
C =	1.00

Restricted Flow Q_r (L/s)= 15.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
1	351.38	29.31	15.00	14.31	0.86
3	286.05	23.86	15.00	8.86	1.59
4	262.41	21.88	15.00	6.88	**1.65**
5	242.70	20.24	15.00	5.24	1.57
7	211.67	17.65	15.00	2.65	1.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.62	7.27	0.93	0	6.34

overflows to: CB12/CB13/CB14

Drainage Area	CB11
Area (Ha)	0.030
C =	0.90

Restricted Flow Q_r (L/s)= 15.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-2	319.47	23.98	15.00	8.98	-1.08
0	230.48	17.30	15.00	2.30	0.00
1	203.51	15.28	15.00	0.28	**0.02**
2	182.69	13.71	15.00	-1.29	-0.15
4	152.51	11.45	15.00	-3.55	-0.85

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.02	0.93	0.00	0.00

overflows to: CB12/CB13/CB14

Drainage Area	CB11
Area (Ha)	0.030
C =	0.90

Restricted Flow Q_r (L/s)= 15.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-4	387.14	29.06	15.00	14.06	-3.37
-2	229.26	17.21	15.00	2.21	-0.26
-1	192.83	14.47	15.00	-0.53	**0.03**
0	167.22	12.55	15.00	-2.45	0.00
2	133.33	10.01	15.00	-4.99	-0.60

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.03	0.93	0.00	0.00

overflows to: CB12/CB13/CB14

Drainage Area	CB12/CB13/CB14				
Area (Ha)	0.330				
C =	1.00	Restricted Flow Q_r (L/s)=		73.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
9	188.25	172.70	73.00	99.70	53.84
10	178.56	163.81	73.00	90.81	54.49
11	169.91	155.87	73.00	82.87	**54.70**
12	162.13	148.74	73.00	75.74	54.53
14	148.72	136.44	73.00	63.44	53.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
6.34	61.03	54.36	5.07	1.60

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
11.07	0.375	0.110	1.22
12.00	0.450	0.159	1.91
			3.13

overflows to: CB10

Drainage Area	CB12/CB13/CB14				
Area (Ha)	0.330				
C =	0.90	Restricted Flow Q_r (L/s)=		73.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
2	182.69	150.84	73.00	77.84	9.34
4	152.51	125.92	73.00	52.92	12.70
5	141.18	116.57	73.00	43.57	**13.07**
6	131.57	108.63	73.00	35.63	12.83
8	116.11	95.87	73.00	22.87	10.98

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.07	54.36	5.07	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB12 (600mm x 600mm)	1.80	0.36	0.65
CB13 (600mm x 600mm)	1.80	0.36	0.65
CB14 (600mm x 600mm)	1.80	0.36	0.65
			1.94

overflows to: CB10

Drainage Area	2/CB13/CB14				
Area (Ha)	0.330				
C =	0.90	Restricted Flow Q_r (L/s)=		73.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
0	167.22	138.07	73.00	65.07	0.00
2	133.33	110.09	73.00	37.09	4.45
3	121.46	100.29	73.00	27.29	**4.91**
4	111.72	92.25	73.00	19.25	4.62
6	96.64	79.79	73.00	6.79	2.44

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.91	54.36	5.07	0.00

overflows to: CB10

Drainage Area	CB10				
Area (Ha)	0.130				
C =	1.00	Restricted Flow Q_r (L/s)=		45.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
5	242.70	87.71	45.00	42.71	12.81
6	226.01	81.68	45.00	36.68	13.20
7	211.67	76.50	45.00	31.50	**13.23**
8	199.20	71.99	45.00	26.99	12.96
10	178.56	64.53	45.00	19.53	11.72

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.62	18.85	6.81	0.00	12.04

overflows to: CB18

Drainage Area	CB10				
Area (Ha)	0.130				
C =	0.90	Restricted Flow Q_r (L/s)=		45.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-1	266.98	86.84	45.00	41.84	-2.51
1	203.51	66.19	45.00	21.19	1.27
2	182.69	59.42	45.00	14.42	**1.73**
3	166.09	54.02	45.00	9.02	1.62
5	141.18	45.92	45.00	0.92	0.28

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.73	6.81	0.00	0.00

overflows to: CB18

Drainage Area	CB10				
Area (Ha)	0.130				
C =	0.90	Restricted Flow Q_r (L/s)=		45.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-2	229.26	74.57	45.00	29.57	-3.55
0	167.22	54.39	45.00	9.39	0.00
1	148.14	48.19	45.00	3.19	**0.19**
2	133.33	43.37	45.00	-1.63	-0.20
4	111.72	36.34	45.00	-8.66	-2.08

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
Balance	#VALUE!	6.81	0.00	#VALUE!

overflows to: CB18

Drainage Area	CBMH2				
Area (Ha)	0.080				
C =	1.00	Restricted Flow Q_r (L/s)=		20.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	47.07	20.00	27.07	11.37
9	188.25	41.87	20.00	21.87	11.81
10	178.56	39.71	20.00	19.71	**11.83**
11	169.91	37.79	20.00	17.79	11.74
13	155.11	34.50	20.00	14.50	11.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	11.83	6.21	0.00	5.62

overflows to: CB11

Drainage Area	CBMH2				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	40.73	20.00	20.73	1.24
3	166.09	33.24	20.00	13.24	2.38
4	152.51	30.53	20.00	10.53	**2.53**
5	141.18	28.26	20.00	8.26	2.48
7	123.30	24.68	20.00	4.68	1.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	6.21	0.00	0.00

Drainage Area	CBMH2				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		20.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-1	192.83	38.60	20.00	18.60	-1.12
1	148.14	29.65	20.00	9.65	0.58
2	133.33	26.69	20.00	6.69	**0.80**
3	121.46	24.31	20.00	4.31	0.78
5	103.57	20.73	20.00	0.73	0.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.80	6.21	0.00	0.00

Drainage Area	CB7				
Area (Ha)	0.080				
C =	1.00	Restricted Flow Q_r (L/s)=		30.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	63.62	30.00	33.62	6.05
5	242.70	53.98	30.00	23.98	7.19
6	226.01	50.26	30.00	20.26	**7.30**
7	211.67	47.07	30.00	17.07	7.17
9	188.25	41.87	30.00	11.87	6.41

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.62	12.91	6.97	0.00	5.94

overflows to: CB8

Drainage Area	CB7				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		30.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-1	266.98	53.44	30.00	23.44	-1.41
1	203.51	40.73	30.00	10.73	0.64
2	182.69	36.57	30.00	6.57	**0.79**
3	166.09	33.24	30.00	3.24	0.58
5	141.18	28.26	30.00	-1.74	-0.52

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.79	6.97	0.00	0.00

overflows to: CB8

Drainage Area	CB7				
Area (Ha)	0.080				
C =	0.90	Restricted Flow Q_r (L/s)=		30.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-3	285.77	57.20	30.00	27.20	-4.90
-1	192.83	38.60	30.00	8.60	-0.52
0	167.22	33.47	30.00	3.47	**0.00**
1	148.14	29.65	30.00	-0.35	-0.02
3	121.46	24.31	30.00	-5.69	-1.02

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	6.97	0.00	0.00

overflows to: CB8

Drainage Area	CB6				
Area (Ha)	0.070				
C =	1.00	Restricted Flow Q_r (L/s)=		20.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
5	242.70	47.23	20.00	27.23	8.17
7	211.67	41.19	20.00	21.19	8.90
8	199.20	38.76	20.00	18.76	**9.01**
9	188.25	36.63	20.00	16.63	8.98
11	169.91	33.06	20.00	13.06	8.62

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.01	13.66	0.00	0.00

overflows to: CB8

Drainage Area	P3/L3				
Area (Ha)	0.160				
C =	0.45	Restricted Flow Q_r (L/s)=		20.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	40.73	20.00	20.73	1.24
3	166.09	33.24	20.00	13.24	2.38
4	152.51	30.53	20.00	10.53	**2.53**
5	141.18	28.26	20.00	8.26	2.48
7	123.30	24.68	20.00	4.68	1.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	13.66	0.00	0.00

overflows to: CB8

Drainage Area	CB6				
Area (Ha)	0.070				
C =	0.45	Restricted Flow Q_r (L/s)=		20.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-4	387.14	33.90	20.00	13.90	-3.34
-2	229.26	20.08	20.00	0.08	-0.01
-1	192.83	16.89	20.00	-3.11	**0.19**
0	167.22	14.64	20.00	-5.36	0.00
2	133.33	11.68	20.00	-8.32	-1.00

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.19	13.66	0.00	0.00

overflows to: CB8

Drainage Area	CB5				
Area (Ha)	0.060				
C =	1.00	Restricted Flow Q_r (L/s)=		15.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	35.31	15.00	20.31	8.53
9	188.25	31.40	15.00	16.40	8.86
10	178.56	29.78	15.00	14.78	**8.87**
11	169.91	28.34	15.00	13.34	8.80
13	155.11	25.87	15.00	10.87	8.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.87	3.41	0.00	5.46

overflows to: CB8

Drainage Area	CB5				
Area (Ha)	0.060				
C =	0.90	Restricted Flow Q_r (L/s)=		15.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	30.55	15.00	15.55	0.93
3	166.09	24.93	15.00	9.93	1.79
4	152.51	22.89	15.00	7.89	**1.89**
5	141.18	21.19	15.00	6.19	1.86
7	123.30	18.51	15.00	3.51	1.47

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.89	3.41	0.00	0.00

overflows to: CB8

Drainage Area	CB5				
Area (Ha)	0.060				
C =	0.90	Restricted Flow Q_r (L/s)=		15.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-1	192.83	28.95	15.00	13.95	-0.84
1	148.14	22.24	15.00	7.24	0.43
2	133.33	20.02	15.00	5.02	**0.60**
3	121.46	18.23	15.00	3.23	0.58
5	103.57	15.55	15.00	0.55	0.16

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
#VALUE!	#VALUE!	3.41	0.00	#VALUE!

overflows to: CB8

Drainage Area	CB8		
Area (Ha)	0.170		
C =	1.00	Restricted Flow Q_r (L/s)=	47.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
6	226.01	106.81	47.00	59.81	21.53
8	199.20	94.14	47.00	47.14	22.63
9	188.25	88.97	47.00	41.97	**22.66**
10	178.56	84.39	47.00	37.39	22.43
12	162.13	76.62	47.00	29.62	21.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
11.40	34.07	24.90	1.60	7.57

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
6.00	0.450	0.159	0.95
			0.95

overflows to: CB9

Drainage Area	CB8		
Area (Ha)	0.170		
C =	0.90	Restricted Flow Q_r (L/s)=	47.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	86.56	47.00	39.56	2.37
3	166.09	70.64	47.00	23.64	4.26
4	152.51	64.87	47.00	17.87	**4.29**
5	141.18	60.05	47.00	13.05	3.91
7	123.30	52.45	47.00	5.45	2.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.29	24.90	1.60	0.00

Structure	Depth	Area (m^2)	Volume (m^3)
CB8 (600mm x 600mm)	1.80	0.36	0.65
			0.65

Drainage Area	CB8		
Area (Ha)	0.170		
C =	0.90	Restricted Flow Q_r (L/s)=	47.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-1	192.83	82.02	47.00	35.02	-2.10
1	148.14	63.01	47.00	16.01	0.96
2	133.33	56.71	47.00	9.71	**1.17**
3	121.46	51.66	47.00	4.66	0.84
5	103.57	44.05	47.00	-2.95	-0.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.17	24.90	1.60	0.00

Drainage Area	CB4		
Area (Ha)	0.030		
C =	1.00	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
9	188.25	15.70	6.00	9.70	5.24
11	169.91	14.17	6.00	8.17	5.39
12	162.13	13.52	6.00	7.52	**5.42**
13	155.11	12.94	6.00	6.94	5.41
15	142.89	11.92	6.00	5.92	5.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
7.57	12.98	10.62	0.00	2.36

overflows to: CBMH1

Drainage Area	CB4		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
3	166.09	12.47	6.00	6.47	1.16
5	141.18	10.60	6.00	4.60	1.38
6	131.57	9.88	6.00	3.88	**1.40**
7	123.30	9.26	6.00	3.26	1.37
9	109.79	8.24	6.00	2.24	1.21

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.40	10.62	0.00	0.00

overflows to: CBMH1

Drainage Area	CB4		
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
1	148.14	11.12	6.00	5.12	0.31
3	121.46	9.12	6.00	3.12	0.56
4	111.72	8.39	6.00	2.39	**0.57**
5	103.57	7.77	6.00	1.77	0.53
7	90.66	6.81	6.00	0.81	0.34

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.57	10.62	0.00	0.00

overflows to: CBMH1

Drainage Area	CBMH1		
Area (Ha)	0.080		
C =	1.00	Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
7	211.67	47.07	20.00	27.07	11.37
9	188.25	41.87	20.00	21.87	11.81
10	178.56	39.71	20.00	19.71	**11.83**
11	169.91	37.79	20.00	17.79	11.74
13	155.11	34.50	20.00	14.50	11.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.36	14.19	0.00	0.00	14.19

overflows to: CB9

Drainage Area	CBMH1		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	40.73	20.00	20.73	1.24
3	166.09	33.24	20.00	13.24	2.38
4	152.51	30.53	20.00	10.53	**2.53**
5	141.18	28.26	20.00	8.26	2.48
7	123.30	24.68	20.00	4.68	1.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.53	0.00	0.00	2.53

overflows to: CB9

Drainage Area	CBMH1		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-1	192.83	38.60	20.00	18.60	-1.12
1	148.14	29.65	20.00	9.65	0.58
2	133.33	26.69	20.00	6.69	**0.80**
3	121.46	24.31	20.00	4.31	0.78
5	103.57	20.73	20.00	0.73	0.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.80	0.00	0.00	0.80

overflows to: CB9

Drainage Area	CB9		
Area (Ha)	0.150		
C =	1.00	Restricted Flow Q_r (L/s)=	43.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
5	242.70	101.21	43.00	58.21	17.46
7	211.67	88.27	43.00	45.27	19.01
8	199.20	83.07	43.00	40.07	**19.23**
9	188.25	78.50	43.00	35.50	19.17
11	169.91	70.85	43.00	27.85	18.38

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
21.75	40.99	10.83	0.00	30.16

overflows to: CB18

Drainage Area	CB9		
Area (Ha)	0.160		
C =	0.45	Restricted Flow Q_r (L/s)=	43.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-3	402.34	80.53	43.00	37.53	-6.76
-1	266.98	53.44	43.00	10.44	-0.63
0	230.48	46.13	43.00	3.13	**0.00**
1	203.51	40.73	43.00	-2.27	-0.14
3	166.09	33.24	43.00	-9.76	-1.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.53	2.53	10.83	0.00	0.00

overflows to: CB18

Drainage Area	CB9		
Area (Ha)	0.150		
C =	0.45	Restricted Flow Q_r (L/s)=	43.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-3	285.77	53.62	43.00	10.62	-1.91
-1	192.83	36.18	43.00	-6.82	0.41
0	167.22	31.38	43.00	-11.62	**0.00**
1	148.14	27.80	43.00	-15.20	-0.91
3	121.46	22.79	43.00	-20.21	-3.64

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	10.83	0.00	0.00

overflows to: CB18

Drainage Area	CB18				
Area (Ha)	0.160				
C =	0.25	Restricted Flow Q_r (L/s)=		15.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	31.81	15.00	16.81	3.03
5	242.70	26.99	15.00	11.99	3.60
6	226.01	25.13	15.00	10.13	**3.65**
7	211.67	23.54	15.00	8.54	3.59
9	188.25	20.93	15.00	5.93	3.20

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
42.19	45.84	13.76	46.33	0.00

Drainage Area	CB18				
Area (Ha)	0.160				
C =	0.20	Restricted Flow Q_r (L/s)=		15.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-2	319.47	28.42	15.00	13.42	-1.61
0	230.48	20.50	15.00	5.50	0.00
1	203.51	18.10	15.00	3.10	**0.19**
2	182.69	16.25	15.00	1.25	0.15
4	152.51	13.57	15.00	-1.43	-0.34

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.19	13.76	46.33	0.00

Drainage Area	CB18				
Area (Ha)	0.160				
C =	0.20	Restricted Flow Q_r (L/s)=		15.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
-3	285.77	25.42	15.00	10.42	-1.88
-1	192.83	17.15	15.00	2.15	-0.13
0	167.22	14.88	15.00	-0.12	**0.00**
1	148.14	13.18	15.00	-1.82	-0.11
3	121.46	10.81	15.00	-4.19	-0.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	13.76	46.33	0.00

Subsurface storage calculation

450mm subdrain @ 96m	15.30	m^3
Bottom of storage medium ave. grade	98.00	m
width of S29 trench	1.00	m
depth of S29 trench (below spill elev.)	1.01	m
Volume of S29 trench	96.96	m^3
Volume of clear stone	81.66	m^3
25mm clear stone per S29	0.38	void ratio
Stoage within clear stone	31.03	m^3

C

overflows to: offsite

overflows to: offsite

overflows to: offsite

Drainage Area	RA				
Area (Ha)	0.300				
C =	1.00	Restricted Flow Q_r (L/s)=		27.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
25	103.85	86.61	27.00	59.61	89.41
26	101.18	84.38	27.00	57.38	89.52
27	98.66	82.28	27.00	55.28	**89.56**
28	96.27	80.29	27.00	53.29	89.53
29	94.01	78.41	27.00	51.41	89.45

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	89.56	90.00	0.00	0.00

Drainage Area	RA				
Area (Ha)	0.300				
C =	0.90	Restricted Flow Q_r (L/s)=		27.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
13	90.63	68.03	27.00	41.03	32.00
14	86.93	65.25	27.00	38.25	32.13
15	83.56	62.72	27.00	35.72	**32.15**
16	80.46	60.39	27.00	33.39	32.06
17	77.61	58.25	27.00	31.25	31.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	32.15	90.00	0.00	0.00

Drainage Area	RA				
Area (Ha)	0.300				
C =	0.90	Restricted Flow Q_r (L/s)=		27.00	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
8	85.46	64.14	27.00	37.14	17.83
10	76.81	57.65	27.00	30.65	18.39
11	73.17	54.92	27.00	27.92	**18.43**
12	69.89	52.46	27.00	25.46	18.33
14	64.23	48.21	27.00	21.21	17.82

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	18.43	90.00	0.00	0.00

Drainage Area	RB
Area (Ha)	0.220
C =	1.00

Restricted Flow Q_r (L/s)= 20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
24	106.68	65.24	20.00	45.24	65.15
26	101.18	61.88	20.00	41.88	65.34
27	98.66	60.34	20.00	40.34	**65.35**
28	96.27	58.88	20.00	38.88	65.32
30	91.87	56.19	20.00	36.19	65.14

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	65.35	66.00	0.00	0.00

Drainage Area	RB
Area (Ha)	0.220
C =	0.90

Restricted Flow Q_r (L/s)= 20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
11	99.19	54.60	20.00	34.60	22.84
13	90.63	49.89	20.00	29.89	23.31
14	86.93	47.85	20.00	27.85	**23.40**
15	83.56	45.99	20.00	25.99	23.39
17	77.61	42.72	20.00	22.72	23.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.40	66.00	0.00	0.00

Drainage Area	RB
Area (Ha)	0.220
C =	0.90

Restricted Flow Q_r (L/s)= 20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
8	85.46	47.04	20.00	27.04	12.98
10	76.81	42.28	20.00	22.28	13.37
11	73.17	40.27	20.00	20.27	**13.38**
12	69.89	38.47	20.00	18.47	13.30
14	64.23	35.36	20.00	15.36	12.90

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.38	66.00	0.00	0.00

Drainage Area	RC
Area (Ha)	0.050
C =	1.00

Restricted Flow Q_r (L/s)= 8.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
12	162.13	22.54	8.00	14.54	10.47
14	148.72	20.67	8.00	12.67	10.64
15	142.89	19.86	8.00	11.86	**10.68**
16	137.55	19.12	8.00	11.12	10.67
18	128.08	17.80	8.00	9.80	10.59

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.68	13.50	1.00	0.00

Drainage Area	RC
Area (Ha)	0.050
C =	0.90

Restricted Flow Q_r (L/s)= 8.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
5	141.18	17.66	8.00	9.66	2.90
7	123.30	15.43	8.00	7.43	3.12
8	116.11	14.53	8.00	6.53	**3.13**
9	109.79	13.74	8.00	5.74	3.10
11	99.19	12.41	8.00	4.41	2.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.13	13.50	0.00	0.00

Drainage Area	RC
Area (Ha)	0.050
C =	0.90

Restricted Flow Q_r (L/s)= 8.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
2	133.33	16.68	8.00	8.68	1.04
4	111.72	13.98	8.00	5.98	1.43
5	103.57	12.96	8.00	4.96	**1.49**
6	96.64	12.09	8.00	4.09	1.47
8	85.46	10.69	8.00	2.69	1.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.49	13.50	0.00	0.00

Drainage Area	RD
Area (Ha)	0.050
C =	1.00

Restricted Flow Q_r (L/s)= 8.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
12	162.13	22.54	8.00	14.54	10.47
14	148.72	20.67	8.00	12.67	10.64
15	142.89	19.86	8.00	11.86	**10.68**
16	137.55	19.12	8.00	11.12	10.67
18	128.08	17.80	8.00	9.80	10.59

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.68	11.25	1.00	0.00

Drainage Area	RD
Area (Ha)	0.050
C =	0.90

Restricted Flow Q_r (L/s)= 8.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
5	141.18	17.66	8.00	9.66	2.90
7	123.30	15.43	8.00	7.43	3.12
8	116.11	14.53	8.00	6.53	**3.13**
9	109.79	13.74	8.00	5.74	3.10
11	99.19	12.41	8.00	4.41	2.91

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.13	11.25	0.00	0.00

Drainage Area	RD
Area (Ha)	0.050
C =	0.90

Restricted Flow Q_r (L/s)= 8.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
2	133.33	16.68	8.00	8.68	1.04
4	111.72	13.98	8.00	5.98	1.43
5	103.57	12.96	8.00	4.96	**1.49**
6	96.64	12.09	8.00	4.09	1.47
8	85.46	10.69	8.00	2.69	1.29

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.49	11.25	0.00	0.00

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	1.00

Restricted Flow Q_r (L/s)= 291.58

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
9	188.25	811.19	291.58	519.61	280.59
11	169.91	732.13	291.58	440.55	290.76
12	162.13	698.63	291.58	407.05	**293.08**
13	155.11	668.36	291.58	376.78	293.89
15	142.89	615.73	291.58	324.15	291.74

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	293.08	270.00	0.00	23.08

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	0.80

Restricted Flow Q_r (L/s)= 291.58

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
2	182.69	629.76	291.58	338.18	40.58
4	152.51	525.73	291.58	234.15	56.19
5	141.18	486.67	291.58	195.09	**58.53**
6	131.57	453.54	291.58	161.96	58.31
8	116.11	400.26	291.58	108.68	52.17

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	58.53	270.00	0.00	0.00

Drainage Area	EXTERNAL
Area (Ha)	1.550
C =	0.80

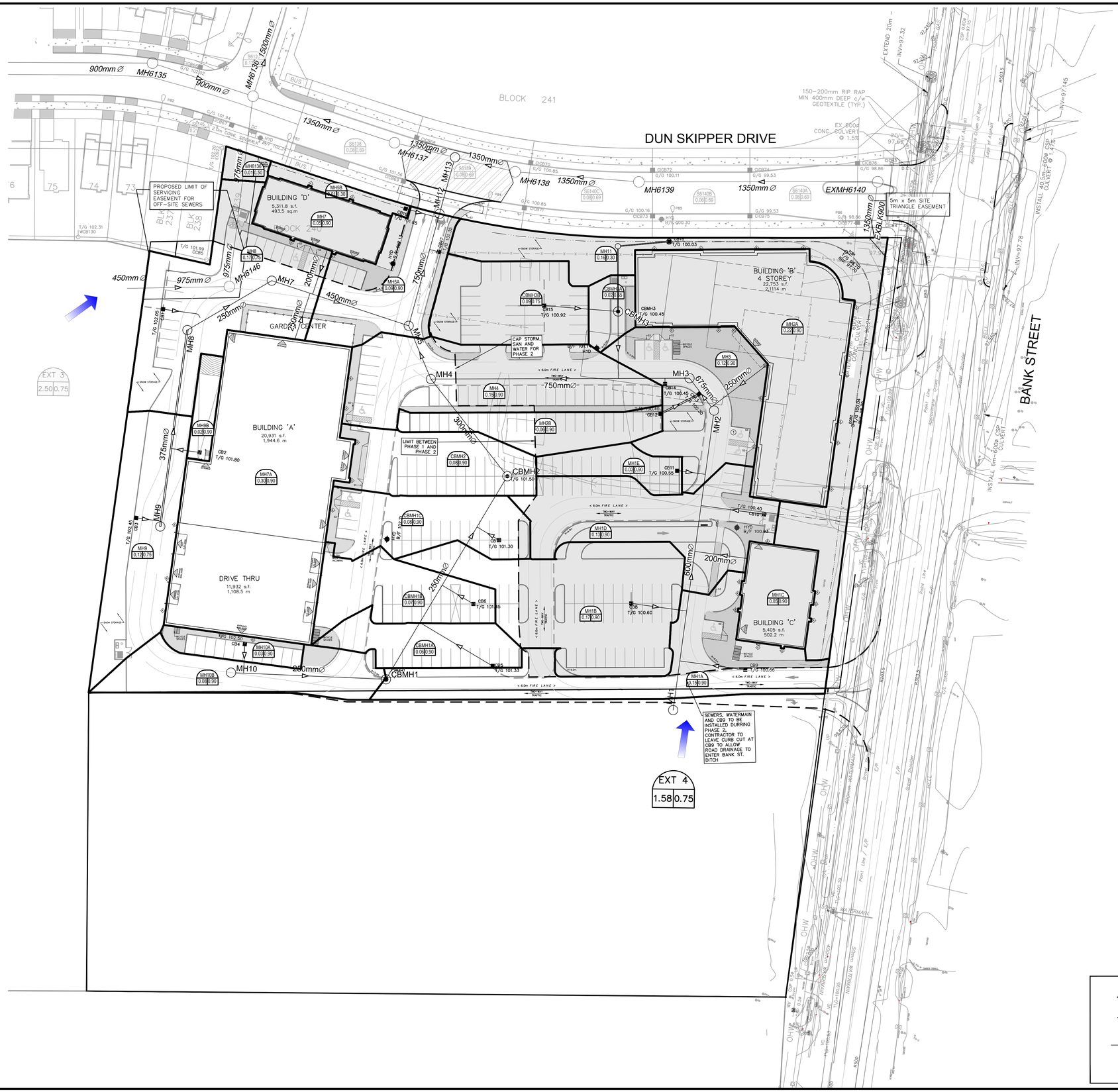
Restricted Flow Q_r (L/s)= 291.58

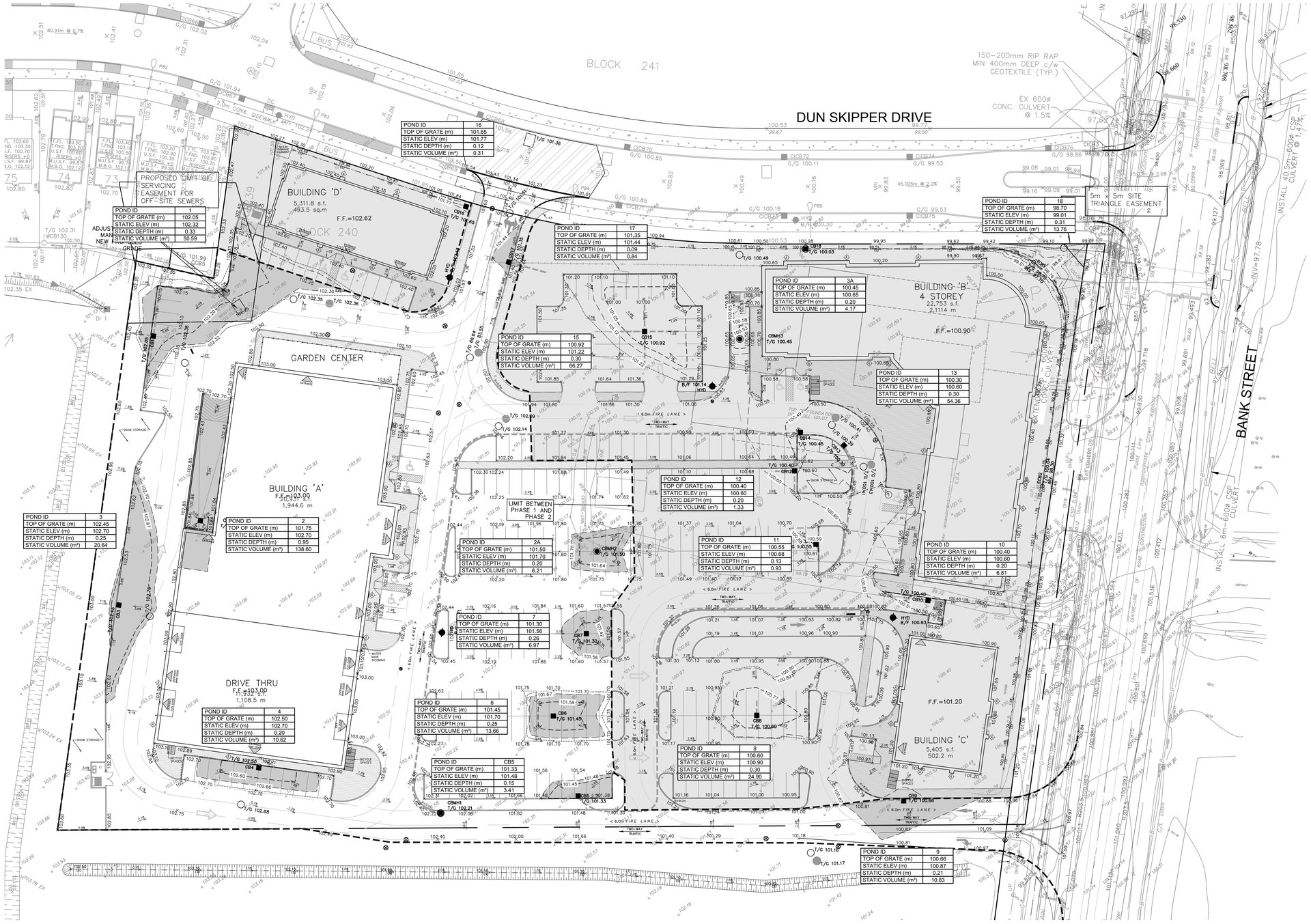
2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
0	167.22	576.45	291.58	284.87	0.00
2	133.33	459.62	291.58	168.04	20.16
3	121.46	418.71	291.58	127.13	**22.88**
4	111.72	385.13	291.58	93.55	22.45
6	96.64	333.13	291.58	41.55	14.96

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	22.88	270.00	0.00	0.00


DUN SKIPPER DRIVE
BANK STREET
BLOCK 241
BUILDING 'A'
20,931 s.f.
1,944.6 m
BUILDING 'B'
4 STOREY
22,753 s.f.
2,114 m
BUILDING 'C'
5,405 s.f.
502.2 m
BUILDING 'D'
5,311.8 s.f.
493.5 sq.m
DRIVE THRU
11,932 s.f.
1,108.5 m
GARDEN CENTER
PROPOSED LIMIT OF SERVICING EASEMENT FOR OFF-SITE SEWERS
5m x 5m SITE TRIANGLE EASEMENT
CAP STORM, SAN AND WATER FOR PHASE 2
LIMIT BETWEEN PHASE 1 AND PHASE 2
SEWERS, WATERMAIN AND CB9 TO BE INSTALLED DURRING PHASE 2. CONTRACTOR TO LEAVE CURB CUT AT CB9 TO ALLOW ROAD DRAINAGE TO ENTER BANK ST. DITCH
EXT 3
2.50 0.75
EXT 4
1.58 0.75
MH6135
MH6136
MH6137
MH6138
MH6139
EXMH6140
EXBLK900
MH13
MH12
MH11
MH7
MH6
MH5
MH4
MH3
MH2
MH9
MH10
CBMH1
CBMH2
CBMH3
900mm∅
1500mm∅
1350mm∅
975mm∅
750mm∅
675mm∅
450mm∅
375mm∅
300mm∅
250mm∅
200mm∅
150–200mm RIP RAP MIN 400mm DEEP c/w GEOTEXTILE (TYP.)
EX. 6000 CONC. CULVERT @ 1.53
INSTALL 40.5m–600ø CSP CULVERT @ 1.42%
INSTALL 6m–600ø CSP CULVERT
EXTEND 20m – INV=97.32
INV=97.145
INV=97.78
INV=97.93
INV=97.93
INV=97.93



POND ID	16
TOP OF GRATE (m)	101.65
STATIC ELEV (m)	101.77
STATIC DEPTH (m)	0.12
STATIC VOLUME (m³)	0.31

POND ID	1
TOP OF GRATE (m)	102.05
STATIC ELEV (m)	102.32
STATIC DEPTH (m)	0.33
STATIC VOLUME (m³)	50.59

POND ID	17
TOP OF GRATE (m)	101.35
STATIC ELEV (m)	101.44
STATIC DEPTH (m)	0.09
STATIC VOLUME (m³)	0.84

POND ID	18
TOP OF GRATE (m)	98.70
STATIC ELEV (m)	99.01
STATIC DEPTH (m)	0.31
STATIC VOLUME (m³)	13.76

POND ID	3A
TOP OF GRATE (m)	100.45
STATIC ELEV (m)	100.65
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	4.17

POND ID	15
TOP OF GRATE (m)	100.92
STATIC ELEV (m)	101.22
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	68.27

POND ID	13
TOP OF GRATE (m)	100.30
STATIC ELEV (m)	100.60
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	54.36

POND ID	12
TOP OF GRATE (m)	100.40
STATIC ELEV (m)	100.60
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	1.33

POND ID	3
TOP OF GRATE (m)	102.45
STATIC ELEV (m)	102.70
STATIC DEPTH (m)	0.25
STATIC VOLUME (m³)	20.64

POND ID	2
TOP OF GRATE (m)	101.75
STATIC ELEV (m)	102.70
STATIC DEPTH (m)	0.95
STATIC VOLUME (m³)	138.60

POND ID	2A
TOP OF GRATE (m)	101.50
STATIC ELEV (m)	101.70
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	6.21

POND ID	11
TOP OF GRATE (m)	100.55
STATIC ELEV (m)	100.68
STATIC DEPTH (m)	0.13
STATIC VOLUME (m³)	0.93

POND ID	10
TOP OF GRATE (m)	100.40
STATIC ELEV (m)	100.60
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	6.81

POND ID	7
TOP OF GRATE (m)	101.30
STATIC ELEV (m)	101.56
STATIC DEPTH (m)	0.26
STATIC VOLUME (m³)	6.97

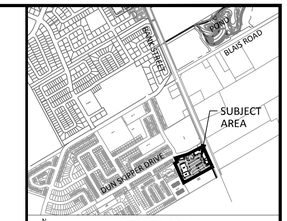
POND ID	4
TOP OF GRATE (m)	102.50
STATIC ELEV (m)	102.70
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	10.62

POND ID	6
TOP OF GRATE (m)	101.45
STATIC ELEV (m)	101.70
STATIC DEPTH (m)	0.25
STATIC VOLUME (m³)	13.66

POND ID	8
TOP OF GRATE (m)	100.60
STATIC ELEV (m)	100.90
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	24.90

POND ID	CB5
TOP OF GRATE (m)	101.33
STATIC ELEV (m)	101.48
STATIC DEPTH (m)	0.15
STATIC VOLUME (m³)	3.41

POND ID	9
TOP OF GRATE (m)	100.66
STATIC ELEV (m)	100.87
STATIC DEPTH (m)	0.21
STATIC VOLUME (m³)	10.83



KEY PLAN
(NTS)

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR H.A. KEN SHIPMAN SURVEYING LTD.

LEGEND :

- 100 YEAR PONDING VOLUME LIMIT
- 5 YEAR PONDING ELEVATION
- SPILL OVER ELEVATION
- MAJOR OVERLAND FLOW ROUTE

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4	ADD PHASING	JIM	2020:06:23
3	REVISED AS PER CITY COMMENTS	JIM	2020:04:20
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	JIM	2019:10:11
1	ISSUED FOR SPA	JIM	2019:04:15

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

BANK STREET DEVELOPMENT

4836 BANK STREET

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2020/06/23
PROVINCE OF ONTARIO

Drawing Title

PONDING PLAN

Scale
1 : 400

Design	Date
SEL	FEB. 2019
Drawn	Checked
DPS	JIM
Project No.	Drawing No.
119351	600

D07-12-19-0092

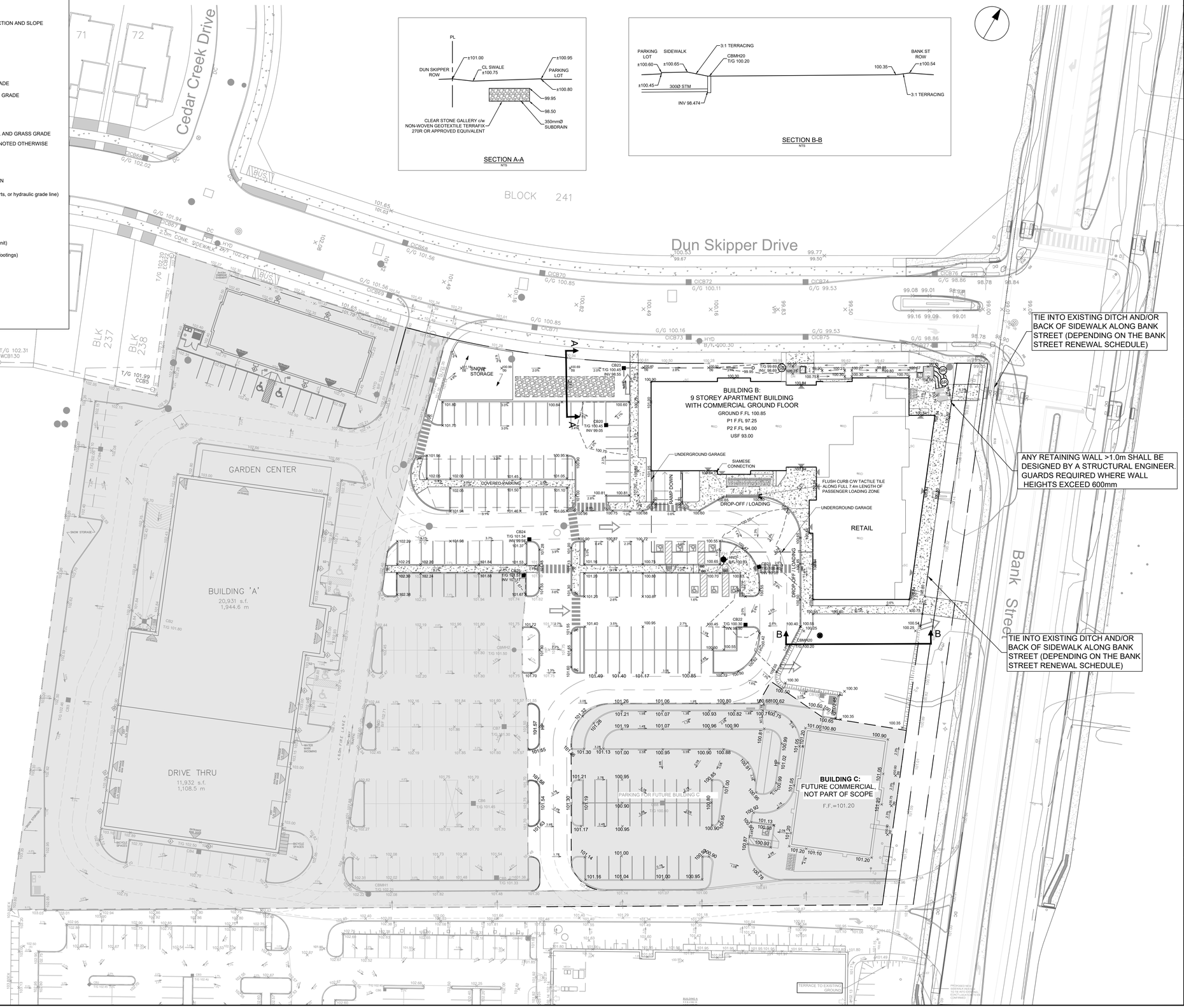
#17977

Appendix E

- **Grading Plan 148290-C-200**
- **Interim Grading Plan 148290-C-201**
- **Erosion and Sediment Control Plan 148290-C-900**
- **Grading Plan 119351-C-200**

GRADING LEGEND

- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH POINT GRADE
- LOT CORNER GRADE C/W EXISTING GRADE
- FULL STATIC PONDING GRADE
- RETAINING WALL C/W TOP OF WALL AND GRASS GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRESSURE REDUCING VALVE
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOTING ELEVATION
- MINIMUM UNDERSIDE OF FOOTING (Based on the higher of the sewer obverts, or hydraulic grade line)
- MINIMUM GARAGE GRADE
- WALKUP UNIT
- WALKOUT UNIT
- NON-STANDARD FOUNDATION (Frost cover not provided for standard unit)
- HIGHBACK UNIT (1.5m frost cover on footings)
- NOISE BARRIER LOCATION
- NOISE BARRIER GATE
- RIP-RAP
- TOWN HOUSE SPLITS
- 2 hr FIREWALL



SECTION A-A
NTS

SECTION B-B
NTS

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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN

CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT
SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **D.G.Y.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

SHEET TITLE
GRADING PLAN

SHEET NUMBER	ISSUE
C-200	5

File Location: C:\Users\hernie6009\DC\ACCDocs\Arcadis ACC US\ACA-00148290-155 Dun Skipper\Project Files\7.03_Design\04_Civil\Sheets\C-200 SITEPLAN GRADING PLAN.dwg Last Saved: August 14, 2025, by mlinsem4626 Plotted: August 19, 2025 8:41:38 AM by Hernie, Eric

D07-12-24-0169

SCALE CHECK 1 in 10mm 19213

GRADING LEGEND

- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH POINT GRADE
- LOT CORNER GRADE C/W EXISTING GRADE
- FULL STATIC PONDING GRADE
- RETAINING WALL C/W TOP OF WALL AND GRASS GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRESSURE REDUCING VALVE
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOTING ELEVATION
- MINIMUM UNDERSIDE OF FOOTING (Based on the higher of the sewer obverts, or hydraulic grade line)
- MINIMUM GARAGE GRADE
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- WALKOUT UNIT
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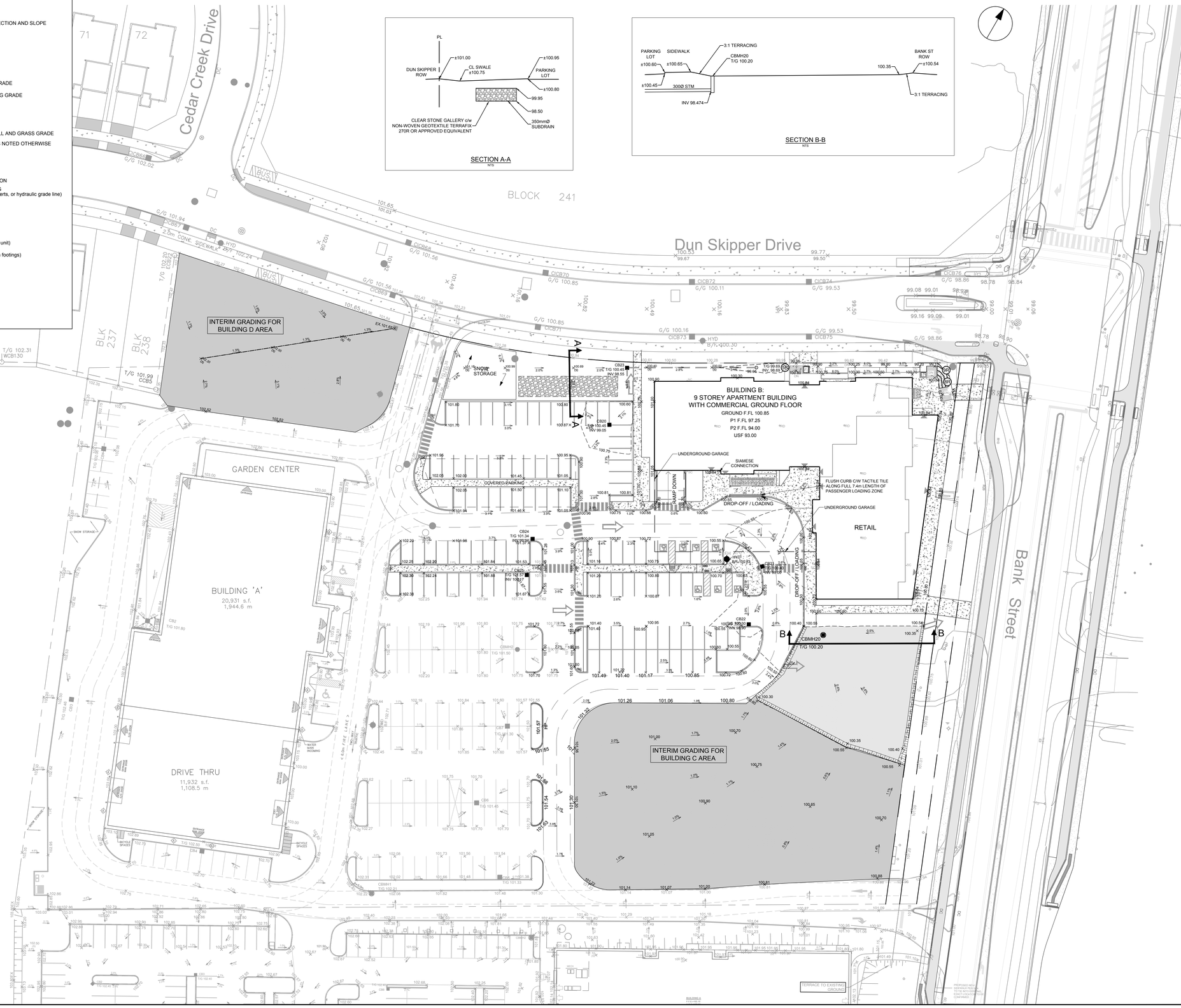
- NOISE BARRIER GATE
- RIP-RAP
- TOWN HOUSE SPLITS
- 2 hr FIREWALL



SECTION A-A
NTS

SECTION B-B
NTS

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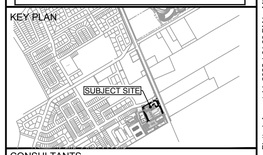
formerly IBI Group Professional Services (Canada) Inc.

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN



CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
L.D. 45. Tannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT
SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

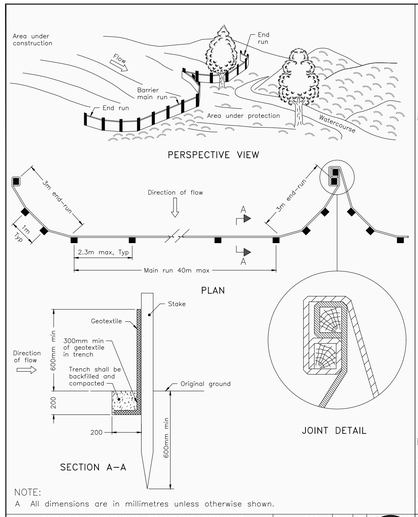
SHEET TITLE
INTERIM GRADING PLAN

SHEET NUMBER	ISSUE
C-201	5

File Location: C:\Users\mlinem4626\DC\ACCDocs\Arcadis ACC US\ACA-00148290-155 Dun Skipper\Project Files\7.03_Design\04_Civil\Sheets\C-201 INTERIM GRADING PLAN.dwg Last Saved: August 14, 2025, by mlinem4626 Plotted: August 14, 2025 4:04:33 PM by Milne, Martian

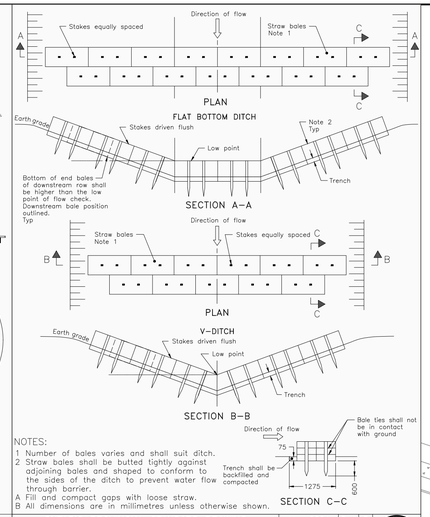
SCALE CHECK 1 in 10mm

19213 D07-12-24-0169



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
LIGHT–DUTY SILT FENCE BARRIER	OPSD 219.110	



NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A Fill and compact gaps with loose straw.
B All dimensions are in millimetres unless otherwise shown.

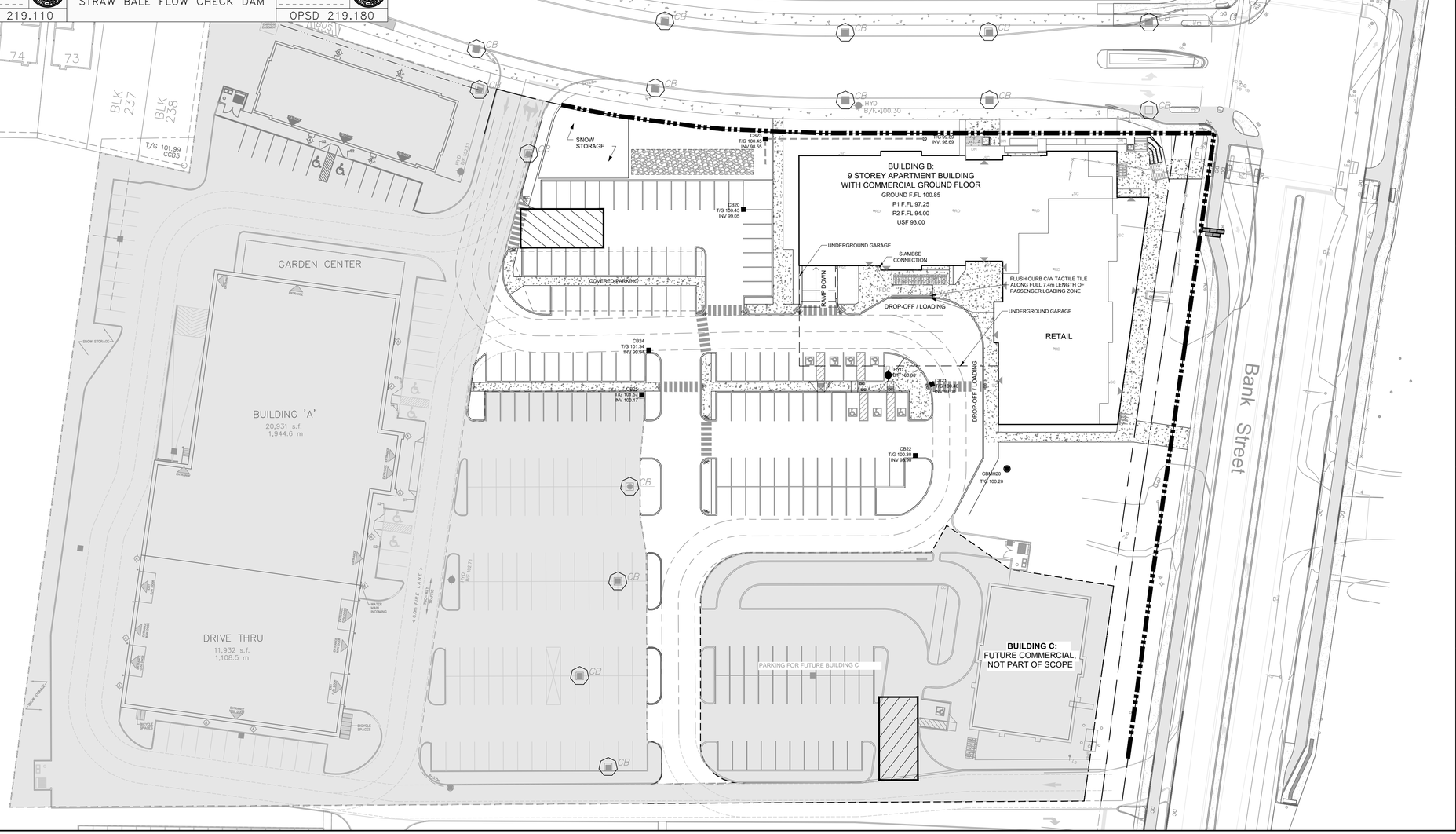
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
STRAW BALE FLOW CHECK DAM	OPSD 219.180	

NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
3. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
4. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
5. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
6. CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.
7. WORKS NOTED ABOVE ARE TO BE INSTALLED, INSPECTED, MAINTAINED AND ULTIMATELY REMOVED BY SERVICING CONTRACTOR.
8. THIS IS A "LIVING DOCUMENT" AND MAY BE MODIFIED IN THE EVENT THE PROPOSED CONTROL MEASURES ARE INSUFFICIENT.

LEGEND:

- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- SNOW FENCE
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- ROCK CHECK DAM AS PER OPSD-219.210
- SILT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH



CLIENT
2668867 Ontario Inc.

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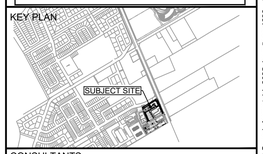
Arcadis Professional Services (Canada) Inc.
formerly IBI Group Professional Services (Canada) Inc.

ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2024-11-26
2	SUBMISSION NO.2 FOR CITY REVIEW	2025-02-18
3	SUBMISSION NO.3 FOR CITY REVIEW	2025-04-22
4	REVISED PER CITY COMMENTS	2025-06-02
5	REVISED SITE PLAN	2025-08-14

SEE 010 FOR NOTES, LEGEND AND DETAILS

KEY PLAN



CONSULTANTS

1:400 0 4 12 20m

SEAL

LICENSED PROFESSIONAL ENGINEER
I.D. G. Yannoulopoulos
2025/08/14
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT
SENIORS APARTMENTS

BANK STREET AT DUN SKIPPER DRIVE

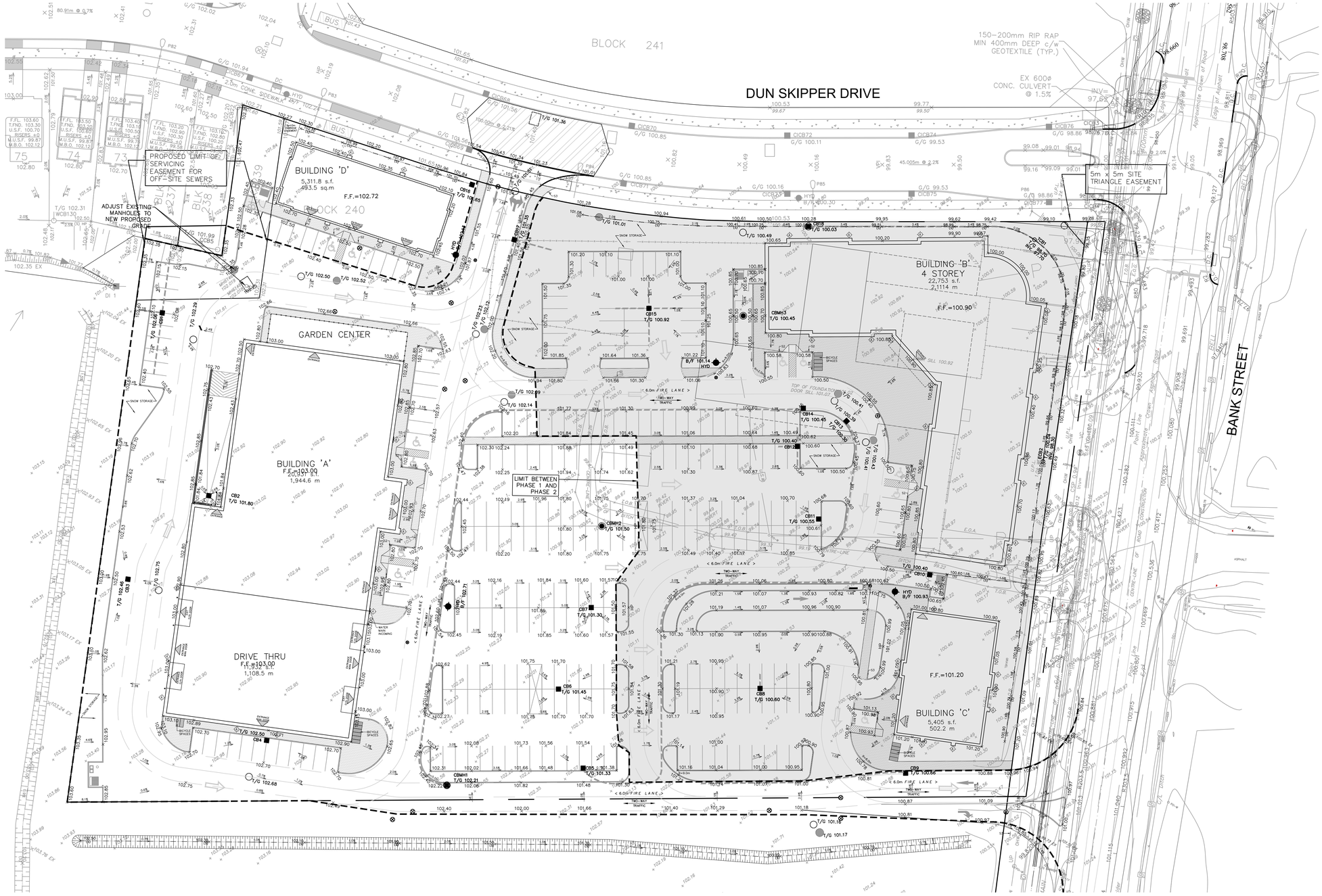
PROJECT NO: 148290	
DRAWN BY: **M.M.**	CHECKED BY: **R.M.**
PROJECT MGR: **R.M.**	APPROVED BY: **A.Z.**

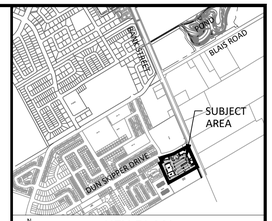
SHEET TITLE
SEDIMENT AND EROSION CONTROL PLAN

SHEET NUMBER	ISSUE
C-900	5

SCALE CHECK 1 in 10mm
19213
D07-12-24-0169

File Location: C:\DARoot\Jobs\3e90\baca0299\42bac0f8\a8527334\e194\ada4f\ea\b.7bf90247-15a4-4e64-8244-bebc3a59b671\ei\Project Files\7.03_Design\04_Civil\Sheets\C-900 SEDIMENT AND EROSION CONTROL PLAN.dwg Last Saved: August 14, 2025, by mlirvem4926 Plotted: Thursday, August 14, 2025 7:59:13 PM by acesuser





KEY PLAN
(NTS)

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR H.A. KEN SHIPMAN SURVEYING LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10	REVISED GRADING AT GARDEN CENTER	JIM	2020:12:09
9	ADD PHASING	JIM	2020:06:22
8	REVISED AS PER CITY COMMENTS	JIM	2020:04:20
7	REVISED AS PER CITY COMMENTS	JIM	2020:04:02
6	ISSUED FOR TENDER	JIM	2020:03:13
5	REVISED AS PER CITY COMMENTS	JIM	2020:03:13
4	REVISED AS PER CITY COMMENTS	JIM	2019:12:09
3	ADD EXISTING AND PROPOSED DITCHES ON WEST AND SOUTH SIDE OF PROPERTY	JIM	2019:11:26
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	JIM	2019:10:11
1	ISSUED FOR SPA	JIM	2019:04:15

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

BANK STREET DEVELOPMENT

4836 BANK STREET

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2020/12/09
PROVINCE OF ONTARIO

Drawing Title

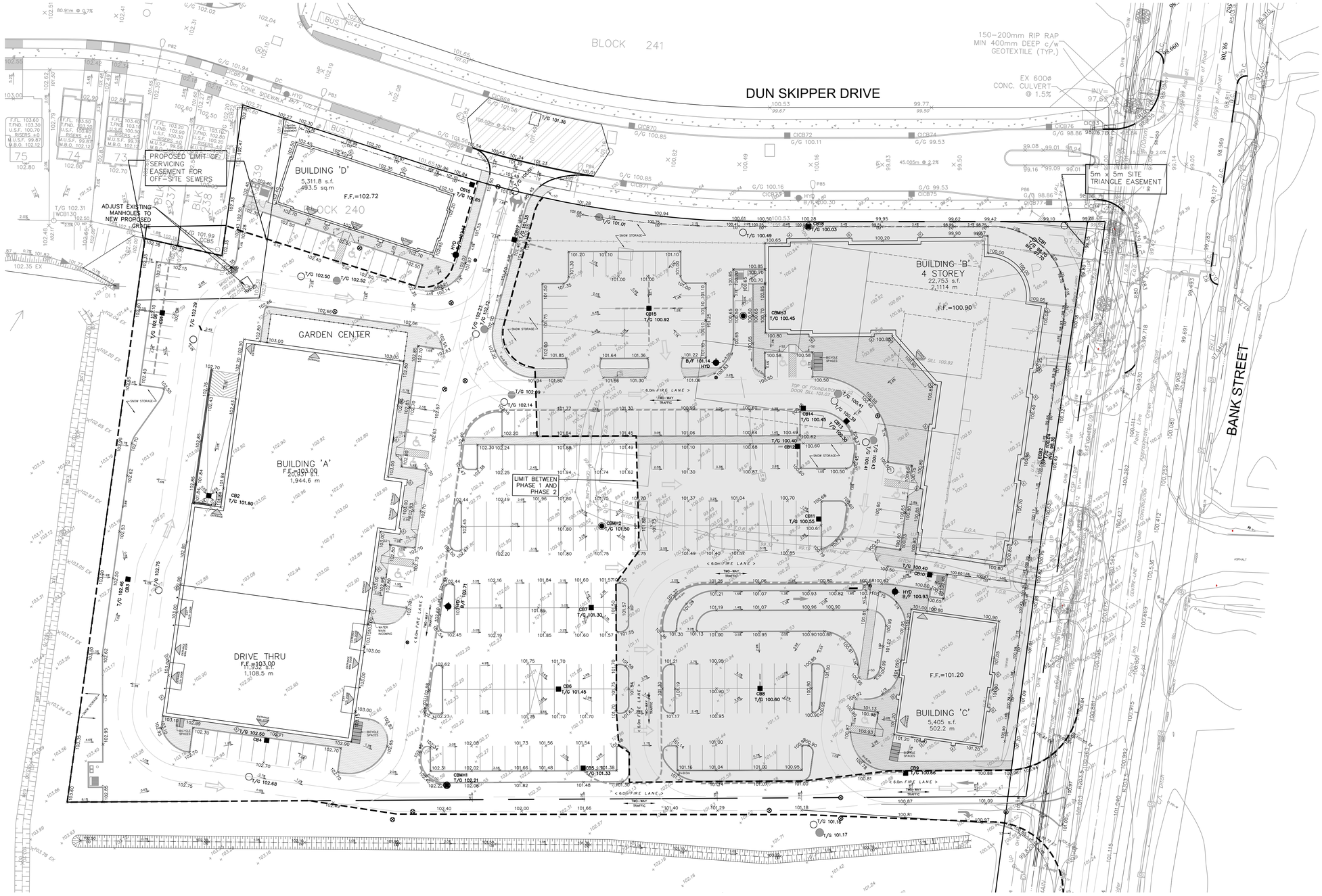
SITE GRADING PLAN

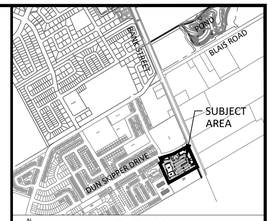
Scale
1 : 400

Design: SEL	Date: FEB. 2019
Drawn: DPS	Checked: JIM
Project No.: 119351	Drawing No.: 200

D07-12-19-0092

#17977





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(NTS)

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Scale
1 : 400

Design: SEL	Date: FEB. 2019
Drawn: DPS	Checked: JIM
Project No.: 119351	Drawing No.: 200

D07-12-19-0092

#17977

Arcadis Professional Services (Canada) Inc.
333 Preston Street, Suite 500
Ottawa, Ontario K1S 5N4
Canada
Phone: 613 241 3300
www.arcadis.com