DCR/PHOENIX GROUP OF COMPANIES

REPORT
PROJECT: 122508-6.2.1

DESIGN BRIEF
115 LUSK STREET
C/O DCR/PHOENIX GROUP OF COMPANIES
WEST BARRHAVEN - CITY OF OTTAWA

City of Ottawa file # D07-12-20-0080

IBI

Prepared for DCR/PHOENIX GROUP OF COMPANIES
by IBI GROUP

Rev # 1 December 2020

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1 INTRODUCTION

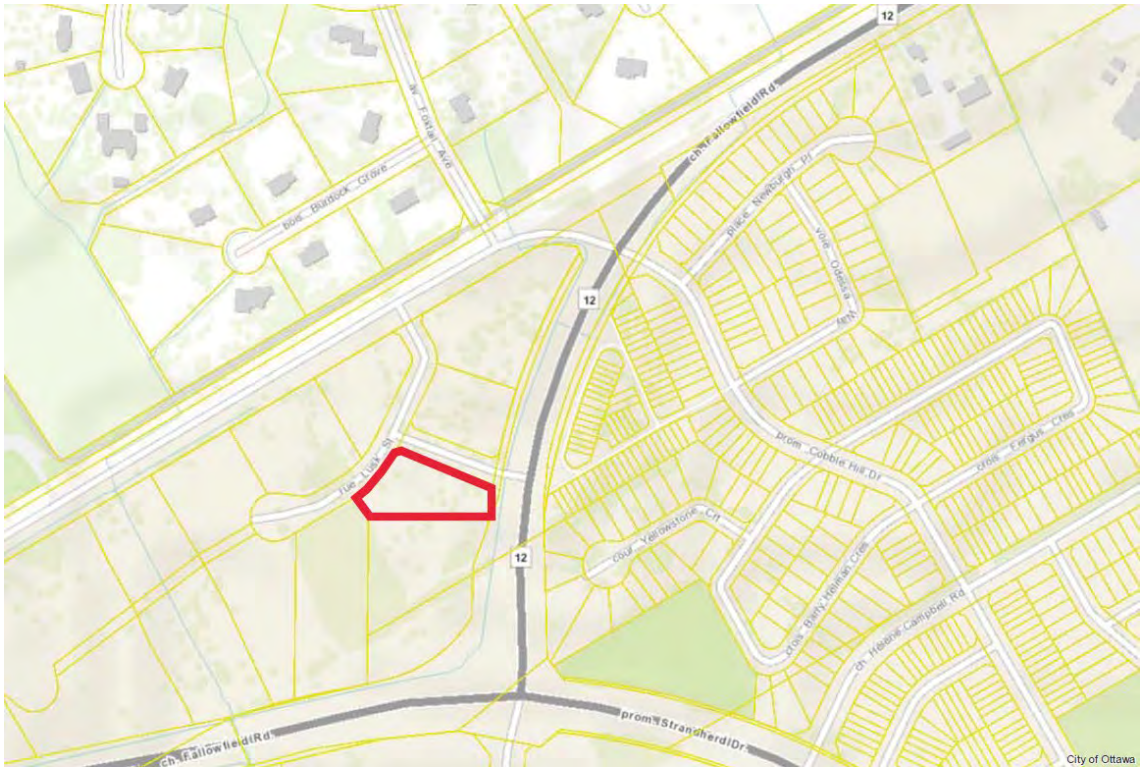
1.1 Purpose

IBI has been retained by the owner (DCR Phoenix) to prepare detail design of municipal services to support the Site Plan Application (SPA) for 115 Lusk Street. The site is located in O'Keefe Court commercial development located at the north east quadrant of the intersection of Fallowfield Road and Strandherd Drive. The development is located in the growth area of West Barrhaven in the City of Ottawa within Areas 9 & 10 Barrhaven Secondary Plan, which identified these lands for commercial Business Park development. The subject site is approximately 0.40 ha and the proposed site plan consists of a medical building and a restaurant.

The site is bounded by Forager Street to the north, vacant lands to the south, Fallowfield Road to the west and Lusk Street to the east. Its civic address is 115 Lusk Street. Refer to key plan on Figure 1.1 for property location.

A copy of the proposed site plan prepared by Colizza Architects is provided in **Appendix A**.

Figure 1.1 Site Location



The proposed servicing design conforms to current City of Ottawa and MECP design criteria, and no pre-consultation meetings were requested from the Rideau Valley Conservation Authority (RVCA) or the Ontario Ministry of Environment, Conservation and Parks (MECP), as the site is serviced by existing municipal infrastructure.

2 WATER DISTRIBUTION

2.1 Existing Conditions

The subject property is located in the City of Ottawa Barrhaven Water Pressure Zone. An existing 300mm diameter watermain runs along Lusk Street frontage; an existing 200mm is located along Forager Street frontage; and an existing 406mm diameter watermain is located along Fallowfield Road east of the site.

As part of the development of the subdivision, a 200 mm diameter water service was constructed along the Lusk Street frontage to service this site.

2.2 Design Criteria

2.2.1 Water Demands

Water demands have been calculated based on Table 4.2 – Ottawa Design Guidelines – Water Distribution. A consumption rate of 25,000 l/hectare/day is used for the commercial lands in the subject site.

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

Average Daily	0.23 l/s
Maximum Daily	0.35 l/s
Peak Hourly	0.42 l/s

2.2.2 System Pressure

The 2010 City of Ottawa Water Distribution Guidelines 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 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines 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 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rate

As per the Ottawa Design Guidelines, fire flow requirements are to be calculated using the Fire Underwriters Survey (FUS) method. The FUS method requires the building area, type of construction, type of occupancy, use of sprinklers and exposures to adjacent buildings. A FUS calculation has been done for the medical building which is the largest building resulting in a fire flow demand of 7,000 l/min (117 l/s); a copy of the FUS calculation is included in **Appendix A**.

2.2.4 Existing Hydraulic Model

As part of the O'Keefe Court – 416 Lands development, watermains were constructed on Lusk and Forager Streets which are connected to existing watermains on Fallowfield Road and O'Keefe Court. A hydraulic model was prepared for this project in the 'Design Brief O'Keefe Court – 416 Lands c/o DCR/Phoenix Group of Companies West Barrhaven – City of Ottawa' prepared by IBI Group May 2018. For the hydraulic analysis, the City of Ottawa provided boundary conditions at the three locations where connections to the existing watermain are made. A copy of the boundary conditions is included in **Appendix A** and summarized as follows:

BOUNDARY CONDITIONS			
SCENARIO	HGL (m) O'Keefe Court (Near Highway 416)	HGL (m) O'Keefe Court (Near Fallowfield Road)	HGL (m) Fallowfield Road
Maximum HGL (Basic Day)	154.0	154.4	154.5
Minimum HGL (Peak Hour)	150.2	149.9	149.8
Max Day + Fire Flow	148.5	146.5	146.0

In the hydraulic water model for O'Keefe Court – 416 Lands, the location where the water services for the two buildings connect to the existing watermain on Lusk Street is represented by Node J-35 in the model. A copy of the model schematic and model output is included in **Appendix A**. As the services to the buildings are for 'domestic' water supply and not for fire protection, the service pipes do not have to be modelled. The water demands used in the hydraulic model are similar to the water demands calculated in Section 2.2.1.

Fire protection to the two buildings is provided by adjacent hydrants on Lusk Street directly opposite the medical building and on Forager Street. In the hydraulic model Nodes J-35 and J-40 represent the available fire flow for the proposed building.

2.3 Hydraulic Model Results

As stated in the above section, the water model schematic and results for the O'Keefe Court – 416 Lands project are included in **Appendix A**. A comparison of the results for the proposed building is summarized as follows:

Maximum Pressure: At node J-35 under the basic day scenario, the pressure at the road elevation is 495.4 kPa. As this pressure is less than 552 kPa, pressure reducing control is not required for these buildings.

Minimum Pressure: The pressure at Node J-35 under the peak hour scenario is 488.9 kPa which is well above the minimum 276 kPa pressure.

Fire Flow: Under the max day plus fire scenario, the design fire flow at nodes J-35 and J-40 is 799.1 l/s and 843.5 l/s respectively, well above the required 117 l/s fire flow per the FUS calculation.

3 WASTEWATER

3.1 Existing Conditions and Studies

The O'Keefe Court Commercial Development is located in the Tributary of the future South Nepean Collector (SNC). A high level master report prepared for the City by Dillon provided a functional design for the SNC. The report "South Nepean Collector (SNC) Wastewater Servicing Study and Functional Design" dated October 2003, identifies the preliminary size, slope and elevation of the SNC up to the intersection of Strandherd Drive and the former Temporary Road. The report also notes the requirement for a sub trunk "G" to be located within the West Barrhaven Community to support the growth node.

In addition, IBI prepared a Servicing Report in 2006 and subsequently updated in 2013 titled 'Sanitary Servicing Brief, Tartan-Claridge (Jockvale Heights) DCR Phoenix (Maravista Heights)'. Future Residential lands West Barrhaven, identifying how this growth node and the adjacent lands can be serviced in advance of the SNC and provided details on the location, size and elevation of sub trunk "G". This servicing strategy has been followed to date allowing all of the following downstream developments to be constructed: DCR Phoenix West Barrhaven Phases 1 to 4, Claridge Homes West Pointe Village Phases 1 to 3, Tartan Homes Havencrest and DCR Phoenix Maravista Heights. The subject lands were not originally included in sub trunk "G"; however, the 2013 servicing report identified sufficient residual capacity within the sub-trunk sewer to accommodate the subject lands. Subsequent agreement with the City allowed for the connection of the City Gate and O'Keefe Court Commercial Development to share the residual capacity until the SNC was fully constructed.

As part of the subdivision works, a 250 mm diameter sanitary service was constructed along the Lusk Street frontage to service this site.

3.2 Verification of Existing Sanitary Sewer Capacity

The sanitary sewers for O'Keefe Court was designed using the criteria of 50,000 L/Ha/day with a Peaking factor of 1.5 for the commercial lands, and an extraneous flow allowance of 0.28 l/s/Ha. The sanitary design sheet and the conceptual sanitary sewer layout and tributary areas for the O'Keefe Court dated September 2017 are provided in the **Appendix B**. The area for the site remains unchanged, however the usages for the site are now known they include a 566sm Medical building with an estimated staff complement of 12, and a 280sm restaurant with seating for 90 people. The City of Ottawa design criteria appendix 4A identifies estimated flows for these uses: 275l/p/d, and 125l/seat/d for medical building and non 24 hour restaurants. The below calculation demonstrates the proposed uses do not exceed the subdivision design criteria; therefore the existing sanitary sewer system has adequate capacity for the subject site, and there will be no negative effect to the downstream sanitary system.

Subdivision design:

ICI 50,000 l/Ha/d for 0.4Ha = 0.231 l/s

Infiltration 0.28l/s/Ha for 0.4Ha = 0.112 l/s

Total Average flow = 0.343 l/s

Site Plan design:

Medical bldg. 12 @ 275l/p/d = 0.038 l/s

Restaurant 90 @ 125l/p/d = 0.130 l/s

Infiltration 0.33l/s/Ha for 0.4Ha = 0.132l/s

Total Average flow = 0.300 l/s

3.3 Design Criteria

Section 3.2 demonstrated the proposed usages do not exceed the subdivision sewer design criteria. Should in the future the specific usages change for this site all of the on-site sewers have been designed to meet current City of Ottawa and MOE design criteria which include but are not limited to the below listed criteria. A copy of the detailed sanitary tributary area plan C-400 and the sanitary sewer design sheets are included in **Appendix B**; refer to the General Plan in **Appendix A** for sewer locations and details.

Institutional/Commercial:	28,000 l/d/Ha
Institutional/Commercial Peak Factor:	1.5
Extraneous Flow:	0.33 l/s/Ha
Minimum Pipe Size:	200 mm diameter
Maximum Velocity	3.0 m/s
Minimum Velocity	0.6 m/s

4 STORMWATER MANAGEMENT

4.1 Background

O'Keefe subdivision is tributary to the O'Keefe Drain which is tributary to the Jock River. The subdivision included the design and construction of an end of pipe SWM Facility to provide both quantity and quality control. The facility is operational and service the subdivision including the subject site. The design of the SWM facility is outlined in the Draft "O'Keefe Court 416 Lands Stormwater Management Report and Design Brief" (IBI, May 2018).

As part of the subdivision works, a 375 mm diameter service was constructed along the Lusk Street frontage to service this site.

4.2 Objective

The purpose of this evaluation is to prepare the dual drainage design, including the minor and major system, for 115 Lusk Street development. The design includes the assignment of inlet control devices, on-site storage and maximum depth of surface ponding. The evaluation takes into consideration the design requirement of the existing stormwater management pond, City of Ottawa Sewer Design Guidelines (OSDG) (October 2012), the February 2014 Technical Bulletin ISDTB-2014-01, the September 2016 Technical Bulletin PIEDTB-2016-01 and the June 2018 Technical Bulletin ISTB-2018-04.

4.3 Design Criteria

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
- Initial Time of Concentration — 10 minutes
- Runoff Coefficients
  - Landscaped Areas — C = 0.25
  - Building and Roof Area — C = 0.90
  - Parking Area and Driveway — C = 0.90
  - Overall Runoff Coefficient — C = 0.77

  (See Figure 2.0 in Appendix C for detailed runoff C calculation)
- Pipe Velocities — 0.80 m/s to 3.0 m/s
- Minimum Pipe Size — 250 mm diameter (200 mm CB Leads)

4.4 System Concept

According to the detail design report of the subdivision prepared by IBI Group dated May 2018, the development of the downstream system included the expected stormwater servicing needs of the subject property. The existing storm sewers constructed adjacent to the site were oversized to provide the needed capacity for minor storm runoff from the subject site. Minor storm runoff from the subject site will connect to the existing 375 mmØ sewer stub that connects to the existing 825mmØ storm sewer in Lusk Street.

According to the IBI Report dated May 2018, the design flow associated with the site is 61.0 l/s. Based on the proposed servicing plan, the design flow of the subject site is calculated to be 60.80 l/s. Therefore, the existing storm sewer has adequate capacity for the subject site, and there will be no negative effect to the downstream storm system. Copies of the subdivision storm design sheet and tributary areas plan are provided in **Appendix C**.

4.4.1 Dual Drainage Design

The dual drainage system proposed for the subject site will accommodate both major and minor stormwater runoff. Minor flow from the subject site will be conveyed through the storm sewer network and discharge into the existing 825mmØ storm sewer in Lusk Street.

The balance of the surface flow not captured by the minor system will be conveyed via the major system. Where possible, storage will be provided in surface sags or low points within the parking lot and landscaped area. Underground storage will also be provided within oversized storm pipes. Once the maximum storage is utilized, the excess flow will cascade to the next downstream sag. Major flow up to 100-year storm event will be restricted and detained on-site. Emergency overflow will be directed towards Lusk Street.

4.4.2 Proposed Minor System

Using the criteria identified in Section 4.3, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan C-500 is included in **Appendix C**. The general plan of services, depicting all on-site storm sewers can be found in **Appendix A**.

The owner of the site will be responsible for regular maintenance of the on-site sewers, catch basins and inlet control devices (ICDs). Maintenance includes but is not limited to the cost of regular cleaning of the structures and ICDs as necessary. The site owner will also be responsible for replacement of damaged or missing catch basin structures, grates or ICDs as needed.

4.5 Stormwater Management

The stormwater management strategy for the subdivision was outlined in the following reports:

• Jock River Reach One Subwatershed Study (Stantec 2007)

• O'Keefe Drain Environmental and Stormwater Management Plan Final Report (June 2013)

• O'Keefe Court Stormwater Management Report and Design Brief (IBI, May 2018)

• O'Keefe Court Design Brief (IBI, May 2018)

The subject site is limited to a maximum minor system release rate of 61.0 l/s according to the IBI Design Brief dated May 2018. Based on the final legal plan of the site, this will be achieved through a combination of inlet control devices (ICD's) at inlet locations, surface storage where possible and underground storage in oversized storm pipes where required.

Surface flows in excess of the site's allowable release rate will be stored on site in strategic surface storage areas or oversized underground pipes and gradually released into the minor system to

respect the site's allowable release rate. The maximum surface retention depth located within the developed areas will be limited to 300mm during a 1:100 year event as show on the ponding plan C-600 located in **Appendix C** and grading plan C-200 located in **Appendix D.** Overland flow routes will be provided in the grading to permit emergency overland flow.

Along the eastern limits of the property, there is an elevation drop from the site to Forager Street and Fallowfield Road, the opportunity to capture and store runoff in this area is limited due to grading constraints and building geometry. As per the subdivision design, these areas will discharge to Fallowfield Road uncontrolled. The 416 Lands Design Brief by IBI Group date May 2018 assumed a total of 0.03 ha of uncontrolled area discharging to the Fallowfield Right of Way. Based on the proposed site plan and the use of retaining walls, the total uncontrolled area has been reduced to 0.02 ha, which is less than what has been previously approved. Therefore, runoff from the uncontrolled area will have no negative impact on the Fallowfield storm sewer system. Refer to Drawing C-500 in **Appendix D** for the detailed storm drainage area plan for the site.

Based on the previously noted factors, the site will be limited to 61.0 l/s discharging into the existing minor system. To achieve this, the on-site storm sewer system servicing sloped roofs (medical building), parking lot and landscape area will be controlled with an orifice and flows from flat roofs (restaurant) will be controlled with roof inlets.

The following table identifies the ICD type for each drainage area and corresponding storage requirements as noted in the modified rational method calculation included in **Appendix D**. A detailed calculation of the underground storage volume is also included in **Appendix D**.

DRAINAGE AREA	ICD TYPE	RESTRICTED FLOW (L/s)		STORAGE REQUIRED (m^3)		STORAGE PROVIDED (m^3)	
		2 YEAR	100 YEAR	2 YEAR	100 YEAR	2 YEAR	100 YEAR
ROOF	RD-100-A-ADJ	1.575	1.575	2.49	10.26	10.50	10.50
PARKING LOT	TEMPEST LMF	59.425[1]	59.425[1]	17.68	99.61	23.27[2]	111.24[3]

[1] While the ICD will be sized for 59.425 l/s with 2.085m head, a reduction of 50% was applied to the flow rate when calculating the storage requirement, per city requirements when using modified rational method.

[2] subsurface storage only

[3] subsurface and surface storage

The above table illustrates the storage required during a 2 yr storm event for the parking lot is 17.68m^3 and that 23.27m^3 of subsurface storage is available, there no surface ponding is anticipated during a 2 year rainfall event.

5 SOURCE CONTROLS

5.1 General

Since an end of pipe treatment facility is provided for the subdivision development, 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 site not only for final development but also during construction. Some of these measures are:

- flat site grading;
- vegetation planting; and
- groundwater recharge in landscaped areas.

5.2 Lot Grading

In accordance with local municipal standards, all grading will be between 0.5 and 6.0 percent for hard surfaces and 2.0 and 6.0 percent for all landscaped areas. Significant pre-development elevation changes exist from west to east. The use of a retaining wall combined terracing (3:1 maximum slope) between the east side of the proposed restaurant and Fallowfield Road allows the remainder of the site to be graded relatively flat. A copy of the grading plan has been included in **Appendix D.**

5.3 Vegetation

As with most site plan agreements, the developer will be required to complete a vegetation and planting program. Vegetation will be provided where opportunities exist to re-create lost vegetation.

6 CONVEYANCE CONTROLS

6.1 General

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

- flat vegetated swales; and
- catchbasin sumps.

6.2 Flat Vegetated Swales

The site plan will make use of relatively flat vegetated swales where possible to encourage infiltration and runoff treatment.

6.3 Catchbasins and Maintenance Hole Sumps

All catchbasins within the development 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. Catchbasins will be to OPSD 705.02. All storm sewer maintenance holes on site shall be constructed with a 300 mm sump as per City standards.

6.4 Pervious Landscaped Area Drainage

Some of the landscaped area swales make use of a filter wrapped perforated drainage pipe constructed below the swales. This perforated system is designed to provide some ground water recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system.

7 SEDIMENT AND EROSION CONTROL PLAN

7.1 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 introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These will include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed in the existing manholes which connect to the existing downstream sewers;
- seepage barriers will be constructed in any temporary drainage ditches;
- filter cloths will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use; and
- Silt fence on the site perimeter.

7.2 Trench Dewatering

Although little groundwater is expected during construction of municipal services, 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.

7.3 Bulkhead Barriers

Temporary ½ diameter bulkhead barriers will be constructed for the existing manholes at the property limits. This bulkhead will trap any sediment carrying flows thus preventing any construction-related contamination of the existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed and removed prior to top course asphalt being laid.

7.4 Seepage Barriers

The presence of road side ditches along Fallowfield Drive and Strandherd Drive and the proximity of the O'Keefe drain necessitate the installation of seepage barriers. These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110 and will be installed in accordance with Drawing C-900 in **Appendix G**. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

7.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures should be covered in some fashion to prevent sediment from entering the minor storm sewer system. Until landscaped areas are sodded or until parking lot is asphalted and curbed, all catchbasins and manholes will be constructed with a geotextile filter fabric 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.

7.6 Stockpile Management

During construction of any development similar to that proposed by the Owner, both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems or natural stream systems is needed.

During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern provided the previous noted seepage barriers are installed.

The parking lot granular materials are not stockpiled on site. They are immediately placed in the parking lot and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

8 SOILS AND ROADS

Paterson Group was retained to prepare a geotechnical investigation for the proposed subject 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 and;
- To provide geotechnical recommendations pertaining to design of the proposed development including construction considerations.

The geotechnical report prepared by Paterson Group in May 2020 is included in **Appendix D**. The report contains recommendations which include but are not limited to the following:

- Material used to raise the approved subgrade to within 150mm of the underside of the concrete slab should consist of sand or OPSS Granular B Type I or Type II
- A 200mm base of OPSS Granular A should be provided immediately beneath the floor slab
- All of the granular materials should be placed in maximum 300mm thick loose lifts and be compacted to at least 98% SPMDD
- Pavement Structure:

CAR PARK AREAS	THICKNESS
Wear course HL 3 (12.5 Superpave)	50mm
OPSS Granular A Base	150mm
OPSS Granular B Type II Subbase	300mm

ACCESS LANES AND FIRE ROUTE	THICKNESS
Wear course HL 3 (12.5 Superpave)	40mm
Binder course HL 8 (19.9 Superpave)	50mm
OPSS Granular A Base	150mm
OPSS Granular B Type II Subbase	450mm

- Pipe bedding and cover; bedding to be minimum 150 mm OPSS Granular 'A' up to spring line of pipe. Cover to be 300 mm OPSS A or Granular B Type I. Both bedding and cover to be placed in maximum 225 mm lifts compacted to 98% SPMDD.

The grading plan for 115 Lusk Street C-200 is included in **Appendix D**.

Vehicular access to 115 Lusk Street is provided by two private entrances from Lusk Street and Forager Street. There are 53 parking spaces provided, including 2 accessible parking spaces.

9 CONCLUSIONS

Water, wastewater and stormwater systems required to develop 115 Lusk Street are designed in accordance with MOE and City of Ottawa's current level of service requirements.

The use of lot level control outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the proposed sediment and erosion control plan during construction will minimize harmful impacts on surface water.

Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

- Site Plan Approval: City of Ottawa
- Water Data Card: City of Ottawa

Report Prepared By:

Demetrius Yannoulopoulos, P.Eng.
Director

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APPENDIX A

Draft Plan of Subdivision
Phoenix Homes Site Plan for 416 Lands Block
Watermain Demand Calculation Sheet
FUS Fireflow Calculation
Water Model Schematic and Results from O'Keefe Court – 416 Lands Design Brief
122508-001 - General Plan of Services
122508-010 – Notes and Details

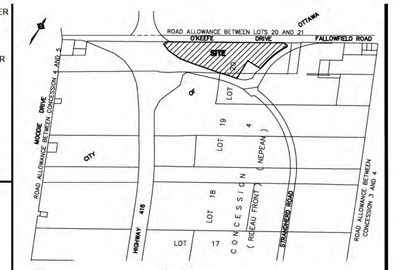
AREA SCHEDULE	
BLOCK	Area (Sq m)
1	7952
2	4595
3	8137
4	8501
5	728
6	7543
7	6202
8	8433
9	4048
10	4048
11	7899
12	4049
13	6591
14	4689
15	5090
16	4048
17	6088
18	606
18	440
STREET No. 1	5351
STREET No. 2	1651
STREET No. 3	3168
TOTAL =	10.986 Ha

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

_____

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS _____ DAY OF _____

_____
DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW, SUBURBAN SERVICES
PLANNING AND GROWTH MANAGEMENT DEPARTMENT
PLANNING AND INFRASTRUCTURE PORTFOLIO
CITY OF OTTAWA



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 20
CONCESSION 4 (Rideau Front)

Geographic Township of Nepean

CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
January 16, 2013.
Revised February 27, 2013
Revised March 14, 2013
Revised June 23, 2014
Revised July 7, 2014
Revised April 24, 2015
Revised December 1, 2015
Revised December 18, 2015
Revised January 12, 2017

Scale 1 : 1250

50 37.5 25 12.5 0 25 50 Metres

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

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

Date _____ EDWARD M. LANCASTER
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

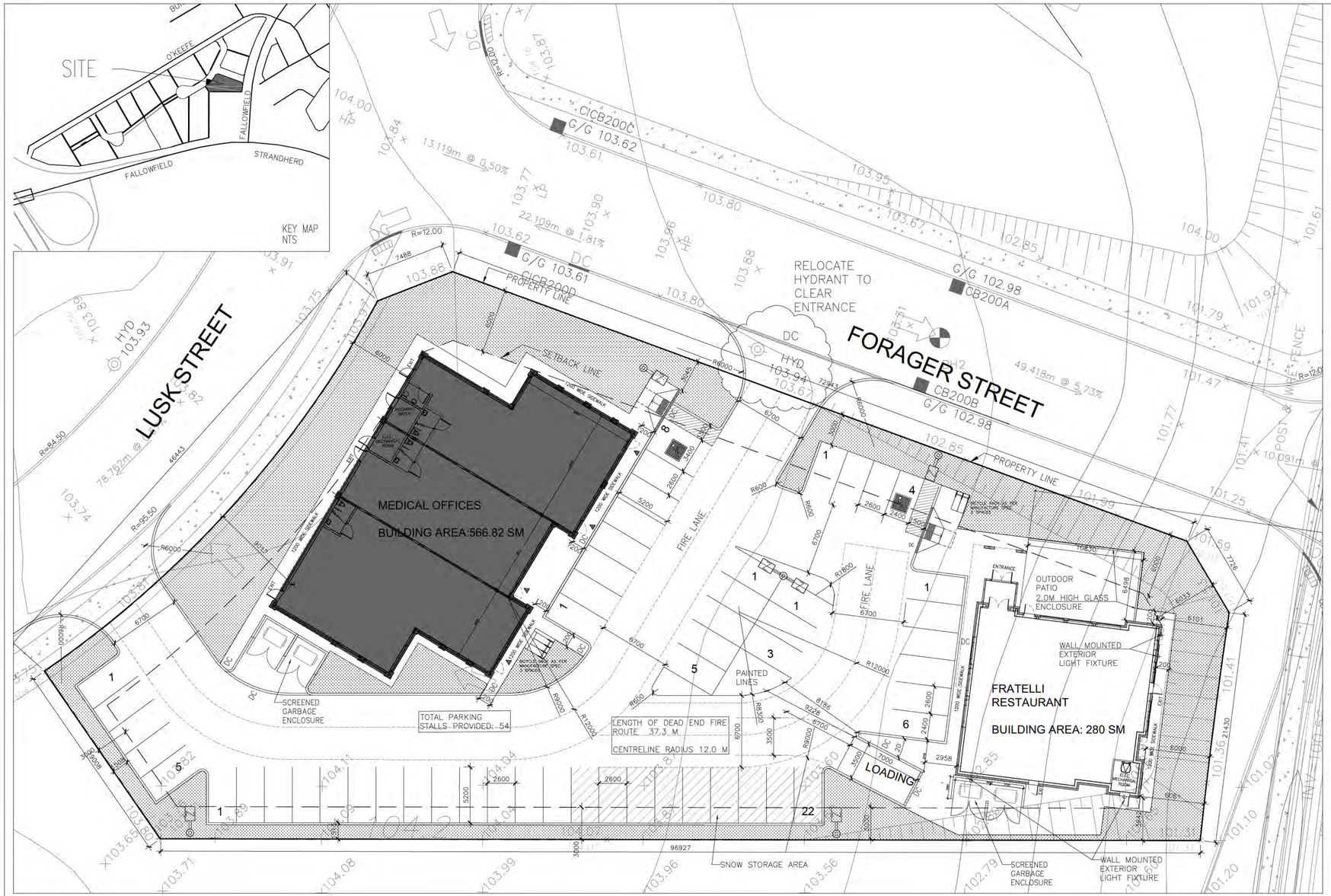
Date _____ Michael Boucher (Manager of Planning)
Phoenix Properties Inc.
I have the authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

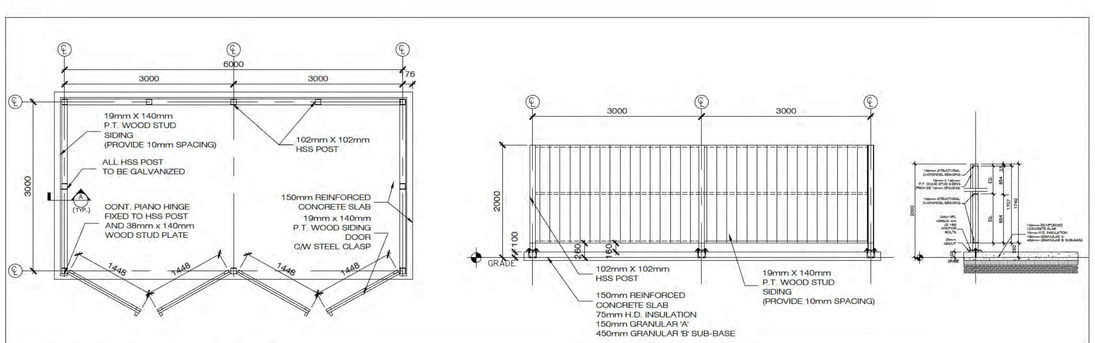
(a) see plan
(b) see plan
(c) see plan
(d) employment area (business park) and storm water management
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

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

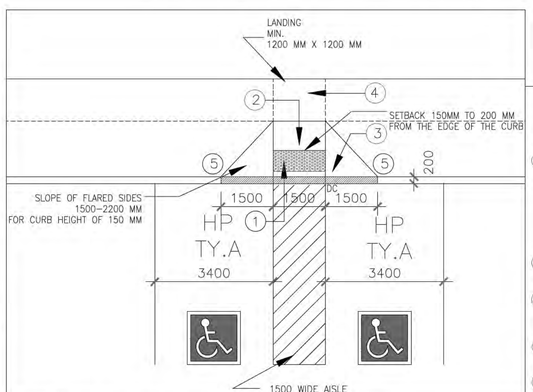
Job No. 14992-14 Phoenix Pl_Ll_20_C4_RF_NP_DPS_F3_D2_S



1 SP1 **SITE PLAN**
SCALE: 1:200



2 SP1 **GARBAGE ENCLOSURE DETAIL**
SCALE: 1:50



3 SP1 **ACCESSIBLE PARKING CURB DETAIL**
SCALE: 1:50

1. Tactile Walking Surface Indicator
   610 mm (min.) extending the full width of the curb ramp
   Set back 150 mm to200 mm from the edge of the curb
2. Running Slope of Curb Ramp 1:12 (8.33%) (max.) for new
3. Slope of Flared Sides 1:15 to 1:10 (6.67 – 10%)
4. Landing 1200 mm by 1200 (min.)
5. Vertical Signage

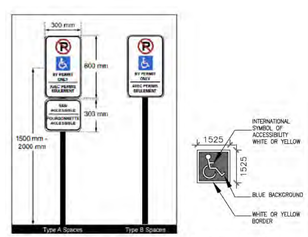


FIG. Vertical Signage

Pavement Marking

PLAN OF SUBDIVISION OF
PART OF LOT 20
CONCESSION 4 (Rideau Front)
Geographic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis , O'Sullivan , Vollebekk Ltd.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
3. Underground utilities shown on this plan are derived from City of Ottawa Department of Public Works and Services utility drawings.

GENERAL NOTES

1. Refer to Landscape drawings for information on trees to be retained.
2. Refer to Civil drawings for existing services and new service connections, and new grading and drainage information.

ZONING INFORMATION

ZONE DESIGNATION

IP [2265] H(18)
ZONING REQUIREMENTS:

NOTE: ZONING REQUIREMENTS PROVIDED IN ACCORDANCE WITH CITY OF OTTAWA BY-LAW IP[2265] H(16) CONSOLIDATION DATE: SEPTEMBER 26, 2018

MIN. LOT WIDTH REQUIRED:	NO MIN.
MIN. LOT AREA REQUIRED (M^2): LOT AREA PROVIDED:	750M^2 4047.9M^2
MAX. BUILDING HEIGHT: BUILDING HEIGHT: FROM AVERAGE GRADE	16.0M ±12.2M
MIN. FRONT YARD SETBACK: FRONT YARD SETBACK	6.0M 6.00
MIN. REAR YARD SETBACK: REAR YARD SETBACK:	6.0M 6.0M
MAX. INTERIOR SIDE YARD SETBACK: (ON THE SOUTH SIDE OF PROPERTY) INTERIOR SIDE YARD SETBACK:	3.0M 3.0M
MIN. CORNER YARD SETBACK: (ON THE NORTH SIDE OF PROPERTY) BUILDING CORNER YARD SETBACK:	6.0M 6.0M

PARKING REQUIREMENTS

NOTE: PARKING SPACE RATES PROVIDED IN ACCORDANCE WITH CITY OF OTTAWA BY-LAW 2008-250 SECTIONS 101 – 102, TABLES 101 – 102 & 106

MIN. PARKING STALLS REQUIRED FOR MEDICAL OFFICES PER 100M^2 GFA	4.0
MIN. PARKING STALLS REQUIRED FOR RESTAURANT PER 100M^2 GFA	10.0
MINIMUM BICYCLE PARKING PER 250M^2 GFA	1.0

DEVELOPMENT INFORMATION

PROPOSED:

LOT AREA: 4047.9M^2

BUILDING AREA		
RESTAURANT :	3,014FT^2	280.00M^2
MEDICAL OFFICES :	6,101FT^2	566.82M^2
TOTAL BUILDING AREA:	9,115FT^2	846.82M^2
GROSS FLOOR AREA		
RESTAURANT (GROUND + MEZZANINE):	2,626FT^2	244.00M^2
MEDICAL OFFICES :	5,382FT^2	500.00M^2
TOTAL G.F.A. (PROPOSED):	8,008FT^2	744.00M^2

LOT COVERAGE PROVIDED:
PHARMACY+CLINIC+OFFICES: 846.82M^2: 20.9%

LANDSCAPED AREA PROVIDED:
PROPOSED LANDSCAPED AREA: 891.0M^2 22.0%

PROPOSED PARKING:

PARKING SPACE DIMENSIONS: 2.6 M X 5.2 M
ACCESSIBLE PARKING SPACE: TYPE A: 3.4 M X 5.2 M, TYPE B: 2.4 M X 5.2 M
LOADING BAY DIMENSIONS (PER 113B)
WIDTH: 3.5 M
LENGTH: 7 M

REQUIRED PARKING RESTAURANT: (10 STALLS PER 100M^2 G.F.A.)
244M^2 25 STALLS
REQUIRED PARKING MEDICAL OFFICES: (4 STALLS PER 100M^2 G.F.A.)
500M^2 20 STALLS

TOTAL OF REQUIRED PARKING: 45 STALLS

TOTAL ACCESSIBLE PARKING REQUIRED: 2 STALLS
FOUR PERCENT (4%) OF THE TOTAL NUMBER OF PARKING SPACES TO BE ACCESSIBLE

TOTAL ACCESSIBLE PARKING PROVIDED:
TYPE A (3400 MM WIDE): 1 STALLS
TYPE B (2400 MM WIDE): 1 STALLS
1 STALLS

TOTAL ON GRADE PARKING PROVIDED: 53 STALLS

BICYCLE PARKING REQUIRED:
RESTAURANT: (1 SPACE PER 250M^2 G.F.A.)
244M^2 1 SPACES
MEDICAL OFFICES: (1 SPACE PER 250M^2 G.F.A.)
500M^2 2 SPACES

TOTAL OF REQUIRED BICYCLE PARKING: 3 SPACES
TOTAL BICYCLE PARKING PROVIDED: 5 SPACES

APPROVED ☐ REFUSED ☐

DATE:____ _____

No.	DESCRIPTION	DATE	CHD
2	ISSUED FOR REVIEW	20/11/12	VPC
1	ISSUED FOR REVIEW	19/12/18	VPC
		YY/MM/DD	

REVISIONS

CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DIMMISSIONS OR DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.

DO NOT SCALE THE DRAWINGS

N

THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.

DATE

DRAWN
RM

DATE
2019-12-12

CHECKED

DATE PRINTED
2020-11-12

VINCENT P. COLIZZA ARCHITECT INCORPORATED

MEDICAL OFFICE & RESTAURANT
115 LUSK ST., OTTAWA, ONT.

DWG. TITLE
SITE PLAN

SCALE
1:200

DWG. NO.
SP1

PROJ. NO.
2319

IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : 115 Lusk St.
CLIENT : DCR Phoenix

FILE 122508
DATE PRINTED 04-Mar-20
DESIGN W.Z.
PAGE 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	TOWN HOUSE UNITS	MEDIUM DENSITY (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
Site						0.4040			0.23	0.23		0.35	0.35		0.42	0.42	7,000

POPULATION DENSITY

Single Family	3.4 persons/unit
Semi Detached & Townhouse	2.7 persons/unit
Medium Density	1.8 persons/unit

WATER DEMAND RATES

Residential	350 l/cap/day
Shopping Center	2,500 L/(1000m2)/day
Commerical	50,000 L/ha/day

PEAKING FACTORS

Maximum Daily	
Residential	2.5 x avg. day
Commercial	1.5 x avg. day
Maximum Hourly	
Residential	2.2 x avg. day
Commercial	1.8 x avg. day

Fire Flow Requirement from Fire Underwriters Survey - 115 Lusk Street

Building

Floor Area of Medical Office	574	m^2
Storeys	1	
Total Floor Area	574	m^2

$F = 220C\sqrt{A}$

C	1.0		C =	1.5 wood frame
A	574	m^2		1.0 ordinary
				0.8 non-combustible
F	5,270	l/min		0.6 fire-resistive
use	5,000	l/min		

Occupancy Adjustment

		-25%	non-combustible
		-15%	limited combustible
Use	0%	0%	combustible
		+15%	free burning
Adjustment	0 l/min	+25%	rapid burning
Fire flow	5,000 l/min		

Sprinkler Adjustment

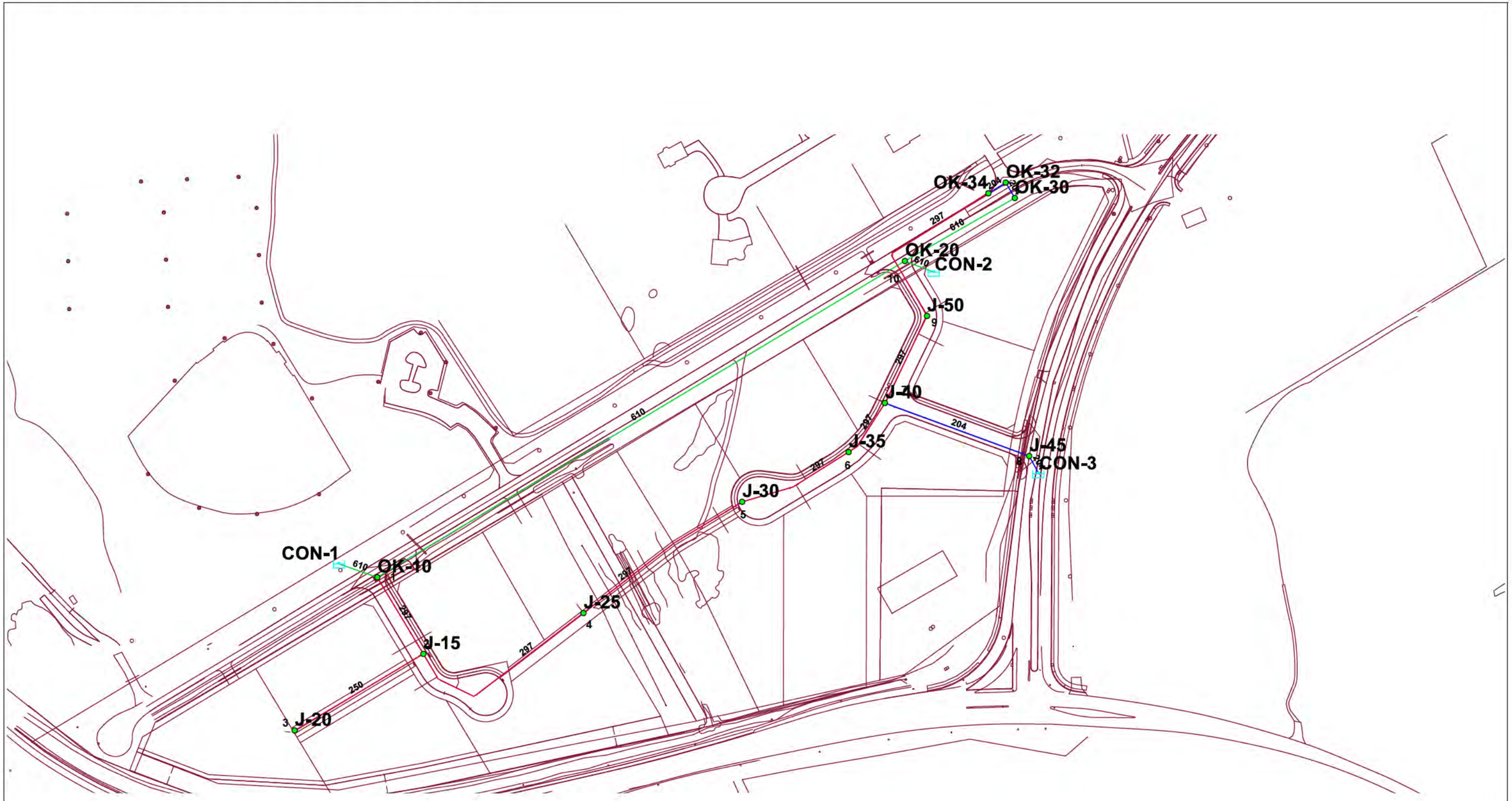
		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	0%		
Adjustment	0 l/min		

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	29.0	20.8	1	21	8%
east	35.8	16.3	1	16	5%
south	18.0	20.8	1	21	12%
west	30.2	31.0	1	31	5%
Total					30%

Adjustment	1,500	l/min
Total adjustments	1,500	l/min
Fire flow	6,500	l/min
Use	**7,000**	**l/min**
	117	**l/s**

O'Keefe Court - 416 Lands - Pipe Sizes and Node ID's



Date: Thursday, September 28, 2017

417 Lands (O'Keefe Court) Boundary Conditions

Information Provided:
Date provided: April 2017

Scenario	Demand	
	L/min	L/s
Average Daily Demand	266.4	4.44
Maximum Daily Demand	399.6	6.66
Peak Hour	718.8	11.98
Fire Flow Demand	15000	250

Location:

Results:

Connection 1 - O'Keefe Court (near HWY 416)

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.0	68.2
Peak Hour	150.2	62.9
Max Day plus Fire (15,000 l/min)	148.5	60.5

[1] Ground Elevation = 106.0 m

Connection 2 - O'Keefe Court (near Fallowfield)

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.4	73.3
Peak Hour	149.9	66.8
Max Day plus Fire (15,000 l/min)	146.5	62.1

[1] Ground Elevation = 102.8 m

Connection 3 - Fallowfield Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	154.5	75.0
Peak Hour	149.8	68.4
Max Day plus Fire (15,000 l/min)	146.0	63.0

[1] Ground Elevation = 101.7 m

Notes:

1) Service connections off the 610 mm backbone watermain should be avoided (refer Section 4.6.5 of the Ottawa Water Design Guidelines).
2) Connection locations to the backbone 610 mm watermain on O'Keefe Court should be discussed with Environmental 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.

Basic Day (Max HGL) - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J-15	1.09	104.71	154.04	483.37
2		J-20	0.46	105.05	154.04	480.04
3		J-25	0.23	103.50	154.13	496.15
4		J-30	0.63	103.60	154.22	496.05
5		J-35	0.87	103.72	154.28	495.44
6		J-40	0.47	104.00	154.31	493.00
7		J-45	0.00	101.08	154.48	523.25
8		J-50	0.69	104.03	154.32	492.85
9		OK-10	0.00	103.05	154.00	499.28
10		OK-20	0.00	104.03	154.40	493.58
11		OK-30	0.00	103.80	154.40	495.82
12		OK-32	0.00	103.80	154.38	495.62
13		OK-34	0.00	103.80	154.35	495.39

Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		J-15	2.94	104.71	150.08	444.61
2		J-20	1.25	105.05	150.08	441.27
3		J-25	0.63	103.50	149.86	454.25
4		J-30	1.70	103.60	149.65	451.24
5		J-35	2.34	103.72	149.53	448.92
6		J-40	1.27	104.00	149.48	445.64
7		J-45	0.00	101.08	146.41	444.21
8		J-50	1.86	104.03	149.54	445.99
9		OK-10	0.00	103.05	150.20	462.02
10		OK-20	0.00	104.03	149.90	449.49
11		OK-30	0.00	103.80	149.90	451.72
12		OK-32	0.00	103.80	149.80	450.75
13		OK-34	0.00	103.80	149.68	449.63

Max Day + Fire - Fireflow Design Report

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		J-15	251.63	J-20	401.63	145.70	1,164.24	1,171.67	J-20	136.64	118.65	1,164.24	1,164.24
2		J-20	250.69	J-20	280.31	133.66	367.49	367.49	J-20	139.96	119.33	367.49	367.49
3		J-25	250.35	J-25	397.16	144.03	803.24	803.17	J-25	139.97	117.78	803.18	803.18
4		J-30	250.95	J-30	390.48	143.45	761.00	760.98	J-30	139.97	117.88	760.99	760.99
5		J-35	251.30	J-35	391.16	143.64	799.07	799.08	J-35	139.97	118.00	799.09	799.07
6		J-40	250.70	J-40	391.12	143.91	843.48	843.49	J-40	139.97	118.28	843.51	843.48
7		J-50	251.03	J-50	386.81	143.50	794.67	794.69	J-50	139.97	118.31	794.70	794.67

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- ☐ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☒ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- ☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- ☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:
- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☐ Confirm consistency with Master Servicing Study, if available
☒ Availability of public infrastructure to service proposed development
☒ Identification of system constraints
☒ Identify boundary conditions
☒ Confirmation of adequate domestic supply and pressure
☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.
☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
☒ Address reliability requirements such as appropriate location of shut-off valves
☐ Check on the necessity of a pressure zone boundary modification.
☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

- ☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- ☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
- ☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.
- ☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
- ☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☒ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
- ☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.
- ☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☒ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☒ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- ☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☐ Set-back from private sewage disposal systems.
- ☐ Watercourse and hazard lands setbacks.
- ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- ☐ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☒ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- ☐ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- ☒ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

- ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.
- ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☐ Changes to Municipal Drains.
- ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and recommendations
- ☒ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.
- ☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

SAN STRUCTURE TABLE						
NAME	RIM ELEV.	INVERT IN	INVERT IN AS-BUILT	INVERT OUT	INVERT OUT AS-BUILT	DESCRIPTION
EXMH09A	101.41	SE99.850 S99.858		W99.828		1200ø OPSD 701.010
MH1A	103.34	E101.753		W101.623		1200ø OPSD 701.010
MH2A	103.49	E101.029		N99.924		1200ø OPSD 701.010

MH2A REQUIRE SOLID WATERTIGHT COVERS

STM STRUCTURE TABLE						
NAME	RIM ELEV.	INVERT IN	INVERT IN AS-BUILT	INVERT OUT	INVERT OUT AS-BUILT	DESCRIPTION
EXMH09	102.79	SE101.105		NW101.085		1200ø OPSD 701.010
MH1	103.70	N101.877		W101.677		1200ø OPSD 701.010
MH2	103.51	E101.455 W101.816		N101.395		1200ø OPSD 701.010
MH3	103.61	E101.192 S101.365		NW101.162		1200ø OPSD 701.010
MH4	103.66	E101.397		W101.367		1200ø OPSD 701.010

MH2 REQUIRE SOLID WATERTIGHT COVERS

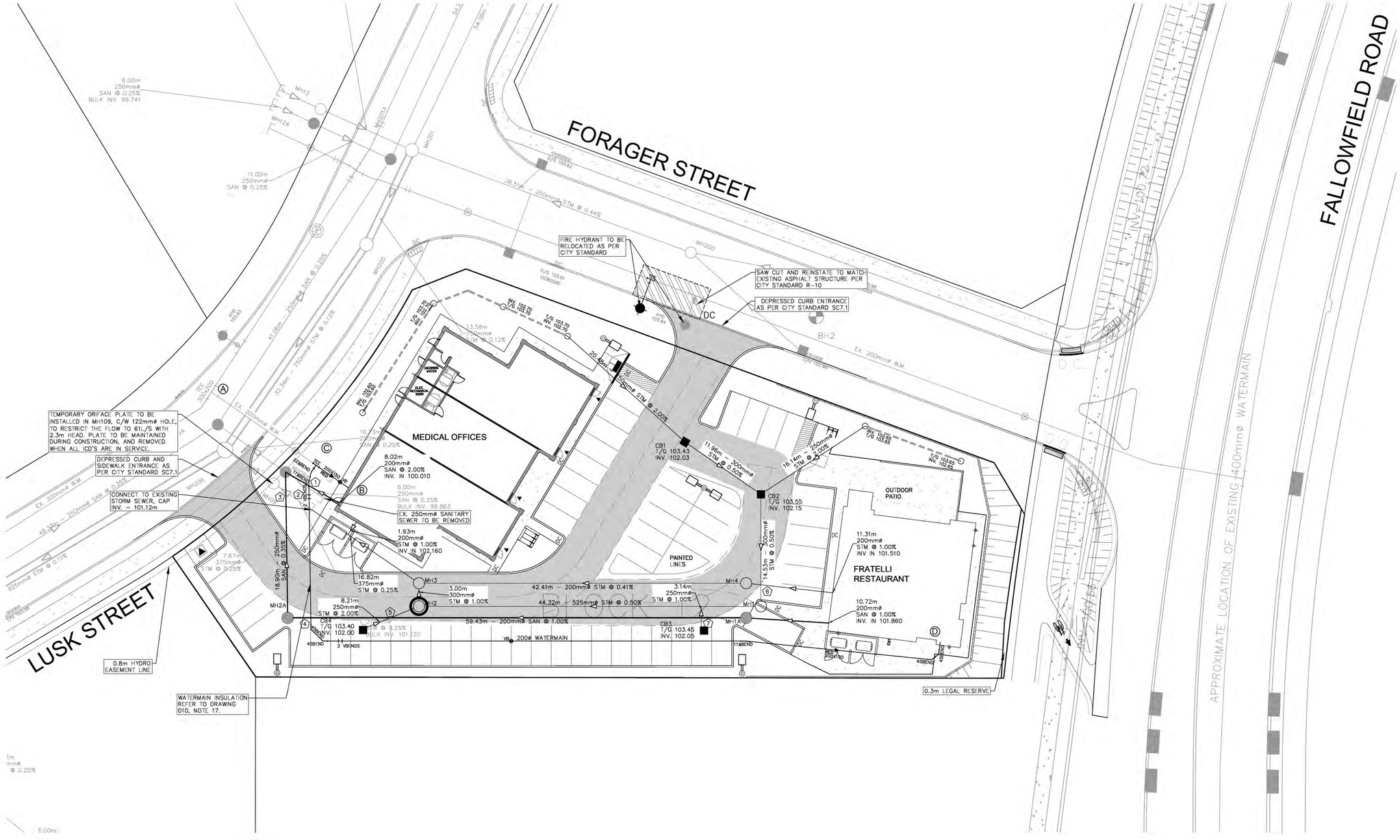
CROSSING SCHEDULE

1	200 mm ø W/M	1.000 m	CLEARANCE OVER	200 mm ø SAN
2	200 mm ø W/M	0.250 m	CLEARANCE OVER	375 mm ø STM
3	375 mm ø STM	0.974 m	CLEARANCE OVER	250 mm ø SAN
4	200 mm ø W/M	0.250 m	CLEARANCE OVER	200 mm ø SAN
5	200 mm ø STM	0.521 m	CLEARANCE OVER	200 mm ø SAN
6	300 mm ø STM	0.260 m	CLEARANCE OVER	200 mm ø STM
7	250 mm ø STM	0.255 m	CLEARANCE OVER	200 mm ø SAN

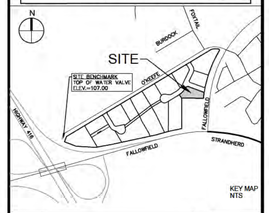
REVISED 2020-01-16

WATERAIN SCHEDULE

	Station	Description	Finished Grade	Top of Waterain	As Built Waterain
A	0+000.00	EXISTING 300X200 TEE	103.68	101.28	
	0+013.30	EXISTING V&VB	103.83	101.43	
C	0+016.55	TEE	103.81	101.41	
	0+019.30	RED 200X150	103.89	101.49	
	0+020.35	VB	103.90	101.50	
B	0+021.54	BUILDING SERVICE	103.89	101.49	
C	0+000.00	TEE	103.81	101.41	
	0+001.11	22.5 BEND	103.87	101.27	
	0+002.38	11.25 BEND	103.87	101.27	
	0+004.07	V BEND	103.87	101.27	
	0+00457	V BEND	103.89	101.96	
	0+021.51	45 BEND	103.45	101.73	
	0+023.67	45 BEND	103.45	101.74	
	0+025.67	V BEND	103.47	101.72	
	0+026.17	V BEND	103.47	101.07	
	0+048.08	VB	103.57	101.17	
	0+078.45	11.25 BEND	103.78	101.38	
	0+090.59	RED 200X150	103.83	101.43	
	0+102.73	45 BEND	104.00	101.60	
	0+103.56	45 BEND	104.02	101.62	
D	0+105.44	BUILDING SERVICE	104.05	101.65	



SEE 010 FOR NOTES, LEGEND, CB TABLE AND DETAILS



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2	REVISED PER CITY COMMENTS	DGY	2020.12.14
1	ISSUED FOR SPA	DGY	2020.03.06

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OTTAWA ONT
K2E 6T8

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Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

N

Drawing Title
SERVICING PLAN

Scale
2.5 0 2.5 5
1:250

Design	Date
WZ/RM	NOVEMBER 2019
Drawn	Checked
EH	DGY
Project No.	Drawing No.
122508	001

CITY FILE No. D07-12-20-0080 CITY PLAN No.18235

UTILITY LEGEND

- TRANSFORMER
- TRANSFORMER C/W CONCRETE WINGS
- HYDRO SWITCHGEAR
- HYDRO MANHOLE
- BELL PEDESTAL
- BELL GRADE LEVEL BOX (l=600mm, w=1200mm, d=750mm) C/W 1.5 x 3.0m easement
- BELL FIBER CABINET (l=1200mm, w=750mm, d=500mm)
- BELL CENTRAL SPLITTING POINTS (l=1175mm, w=1200mm, d=500mm)
- ROGERS PEDESTAL
- ROGERS VAULT (l=1000mm, w=1000mm, d=1200mm) C/W 1m x 2m easement
- STREET LIGHT
- STREET LIGHT DISCONNECT
- STREET LIGHT GROUNDING
- JOINT UTILITY TRENCH
- HYDRO CABLE AND DUCTS
- BELL CABLE
- BELL DUCTS
- ROGERS CABLE
- ROGERS DUCTS
- GAS
- STREET LIGHT CABLE
- UTILITY DROP LOCATIONS
- CONCRETE ENCASED DUCT BANK C/W NUMBER OF DUCTS
- COMMUNITY MA LBOX
- PROPOSED TREE LOCATION
- ROOT MANAGEMENT BARRIER

SEDIMENT EROSION LEGEND

- HEAVY DUTY SILT FENCE
- SNOW FENCE
- STRAW BALE CHECK DAM
- STRAW BALE CHECK DAM WITH F LTER CLOTH
- ROCK CHECK DAM
- SED MENT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN F LTER CLOTH

GENERAL LEGEND

- L MIT OF CONSTRUCTION
- PHAS NG LINE
- BARRIER CURB
- MOUNTABLE CURB
- DEPRESSED BARRIER CURB
- CONCRETE S DEWALK
- TACTILE WALK NG SURFACE INDICATOR
- ASPHALT SIDEWALK / PATHWAY
- BUS STOP CONCRETE / ASPHALT

SERVICING LEGEND

- SANITARY MANHOLE
- SANITARY SEWER
- STORM MANHOLE
- STORM SEWER - LESS THAN 900Ø
- STORM SEWER - 900Ø AND GREATER
- WATERMAIN
- STREET CATCHBASIN C/W TOP OF GRATE
- CURB INLET CATCHBASIN C/W GUTTER GRADE
- DOUBLE CATCHBASIN C/W TOP OF GRATE
- DITCH NLET CATCHBASIN C/W GUTTER GRADE
- CATCHBASIN MANHOLE C/W TOP OF GRATE
- DITCH NLET MANHOLE C/W TOP OF GRATE
- ICD LOCATION
- REAR YARD CATCHBASIN IN ROAD CONNECT NG STRUCTURE C/W SOL D GRATE
- REAR YARD "TEE" CATCHBAS N (300Ø) C/W TOP OF GRATE AND INVERT OUT
- REAR YARD "END" CATCHBAS N (300Ø) C/W TOP OF GRATE AND INVERT OUT
- REAR YARD "CUSTOM ANGLED " CATCHBAS N (450Ø) C/W TOP OF GRATE AND INVERT OUT
- REAR YARD "THREE WAY" CATCHBAS N (450Ø) C/W TOP OF GRATE AND INVERT OUT
- PERFORATED REAR YARD SUBDRAIN
- CSP CULVERT C/W DIAMETER
- VALVE AND VALVE BOX
- VALVE AND VALVE CHAMBER
- FIRE HYDRANT C/W BOTTOM OF FLANGE ELEVATION
- WATERMAIN REDUCER
- VERTICAL BEND LOCATION
- SINGLE SERVICE LOCATION
- DOUBLE SERVICE LOCATION
- NFERRED BEDROCK (SEE GEOTECHNICAL REPORT)
- 100 YEAR STORM HYDRAULIC GRADE LINE AT MANHOLE
- STRESS TEST STORM HYDRAULIC GRADE LINE AT MANHOLE
- UNDERSIDE OF FOOT NG ELEVATION (WITH LOT #)
- CLAY SEAL IN SEWER / WATERMA N TRENCH

GRADING LEGEND

- PROPOSED SWALE C/W FLOW D RECTION
- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE
- SLOPE C/W FLOW D RECTION
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE
- PROPOSED SWALE GRADE
- PROPOSED SWALE HIGH PO NT GRADE
- LOT CORNER GRADE C/W EXIST NG GRADE
- T E INTO EXISTING GRADE
- FULL STATIC POND NG GRADE
- RETA N NG WALL
- TOP OF RETA N NG WALL GRADE
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PROPOSED BOTTOM OF RETAIN NG WALL GRADE
- PRESSURE REDUCING VALVE (Based on the higher of the sewer obverts, or hydraulic grade line)
- FINISHED FLOOR ELEVATION
- TOP OF FOUNDATION ELEVATION
- UNDERSIDE OF FOOT NG ELEVATION
- TOTAL NUMBER OF RISERS
- M N MUM UNDERSIDE OF FOOTING
- MINIMUM GARAGE GRADE
- WALKUP UNIT
- WALKOUT UNIT
- NON-STANDARD FOUNDATION (Frost cover not provided for standard unit)
- BACKSPLIT UNIT (1.5m frost cover on footings)
- NOISE FENCE LOCATION
- NOISE FENCE GATE

NOTES :

1. ALL MATERIALS AND CONSTRUCTION IS TO BE N ACCORDANCE WITH THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS & SPECIFICATIONS OR OPSD/OPSS IF CITY DRAWINGS AND SPEC FICATIONS DO NOT APPLY.
2. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES PRIOR TO CONSTRUCTION AND SHALL PROTECT AND ASSUME RESPONS BILITY FOR ALL UT LIT ES WHETHER OR NOT SHOW ON THESE DRAWINGS.
3. FOR GEOTECHNICAL INFORMATION REFER TO GEOTECHNICAL REPORT PREPARED BY PATERSON GROUP DATED MAY 29, 2020.
4. FOR GEODETIC BENCHMARK AND GEOMETRIC LAYOUT OF STREET AND LOTS, REFER TO TOPOGRAPHICAL SURVEY AND PLAN OF SUBDIVISION PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD, BENCHMARK BASED ON CAN--NET V RTUAL REFERENCE SYSTEM NETWORK.
5. ROADWAY SECTIONS REQUIR NG GRADE RAISE TO PROPOSED SUB GRADE LEVEL TO BE FILLED WITH ACCEPTABLE NATIVE EARTH BORROW OR IMPORTED OPSS SELECTED SUBGRADE MATERIAL IF NATIVE MATERIAL IS DEFICIENT AS PER RECOMMENDATION OF GEOTECHNICAL ENGINEER.
6. IN AREAS WHERE EXIST NG GROUND IS BELOW THE PROPOSED ELEVATION OF SEWER AND WATERMAINS, GRADE RAISING AND FILLING IS TO BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT, AS PER CITY GUIDELINES ALL WATERMAINS N FILL AREAS ARE TO BE T ED WITH RESTRAINING JO NTS AND THRUST BLOCKS.
7. S LT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNT L START OF SUBSEQUENT PHASE.
8. STRAW BALE SED MENT TRAPS TO BE PLACED AND MAINTA NED IN EXISTING AND CONSTRUCTED ROAD S DE DITCHES. TRAPS TO REMAIN AND BE MAINTA NED UNT L VEGETATION IS ESTABLISHED (F APPLICABLE).
9. S LT SACK TO BE PLACED AND MA NTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK N STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMA N UNT L VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY NSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
10. ALL CONNECTIONS TO EXISTING WATERMAINS ARE TO BE COMPLETED BY CITY FORCES. CONTRACTOR IS TO EXCAVATE, BACKF LL, COMPACT AND REINSTATE.
11. ALL LEADS FOR STREET CB's TO AND CICB's CONNECTED TO MAIN SHALL BE 250mmØ PVC DR35 @ M N 2% SLOPE UNLESS NOTED OTHERWISE. ALL LEADS FOR CB's CONNECTED TO MAIN SHALL BE 200mmØ PVC DR35 @ MIN 1% SLOPE UNLESS NOTED OTHERWISE.
12. THESE DRAWINGS ARE NOT TO BE SCALED OR USED FOR LAYOUT PURPOSES.
13. THE COMPOSITE UT LITY PLAN HAS BEEN REV EWED BY IBI GROUP FOR CONFORMITY TO THE DESIGN CONCEPT FOR THE DEVELOPMENT AND FOR GENERAL ARRANGEMENT ONLY AND AS SUCH SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR OMISSIONS IN EITHER LAYOUT OR WORKMANSH P.
14. THIS DRAWING IS A COMPILATION OF OTHER UTILITY DESIGNS AND DOES NOT INDICATE N ANY WAY THAT THE PARTY SIGNING THIS DRAWING HAS DESIGNED OR APPROVED THE RESPECTIVE UT LITY PLANTS INDICATED ON THIS DRAW NG. THE DRAWING WAS PREPARED TO BE USED AS REFERENCE ONLY AS PER REQU REMENTS OF THE CITY OF OTTAWA. IT IS THE CONTRACTORS RESPONS BILITY TO ENSURE IT HAS REV EWED THE CURRENT AND EXIST NG DESIGNS BY HYDRO, STREET LIGHTING, BELL, CANADA POST, O.C. TRANSPO, CABLE TV AND ANY OTHER PARTIES INCLUDED BUT NOT MENTIONED AND COMPLETE THE INSTALLATION IN ACCORDANCE WITH THE REQUIREMENTS OF THE STAKEHOLDER UT LITY DESIGNS.
15. THE HGL PROVIDED IS BASED ON HYDRAULIC MODELING COMPLETED USING XPSWMM AND THE 100 YEAR CHICAGO STORM EVENT (C3H10010).
16. ALL UTILITY BOXES (I.E. PEDESTALS, TRANSFORMERS, ETS) ARE TO BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF OTTAWA'S "GUIDELINES FOR UTILITY PEDESTALS WITHIN THE ROAD RIGHT OF WAY"
17. ANY WATERMAIN WITH LESS THAN 2.4m COVER REQUIRES THERMAL NSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

ROADWAY STRUCTURE:

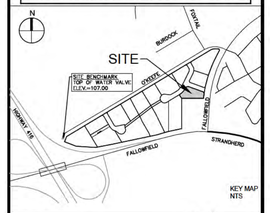
CAR ONLY PARKING AREAS (500mm)

- 50mm - SUPERPAVE 12.5 ASPHALTIC CONCRETE
- 150mm - OPSS GRANULAR "A" CRUSHED STONE
- 300mm - OPSS GRANULAR "B" TYPE II

ACCESS LANES AND HEAVY TRUCK (690mm)

- 40mm - SUPERPAVE 12.5 ASPHALTIC CONCRETE
- 50mm - SUPERPAVE 19.0 ASPHALTIC CONCRETE
- 150mm - OPSS GRANULAR "A" CRUSHED STONE
- 450mm - OPSS GRANULAR "B" TYPE II

SEE 010 FOR NOTES, LEGEND, CB TABLE AND DETAILS



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DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

Drawing Title
GENERAL NOTES, LEGEND AND CB DATA TABLE

Scale
N.T.S.

Design	Date
WZ/RM	NOVEMBER 2019
Drawn	Checked
EH	DGY
Project No.	Drawing No.
122508	010

CITY FILE No. D07-12-20-0080
CITY PLAN No.18235

J:\122508_115Lusk\3 Design\04_Civil\Sheets\010 NOTES--LEGEND--CB DATA.dwg Layout Name: NOTES--LEGEND--CB DATA Plotted At: 12/15/2020 7:39 AM Last Saved By: EHOWE Last Saved At: Dec. 14, 20

APPENDIX B

Sanitary Sewer Design Sheet
122508-400 - Sanitary Drainage Plan
416 Lands Sanitary Design Sheet
416 Lands Sanitary Drainage Area Plan

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

115 Lusk Street
C ty of Ot awa
DCR Phoenix

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				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
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)	INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM	PEAK FACTOR	FLOW (L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
Parking Lot		BLDG	MH1A	0.000					0.000	0.0	0.0	3.80	0.00	0.00	0.00	0.106	0.106	0.00	0.00	1.50	0.05	0.106	0.106	0.03	0.00	0.00	0.09	34.22	10.72	200	1.00	1.055	34.13	99.75%
Parking Lot		MH1A	MH2A	0.000					0.000	0.0	0.0	3.80	0.00	0.00	0.00	0.174	0.280	0.00	0.00	1.50	0.14	0.174	0.174	0.06	0.00	0.00	0.19	34.22	59.43	200	1.00	1.055	34.02	99.43%
Parking Lot		MH2A	EX. MH9A	0.000					0.000	0.0	0.0	3.80	0.00	0.00	0.00	0.000	0.280	0.00	0.00	1.50	0.14	0.000	0.174	0.06	0.00	0.00	0.19	36.70	18.90	250	0.35	0.724	36.51	99.47%
Parking Lot		BLDG	EXMH9A	0.000					0.000	0.0	0.0	3.80	0.00	0.00	0.00	0.124	0.124	0.00	0.00	1.50	0.06	0.124	0.298	0.10	0.00	0.00	0.16	48.39	8.02	200	2.00	1.492	48.23	99.67%
Lusk Street		EX. MH9A	EX. MH2016A	0.000					0.000	0.0	0.0	3.80	0.00	0.00	0.00	0.000	0.404	0.00	0.00	1.50	0.20	0.000	0.174	0.06	0.00	0.00	0.25	31.02	10.73	250	0.25	0.612	30.77	99.18%

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 f greater than 20% otherwise 1.0

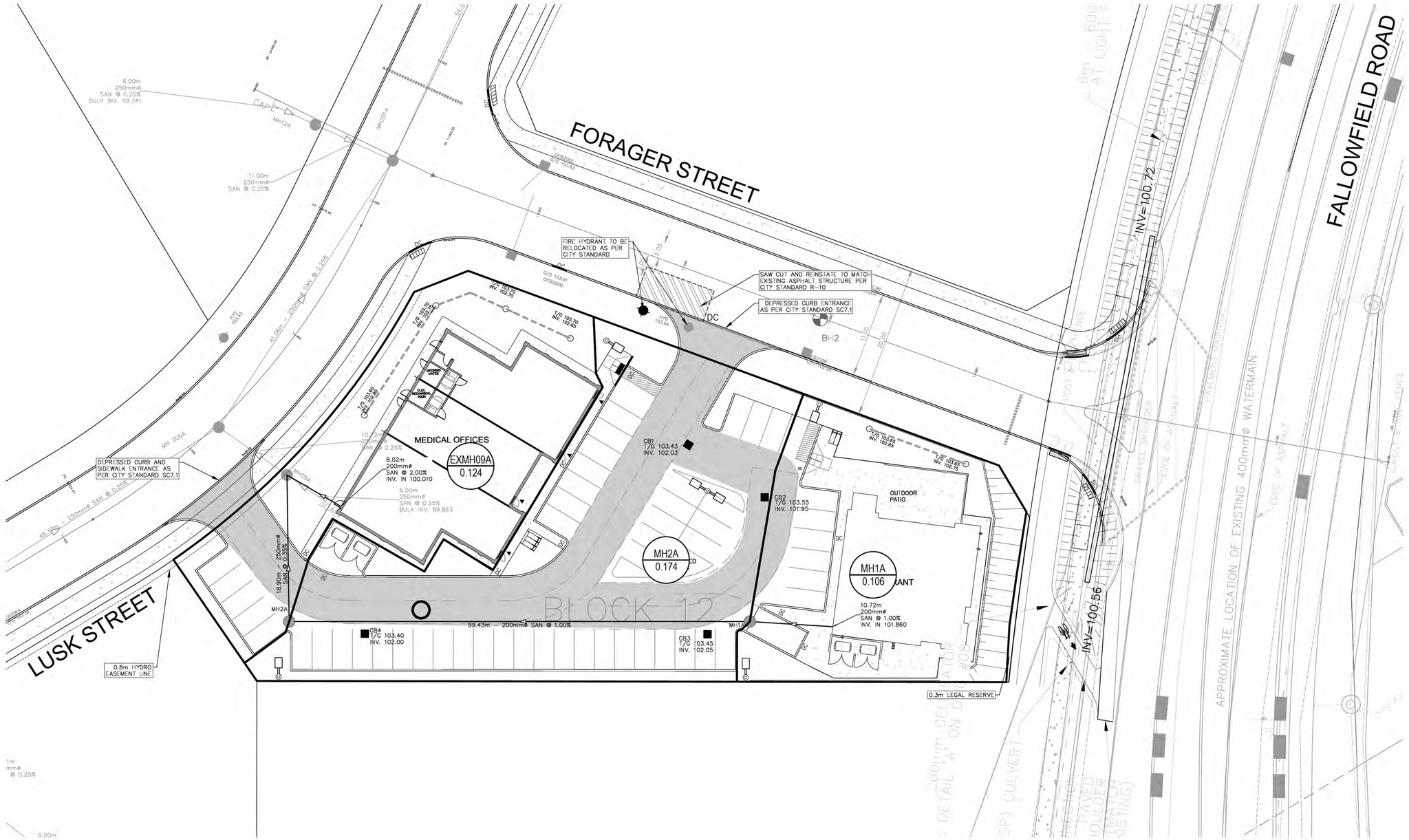
Designed: W.Z.

Checked: D.G.Y.

Dwg. Reference: 122508-400

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2020-03-06
2.	Servicing Brief - Submission No. 2	2020-12-15

File Reference: 122508.6.2.4
Date: 2020-03-06
Sheet No: 1 of 1



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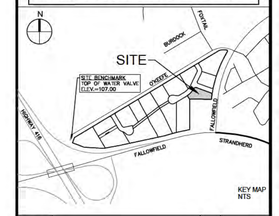

KEY MAP NTS

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PROVINCE OF ONTARIO

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Drawing Title

SANITARY TRIBUTARY PLAN

Scale

2.5 0 2.5 5
1:250

Design	Date
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EH	DGY
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SANITARY SEWER DESIGN SHEET

416 Lands
CITY OF OTTAWA
DCR Phoenix

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION		PEAK	PEAK	AREA (Ha)						PEAK	AREA (Ha)		FLOW				CAPACITY	LENGTH	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	FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	FLOW (L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
BLOCK 2	02A	STUB W	MH02A							0 0	0 0	4 00	0 00			0.46	0.46			0.40	0.46	0.46	0.13			0 53	31 02	6 00	250	0.25	0.612	30.49	98 30%
STREET NO. 3		MH02A	MH 305A							0 0	0 0	4 00	0 00			0	0.46			0.40	0 00	0.46	0.13			0 53	31 02	11.00	250	0.25	0.612	30.49	98 30%
BLOCK 17	17A	STUB E	MH17A							0 0	0 0	4 00	0 00			0.61	0 61			0.53	0 61	0.61	0.17			0.70	31 02	6 00	250	0.25	0.612	30 32	97.74%
STREET NO. 3		MH17A	MH 305A							0 0	0 0	4 00	0 00			0	0 61			0.53	0 00	0.61	0.17			0.70	31 02	11.00	250	0.25	0.612	30 32	97.74%
STREET NO. 3	305A	MH 305A	MH 304A	0.11						0 0	0 0	4 00	0 00			0	1 07			0.93	0.11	1.18	0 33			1 26	31 02	16.58	250	0.25	0.612	29.76	95 94%
BLOCK 1	01A	STUB NW	MH01A							0 0	0 0	4 00	0 00			0 8	0.8			0.69	0 80	0.80	0 22			0 92	31 02	6 00	250	0.25	0.612	30.10	97 04%
EASEMENT		MH01A	MH 304A							0 0	0 0	4 00	0 00			0	0.8			0.69	0 00	0.80	0 22			0 92	31 02	105 01	250	0.25	0.612	30.10	97 04%
STREET NO. 3	304A	MH 304A	MH 303A	0 04						0 0	0 0	4 00	0 00			0	1 87			1.62	0 04	2.02	0 57			2.19	31 02	19.16	250	0.25	0.612	28 83	92 94%
BLOCK 3	03A	STUB W	MH03A							0 0	0 0	4 00	0 00			0.81	0 81			0.70	0 81	0.81	0 23			0 93	31 02	6 00	250	0.25	0.612	30 09	97 00%
STREET NO. 3		MH03A	MH 303A							0 0	0 0	4 00	0 00			0	0 81			0.70	0 00	0.81	0 23			0 93	31 02	9 91	250	0.25	0.612	30 09	97 00%
STREET NO. 3	303A	MH 303A	MH 302A	0 07						0 0	0 0	4 00	0 00			0	2 68			2.33	0 07	2.90	0 81			3.14	31 02	30.74	250	0.25	0.612	27 88	89 88%
STREET NO. 3 / BLOCK 5	302A	MH 302A	MH 301A	0.16						0 0	0 0	4 00	0 00			0	2 68			2.33	0.16	3.06	0 86			3.18	31 02	102.15	250	0.25	0.612	27 84	89.74%
BLOCK 16	16A	STUB N	MH16A							0 0	0 0	4 00	0 00			0.4	0.4			0.35	0.40	0.40	0.11			0.46	31 02	6 00	250	0.25	0.612	30 56	98 52%
BLOCK 5		MH16A	MH 301A							0 0	0 0	4 00	0 00			0	0.4			0.35	0 00	0.40	0.11			0.46	31 02	5 50	250	0.25	0.612	30 56	98 52%
BLOCK 18	301A	MH 301A	MH 210A	0 07						0 0	0 0	4 00	0 00			0	3 08			2.67	0 07	3.53	0 99			3 66	31 02	77.32	250	0.25	0.612	27 36	88.19%
BLOCK 19	210A	MH 210A	MH209A	0 04						0 0	0 0	4 00	0 00			0	3 08			2.67	0 04	3.57	1 00			3 67	31 02	39.94	250	0.25	0.612	27 35	88.16%
BLOCK 14	14A	STUB N	MH14A							0 0	0 0	4 00	0 00			0.47	0.47			0.41	0.47	0.47	0.13			0 54	31 02	6 00	250	0.25	0.612	30.48	98 26%
BLOCK 19		MH14A	MH209A							0 0	0 0	4 00	0 00			0	0.47			0.41	0 00	0.47	0.13			0 54	31 02	5 50	250	0.25	0.612	30.48	98 26%
BLOCK 7	07A	STUB S	MH07A							0 0	0 0	4 00	0 00			0.62	0 62			0.54	0 62	0.62	0.17			0.71	31 02	6 00	250	0.25	0.612	30 31	97.71%
BLOCK 19		MH07A	MH209A							0 0	0 0	4 00	0 00			0	0 62			0.54	0 00	0.62	0.17			0.71	31 02	5 50	250	0.25	0.612	30 31	97.71%
BLOCK 19	209A	MH209A	MH208A	0 01						0 0	0 0	4 00	0 00			0	4.17			3.62	0 01	4.67	1 31			4 93	31 02	16.67	250	0.25	0.612	26 09	84.12%
STREET NO. 1	208A	MH208A	MH 207A	0.15						0 0	0 0	4 00	0 00			0	4.17			3.62	0.15	4.82	1 35			4 97	31 02	37.15	250	0.25	0.612	26 05	83 98%
BLOCK 8	08A	STUB S	MH08A							0 0	0 0	4 00	0 00			0.84	0 84			0.73	0 84	0.84	0 24			0 96	31 02	6 00	250	0.25	0.612	30 06	96 89%
STREET NO. 1		MH08A	MH 207A							0 0	0 0	4 00	0 00			0	0 84			0.73	0 00	0.84	0 24			0 96	31 02	11.51	250	0.25	0.612	30 06	96 89%
STREET NO. 1	207A	MH 207A	MH207B	0 01						0 0	0 0	4 00	0 00			0	5 01			4.35	0 01	5.67	1 59			5 94	31 02	6 00	250	0.25	0.612	25 08	80 86%
BLOCK 13	13A	STUB NE	MH13A							0 0	0 0	4 00	0 00			0.66	0 66			0.57	0 66	0.66	0.18			0.76	31 02	6 00	250	0.25	0.612	30 26	97 56%
STREET NO. 1		MH13A	MH207B							0 0	0 0	4 00	0 00			0	0 66			0.57	0 00	0.66	0.18			0.76	31 02	13.00	250	0.25	0.612	30 26	97 56%
STREET NO. 1	207B	MH207B	MH 206A	0.10						0 0	0 0	4 00	0 00			0	5 67			4.92	0.10	6.43	1 80			6.72	31 02	48.37	250	0.25	0.612	24 30	78 33%
BLOCK 9	09A	STUB SE	MH09A							0 0	0 0	4 00	0 00			0.4	0.4			0.35	0.40	0.40	0.11			0.46	31 02	6 00	250	0.25	0.612	30 56	98 52%
STREET NO. 9		MH09A	MH 206A							0 0	0 0	4 00	0 00			0	0.4			0.35	0 00	0.40	0.11			0.46	31 02	10.73	250	0.25	0.612	30 56	98 52%
STREET NO. 1	206A	MH 206A	MH201A	0 09						0 0	0 0	4 00	0 00			0	6 07			5.27	0 09	6.92	1 94			7 21	31 02	41.06	250	0.25	0.612	23 81	76.77%
BLOCK 12	12A	STUB NW	MH12A							0 0	0 0	4 00	0 00			0.41	0.41			0.36	0.41	0.41	0.11			0.47	31 02	6 00	250	0.25	0.612	30 55	98.48%
STREET NO. 1		MH12A	MH201A							0 0	0 0	4 00	0 00			0	0.41			0.36	0 00	0.41	0.11			0.47	31 02	11.00	250	0.25	0.612	30 55	98.48%
STREET NO. 1	201A	MH201A	MH202A	0.11						0 0	0 0	4 00	0 00			0	6.48			5.63	0.11	7.44	2 08			7.71	31 02	54.28	250	0.25	0.612	23 31	75.15%
BLOCK 10	10A	STUB SE	MH10A							0 0	0 0	4 00	0 00			0.4	0.4			0.35	0.40	0.40	0.11			0.46	31 02	6 00	250	0.25	0.612	30 56	98 52%
STREET NO. 1		MH10A	MH202A							0 0	0 0	4 00	0 00			0	0.4			0.35	0 00	0.40	0.11			0.46	31 02	11.86	250	0.25	0.612	30 56	98 52%
STREET NO. 1	202A	MH202A	MH203A	0 03						0 0	0 0	4 00	0 00			0	6 88			5.97	0 03	7.87	2 20			8.18	31 02	13.57	250	0.25	0.612	22 84	73 64%
BLOCK 11	11A	STUB E	MH11A							0 0	0 0	4 00	0 00			0.79	0.79			0.69	0.79	0.79	0 22			0 91	31 02	6 98	250	0.25	0.612	30.11	97 08%
STREET NO. 1		MH11A	MH203A							0 0	0 0	4 00	0 00			0	0.79			0.69	0 00	0.79	0 22			0 91	31 02	9.49	250	0.25	0.612	30.11	97 08%
STREET NO. 1	203A	MH203A	MH104A	0 06						0 0	0 0	4 00	0 00			0	7 67			6.66	0 06	8.72	2.44			9.10	31 02	48.91	250	0.25	0.612	21 92	70 66%
O'KEEFE COURT		MH104A	MH103A							0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	31 02	93.50	250	0.25	0.612	21 92	70 66%
O'KEEFE COURT		MH103A	MH102A							0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	31 02	32.00	250	0.25	0.612	21 92	70 66%
O'KEEFE COURT		MH102A	MH101A							0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	31 02	38.00	250	0.25	0.612	21 92	70 66%
O'KEEFE COURT		MH101A	MH100A							0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	31 02	18.08	250	0.25	0.612	21 92	70 66%
FALLOWFIELD ROAD		MH100A	EXMH1A							0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	116.06	31.50	250	3.50	2.291	106.96	92.16%
		EXMH1A								0 0	0 0	4 00	0 00			0	7 67			6.66	0 00	8.72	2.44			9.10	124.08	29.99	250	4.00	2.449	114.98	92 67%

Design Parameters

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	NST	50,000	L/Ha/day	1 5
APT	1 8	p/p/u	COM	50,000	L/Ha/day	1 5
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): 350 L/day 300 L/day
3. Infiltration allowance: 0 28 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed KH

Checked RM

Dwg. Reference 39744-501

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2017-05-05
2.	Revised per City Comments - Submission No. 2	2017-09-27

File Reference 39744 5.7.1

Date 2017-05-05

Sheet No 1 of 1

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

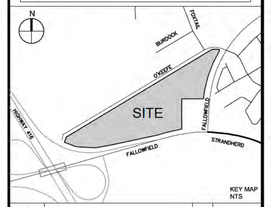
Date _____ 2017

Plan Number _____

LEGEND :

204 / 0.07 — AREA NUMBER / AREA N HECTARES

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
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6			
5	REVISED PER CITY COMMENTS	DGY	18.05.22
4	REVISED PER CITY COMMENTS	DGY	18.04.06
3	REVISED PER CITY COMMENTS	DGY	18.01.10
2	REVISED PER CITY COMMENTS	DGY	17.09.26
1	ISSUED FOR CITY REVIEW	DGY	17.05.04

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title

416 LANDS

4401 FALLOWFIELD ROAD

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
22/05/2018
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale: 1:1250

Design	Date
MB/RM	MARCH 2016
Drawn: EH	Checked: DGY
Project No.: 39744	Drawing No.: 501

CITY FILE No. D07-16-13-0013 CITY PLAN No. 17492

APPENDIX C

Storm Sewer Design Sheet
Storm Runoff Coefficient Calculation
122508-500 - Storm Drainage Plan
122508-600 - Ponding Plan
416 Lands Storm Design Sheet
416 Lands Storm Drainage Area Plan
On-site Underground Storage Calculations

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

115 Lusk Street
City of Ottawa
DCR Phoenix

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C 0.20	C 0.25	C 0.40	C 0.50	C 0.57	C 0.65	C 0.69	C 0.70	C 0.77	C 0.90	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)	(%)
	ECB 1	ECB 1	CB 1									0.063		0.13	0.13	10.00	0.20	10.20	76.81	104.19	122.14	178.56	10.36	14.05	16.47	24.08		10.36	87.74	20.48	250			2.00	1.731	77.38	88.19%
	CB 1	CB 1	CB 2									0.068		0.15	0.28	10.20	0.20	10.40	76.06	103.16	120.93	176.78	21.33	28.93	33.91	49.57		21.33	71.33	11.96	300			0.50	0.978	50.01	70.10%
	ECB 5	ECB 5	CB 2									0.020		0.04	0.04	10.00	0.16	10.16	76.81	104.19	122.14	178.56	3.29	4.46	5.23	7.64		3.29	87.74	16.14	250			2.00	1.731	84.45	96.25%
	CB 2	CB 2	MH1									0.035		0.07	0.40	10.40	0.25	10.65	75.30	102.12	119.70	174.97	29.98	40.66	47.66	69.67		29.98	71.33	14.53	300			0.50	0.978	41.35	57.97%
	CB 3	CB 3	MAIN									0.053		0.11	0.11	10.65	0.04	10.69	74.40	100.89	118.25	172.84	8.44	11.45	13.42	19.61		8.44	62.04	3.14	250			1.00	1.224	53.60	86.39%
		MH 1	MH 2											0.00	0.51	10.69	0.52	11.21	74.25	100.68	118.00	172.48	37.99	51.51	60.37	88.24		37.99	317.25	44.32	525			0.50	1.420	279.26	88.03%
	CB 4	CB 4	MH 2									0.122		0.26	0.26	10.00	0.08	10.08	76.81	104.19	122.14	178.56	20.06	27.21	31.90	46.63		20.06	87.74	8.21	250			2.00	1.731	67.68	77.14%
		MH 2	MH 3											0.00	0.77	11.21	0.04	11.25	72.45	98.20	115.08	168.19	55.98	75.88	88.93	129.97		55.98	100.88	3.00	300			1.00	1.383	44.90	44.51%
	ROOF	BLDG	MH 4										0.028	0.07	0.07	10.00	0.18	10.18	76.81	104.19	122.14	178.56	5.38	7.30	8.56	12.51		5.38	34.22	11.31	200			1.00	1.055	28.84	84.27%
	ROOF	MH 4	MH 3											0.00	0.07	10.18	1.05	11.22	76.13	103.26	121.04	176.94	5.33	7.23	8.48	12.40		5.33	21.91	42.41	200			0.41	0.676	16.58	75.66%
		MH 3	*MH 09*											0.00	0.84	11.25	0.47	11.72	72.32	98.03	114.89	167.90	60.96	82.62	96.83	141.51		60.96	91.46	22.82	375			0.25	0.802	30.50	33.35%
												TOTAL	0.389	0.84	TRUE																375						

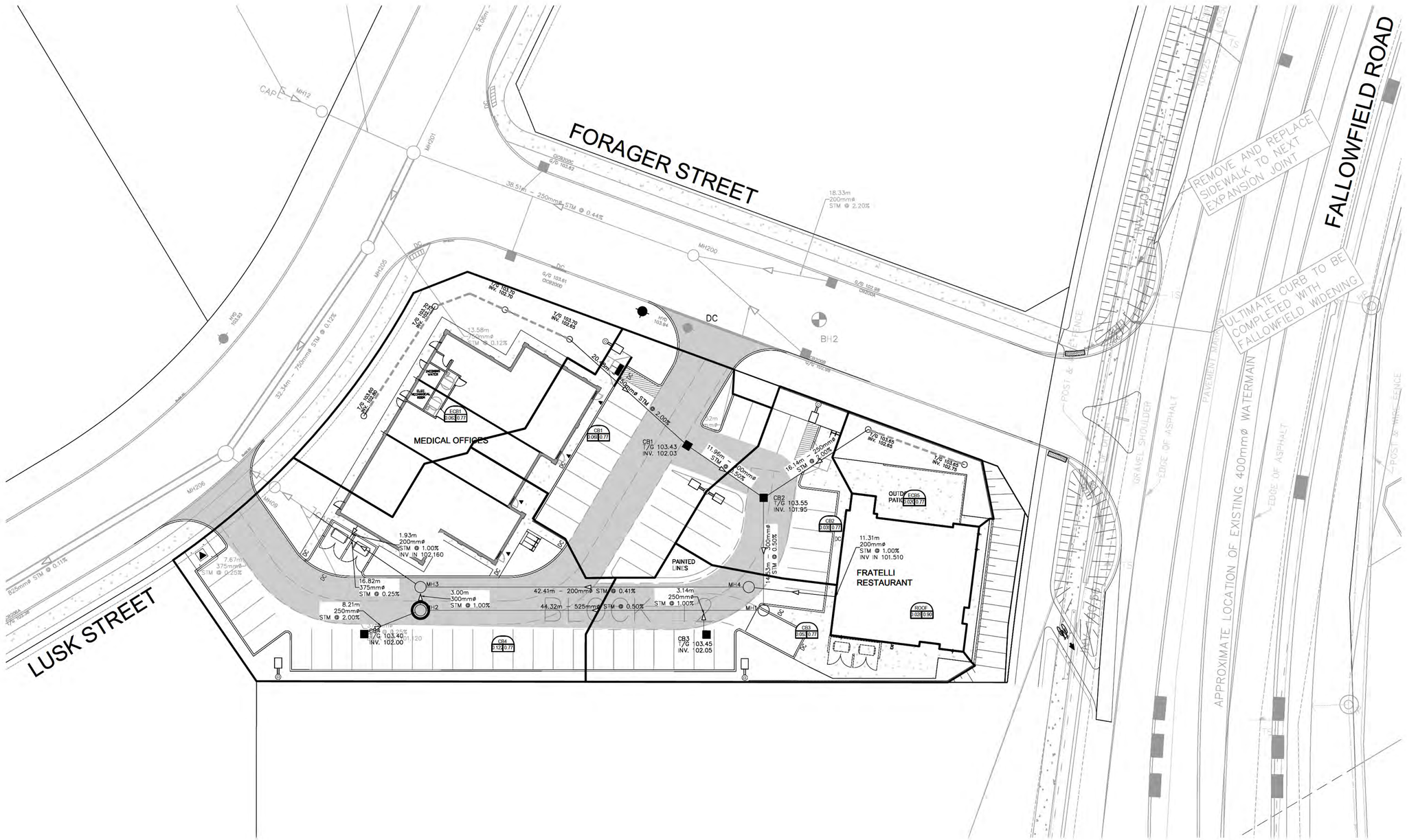
Definitions:
Q 2.78CiA, where
Q Peak Flow in Litres per Second (L/s)
A Area in Hectares (Ha)
i Rainfall intens ty in millimeters per hour (mm/hr)
[i 732.951 / (TC+6.199)^0.810] 2 YEAR
[i 998.071 / (TC+6.053)^0.814] 5 YEAR
[i 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) 0.013

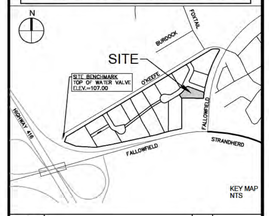
Designed: W.Z.
Checked: D.G.Y.
Dwg. Reference: 122508-500

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2020-03-06
2.	Servicing Brief - Submission No. 2	2020-12-15

File Reference: 122508-6.2.4
Date: 2020-03-06
Sheet No: 1 of 1



SEE 010 FOR NOTES, LEGEND, CB TABLE AND DETAILS



No.	REVISIONS	By	Date
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2	REVISED PER CITY COMMENTS	DGY	2020:12:14
1	ISSUED FOR SPA	DGY	2020:03:06

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

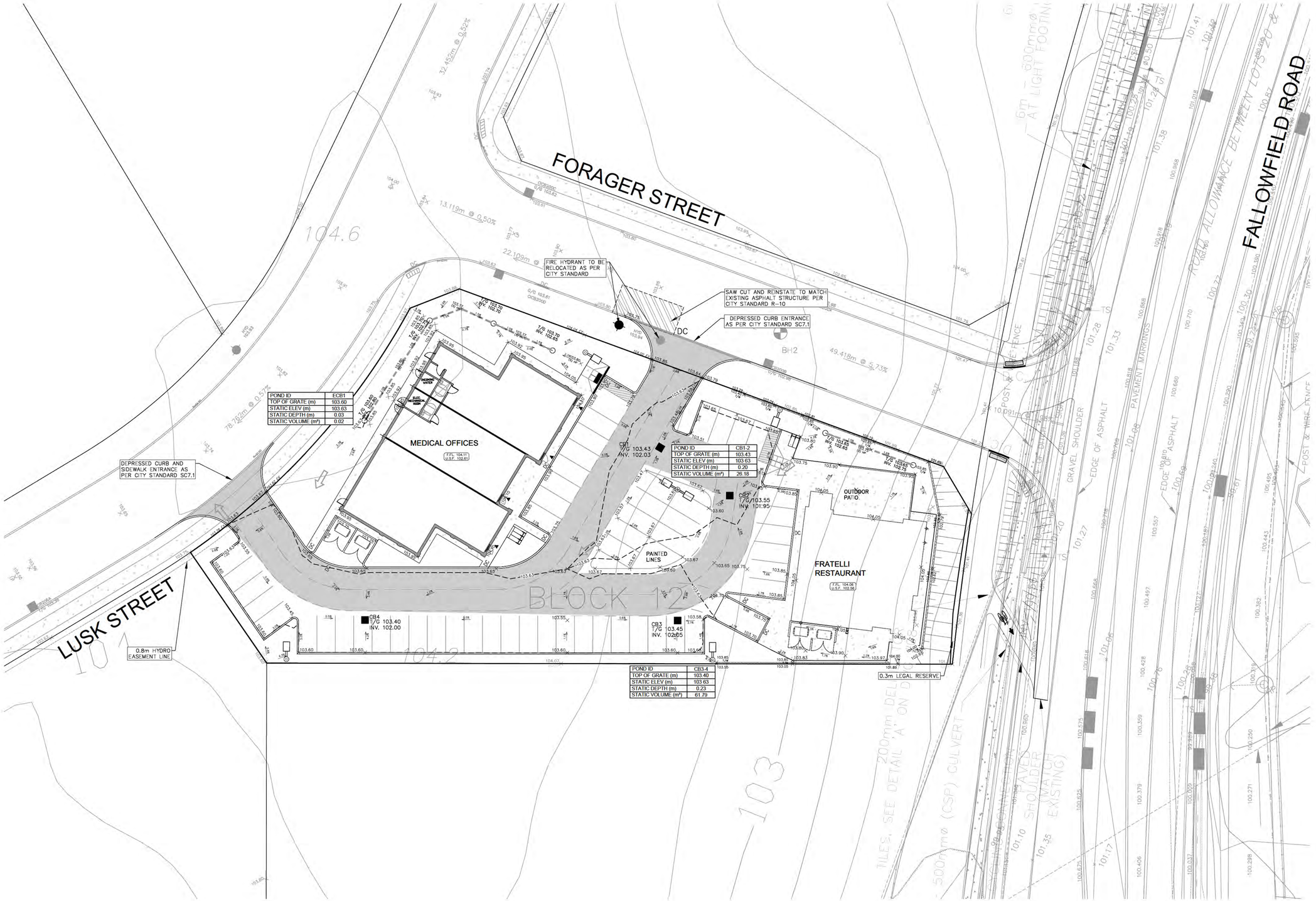
N

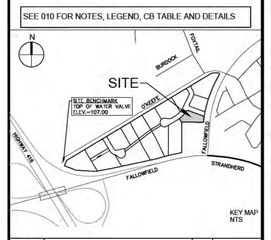
Drawing Title
STORM DRAINAGE
AREA PLAN

Scale
2.5 0 2.5 5
1:250

Design	Date
WZ/RM	NOVEMBER 2019
Drawn	Checked
EH	DGY
Project No.	Drawing No.
122508	500

CITY FILE No. D07-12-20-0080 CITY PLAN No.18235





No.	REVISIONS	By	Date
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2	REVISED PER CITY COMMENTS	DGY	2020.12.14
1	ISSUED FOR SPA	DGY	2020.03.06

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9888
ibigroup.com

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

N

Drawing Title
PONDING PLAN

Scale
2.5 0 2.5 5
1:250

Design	Date
WZ/RM	NOVEMBER 2019
Drawn	Checked
EH	DGY
Project No.	Drawing No.
122508	600

CITY FILE No. D07-12-20-0080
CITY PLAN No.18235

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

416 Lands
City of Ottawa
DCR Phoenix

LOCATION				AREA (Ha)							RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.57	C= 0.80	C= 0.90	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)	(%)
STREET NO. 3	S305A	CB305A	MH 305							0.04	0.10	0.10	10.00	0.57	10.57	76.81	104.19	122.14	178.56	7.69	10.43	12.22	17.87		7.69	34.22	35.99	200			1.00	1.055	26.53	77.54%
STREET NO. 3	S305B	CB305B	MH 305							0.04	0.10	0.10	10.00	0.58	10.58	76.81	104.19	122.14	178.56	7.69	10.43	12.22	17.87		7.69	34.22	36.45	200			1.00	1.055	26.53	77.54%
BLOCK 2	2	STUB W	MH02						0.43		0.96	0.96	10.00	0.12	10.12	76.81	104.19	122.14	178.56	73.45	99.64	116.81	170.76		73.45	133.02	6.00	450			0.20	0.810	59.57	44.78%
STREET NO. 3		MH02	MH 305								0.00	0.96	10.12	0.20	10.32	76.33	103.55	121.38	177.44	73.00	99.02	116.08	169.69		73.00	133.02	9.49	450			0.20	0.810	60.02	45.12%
BLOCK 17	17	STUB E	MH17						0.58		1.29	1.29	10.00	0.12	10.12	76.81	104.19	122.14	178.56	99.07	134.40	157.55	230.33		99.07	133.02	6.00	450			0.20	0.810	33.94	25.52%
STREET NO. 3		MH17	MH 305								0.00	1.29	10.12	0.26	10.38	76.33	103.55	121.38	177.44	98.46	133.56	156.57	228.88		98.46	133.02	12.51	450			0.20	0.810	34.55	25.98%
STREET NO. 3		MH 305	MH 304								0.00	2.45	10.58	0.42	11.00	74.66	101.25	118.67	173.46	182.65	247.69	290.32	424.36		182.65	239.68	20.70	600			0.14	0.821	57.02	23.79%
BLOCK 1	1	STUB NW	MH01						0.55		1.22	1.22	10.00	0.12	10.12	76.81	104.19	122.14	178.56	93.95	127.45	149.40	218.41		93.95	133.02	6.00	450			0.20	0.810	39.07	29.37%
EASEMENT		MH01	MH 304								0.00	1.22	10.12	2.13	12.25	76.33	103.55	121.38	177.44	93.37	126.66	148.47	217.04		93.37	133.02	103.51	450			0.20	0.810	39.64	29.80%
STREET NO. 3	S304A, S304B	MH 304	MH 303							0.28	0.70	4.37	12.25	0.38	12.63	69.12	93.63	109.70	160.29	302.05	409.18	479.42	700.50		302.05	385.20	19.16	750			0.11	0.845	83.14	21.58%
BLOCK 3	3	STUB W	MH03						0.51		1.13	1.13	10.00	0.12	10.12	76.81	104.19	122.14	178.56	87.12	118.18	138.54	202.53		87.12	179.46	6.00	525			0.16	0.803	92.35	51.46%
STREET NO. 3		MH03	MH 303								0.00	1.13	10.12	0.16	10.29	76.33	103.54	121.37	177.43	86.58	117.44	137.67	201.25		86.58	179.46	7.77	525			0.16	0.803	92.89	51.76%
STREET NO. 3		MH 303	MH 302								0.00	5.50	12.63	0.57	13.20	67.99	92.09	107.89	157.62	374.25	506.87	593.84	867.61		374.25	496.66	31.01	825			0.11	0.900	122.42	24.65%
STREET NO. 3	302	MH 302	MH 301							0.07	0.18	5.68	13.20	1.96	15.16	66.36	89.84	105.25	153.75	376.87	510.27	597.76	873.23		376.87	496.66	105.60	825			0.11	0.900	119.79	24.12%
BLOCK 16	16	STUB N	MH16						0.36		0.80	0.80	10.00	0.12	10.12	76.81	104.19	122.14	178.56	61.49	83.42	97.79	142.96		61.49	91.46	6.00	375			0.25	0.802	29.96	32.76%
BLOCK 5		MH16	MH 301								0.00	0.80	10.12	0.16	10.28	76.33	103.54	121.37	177.43	61.11	82.90	97.17	142.06		61.11	91.46	7.59	375			0.25	0.802	30.34	33.18%
BLOCK 11	11	STUB E	MH11						0.71		1.58	1.58	10.00	0.14	10.14	76.81	104.19	122.14	178.56	121.28	164.52	192.87	281.95		121.28	133.02	6.98	450			0.20	0.810	11.74	8.82%
STREET NO. 1		MH11	MH203								0.00	1.58	10.14	0.13	10.28	76.26	103.44	121.25	177.26	120.41	163.34	191.47	279.89		120.41	133.02	6.56	450			0.20	0.810	12.60	9.47%
STREET NO. 1		MH203	MH202								0.00	1.58	10.28	0.24	10.52	75.75	102.74	120.43	176.05	119.61	162.24	190.17	277.99		119.61	133.02	11.83	450			0.20	0.810	13.40	10.08%
BLOCK 10	10	STUB SE	MH10						0.36		0.80	0.80	10.00	0.12	10.12	76.81	104.19	122.14	178.56	61.49	83.42	97.79	142.96		61.49	91.46	6.00	375			0.25	0.802	29.96	32.76%
STREET NO. 1		MH10	MH202								0.00	0.80	10.12	0.19	10.31	76.33	103.54	121.37	177.43	61.11	82.90	97.17	142.06		61.11	91.46	8.91	375			0.25	0.802	30.34	33.18%
STREET NO. 1	S202A, S202B	MH202	MH201							0.20	0.50	2.88	10.52	1.10	11.62	74.86	101.51	118.99	173.92	215.59	292.37	342.69	500.92		215.59	239.68	54.06	600			0.14	0.821	24.08	10.05%
BLOCK 12	12	STUB NW	MH12						0.41		0.91	0.91	10.00	0.12	10.12	76.81	104.19	122.14	178.56	70.03	95.01	111.37	162.82		70.03	91.46	6.00	375			0.25	0.802	21.42	23.42%
STREET NO. 1		MH12	MH201								0.00	0.91	10.12	0.27	10.39	76.33	103.54	121.37	177.43	69.60	94.41	110.67	161.79		69.60	91.46	12.98	375			0.25	0.802	21.86	23.90%
STREET NO. 1	S200A	CB200A	MH200							0.02	0.05	0.05	10.00	0.20	10.20	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	50.75	18.33	200			2.20	1.565	46.91	92.43%
STREET NO. 1	S200B	CB200B	MH200							0.02	0.05	0.05	10.00	0.21	10.21	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	49.23	19.52	200			2.07	1.518	45.39	92.19%
STREET NO. 1	S200C, S200D	MH200	MH201							0.06	0.15	0.25	10.21	0.79	11.00	75.99	103.07	120.82	176.62	19.01	25.79	30.23	44.19		19.01	41.15	38.51	250			0.44	0.812	22.14	53.80%
STREET NO. 1		MH201	MH205								0.00	4.04	11.62	0.26	11.88	71.10	96.35	112.91	165.00	287.40	389.47	456.39	666.95		287.40	402.33	13.58	750			0.12	0.882	114.93	28.57%
STREET NO. 1		MH205	MH206								0.00	4.04	11.88	0.61	12.49	70.28	95.23	111.59	163.06	284.09	384.93	451.05	659.09		284.09	402.33	32.34	750			0.12	0.882	118.24	29.39%
BLOCK 9	9	STUB SE	MH09						0.37		0.82	0.82	10.00	0.12	10.12	76.81	104.19	122.14	178.56	63.20	85.74	100.51	146.93		63.20	91.46	6.00	375			0.25	0.802	28.25	30.89%
STREET NO. 1		MH09	MH206								0.00	0.82	10.12	0.16	10.28	76.33	103.54	121.37	177.43	62.81	85.20	99.87	146.00		62.81	91.46	7.67	375			0.25	0.802	28.65	31.32%
STREET NO. 1	S206A, S206B	MH206	MH207							0.27	0.68	5.54	12.49	1.03	13.51	68.41	92.67	108.57	158.63	379.06	513.42	601.54	878.88		379.06	496.66	55.51	825			0.11	0.900	117.61	23.68%
BLOCK 8	8	STUB S	MH08						0.75		1.67	1.67	10.00	0.12	10.12	76.81	104.19	122.14	178.56	128.11	173.79	203.73	297.84		128.11	179.46	6.00	525			0.16	0.803	51.35	28.61%
STREET NO. 1		MH08	MH207								0.00	1.67	10.12	0.20	10.32	76.33	103.54	121.37	177.43	127.32	172.70	202.45	295.95		127.32	179.46	9.50	525			0.16	0.803	52.14	29.06%
BLOCK 13	13	STUB NE	MH13						0.66		1.47	1.47	10.00	0.12	10.12	76.81	104.19	122.14	178.56	112.74	152.94	179.28	262.10		112.74	179.46	6.00	525			0.16	0.803	66.73	37.18%
STREET NO. 1		MH13	MH207								0.00	1.47	10.12	0.34	10.47	76.33	103.54	121.37	177.43	112.04	151.98	178.16	260.44		112.04	179.46	16.62	525			0.16	0.803	67.42	37.57%
STREET NO. 1		MH207	MH208								0.00	8.68	13.51	0.62	14.13	65.51	88.68	103.88	151.75	568.40	769.46	901.33	1,316.62		568.40	775.41	37.18	975			0.11	1.006	207.01	26.70%
BLOCK 19	S208	MH208	MH209							0.06	0.15	8.83	14.13	0.21	14.34	63.90	86.48	101.28	147.93	564.00	763.28	893.99	1,305.72		564.00	775.41	12.54	975			0.11	1.006	211.41	27.26%
BLOCK 14	14	STUB N	MH14						0.44		0.98	0.98	10.00	0.12	10.12	76.81	104.19	122.14	178.56	75.16	101.96	119.52	174.73		75.16	133.02	6.00	450			0.20	0.810	57.86	43.50%
BLOCK 19		MH14	MH209								0.00	0.98	10.12	0.15	10.28	76.33	103.55	121.38	177.44	74.70	101.33	118.78	173.63		74.70	133.02	7.50	450			0.20	0.810	58.32	43.84%
BLOCK 7	7	STUB S	MH07						0.57		1.27	1.27	10.00	0.12	10.12	76.81	104.19	122.14	178.56	97.36	132.08	154.84	226.36		97.36	133.02	6.00	450			0.20	0.810	35.65	26.80%
BLOCK 19		MH07	MH209								0.00	1.27	10.12	0.07	10.20	76.33	103.55	121.38	177.44	96.77	131.26	153.87	224.94		96.77	133.02	3.50	450			0.20	0.810	36.25	27.25%
BLOCK 19	S209	MH209	MH210							0.04	0.10	11.17	14.34	0.67	15.01	63.37	85.76	100.44	146.69	708.07	958.16	1,122.20	1,638.97		708.07	775.41	40.55	975			0.11	1.006	67.34	8.68%
BLOCK 18		MH210	MH 301								0.00	11.17	15.01	1.27	16.28	61.74	83.52	97.81	142.84	689.85	933.21	1,092.86	1,595.91		689.85	775.41	76.48	975			0.11	1.006	85.56	11.03%
BLOCK 4		MH 301	MH 300								0.00	17.65	16.28	0.26	16.54	58.91	79.65	93.25	136.15	1,039.93	1,406.00	1,646.20	2,403.40		1,039.93	1,348.97	18.34	1200			0.11	1.155	309.04	22.91%
BLOCK 4		MH 300	HW1								0.00	17.65	16.54	0.16	16.70	58.35	78.89	92.36	134.84	1,030.12	1,392.59	1,630.43	2,380.26		1,030.12	1,348.97	10.75	1200			0.11	1.155	318.85	23.64%
										Total:	17.65																					

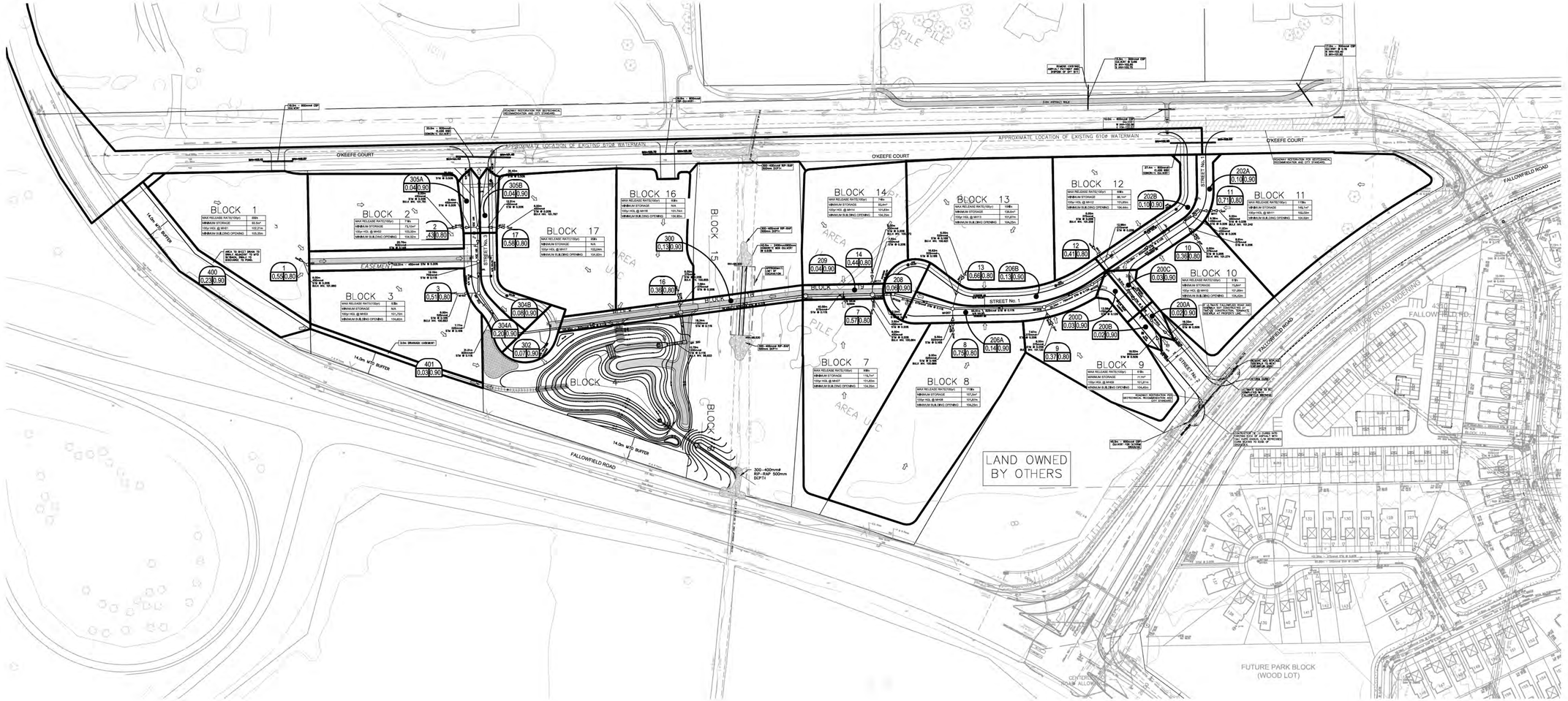
Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.01

Designed: KH
Checked: RM
Dwg. Reference: 39744-500

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2017-05-05
2.	Revised per City Comments - Submission No. 2	2017-09-27

File Reference: 39744.5.7.1
Date: 2017-05-05
Sheet No: 1 of 1



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____

Date _____ 2017

Plan Number _____

LEGEND :

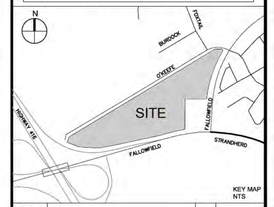
S168 2.01 0.80 — AREA NUMBER / RUNOFF COEFFICIENT / AREA N HECTARES

⇨ EMERGENCY FLOW ROUTE

NOTE :

* MINIMUM BUILDING OPENING TO BE CONFIRMED AT SITE PLAN STAGE.

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEY MAP NTS

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED PER CITY COMMENTS	DGY	18.05.22
4	REVISED PER CITY COMMENTS	DGY	18.04.06
3	REVISED PER CITY COMMENTS	DGY	18.01.10
2	REVISED PER CITY COMMENTS	DGY	17.09.26
1	ISSUED FOR CITY REVIEW	DGY	17.05.04

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title

416 LANDS
4401 FALLOWFIELD ROAD

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
22/05/2018
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale 1:1250

Design	Date
MB/RM	MARCH 2016
Drawn: EH	Checked: DGY
Project No.: 39744	Drawing No.: 500

CITY FILE No. D07-16-13-0013 CITY PLAN No. 17492

J:\39744-Hwy416\5.0 Drawings\Drawings\Layouts\500STM_R00.dwg Layout Name: 500STM R00 Plot Style: AIA STANDARD - FULL.CTB Plot Scale: 1:25.4 Plotted At: May 22, 18 Plotted By: dmenix Last Saved At: May 22, 18 11:12 AM Last Saved By: dmenix

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

PROJECT: 115 Lusk Street
DATE: 2020-03-06
FILE: 122508-6.2
REV #: -
DESIGNED BY: R.M. & W.Z.
CHECKED BY: D.G.Y.

STORMWATER MANAGEMENT

Maximum Allowable Release Rate

Restricted Flowrate (based on 39744 - 416 Lands Design Brief)

A_{site}	0.388 Ha
$Q_{restricted}$	61.00 L/s

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

$Q_{max\ allowable}$	61.00 L/s

Formulas and Descriptions

i_{2yr} 1 2 year Intensity $732.951 / (T_c+6.199)^{0.810}$
i_{5yr} 1 5 year Intensity $998.071 / (T_c+6.053)^{0.81}$
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)

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

Drainage Area	Roof Area		
Area (Ha)	0.028		
C	1.00	Restricted Flow Q_r (L/s)	1.575

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)
31	89.83	6.99	1.58	5.42	10.08
36	80.96	6.30	1.58	4.73	10.21
41	73.83	5.75	1.58	4.17	**10.26**
46	67.96	5.29	1.58	3.72	10.25
56	58.83	4.58	1.58	3.00	10.10

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	10.26	10.50	0	0.00

Overflows to Parking Lot

Drainage Area	Roof Area		
Area (Ha)	0.028		
C	0.90	Restricted Flow Q_r (L/s)	1.575

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)
14	86.93	6.09	1.58	4.52	3.79
19	72.53	5.08	1.58	3.51	4.00
24	62.54	4.38	1.58	2.81	**4.04**
29	55.18	3.87	1.58	2.29	3.99
34	49.50	3.47	1.58	1.89	3.86

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	4.04	10.50	0	0.00

Overflows to Parking Lot

Drainage Area	Roof Area		
Area (Ha)	0.028		
C	0.90	Restricted Flow Q_r (L/s)	1.575

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	5.67	1.58	4.09	2.21
14	64.23	4.50	1.58	2.92	2.46
19	53.70	3.76	1.58	2.19	**2.49**
24	46.37	3.25	1.58	1.67	2.41
34	36.78	2.58	1.58	1.00	2.04

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	2.49	10.50	0	0.00

Overflows to Parking Lot

Drainage Area	115 Lusk St		
Area (Ha)	0.360	ICD Size (L/s)	59.425
C	0.92	Reduced Restricted Flow Q_r (L/s)	29.713

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)
18	128.08	118.44	29.71	88.73	95.83
23	109.68	101.43	29.71	71.71	98.97
26	101.18	93.56	29.71	63.85	**99.61**
29	94.01	86.94	29.71	57.23	99.57
34	84.27	77.93	29.71	48.21	98.35

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	99.61	87.97	23.27	0.00

Overflows to Lusk Street

Drainage Area	115 Lusk St		
Area (Ha)	0.360	ICD Size (L/s)	59.425
C	0.77	Reduced Restricted Flow Q_r (L/s)	29.713

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	80.29	29.71	50.58	30.35
12	94.70	72.97	29.71	43.26	31.15
14	86.93	66.99	29.71	37.28	**31.32**
16	80.46	62.00	29.71	32.29	31.00
18	74.97	57.77	29.71	28.06	30.31

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	31.32	87.97	23.27	0.00

Overflows to Lusk Street

Drainage Area	115 Lusk St		
Area (Ha)	0.360	ICD Size (L/s)	59.425
C	0.77	Reduced Restricted Flow Q_r (L/s)	29.713

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	65.85	29.71	36.14	17.35
9	80.87	62.32	29.71	32.61	17.61
10	76.81	59.19	29.71	29.47	**17.68**
11	73.17	56.38	29.71	26.67	17.60
12	69.89	53.86	29.71	24.15	17.39

Storage (m^3)

Overflow	Required	Surface	Sub surface	Balance
0.00	17.68	87.97	23.27	0.00

Overflows to Lusk Street

	Area	Flow	
Roof	0.028	1.575	
Site	0.360	59.425	
	0.388	**61.00**	0.00
Allowable		**61.00**	

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

PROJECT:	115 Lusk Street
DATE:	2020-03-06
FILE:	122508-6.2
REV #:	-
DESIGNED BY:	W.Z.
CHECKED BY:	D.G.Y. & R.M.

UNDERGROUND STORAGE CALCULATIONS

Pipe Storage ***115 Lusk St.***

From	To	Length	Diameter	X-sec Area	Volume
ECB 1	TCB 2	16.88	250	0.049	0.83
TCB 2	TCB 3	7.96	250	0.049	0.39
TCB 3	TCB 4	9.18	250	0.049	0.45
TCB 4	CB 1	20.48	250	0.049	1.01
CB 1	CB 2	11.96	300	0.071	0.85
ECB 5	TCB 6	13.24	250	0.049	0.65
TCB 6	CB 2	16.14	250	0.049	0.79
CB 2	MH 1	14.53	300	0.071	1.03
CB 3	MAIN	3.14	250	0.049	0.15
CB 4	MH 2	8.21	250	0.049	0.40
MH 1	MH 2	44.32	525	0.216	9.59
				Total	16.14

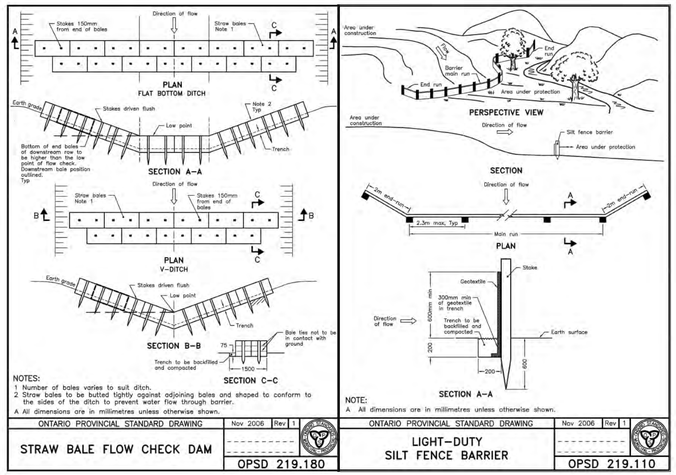
Structure Storage ***115 Lusk St.***

	Base	Top	Height	diameter	X-sec Area	Volume
ECB 1	102.800	103.61	0.81	300	0.071	0.06
TCB 2	102.750	103.61	0.86	300	0.071	0.06
TCB 3	102.700	103.61	0.91	300	0.071	0.06
TCB 4	102.650	103.61	0.96	300	0.071	0.07
ECB 5	102.750	103.61	0.86	300	0.071	0.06
TCB 6	102.650	103.61	0.96	300	0.071	0.07
CB 1	102.050	103.45	1.40	600	0.360	0.50
CB 2	101.950	103.55	1.60	600	0.360	0.58
CB 3	102.050	103.45	1.40	600	0.360	0.50
CB 4	101.980	103.38	1.40	600	0.360	0.50
MH 1	101.677	103.70	2.02	1200	1.131	2.29
MH 2	101.395	103.49	2.10	1200	1.131	2.37
					Total	7.12

TOTAL STORAGE	**23.27**

APPENDIX D

122508-900 - Erosion and Sediment Control Plan
122508-200 - Grading Plan
Geotechnical Report

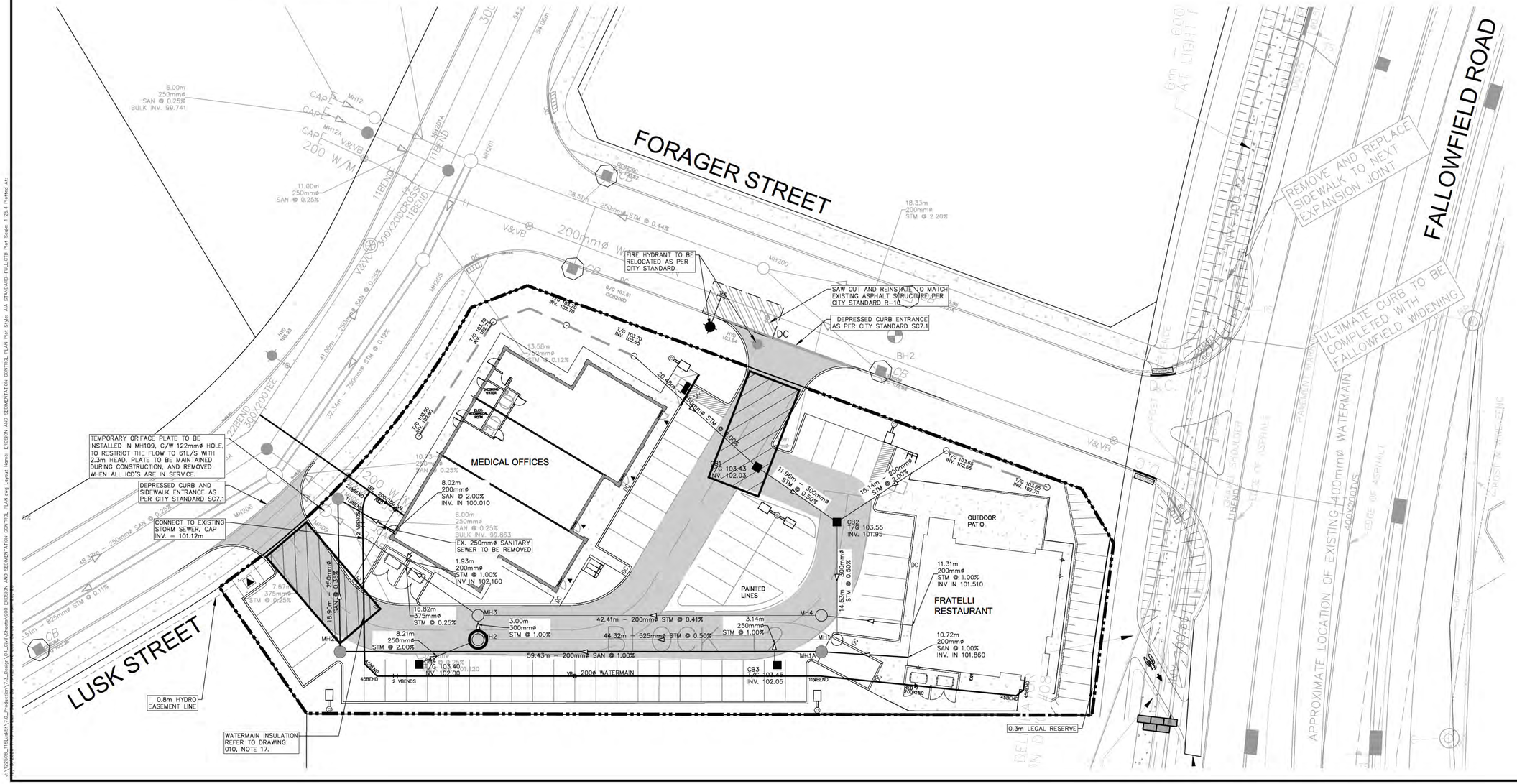


ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1	
STRAW BALE FLOW CHECK DAM			OPSD 219.180

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1	
LIGHT–DUTY SILT FENCE BARRIER			OPSD 219.110

NOTES:

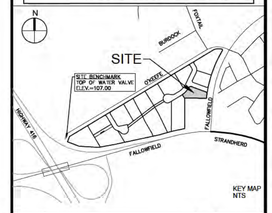
1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. 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.
4. WORKS NOTED ABOVE ARE TO BE INSTALLED, INSPECTED, MAINTAINED AND ULTIMATELY REMOVED BY SERVICING CONTRACTOR.
5. 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 EXIST NG CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH (2.0 × 15.0)

SEE 010 FOR NOTES, LEGEND, CB TABLE AND DETAILS



KEY MAP
NTS

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED PER CITY COMMENTS	DGY	2020.12.14
1	ISSUED FOR SPA	DGY	2020.03.06

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

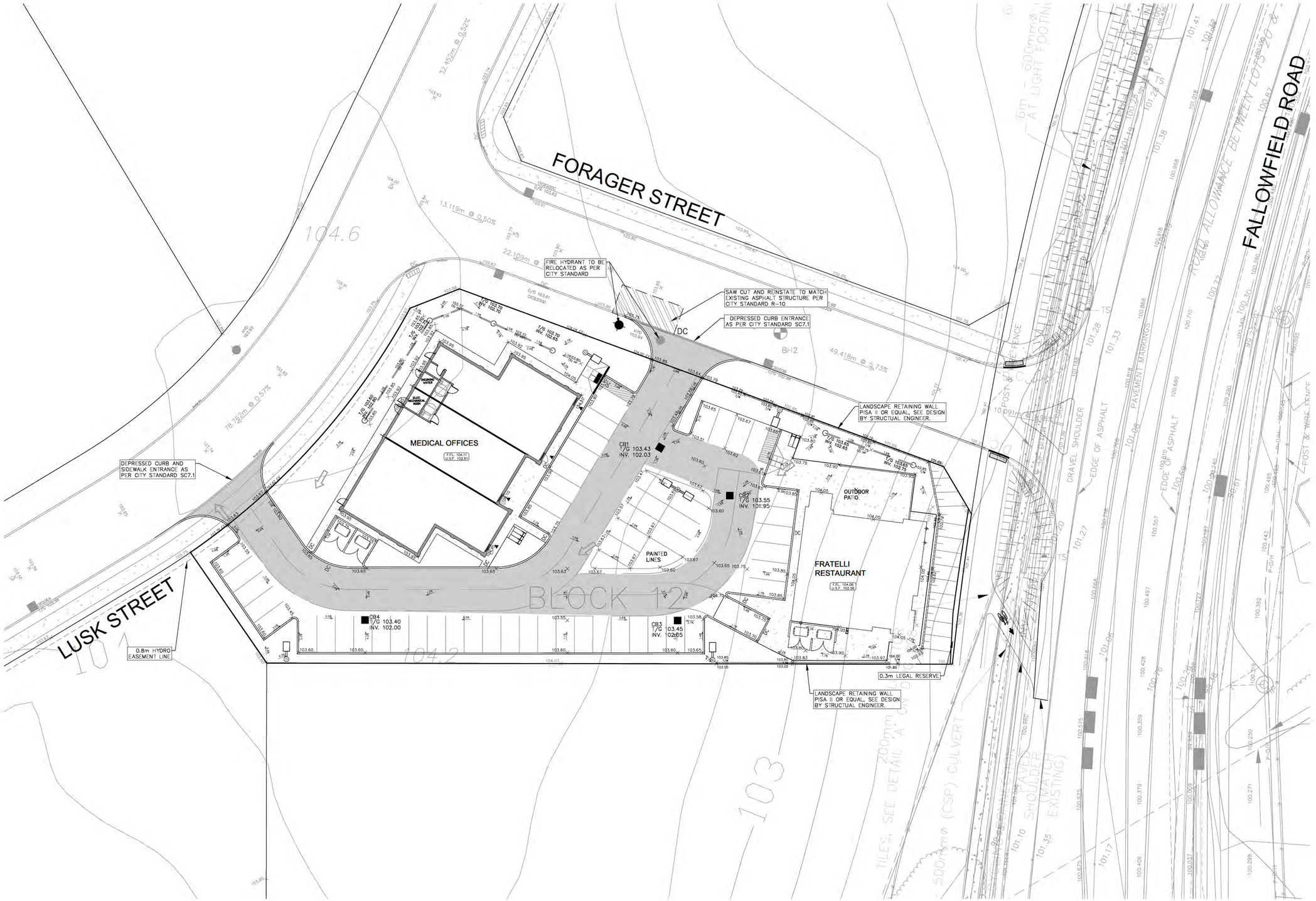
N

Drawing Title
EROSION AND SEDIMENTATION CONTROL PLAN

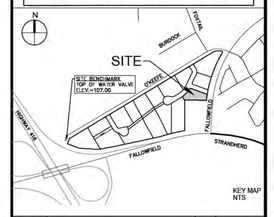
Scale
1:250

Design	Date
WZ/RM	NOVEMBER 2019
Drawn	Checked
EH	DGY
Project No.	Drawing No.
122508	900

CITY FILE No. D07-12-20-0080
CITY PLAN No.18235



SEE 010 FOR NOTES, LEGEND, CB TABLE AND DETAILS



No.	REVISIONS	By	Date
14			
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4			
3			
2	REVISED PER CITY COMMENTS	DGY	2020:12:14
1	ISSUED FOR SPA	DGY	2020:03:06

DCR/PHOENIX GROUP OF COMPANIES
18A BENTLEY AVE,
OTTAWA ONT
K2E 6T8

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

Project Title
115 LUSK STREET

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2020/12/14
PROVINCE OF ONTARIO

N

Drawing Title
GRADING PLAN

Scale
2.5 0 2.5 5
1:250

Design	Date
WZ/RM	NOVEMBER 2019
Drawn: EH	Checked: DGY
Project No.: 122508	Drawing No.: 200

CITY FILE No. D07-12-20-0080 CITY PLAN No.18235

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Geotechnical Investigation

Proposed Commercial Development
115 Lusk Street
Ottawa, Ontario

Prepared For

DCR/Phoenix Homes

May 29, 2020

Report PG5213-2

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Appendices

Appendix 1 Soil Profile and Test Data Sheets
Symbols and Terms

Appendix 2 Figure 1 - Key Plan
Drawing PG5213-1 - Test Hole Location Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by DCR/Phoenix Homes to conduct a geotechnical investigation for the proposed commercial development to be located at 115 Lusk Street in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- ❏ Determine the subsoil and groundwater conditions at this site by means of boreholes.
- ❏ Provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed commercial development will consist of two low-rise structures of slab-on-grade construction as well as associated access lanes, parking areas and landscaped areas.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the geotechnical investigation was carried out on May 27, 2020. At that time, 5 boreholes were advanced to a maximum depth of 5.9 m. The borehole locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the boreholes are shown on Drawing PG5213-1 - Test Hole Location Plan included in Appendix 2.

All boreholes were advanced using a track-mounted auger drill rig, which was operated by a two-person crew. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer. The drilling procedure consisted of augering to the required depths at the selected locations, sampling and testing the overburden.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split-spoon (SS) sampler. All samples were visually inspected and initially classified on site and subsequently placed in sealed plastic bags. All samples were transported to our laboratory for further examination and classification. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets in Appendix 1 of this report.

3.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the proposed development, taking into consideration the existing site features and underground utilities. The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson and referenced to a geodetic datum. The location of the test holes and ground surface elevation at each test hole location are presented on Drawing PG5213-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Soil samples will be stored for a period of one month after this report is completed, unless otherwise directed.

4.0 Observations

4.1 Surface Conditions

The subject site is currently undeveloped and tree covered. Fill piles are present along the eastern edge of the property. The subject site is bordered by Forager Street to the north, Fallowfield Road to the east, an active construction site to the south and Lusk Street to the west. The existing ground surface across the site slopes gradually downward from west to east with approximate geodetic elevations 104 to 102 m.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the test hole locations located within the subject site consists an approximate 0.6 to 1.5m thick fill layer either at surface or underlying a thin topsoil layer.

A 1.1 m thick silty clay layer was encountered underlying the topsoil layer at BH 4.

A glacial till deposit was encountered underlying either the fill layer or the silty clay layer at all test hole locations. The glacial till layer was generally observed to consist of a compact to very dense brown silty sand with gravel, cobbles and boulders which transitions to a brown to grey clayey silt with gravel, cobbles and boulders at depths ranging from 1.1 to 3.7 m below the existing ground surface.

Practical refusal to augering was encountered at approximate depths of 5.6 m, 4.4 m and 5.0 m in BH 1, BH 3 and BH 4 respectively.

Bedrock

Based on available geological mapping, the bedrock in the area consists of interbedded sandstone and dolomite of the March formation with a drift thickness of 2 to 5 m.

4.3 Groundwater

Groundwater was not observed in the boreholes at the time of construction. However, based on the colour and consistency of the recovered soil samples as well our knowledge of the area, the long-term groundwater table can be expected at approximately 3 to 4 m below ground surface. It should be noted that groundwater levels are subject to seasonal fluctuations and could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is expected that the proposed buildings will be founded on conventional shallow footings bearing on an undisturbed, compact to very dense glacial till or stiff silty clay bearing surface .

5.2 Site Grading and Preparation

Stripping Depth

Topsoil, and fill, containing significant amounts of deleterious or organic materials, should be stripped from under any building, paved areas, pipe bedding and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the proposed building should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill where settlement of the ground surface is of minor concern. This material should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless used in conjunction with a composite drainage membrane.

5.3 Foundation Design

Bearing Resistance Values

Pad footings, up to 5 m wide, and strip footings up to 3 m wide, placed on an undisturbed, stiff silty clay bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

Footings placed on an undisturbed, compact to very dense glacial till bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **175 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **250 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

The bearing resistance value at SLS will be subjected to potential post-construction total and differential settlement of 25 and 20 mm, respectively.

An undisturbed soil bearing surface consists of a surface from which topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a silty clay or glacial till bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V, passes only through in situ soil or engineered fill of the same or higher capacity as the soil.

5.4 Design for Earthquakes

A seismic site response **Class C** should be used for the design of the proposed buildings at the subject site according to the OBC 2012. Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the OBC 2012 for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

With the removal of all topsoil and fill, containing significant amounts of deleterious or organic materials, the existing fill or native soil subgrade approved by Paterson personnel at the time of excavation will be considered an acceptable subgrade surface on which to commence backfilling for slab-on-grade construction.

Where the subgrade consists of existing fill, free of significant amounts of organics and/or deleterious material, a proof-rolling program should be completed under dry and above freezing temperatures. A vibratory drum roller should complete several passes over the subgrade surface and reviewed by Paterson personnel as a proof-rolling program. Any poor performing areas should be removed and reinstated with an engineered fill, such as Granular B Type II or approved alternative, placed in maximum 300 mm loose lifts and compacted to 98% of its SPMDD.

It is recommended that the upper 200 mm of sub-floor fill consist of Granular A crushed stone.

5.6 Pavement Structure

Car only parking areas, heavy truck parking areas and access lanes are anticipated at the subject site. The proposed pavement structures are presented in Tables 1 and 2.

Table 1 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
300	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 2 - Recommended Pavement Structure - Access Lanes and Heavy Truck Parking Areas	
Thickness (mm)	**Material Description**
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete
50	Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
450	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD using suitable vibratory equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

It is recommended that a perimeter foundation drainage system be provided for the proposed buildings to ensure frost heave is limited below perimeter sidewalks adjacent to the proposed buildings. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone, which is placed at the footing level around the exterior perimeter of the structure or at least 10 m below finished grade. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or Miradrain G100N. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. Generally, a minimum of 1.5 m thick soil cover (or an equivalent combination of soil cover and foundation insulation) should be provided in this regard.

Exterior unheated footings are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is expected that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations)

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be excavated at 1H:1V or shallower. The shallower slope is required for excavation below groundwater level. The subsurface soils are considered to be a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

A trench box is recommended to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by “cut and cover” methods and excavations should not remain open for extended periods of time.

6.4 Pipe Bedding and Backfill

A minimum of 150 mm of OPSS Granular A should be placed for bedding for sewer or water pipes. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe, should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts and compacted to 98% of the SPMDD.

It should generally be possible to re-use the site materials above the cover material if the operations are carried out in dry weather conditions.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) and above the cover material should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 225 mm thick loose lifts and compacted to a minimum of 95% of the material standard Proctor maximum dry density.

6.5 Groundwater Control

It is anticipated that groundwater infiltration into the excavations should be controllable using open sumps. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Groundwater Control for Building Construction

A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site mostly consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be carried out in a manner to avoid the introduction of frozen materials, snow or ice into the trenches.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations provided in this report are in accordance with our present understanding of the project. We request permission to review our recommendations when the drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we request immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine its suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than DCR/Phoenix Homes or their agents is not authorized without review by Paterson for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

May 29, 2020

Kevin A. Pickard, EIT

David J. Gilbert, P.Eng

Report Distribution

- ❑ DCR/Phoenix Homes (e-mail copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Restaurant & Medical Building - 115 Lusk St.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5213

REMARKS

HOLE NO. BH 1

BORINGS BY CME-55 Low Clearance Drill DATE May 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.87
FILL: Brown silty sand, trace gravel and cobbles		AU	1				
0.60							
		SS	2	58	20	1	102.87
GLACIAL TILL: Compact to very dense, brown silty sand with gravel, cobbles and boulders, some clay		SS	3	29	44	2	101.87
		SS	4	38	65		
		SS	5	25	55	3	100.87
3.70							
		SS	6	50	13	4	99.87
GLACIAL TILL: Brown clayey silt, some sand, greavel, cobbles and boulders		SS	7	62	23	5	98.87
		SS	8	50	50+		
5.59							
End of Borehole							
Practical refusal to augering at 5.59m depth							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Restaurant & Medical Building - 115 Lusk St.
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill DATE May 27, 2020

FILE NO. PG5213

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	104.06
TOPSOIL 0.05		AU	1				
FILL: Brown silty sand, trace clay, gravel, cobbles and organics 1.12		SS	2	75	4	1	103.06
GLACIAL TILL: Dense, brown sandy silt with gravel, cobbles and boulders 1.83		SS	3	79	43	2	102.06
		SS	4	71	32	3	101.06
GLACIAL TILL: Brown clayey silt to silty clay with sand, gravel, cobbles and boulders		SS	5	75	31	4	100.06
		SS	6	92	22		
		SS	7	100	40	5	99.06
		SS	8	79	18		
5.94 End of Borehole							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Restaurant & Medical Building - 115 Lusk St.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5213

REMARKS

HOLE NO. BH 3

BORINGS BY CME-55 Low Clearance Drill DATE May 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.66
TOPSOIL 0.05		AU	1				
FILL: Brown silty sand, trace clay, gravel and organics 1.12		SS	2	67	12	1	102.66
		SS	3	86	50+		
GLACIAL TILL: Very dense, brown silty sand with clay, gravel, cobbles and boulders		SS	4	100	98	2	101.66
		SS	5	82	58	3	100.66
3.67							
GLACIAL TILL: Grey clayey silt with sand, gravel, cobbles and boulders 4.37		SSs	6	89	50+	4	99.66
End of Borehole							
Practical refusal to augering at 4.37m depth							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Restaurant & Medical Building - 115 Lusk St.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5213

REMARKS

HOLE NO. BH 4

BORINGS BY CME-55 Low Clearance Drill

DATE May 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.36
TOPSOIL 0.05		AU	1				
Brown SILTY CLAY, trace sand, gravel and organics		SS	2	43		1	102.36
		SS	3	83	42	2	101.36
GLACIAL TILL: Dense to very dense, brown silty sand with gravel, cobbles and boulders, some clay		SS	4	100	30		
		SS	5	83	53	3	100.36
		SS	6	83	32	4	99.36
4.57							
GLACIAL TILL: Brown clayey silt with sand, gravel, cobbles and boulders 4.95		SS	7	88	50+		
End of Borehole							
Practical refusal to augering at 4.95m depth							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Restaurant & Medical Building - 115 Lusk St.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5213

REMARKS

HOLE NO. BH 5

BORINGS BY CME-55 Low Clearance Drill DATE May 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	101.76
FILL: Brown silty clay, trace sand and gravel		AU	1				
		SS	2	67	2	1	100.76
1.52							
		SS	3	58	16	2	99.76
GLACIAL TILL: Brown clayey silty with sand, gravel, cobbles and boulders		SS	4	75	12		
		SS	5	54	10	3	98.76
4.14		SS	6	75	38	4	97.76
GLACIAL TILL: Dense to very dense, grey silty sand with gravel, cobbles and boulders, trace clay		SS	7	46	37	5	96.76
		SS	8	67	61		
5.94							
End of Borehole							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

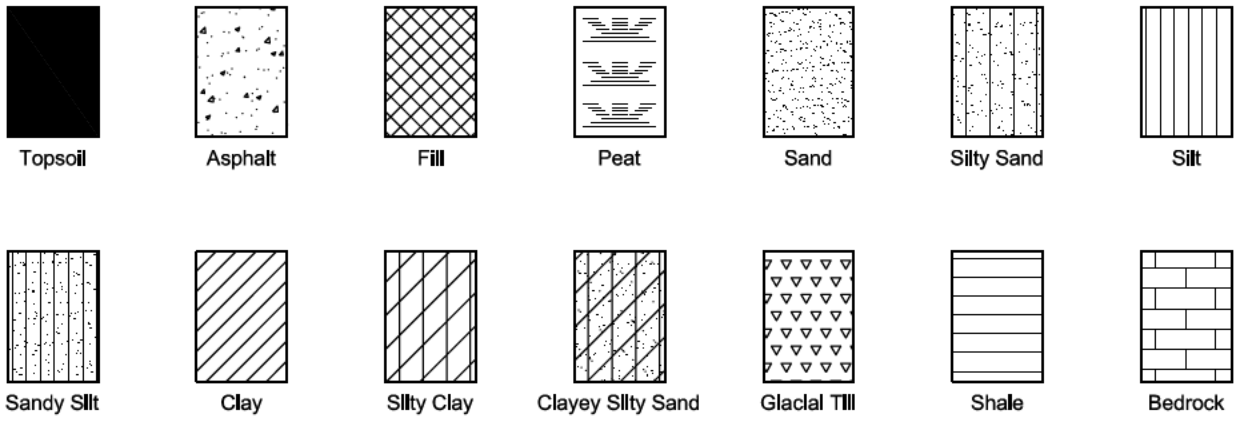
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

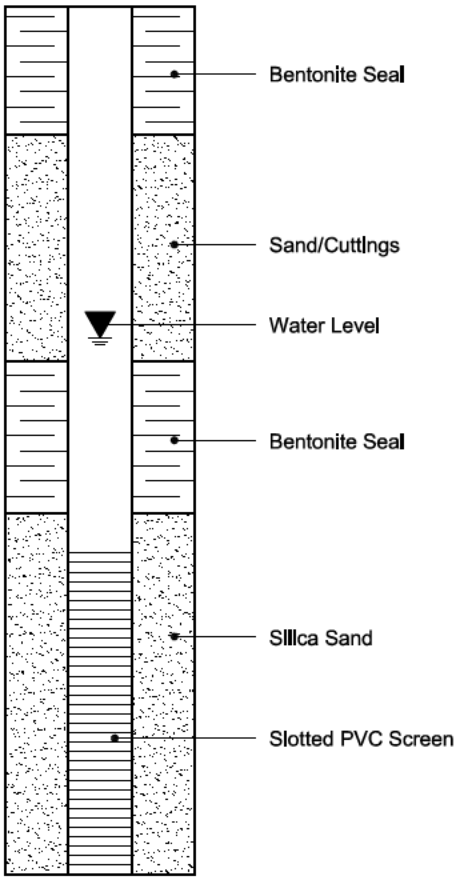
SYMBOLS AND TERMS (continued)

STRATA PLOT

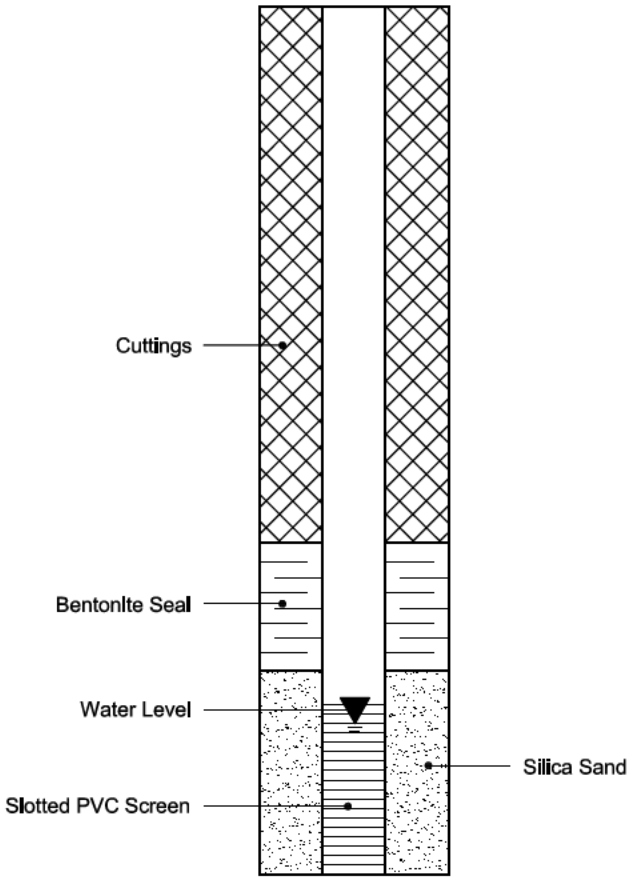


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG5213-1 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN

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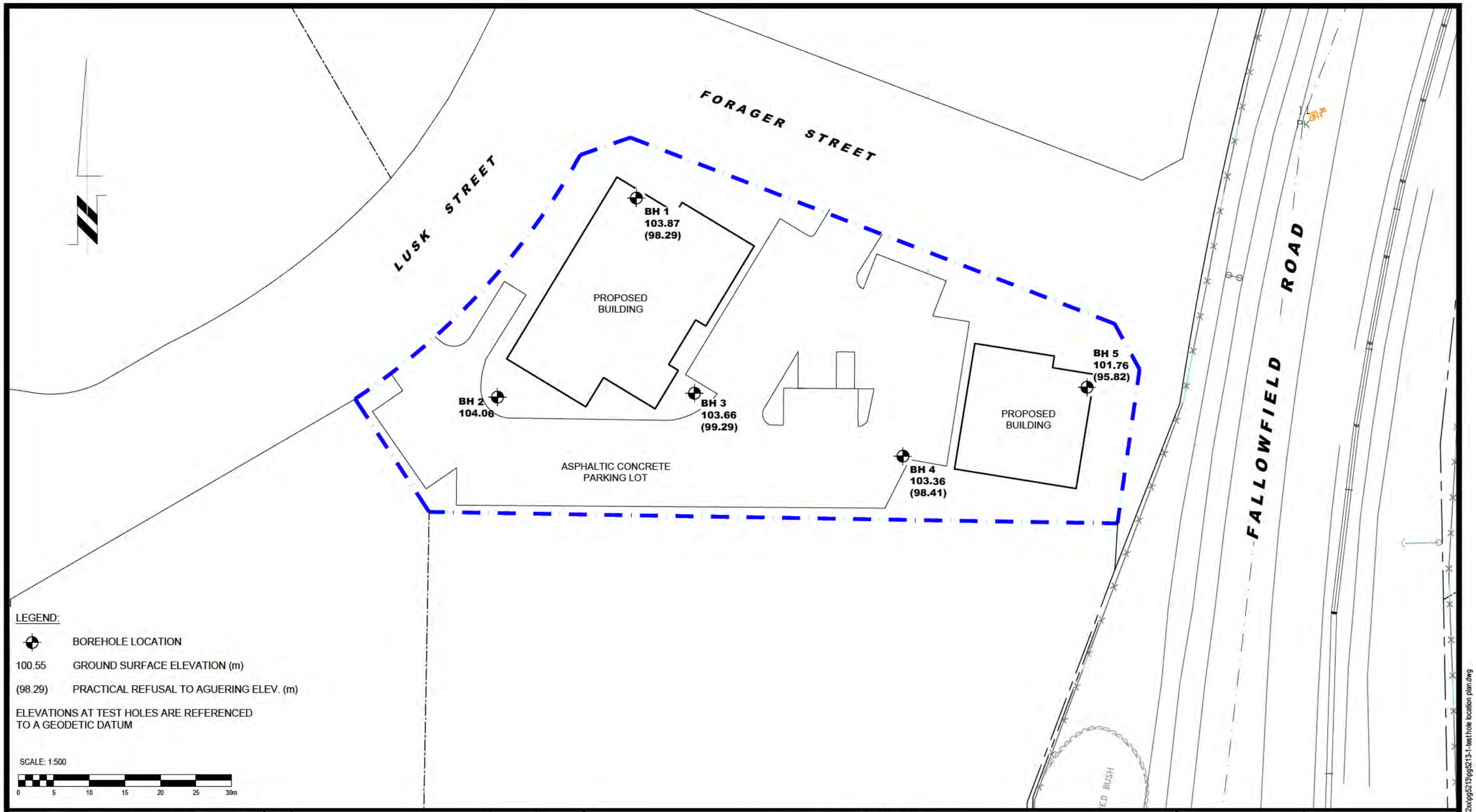

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

DCR-PHOENIX

GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT- 115 LUSK STREET
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 04/2020
Drawn by: RCG	Report No.: PG5213-1
Checked by: KP	Dwg. No.: PG5213-1
Approved by: DJG	Revision No.:

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