BROOKSTREET APARTMENTS
525 LEGGET DRIVE
359 TERRY FOX DRIVE

SITE SERVICING AND SWM BRIEF

Prepared for:

KRP Properties

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
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Ref: R-2021-131
Novatech File No. 120202

April 4, 2022

City of Ottawa
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Ms. Jessica Valic, P.Eng.

Re: Brookstreet Apartments
525 Legget Drive and 359 Terry Fox Drive
Site Servicing and Stormwater Management Brief

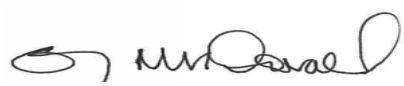
Dear Jessica:

Please find enclosed the Site Servicing and Stormwater Management Brief for the proposed development at 525 Legget Drive and 359 Terry Fox Drive. This report addresses comments received from the City of Ottawa dated March 4,2020 on the zoning amendment and site plan control application for the development.

If you have any questions, please contact the undersigned.

Sincerely,

NOVATECH



Greg MacDonald, P.Eng.
Director, Land Development and Public Sector Infrastructure

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

This Site Servicing and Stormwater Management Brief has been prepared in support of a zoning amendment and site plan control application for the construction of a 30 – story apartment building attached to the existing hotel expansion constructed in 2016. The building will contain 253 apartment units, ground floor amenities, an extension of the existing ball room and a roof top restaurant. Two levels of underground parking will provide 107 parking spaces. The existing parking structure will provide another 288 spaces on the two lower levels. Refer to **Figure 1 – Brookstreet Apartments** for an overview.

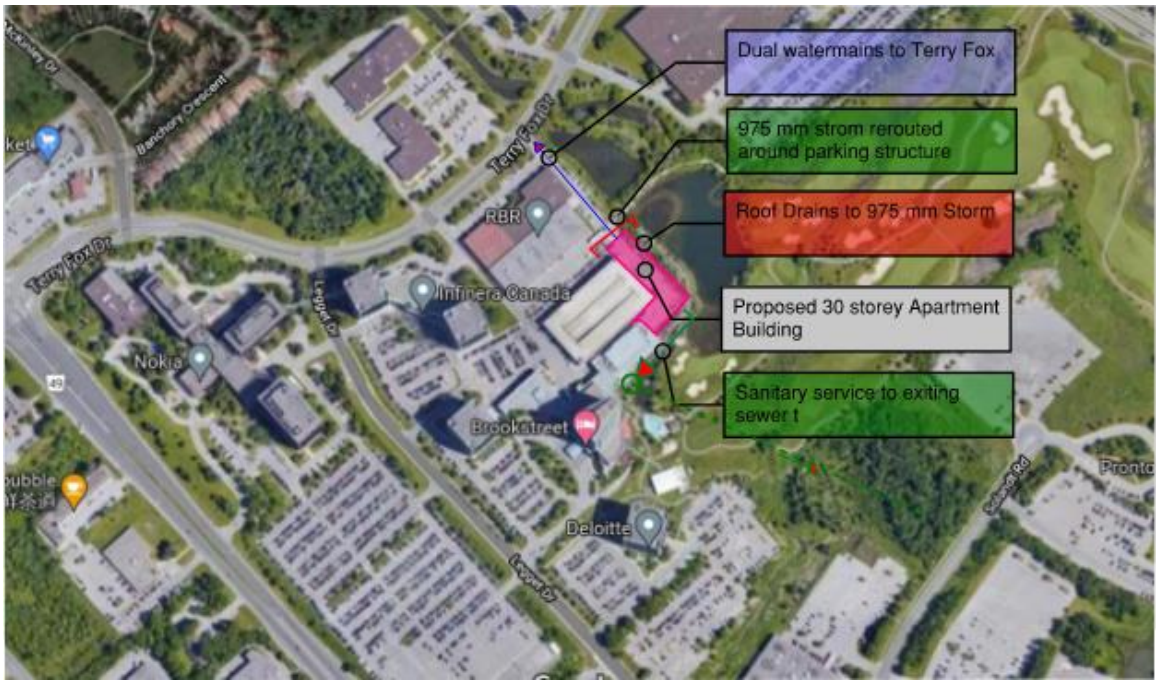


Figure 1 Brookstreet Apartments

The stormwater management for the site will continue in the current pattern with negligible impact from the additional building. The storm flows will be conveyed in the existing storm sewer to the existing stormwater management pond. The existing stormwater pond has surplus capacity for this development.

The sanitary service for the expansion will be provided by connecting to an existing 250mm sanitary service in the vicinity of the existing hotel building. The existing sanitary service currently services the underground parking facility and the recently constructed hotel expansion and has excess capacity which will be utilized to service the proposed apartment building.

The proposed apartment building will connect to the existing municipal water service on Terry Fox Drive. Dual water services will be provided.

Servicing and Grading Plans for the development are included in **Appendix A** for reference.

2.0 GEOTECHNICAL INVESTIGATION

A subsurface investigation was carried out at the site by Paterson Group. The results of that investigation are provided in the report entitled “Geotechnical Investigation, Proposed Brookstreet Development, Report No. PG5673-1 Revision 2, January 27, 2022”. The principal findings of the geotechnical investigations are as follows:

- A surficial layer of pavement structure and/or topsoil and surficial fill of thickness from 0.3m to 0.6m.
- A silty sand and silty clay layer of thickness up to 2 metres was encountered below the pavement structure/topsoil in all boreholes.
- A glacial till layer at depths of 1.5m to 2.5m below existing ground surface
- The boreholes were encountered bedrock at depths of about 1.5m to 2.5m below ground surface.
- the overburden is not hydraulically connected to the existing pond due to the relatively dry material and negligible infiltration across the bedrock surface that was encountered at the time of investigation
- A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) will be required for this project as it is anticipated that more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP. All water takings under a PTTW are required to be reported to the MECP Water Taking Reporting Systems (WTRS).

3.0 STORM SERVICING

Stormwater management design criteria for the proposed development is as per the City of Ottawa Guidelines. The stormwater management criteria provided is as follows:

- Storm sewers are to be designed to convey the 1:2-year post-development peak flow for the proposed development.
- The storm system shall be designed such to ensure that the following stormwater management (SWM) objectives are satisfied:
    - No surface ponding following a 2-year rainfall event.
    - Maximum 100-year flow depths and elevations shall not exceed 300 mm.
    - Major system overland flow routes will be established to ensure there is no flooding threat to buildings.

The existing storm system within the development area ranges in size from 200mm to 900mm in diameter, and discharges to the existing SWM facility to the north-east of the site. The proposed development will require the rerouting of the existing storm system around the extents of the underground parking structure. It is proposed to upsize the downstream pipes to 975mm diameter and shift the existing headwall +/-10.0m to the North. Refer to drawing 120202-GP for details.

The proposed storm sewers have been sized to convey the uncontrolled 2-year storm event using the Rational Method. The design criteria used in sizing the storm sewers are summarized below in **Table 3.1**.

Table 3.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	200 mm

Refer to **Appendix B** for detailed storm drainage area plans and storm sewer design sheets.

Additionally, a PCSWMM model was prepared to ensure that the site does not have ponding within the 2-year stm event as per the city of Ottawa guidelines. Refer to the Memo included in **Appendix B** for details.

4.0 STORMWATER MANAGEMENT

The stormwater management strategy for the Kanata Research Park is described in the Kanata Research Park Stormwater Management Report (April 2000) for the 188 ha site. There are four existing SWM ponds (Pond 1, Pond 2, Pond 3, and the Duck Pond) which were used to control post-development peak flows to pre-development levels up to the 100-year storm as well as to provide water quality control. The Brookstreet Apartment lands are part of Area 1 in that SWM plan and drain to Pond 1. Area 1 is 19.85 ha in size with an imperviousness of 80%. Characteristics of Stormwater Management Facility No. 1 are summarized below and are highlighted in the main body of the KRPC Stormwater Management Report (April 2000) in **Appendix C**.

Table 4.1 Water Quantity Control

Criteria	Reference
Control Post to Pre for 2-yr to 100-yr Event	Page 4 of KRPC Stormwater Management Report, April 2000 in Appendix B

Table 4.2 Water Quality Control

Criteria	Reference
Enhanced Level Water Quality Treatment, 80 % TSS	Page 4 of KRPC Stormwater Management Report, April 2000 in Appendix B Table 3.2 of MOE Planning and Practices Design Manual, March 2003 in Appendix B

Characteristics of Stormwater Management Facility No. 1 are provided below:

Table 4.3 SWMF 1 Characteristics

Criteria	Value	Reference
100-Year Release Rate from SWMF	1,514 L/sec	Table 5 of page 9 of Stormwater Management Report, April 2000 in Appendix B.
Required Storage to Control 100-year post storm to Allowable Release Rate	5,210 m^3	Table 6 of page 10 of Stormwater Management Report, April 2000 in Appendix B.
Required Permanent Pool for 80 % TSS Protection	4,272 m^3	Table 7 of page 11 of Stormwater Management Report, April 2000 in Appendix B.
Required Extended Detention for 80 % TSS	846 m^3	Table 7 of page 11 of Stormwater Management Report, April 2000 in Appendix B.

The proposed building footprint is located within Area 1 as illustrated on Drawing 93063SWM in **Appendix C.** The proposed development will add an additional drainage area of 1100 m^2. Refer to Area A-1 on Drawing 120202-STM1 in **Appendix B** described as part of the driveway from Terry Fox Drive. In the 100-year rainfall event, this additional area is projected to create 99 m^3 of additional runoff and increase in water level of 9 mm. Refer to **Appendix C** for calculations.

This increase in volume (99 m3) and depth (9 mm) is negligible and will not affect the function of SWMF No. 1. While the SWMF requires 5,210 m^3 of storage, the available storage between normal water level (74.25 m) and the maximum 100-year water level (75.10 m) is 9,052 m^3. Calculations are provided in **Appendix C.**

Water quality treatment for the subject development is provided by the existing SWMF No. 1. The additional area, A-1 as described above will also discharge to the facility. This additional area of 0.11 ha would result in additional permanent pool volume of 22 m3 (202 m^3/ha x 0.11 ha) and 4.4 m^3 of extended detention (40 m^3/ha x 0.11 ha). The provided volume of the permanent pool is under-estimated to be 10,254 m^3 compared to the required volume of 4,272 m^3 (Table 3.3 above) and the additional 22 m^3. The additional extended detention volume of 4.4 m^3 would result an extended detention elevation of 74.33 m compared to the original design level of 74.32.

5.0 FLOODPLAIN

The proposed site is within the MVCA regulatory setback and impacts the 100-year flood line as delineated by the MVCA. Additionally, as depicted on the grading plans a portion of the existing site entrance way is within the delineated 100-year flood area. This area will have a maximum ponding depth of 0.19m during the 100-year storm event and will not impact the site access or proposed infrastructure. Refer to drawing 120202-GR for details.

Through correspondence with the MVCA it is understood that a balanced compensating cut will be required to mitigate the impacts to the existing floodplain. It is proposed to provide the compensating cut on the opposing side of the existing SWM facility. The proposed floodplain reduction and compensation are summarised in **Table 5.1** below.

Table 5.1: Floodplain

FLOODPLAIN COMPARISON				
Elevation Interval (m)		**Reduction (m3)**	**Compensation (m3)**	**Variance (m3)**
74.81	75.11	18.09	21.23	3.14
75.11	75.41	20.23	50.99	30.76
75.41	75.71	59.88	64.94	5.06
75.71	75.74	8.94	4.6	-4.34
TOTAL		**107.14**	**141.76**	**34.62**

As can be seen above the floodplain volume is slightly below the original volume for the top +/-0.03m interval but is above in the lower intervals. The proposed compensation will result in a 34.62m^3 increase to the existing flood plain volume. Thus, the proposed development and compensating cut will not cause any negative impacts to the existing floodplain. Refer to **Appendix D** for Figures, sections, and correspondence regarding the floodplain compensation.

6.0 SANITARY SEWER SYSTEM

The proposed apartment Building will be serviced by connecting to an existing 250mm sanitary service that currently services the existing parking garage and the recent hotel expansion. The existing 250mm sanitary sewer outlets a 250mm sanitary sewer to the west of the hotel which ultimately discharges to the 750mm dia. March Trunk Sewer within the Marshes Golf Course lands. The March Trunk Sewer was designed to accommodate flow from the tributary drainage areas shown on the Sanitary Drainage Area Plan (C-200) in **Appendix E.**

As part of previous investigations, the capacity of the existing sanitary sewer system within the Kanata Research Park Lands has been reviewed within the report titled: Sanitary and Storm Trunk Sewer Design Brief Kanata Research Park Lands by Novatech, dated November 12, 2014. A Sanitary Sewer Design Sheet and Drainage Area Plan from this report are included in **Appendix E,** as well as flows from the recent expansion.

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines and the Ontario Building Code as follows:

- Residential Average Flow = 280 L/capita/day
- 1 Bed Apartment = 1.4 Person/unit
- 1 Bed + Den Apartment = 1.8 Person/unit
- 2 Bed Apartment = 2.1 Person/unit
- 2 Bed + Den/ Executive/ Penthouse Apartment = 3.1 Person/unit
- Restaurant/Lounge flow = 125L/seat/day
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

The peak sanitary flow including infiltration for the development was calculated to be 5.52 L/s. Detailed sanitary flow calculations are provided in **Appendix E** for reference.

In the Sanitary and Storm Trunk Sewer Design Brief Kanata Research Park Lands by Novatech dated November 12, 2014, the existing underground parking area tributary to the sanitary sewer system had no peak population flow and a peak design flow of 0.36 L/s that included extraneous flows. The recent hotel expansion added a flow of 0.45 L/s to the existing system. From the 2014 report, the total peak design flow in the sanitary sewer downstream of the proposed hotel expansion connection was 13.91 L/s. With the addition of the hotel expansion the pre-existing sanitary flow is 14.36 L/sec which amounts to 31.1% of the system capacity.

With the additional flow from the proposed apartment building, the peak design flow will increase to 19.88 L/s (14.36L/s + 5.52L/s). This will increase the flows to 44.4% of the system capacity well below the available 44.74L/s. Refer to **Appendix E** for detailed calculations.

7.0 WATER SERVICING

The proposed Apartment Building will be connected to the existing municipal water main within Terry Fox Drive. The existing 150 mm diameter water service that services the Monmouth Building will be extended to the limit of the underground parking garage of the proposed apartment building. A new 200 mm diameter water service compete with a district area meter chamber will be constructed from Terry Fox Drive to the parking structure. A valve will be installed on the Terry Fox main between the two watermain services.

The theoretical water demands for the proposed apartment building were calculated using from Section 4 of the City of Ottawa Water Distribution Guidelines and the Ontario Building Code. The required fire demand was calculated using the Fire Underwriters Survey (FUS) Guidelines. The design parameters are as follows:

Residential
- Average Day Demand = Design Population x 280 L/cap/day
- Maximum Day Demand = 2.5 x Average Day Demand
- Peak Hour Demand = 2.2 x Maximum Day Demand

Commercial (Restaurant)
- Average Day Demand = 125 L/seat/day
- Maximum Day Demand = 1.5 x Average Day Demand
- Peak Hour Demand = 1.8 x Maximum Day Demand

The domestic water demands for the proposed development are summarized in **Table 7.1** below.

Table 7.1 Theoretical Water Demand Brookstreet Apartments

Building	Population	Restaurant/ Lounge Seats	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
Brookstreet Apartments	463	207	1.80	4.20	9.06	100

The proposed apartment building will be sprinklered with a Siamese connection located at the underground parking garage staircase within 45m of the existing private fire hydrant. An additional private hydrant is proposed on the site +/- 63m from the proposed Siamese connection. The existing and proposed hydrants will be utilized to provide fire protection for the proposed development as per ISTB 2018-02.

Water demand information was submitted to the City for boundary conditions from the City's water model. The proposed boundary conditions from the City assumes that the site will connect to the existing 400mm dia. watermain in Terry Fox Drive. Refer to **Table 7.2** for a summary of the provided boundary conditions.

Table 7.2 Water Boundary Conditions and Hydraulic Analysis Summary

Criteria	Head (m)	Pressure[1] (psi)	Pressure Requirements (psi)
Connection 1 -Terry Fox Dr.			
Max HGL	129.9	74.1	< 80psi
Min HGL	126.3	68.9	> 40psi
Max Day + Fire Flow	125.9	68.4	> 20psi
Connection 2 – Terry Fox Dr.			
Max HGL	129.9	74.1	< 80psi
Min HGL	126.3	68.9	> 40psi
Max Day + Fire Flow	125.9	68.4	> 20psi

[1]Pressures based on ground elevation of 77.8

These boundary conditions were used to create a hydraulic model using EPANET for analyzing the performance of the proposed watermain system for three theoretical conditions: 1) High Pressure check under Average Day conditions, 2) Peak Hour demand, 3) Maximum Day + Fire Flow Demand. The following **Table 7.3** summarizes the results from the hydraulic water model.

Table 7.3 Water Analysis Results Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	1.80 L/s	80psi (Max)	77.27psi (Max)
Maximum Daily Demand and Fire Flow	104.2 L/s	20psi (Min)	65.99psi (Min)
Peak Hour	9.06 L/s	40psi (min)	70.16psi (min)

Based on the preceding analysis it can be concluded that the watermain, as designed, will provide adequate system pressures for the fire flow+maximum day demand and the peak hour demand. Due to the number of story's an internal booster pump will be required to maintain pressures for the upper floors (refer to the mechanical design for details). Refer to **Appendix F** for detailed model results, schematics of the model and boundary conditions. For detailed watermain, valve, and hydrant layout refer to the General plan of Services (drawings 120202-GP1 and GP2).

8.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (120202-ESC) for additional information.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The proposed 200mm dia. watermain and existing 150mm diameter watermain that connect to the existing 400mm dia. watermain in Terry Fox Drive can service the proposed development.
- There are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- There is adequate flow to service the proposed fire protections system.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- There is adequate capacity within the existing sanitary infrastructure to service the proposed development. The increase in post development flows from pre-development are considered negligible .
- The proposed sanitary system on site has been designed accordingly to convey the post-development flows.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system is to discharge to the existing SWM facility adjacent to the site
    - Storm sewers (minor system) have been designed to convey the uncontrolled 2-year peak flow using the Rational Method.
- Parking lots have been graded to ensure that static ponding depths do not exceed 0.30m.
    - As per existing condition a major overland flow route is provided to the existing SWMF adjacent to the development property.
- Quality control of stormwater will be provided by the existing SWM facility

Erosion and Sediment control

- Erosion and sediment control measures (i.e., filter fabric, catch basin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

8.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

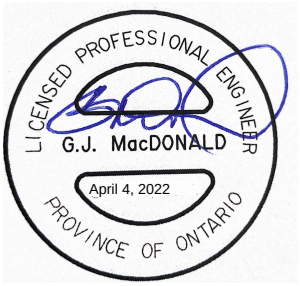
NOVATECH

Prepared by:

Anthony Mestwarp, P.Eng.

Project Engineer
Land Development Engineering

Reviewed by:



Greg MacDonald, P.Eng.

Director
Land Development and
Public Sector Infrastructure

APPENDIX A
Servicing and Grading Drawings

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC. THE SITE BENCHMARKS IS CURRENTLY SET CUT CROSS TOP OF HYDRO TRANSFORMER (ELEV. = 76.57), LOCATED SOUTH WEST OF THE CONCRETE BLOCK PUMP HOUSE. REFER TO FAIRHALL, MOFFAT AND WOODLAND LIMITED TOPOGRAPHIC SURVEY OF PART OF BLOCK 11, REGISTERED PLAN 4M-1096 AND PART OF LOT PLAN OF PART OF LOT 8 CONCESSION 4 GEOGRAPHICAL TOWNSHIP OF MARCH, NOW CITY OF OTTAWA). NOTE THAT AS PART OF THIS PROJECT, THE BENCHMARK WILL BE DESTROYED DURING CONSTRUCTION, A NEW BENCH MARK WILL NEED TO BE SET BY THE SURVEYOR PRIOR TO THE START OF CONSTRUCTION.
8. REFER TO GEOTECHNICAL REPORT (No. PG5673-1 REVISION 2 DATED JANUARY 27, 2022 BY PATTERSON GROUP) FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
10. REFER TO SITE SERVICING AND STORMWATER MANAGEMENT BRIEF (REPORT NO. R-2021-131, DATED APRIL 4, 2022) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. ALL MONITORING WELLS SHOULD BE DECOMMISSIONED IN ACCORDANCE WITH ONTARIO REGULATIONS O.REG 903 BY A QUALIFIED LICENSED WELL TECHNICIAN PRIOR TO CONSTRUCTION.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
STORM / SANITARY MANHOLE (1500Ø)	701.011	OPSD
STORM / SANITARY MANHOLE (2400Ø)	701.013	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM/SANITARY MH FRAME	S25	CITY OF OTTAWA
SANITARY COVER	S24	CITY OF OTTAWA
STORM COVER (CLOSED)	S24.1	CITY OF OTTAWA
STORM COVER (OPEN)	S28.1	CITY OF OTTAWA
SEWER TRENCH	S6 & S7	CITY OF OTTAWA
LANDSCAPE DRAINS	S30 & S31	CITY OF OTTAWA
TRENCH DRAIN	SOLENO 300mm FILCOTEN INFRA CHANNEL (OR APPROVED EQUIVALENT)	
STORM SEWER < 450mmØ	PVC SDR 35 (UNLESS SPECIFIED OTHERWISE)	
STORM SEWER >= 450mmØ	CONC 65D (UNLESS SPECIFIED OTHERWISE)	
SANITARY SEWER	PVC DR 35	CITY OF OTTAWA

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 2.0m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%(2.0% IS PREFERRED).
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. SEWER SERVICE CONNECTIONS PER CITY OF OTTAWA DETAILS S11 AND S11.1.
6. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
7. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
8. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
9. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
10. ALL CATCHBASINS AND CATCHBASIN MANHOLES TO BE PROVIDED WITH MINIMUM 3 METER LONG PERFORATED SUBDRAINS EXTENDING IN TWO DIRECTIONS AT THE SUBGRADE LEVEL. SUBDRAIN IS TO BE PROVIDED AT THE TRANSITIONS BETWEEN DIFFERENT PAVEMENT COMPOSITIONS. THE SUBGRADE SURFACE SHOULD BE SHAPED TO PROMOTE WATER FLOW TO THE DRAINAGE LINES.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER / OVER SEWER	W25 / W25.2	CITY OF OTTAWA
VALVE BOX	W24	CITY OF OTTAWA
WATERMAIN	PVC DR 18	

2. THE WATERMAIN SHALL BE PVC DR 18 IN ACCORDANCE WITH MATERIAL SPECIFICATION MW-18.1, UNLESS OTHERWISE INDICATED.
3. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY FORCES.
4. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
5. PROVIDE MINIMUM 0.25m ABOVE, 0.5m IF BELOW, CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS AS PER OTTAWA STANDARDS W25/W25.2.
6. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, CITY OF OTTAWA AND THE CONSERVATION AUTHORITY. THEY SHALL BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, FILTER SOCKS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS, AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
4. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. THE CONTRACTOR SHALL PROVIDE DUST CONTROL WITH THE APPLICATION OF WATER AND/OR CALCIUM CHLORIDE AS REQUIRED.

GRADING NOTES:

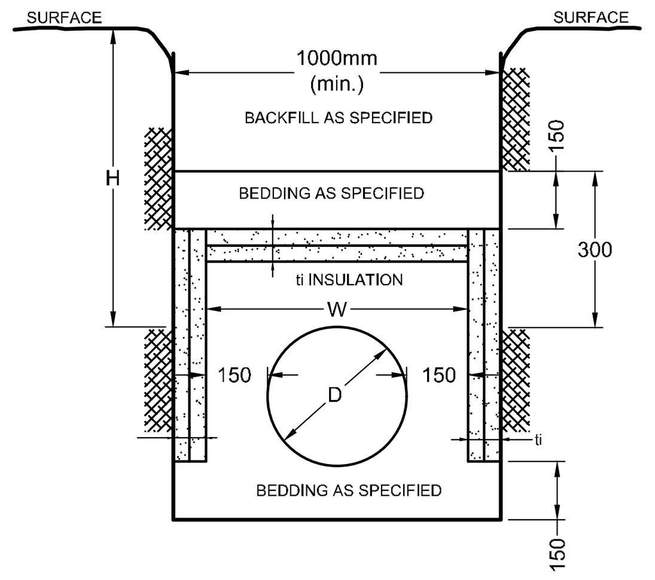
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. GRADE AND/OR FILL BEHIND PROPOSED CURB AND BETWEEN BUILDINGS AND CURBS, WHERE REQUIRED TO PROVIDE POSITIVE DRAINAGE
6. MAXIMUM TERRACING GRADE TO BE 2:1.
7. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
8. AS PER PRIVATE APPROACH BY-LAW NO. 2004-447 SECTION 26 (h) THE GRADE OF ANY PART OF A PRIVATE APPROACH TO A BUILDING MAY BE GREATER THAN 6% BUT SHALL NOT EXCEED 12% PROVIDED THAT A SUBSTANCE MELTING DEVICE SUFFICIENT TO KEEP THE PRIVATE APPROACH FREE OF ICE AT ALL TIMES IS INSTALLED AND PROPERLY MAINTAINED BY THE OWNER.
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THE GRADING PLANS.

SEWER & WATERMAIN INSULATION NOTES:

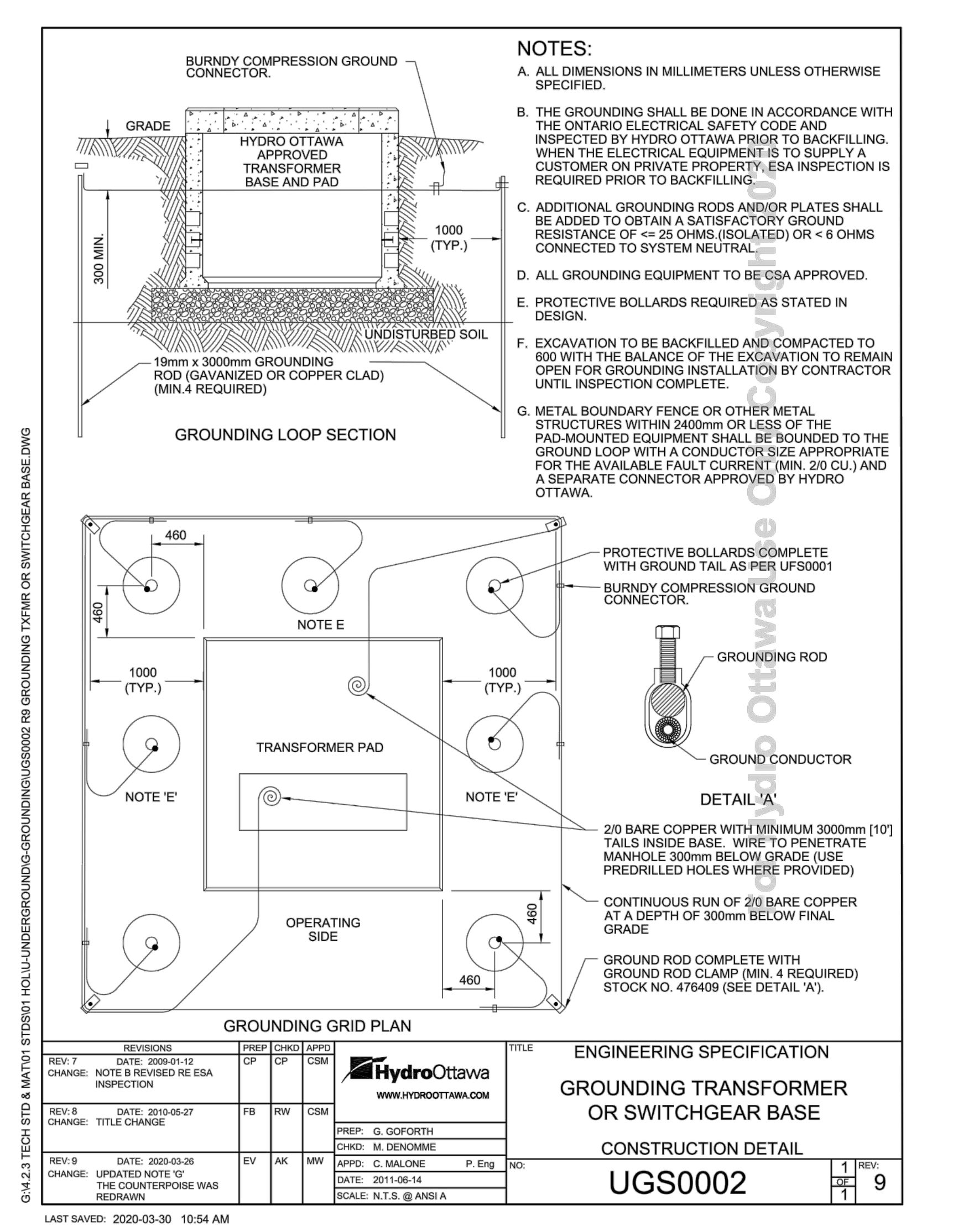
1. INSULATE ALL SEWER PIPES THAT HAVE LESS THAN 2.0m COVER AND ALL WATERMAIN WITH LESS THAN 2.4m OF COVER WITH EXPANDED POLYSTYRENE INSULATION AS PER OPSD 1109.030.
2. THE THICKNESS OF INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER WITH 50mm MINIMUM (SEE TABLE)

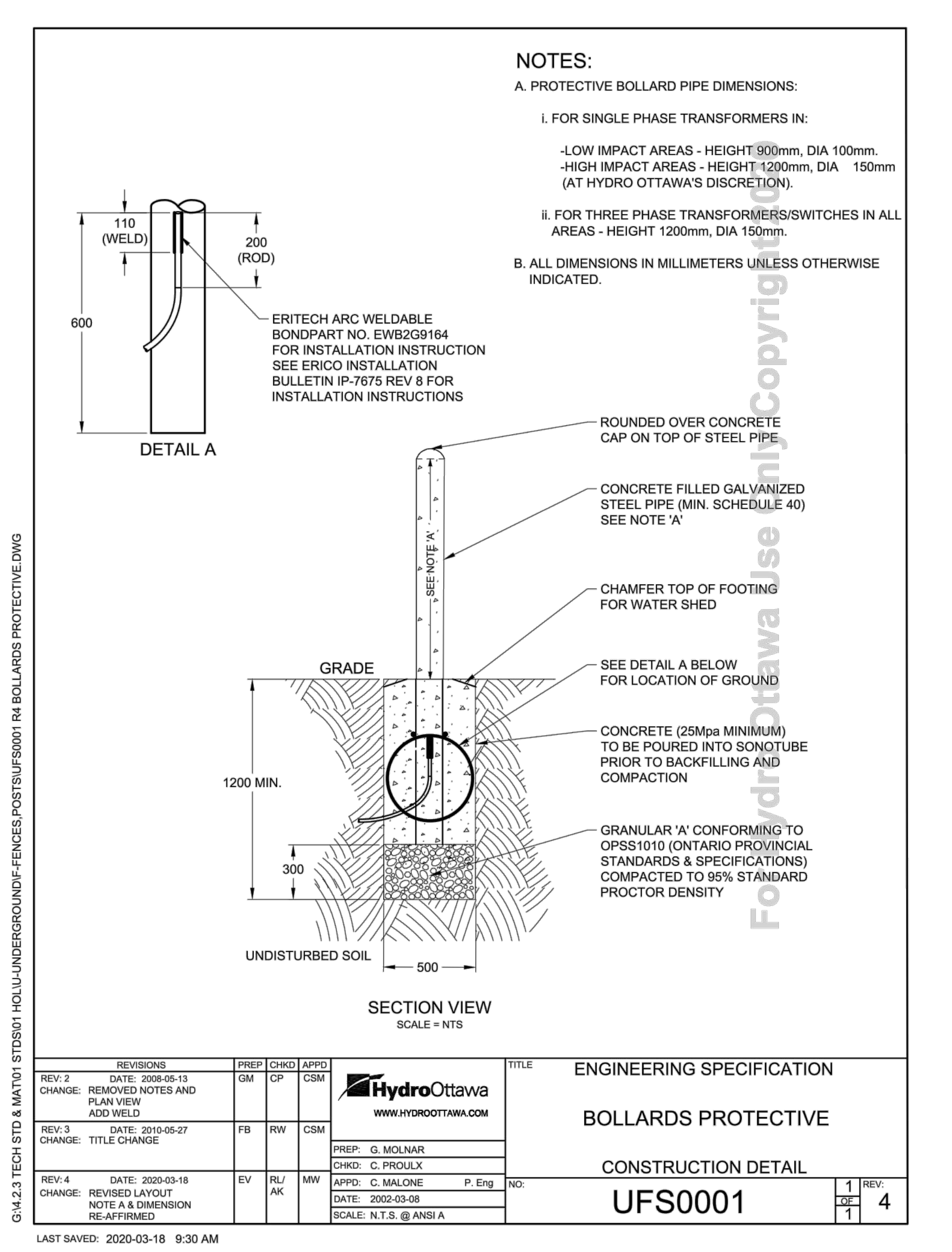
T = THICKNESS OF INSULATION (mm)
W = WIDTH OF INSULATION (mm)
W = D + 300 (1000 min.)
D = O.D OF PIPE (mm)

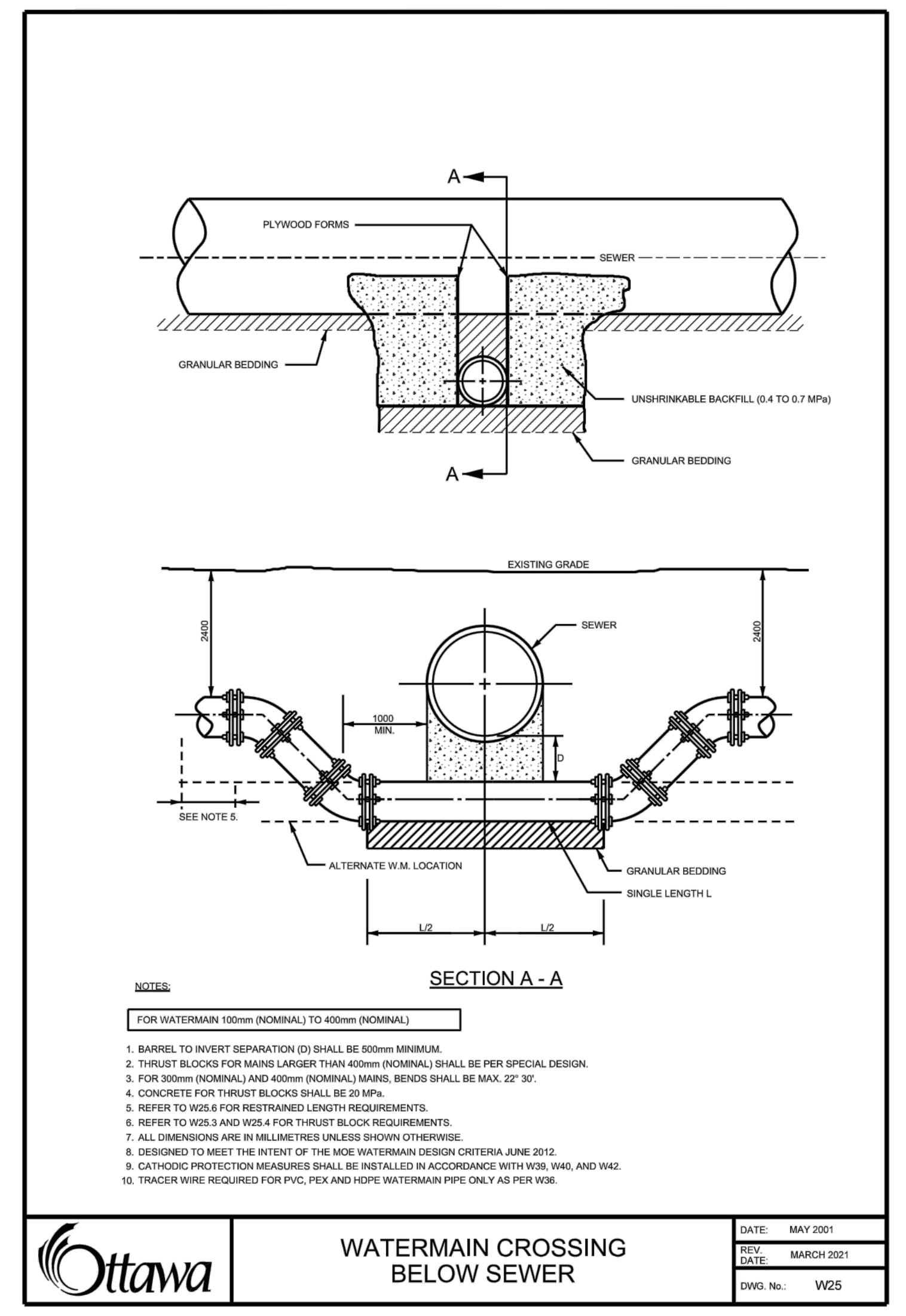
COVER SEWER / WATER (mm)	INSULATION THICKNESS (mm)
2000-1700 / 2400-2100	50
1700-1400 / 2100-1800	75
1400 - / 1800-1500	100

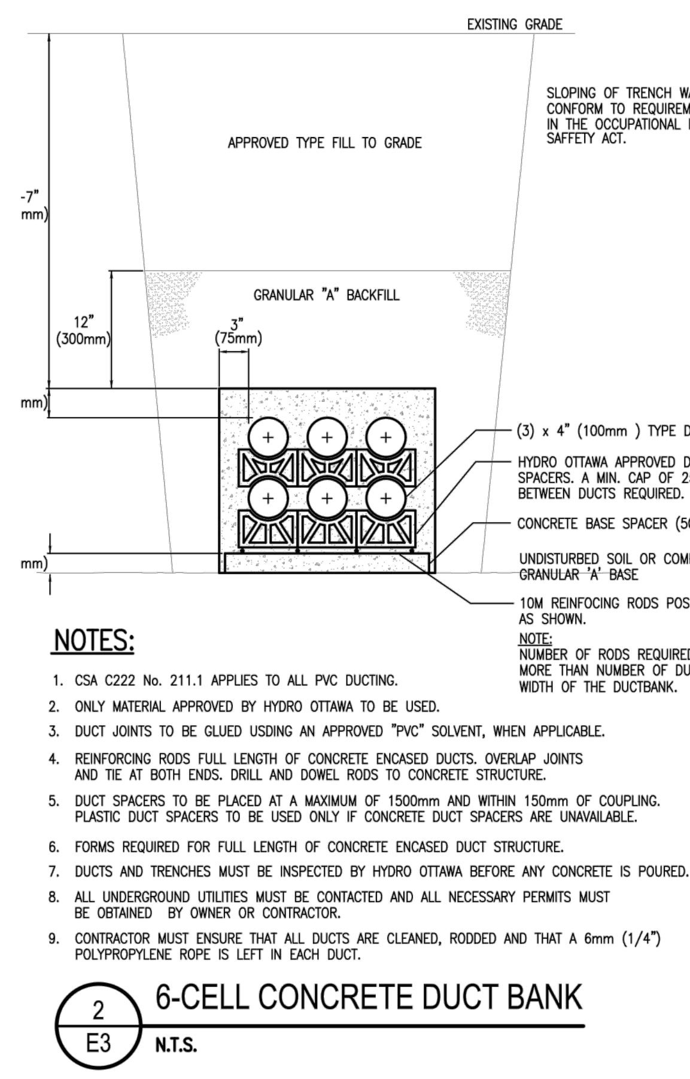


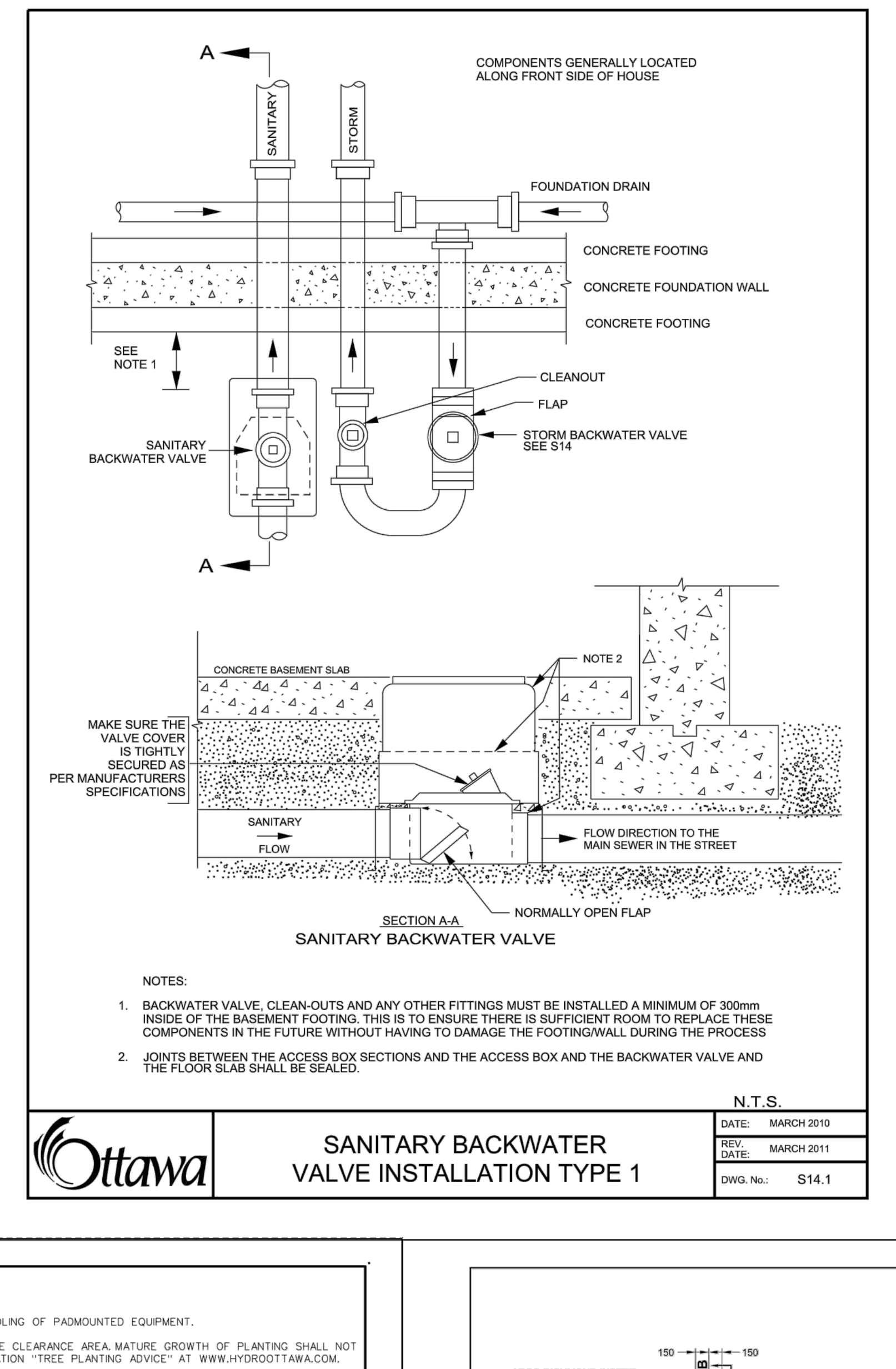
INSULATION DETAIL FOR SHALLOW SEWERS & WATERMAIN
N.T.S.

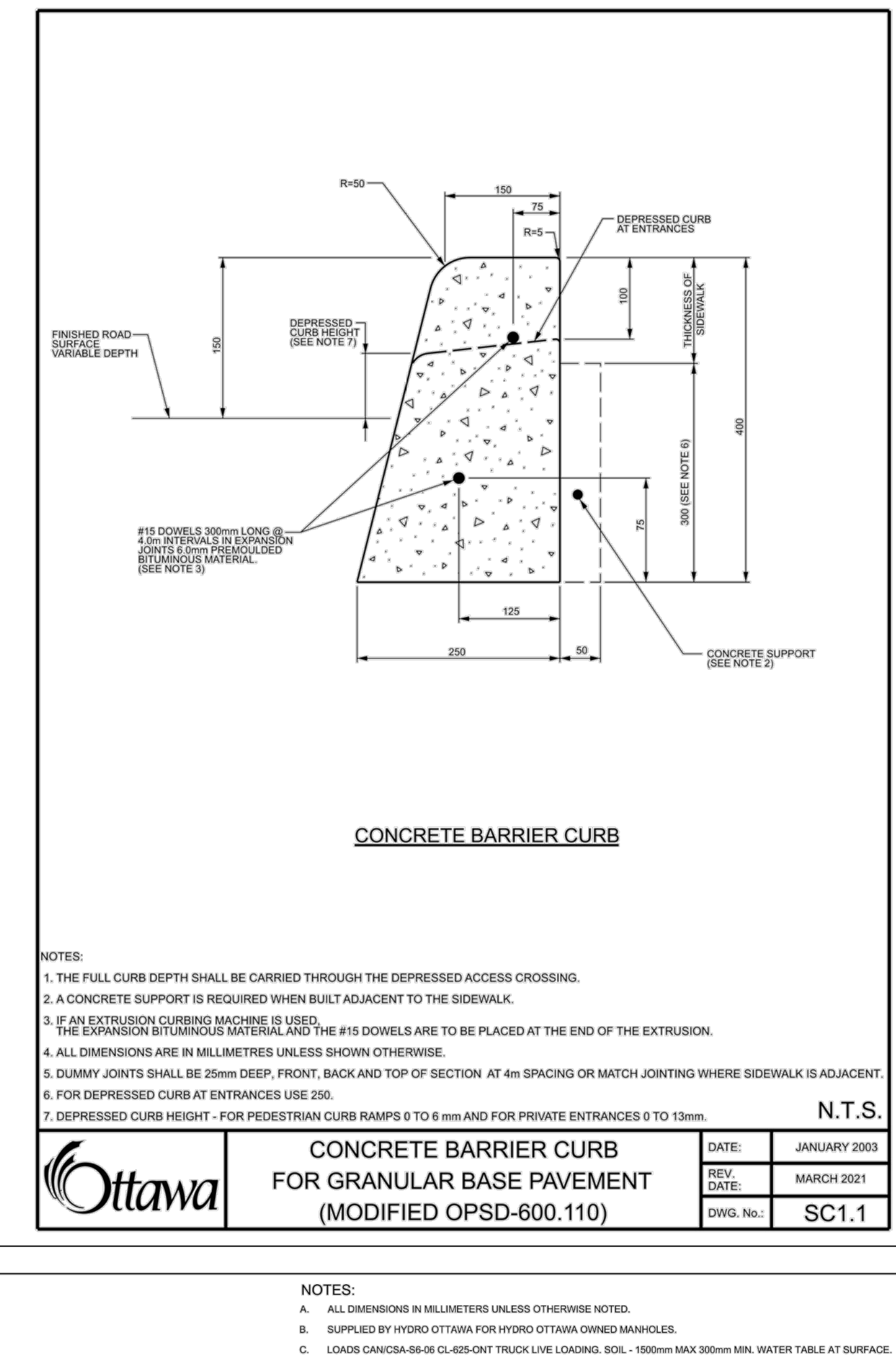


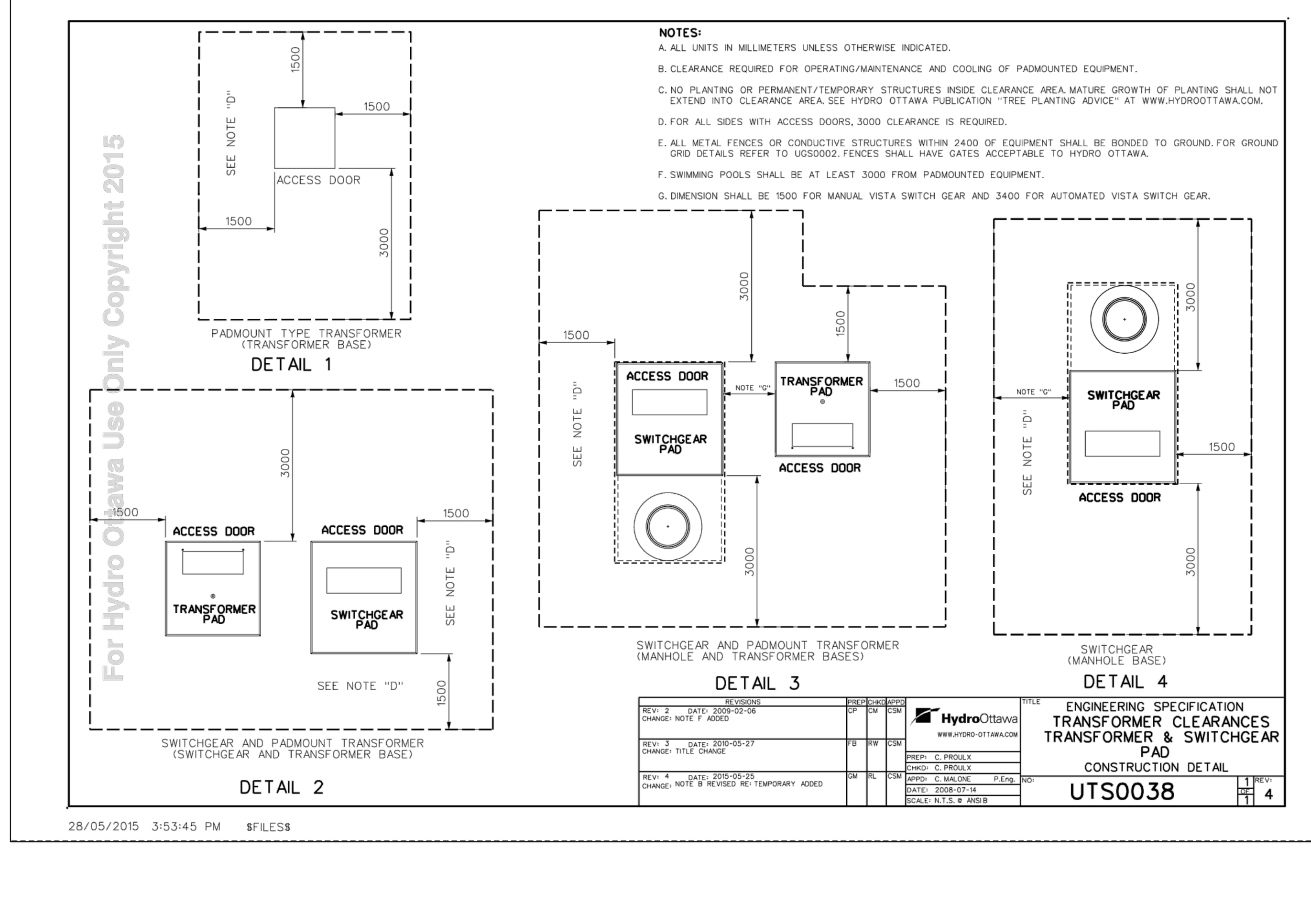


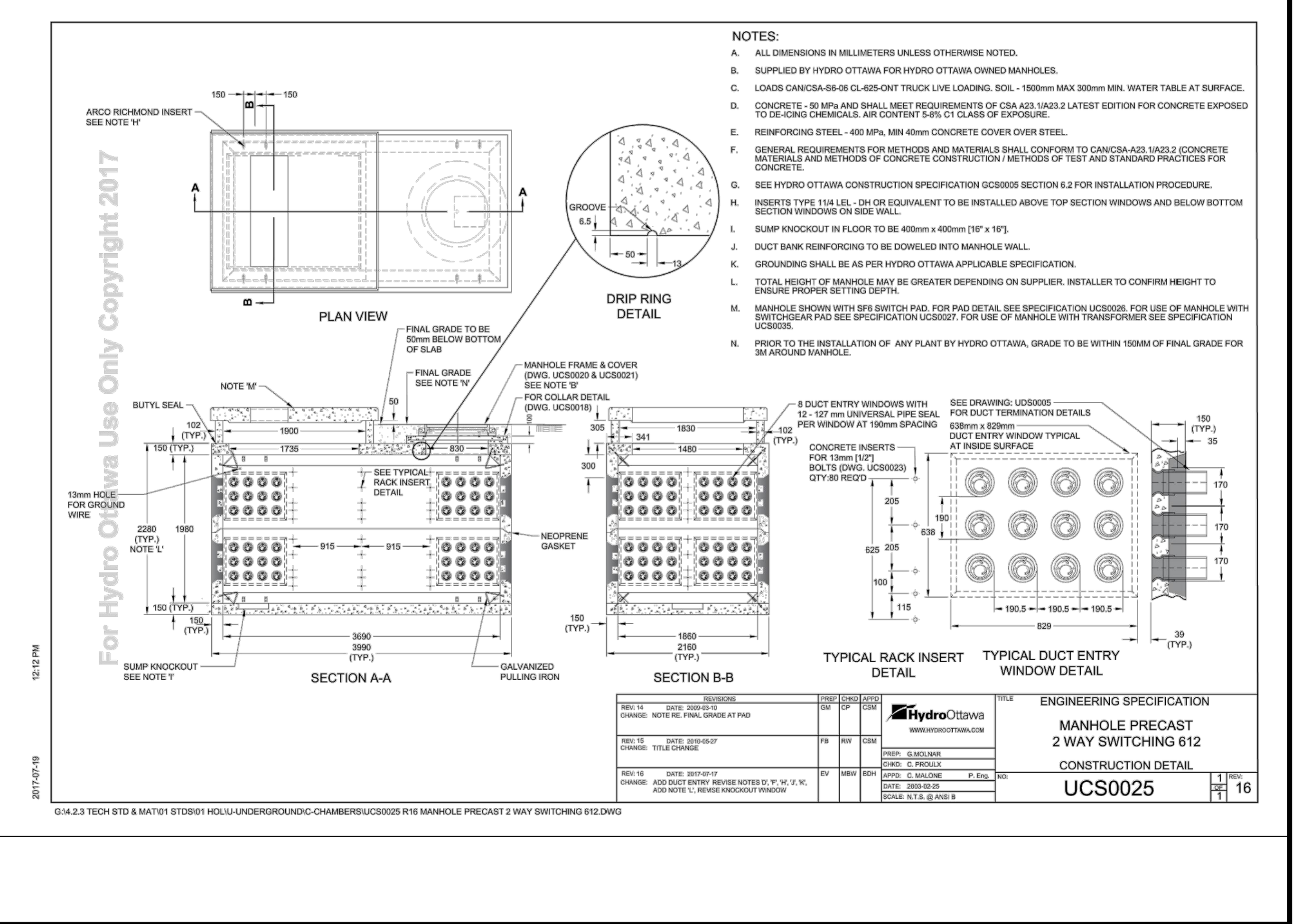












NOTE:
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Owner:
Wesley Clover International
c/o Richard Goldstein
KRP Propoerties
300-555 Legget Drive, Tower B,
Kanata, ON K2K 2X3

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
3.	REVISED PER CITY COMMENTS	APR 04/22	GJM
2.	ISSUED FOR GARAGE COORDINATION	MAR 25/22	GJM
1.	REVISED PER CITY COMMENTS	JAN 28/22	GJM

SCALE: AS SHOWN
DESIGN: GJM
CHECKED: GJM
DRAWN: RJG
CHECKED: GJM
APPROVED: GJM

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
NOTES AND DETAILS

PROJECT No. 120202-00
REV: REV 3
DRAWING No. 120202-ND

D07-12-21-0160

PLANA1.DWG - 841mmx594mm
PLAN # 18607

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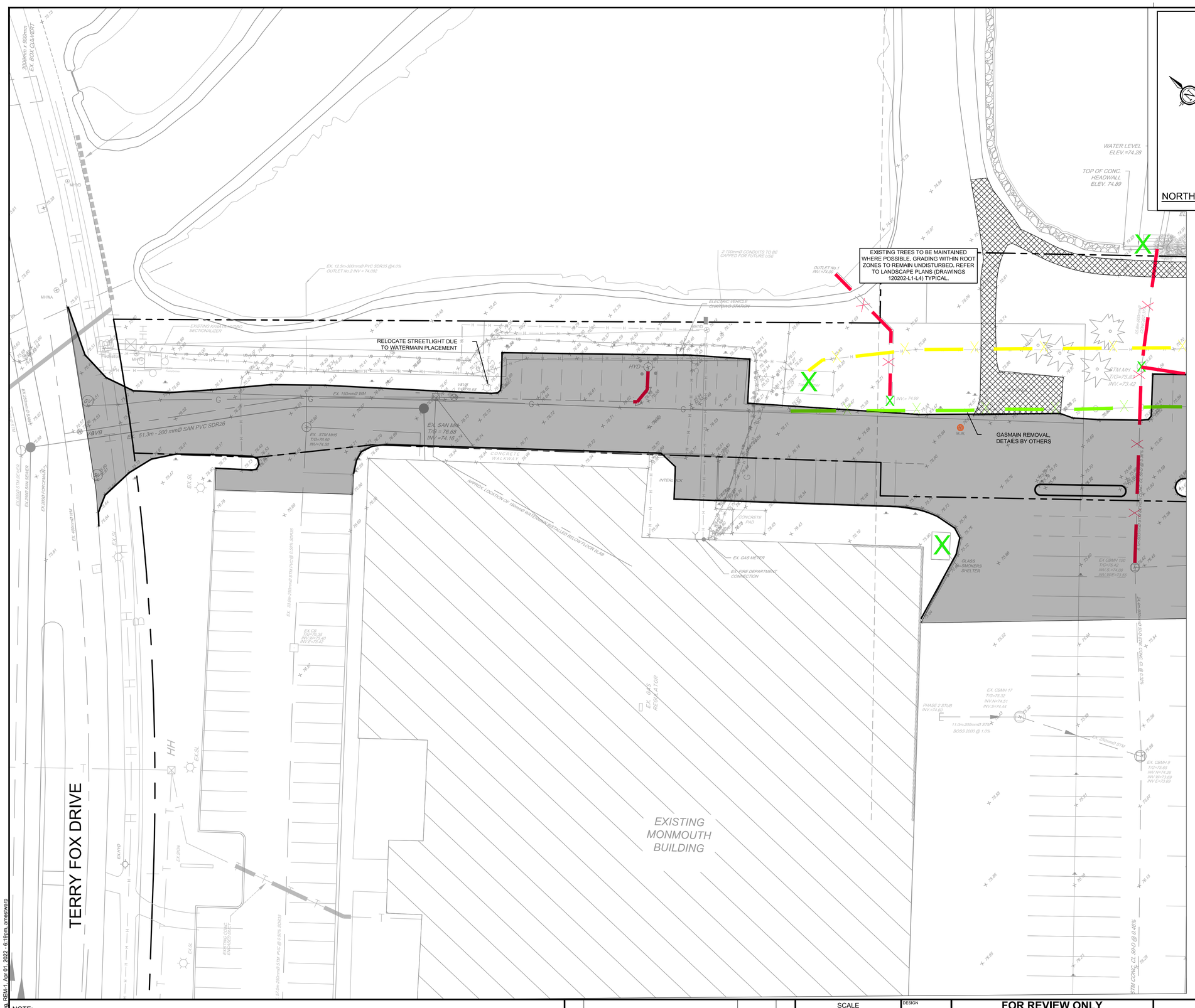

REMOVALS NOTES:

1. OBTAIN ALL APPROVALS AND PERMITS FROM THE CITY OF OTTAWA PRIOR TO ANY REMOVAL WORK OR CONSTRUCTION.
2. ALL STORM STRUCTURES AND PIPES WITHEN THE PROPOSED BUILDING AREA TO BE REMOVED AND DISPOSED OF OFF SITE.
3. ALL STORM PIPES OUTSIDE THE BUILDING AREA TO BE ABANDONED PER CITY OF OTTAWA STANDARD DETAIL S11.4.
4. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS PER CITY OF OTTAWA STANDARD DETAIL R10.
5. EXISTING TREES TO BE MAINTAINED WHERE POSSIBLE. GRADING WITHIN ROOT ZONES TO REMAIN UNDISTURBED. REFER TO LANDSCAPE PLANS (DRAWINGS 120202-L1-L3).
6. ALL MONITORING WELLS SHOULD BE DECOMMISSIONED IN ACCORDANCE WITH ONTARIO REGULATIONS O.REG 903 BY A QUALIFIED LICENSED WELL TECHNICIAN PRIOR TO CONSTRUCTION.

LEGEND

- PROPERTY LINE
- EXISTING STRUCTURE/LIGHT POST REMOVALS
- REMOVAL/ ABANDONMENT OF EXISTING SEWERS
- EXISTING HYDRO REMOVALS
- EXISTING GAS REMOVALS
- ASPHALT REMOVAL (FULL DEPTH)
- ASPHALT PATHWAY REMOVAL
- BUILDING REMOVAL
- CURB REMOVAL
- MONITORING WELL DECOMMISSIONING
- EXISTING UTILITY POLE C/W GUY WIRES
- EXISTING WATERMAIN C/W WATER VALVE
- EXISTING HYDRANT C/W VALVE & LEAD
- EXISTING SANITARY MANHOLE & SEWER
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- EXISTING MONITORING WELL
- EXISTING GAS MAIN
- EXISTING UNDERGROUND BELL LINE
- EXISTING UNDERGROUND TELECOMMUNICATIONS LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING STREETLIGHT
- EXISTING PARKING LINE PAINTING TO REMAIN
- EXISTING PARKING LINE PAINTING TO BE REMOVED
- EXISTING POND WALL

TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS

NOTE:
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300-555 Legget Drive, Tower B,
Kanata, ON K2K 2X3

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3.	REVISED PER CITY COMMENTS	APR 04/22	GJM
2.	ISSUED FOR GARAGE COORDINATION	MAR 25/22	GJM
1.	REVISED PER CITY COMMENTS	JAN 28/22	GJM

SCALE: AS SHOWN

DESIGN GJM | CHECKED GJM | DRAWN RJG | CHECKED GJM | APPROVED GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
REMOVALS AND DEMOLITION PLAN (WEST)

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-REM1

D07-12-21-0160

PLAN # 18607

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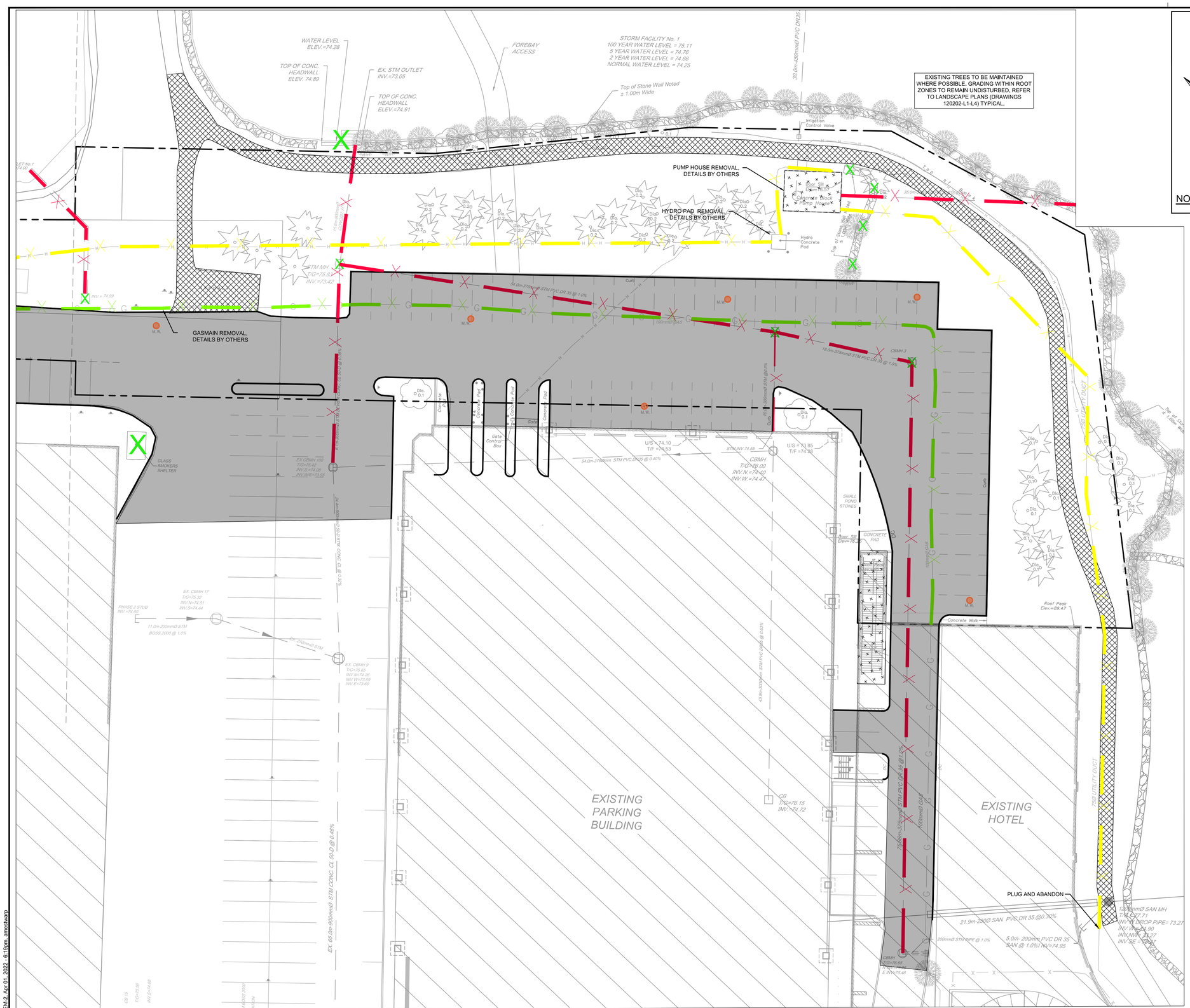

REMOVALS NOTES:

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LEGEND

- PROPERTY LINE
- EXISTING STRUCTURE/LIGHT POST REMOVALS
- REMOVAL/ ABANDONMENT OF EXISTING SEWERS
- EXISTING HYDRO REMOVALS
- EXISTING GAS REMOVALS
- ASPHALT REMOVAL (FULL DEPTH)
- ASPHALT PATHWAY REMOVAL
- BUILDING REMOVAL
- CURB REMOVAL
- EXISTING UTILITY POLE C/W GUY WIRES
- EXISTING WATERMAIN C/W WATER VALVE
- EXISTING HYDRANT C/W VALVE & LEAD
- EXISTING SANITARY MANHOLE & SEWER
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- EXISTING MONITORING WELL
- EXISTING GAS MAIN
- EXISTING UNDERGROUND BELL LINE
- EXISTING UNDERGROUND TELECOMMUNICATIONS LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING STREETLIGHT
- EXISTING PARKING LINE PAINTING TO REMAIN
- EXISTING PARKING LINE PAINTING TO BE REMOVED
- EXISTING POND WALL

TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS

NOTE:
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1.	REVISED PER CITY COMMENTS	JAN 28/22	GJM

SCALE: AS SHOWN

DESIGN GJM | CHECKED GJM | DRAWN RJG | CHECKED GJM | APPROVED GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
REMOVALS AND DEMOLITION PLAN (EAST)

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-REM2

D07-12-21-0160

PLAN # 18607

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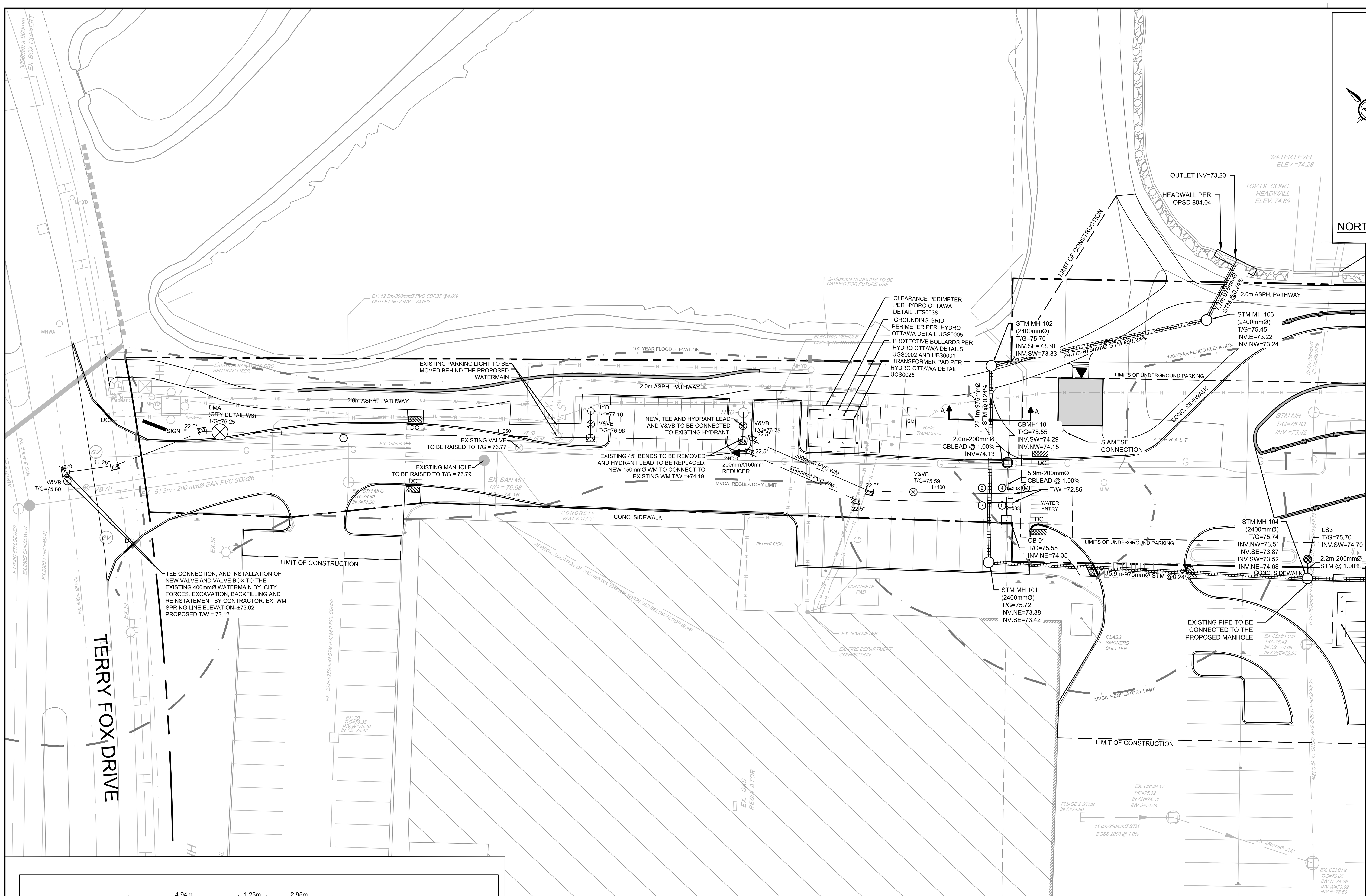
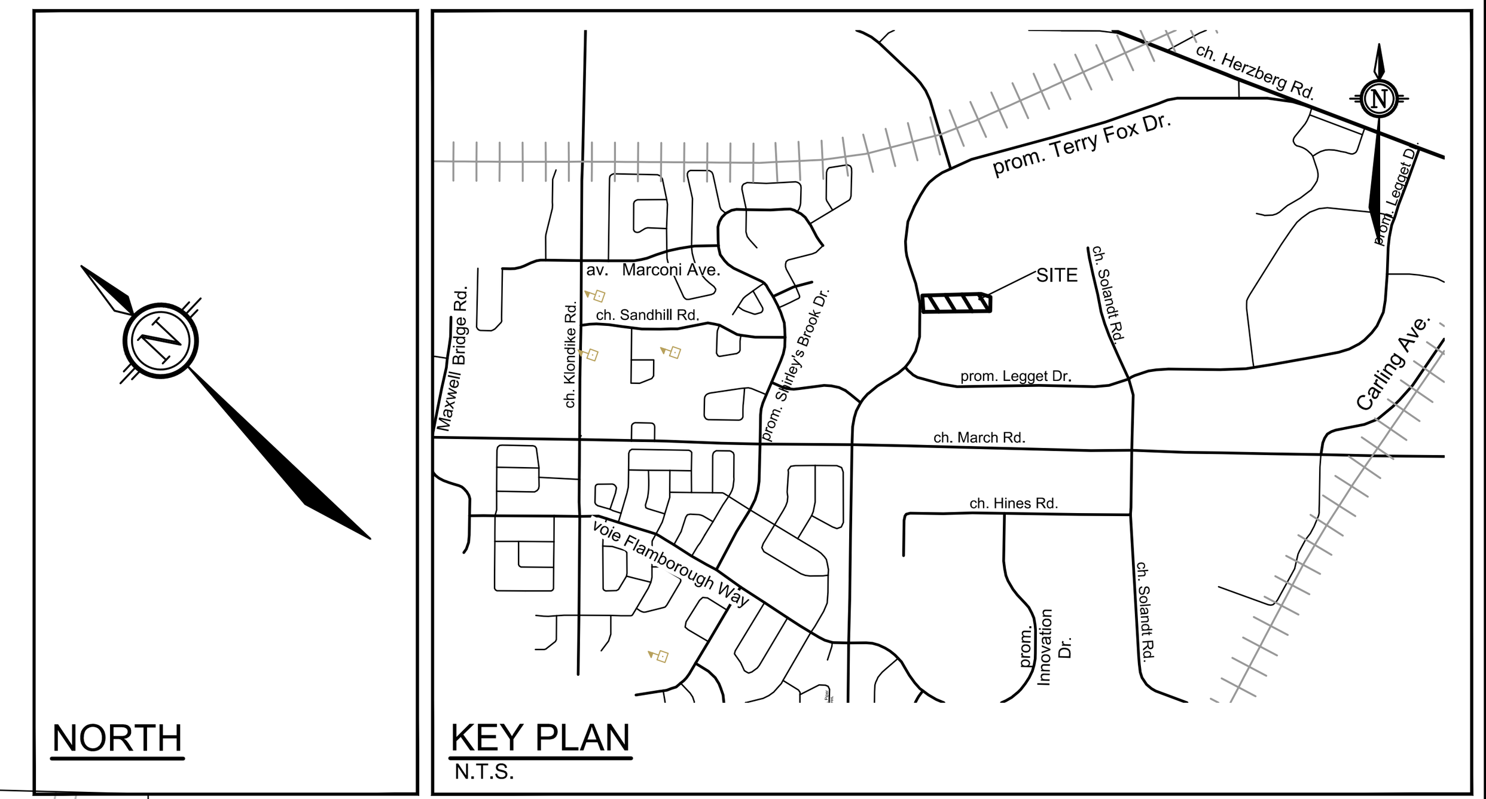


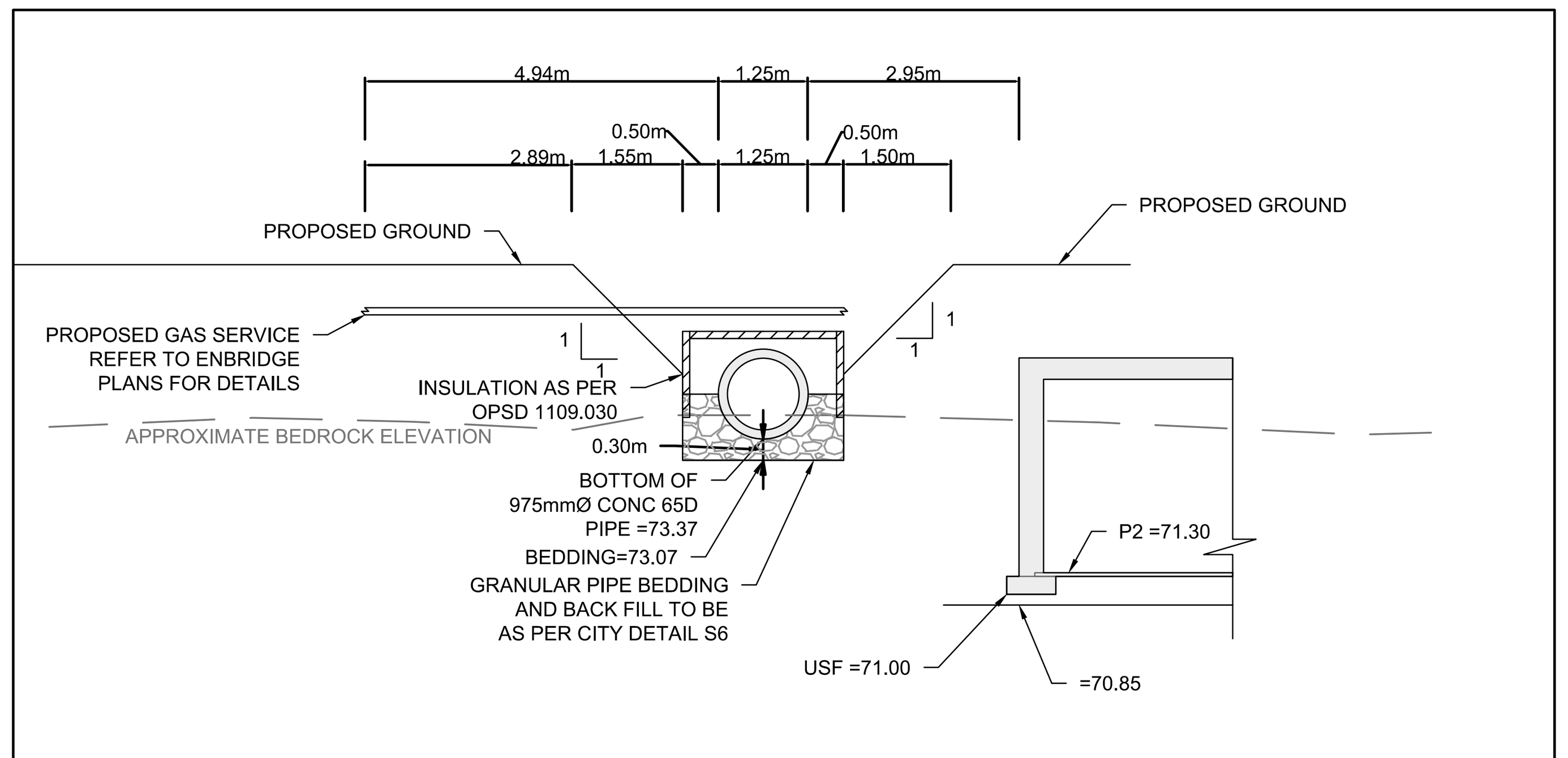


LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)
- PROPOSED RETAINING WALL C/W GUARD RAIL
- PROPOSED PATIO TERRACE
- PROPOSED CAP
- PROPOSED SANITARY SEWER C/W MANHOLE
- PROPOSED STORM SEWER C/W MANHOLE
- PROPOSED SEWER INSULATION (REFER TO ND.DWG FOR DETAILS)
- PROPOSED WEEPING TILE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED SIAMESE CONNECTION
- V&VB — PROPOSED WATER MAIN
- PROPOSED VALVE AND VALVE BOX
- PROPOSED REMOTE WATER METER
- PROPOSED WATER METER
- DMA — PROPOSED WATER DISTRICT METER AREA CHAMBER
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF FLOW
- PIPE CROSSING
- PROPOSED TRANSFORMER PAD LOCATION
- PROPOSED TERRACING
- LIMIT OF CONSTRUCTION
- PROPOSED TRANSFORMER DETAIL
- GM — PROPOSED GAS METER
- PROPOSED SUPPORT COLUMN
- CROSS-SECTION (REFER TO DETAIL)
- 100-YEAR FLOODLINE (75.74)
- MVCA REGULATORY LIMIT
- WV — EXISTING WATERMAIN C/W WATER VALVE
- EXISTING HYDRANT C/W VALVE & LEAD
- SAN MH — EXISTING SANITARY MANHOLE & SEWER
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB — EXISTING CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- M.W. — EXISTING MONITORING WELL
- EXISTING GAS MAIN
- EXISTING UNDERGROUND BELL LINE
- EXISTING UNDERGROUND TELECOMMUNICATIONS LINE
- EXISTING UNDERGROUND HYDRO LINE
- EX.SL — EXISTING STREETLIGHT
- EXISTING PARKING LINE PAINTING TO REMAIN
- EXISTING PARKING LINE PAINTING TO BE REMOVED
- EXISTING PARKING SIGNAGE
- EXISTING POND WALL

STM MANHOLE TABLE			
MANHOLE ID	SIZE (mm)	T/G ELEV (m)	INVERT (m)
CBMH110	1200mmØ	75.55	SW=74.29 NW=74.15
STM MH 101	2400mmØ	75.72	SE=73.42 NE=73.38
STM MH 102	2400mmØ	75.70	SE=73.30 SW=73.33
STM MH 103	2400mmØ	75.45	NW=73.24 E=73.22
STM MH 104	2400mmØ	75.74	SE=73.87 SW=73.52 NW=73.51 NE=74.68

CATCHBASIN TABLE		
CB No.	T/G ELEVATION	INVERT
CB 01	75.55	NE=74.35



SECTION A-A
975mmØ STORM DETAIL
SCALE 1:100

PROPOSED 200mmØ WATERMAIN			
STATION	SURFACE ELEVATION	TOP OF WM ELEVATION*	DESCRIPTION
1+000.00	75.62	73.12	CONNECT TO EXISTING 400mmØ WATERMAIN
1+005.51	75.63	73.23	11.25° HORIZONTAL BEND
1+016.07	76.20	73.80	22.5° HORIZONTAL BEND
1+018.07	76.25	73.85	DISTRICT AREA WATERMETER CHAMBER PER CITY OF OTTAWA DETAIL W3
1+032.50	76.62	73.82	CROSS BELOW 300mmØ STORM SEWER, AS PER CITY DETAIL W25. (CLEARANCE=0.5m)
1+059.74	76.95	74.55	TEE CONNECTION TO HYDRANT LEAD
1+076.85	76.75	74.20	TEE CONNECTION TO HYDRANT LEAD
1+077.90	76.57	74.17	22.5° HORIZONTAL BEND
1+092.30	76.18	73.78	22.5° HORIZONTAL BEND
1+097.22	75.59	73.19	VALVE AND VALVE BOX
1+105.79	75.69	72.76	CROSSING BELOW 975mmØ STORM SEWER, AS PER CITY DETAIL W25.(CLEARANCE=0.5m)
1+107.73	75.59	72.83	CROSSING BELOW 200mm STORM SEWER
1+108.43	75.61	72.86	WATERMAIN CAP 1m FROM BUILDING

* EXACT ELEVATION OF EXISTING WATERMAIN TO BE DETERMINED IN THE FIELD. PROVIDE THERMAL INSULATION ON SHALLOW WATERMAIN AS PER THE CITY OF OTTAWA DETAIL W22 WHERE COVER IS LESS THAN 2.4m

PROPOSED 200mmØ WATERMAIN			
STATION	SURFACE ELEVATION	TOP OF WM ELEVATION*	DESCRIPTION
2+000.00	76.60	74.20	CONNECT TO EXISTING 150mmØ WATERMAIN C/W 200X150mm REDUCER
2+001.95	76.58	74.18	22.5° HORIZONTAL BEND
2+015.11	76.29	73.89	22.5° HORIZONTAL BEND
2+030.11	75.66	72.76	CROSSING BELOW 975mmØ STORM SEWER, AS PER CITY DETAIL W25. (CLEARANCE=0.5m)
2+032.04	75.56	72.83	CROSS BELOW 200mmØ STORM SEWER
2+032.75	75.57	72.86	WATERMAIN CAP 1m FROM BUILDING

* EXACT ELEVATION OF EXISTING WATERMAIN TO BE DETERMINED IN THE FIELD. PROVIDE THERMAL INSULATION ON SHALLOW WATERMAIN AS PER THE CITY OF OTTAWA DETAIL W22 WHERE COVER IS LESS THAN 2.4m

150mmØ HYDRANT LEAD TABLE			
STATION	SURFACE ELEVATION	TOP OF WM ELEVATION	DESCRIPTION
0+000.00	76.75	74.20	TEE CONNECTION TO HYDRANT LEAD
0+002.28	76.77	74.37	VALVE AND VALVE BOX
0+004.55	76.85	74.45	HYDRANT

WATERMAIN CROSSING TABLE					
CROSSING	STATION	SURFACE ELEVATION	INVERT OF STORM SEWER	TOP OF WM ELEVATION	CLEARANCE
1	1+032.50	76.62	74.32	73.82	0.50
2	1+105.79	75.69	73.26*	72.76	0.50
3	2+030.11	75.66	73.26*	72.76	0.50
4	1+107.73	75.59	74.33	72.83	1.50
5	2+030.11	75.66	74.34	72.83	1.51

*INVERTS/OBVERTS ON CONCRETE PIPES ARE OUTSIDE DIAMETER

REFER TO 120202-ND FOR ADDITIONAL NOTES AND DETAILS

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4.	REVISED PER CITY COMMENTS	APR 04/22	GJM
3.	ISSUED FOR GARAGE COORDINATION	MAR 25/22	GJM
2.	REVISED PER CITY COMMENTS	JAN 28/22	GJM
1.	ISSUED WITH ZONING AND SITE PLAN APPLICATION	OCT 01/21	GJM

SCALE 1:250

1:250
0 2 4 6 8 10

DESIGN GJM
CHECKED GJM
DRAWN RJG
CHECKED GJM
APPROVED GJM

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
GENERAL PLAN OF SERVICES (WEST)

PROJECT No. 120202-00
REV 4
DRAWING No. 120202-GP1

D07-12-21-0160

PLAN # 18607

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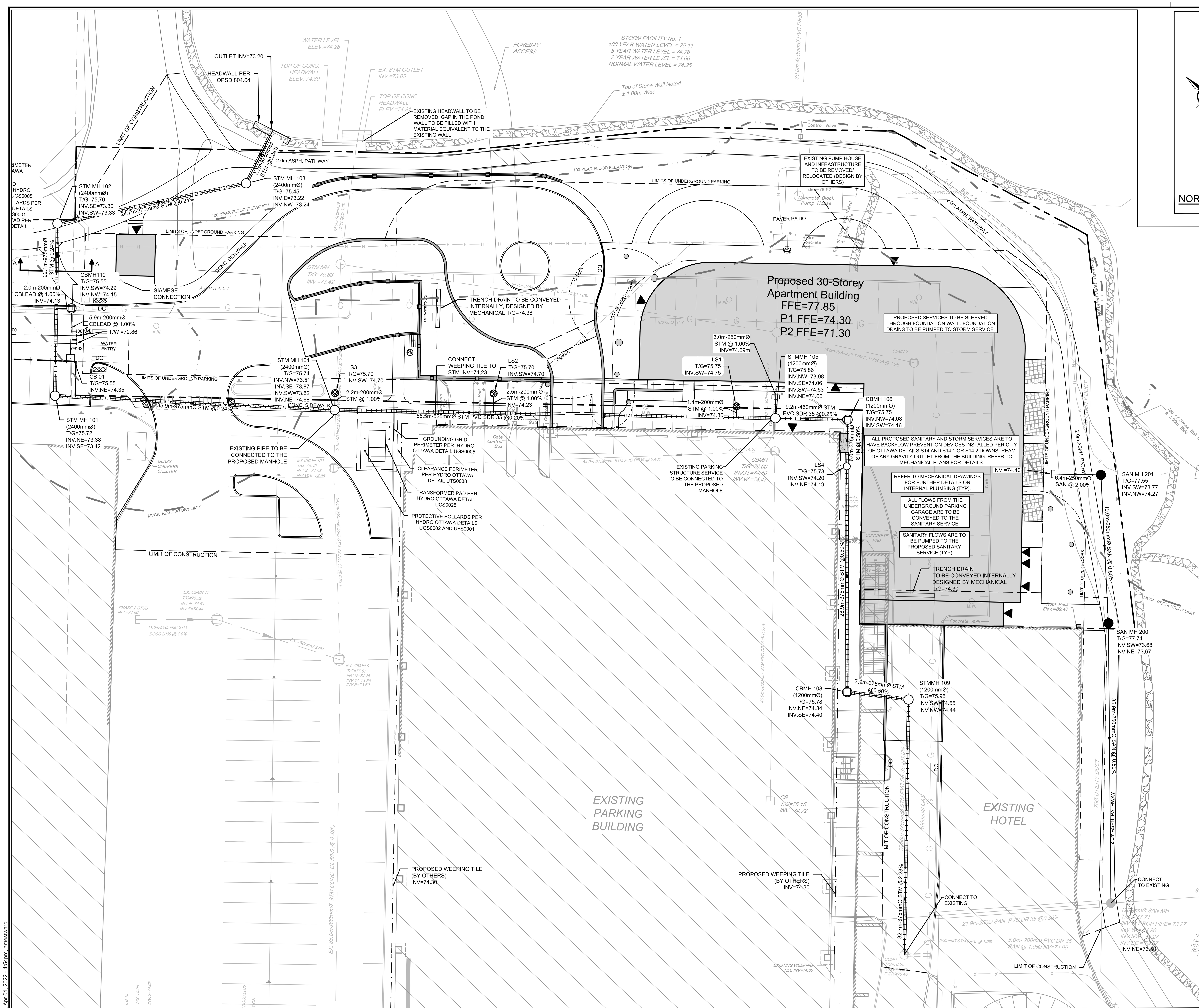

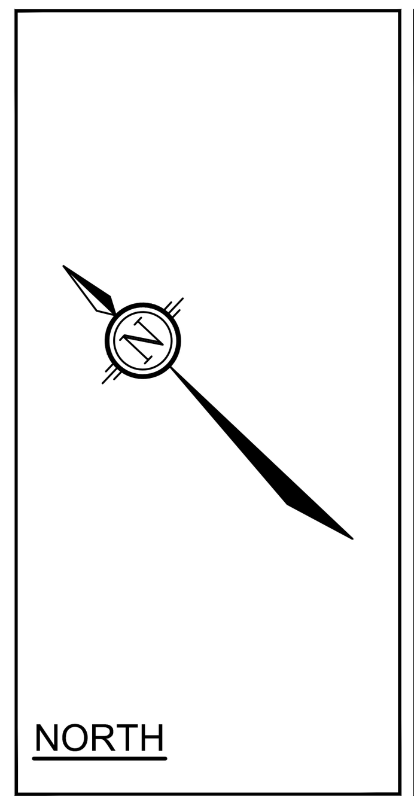

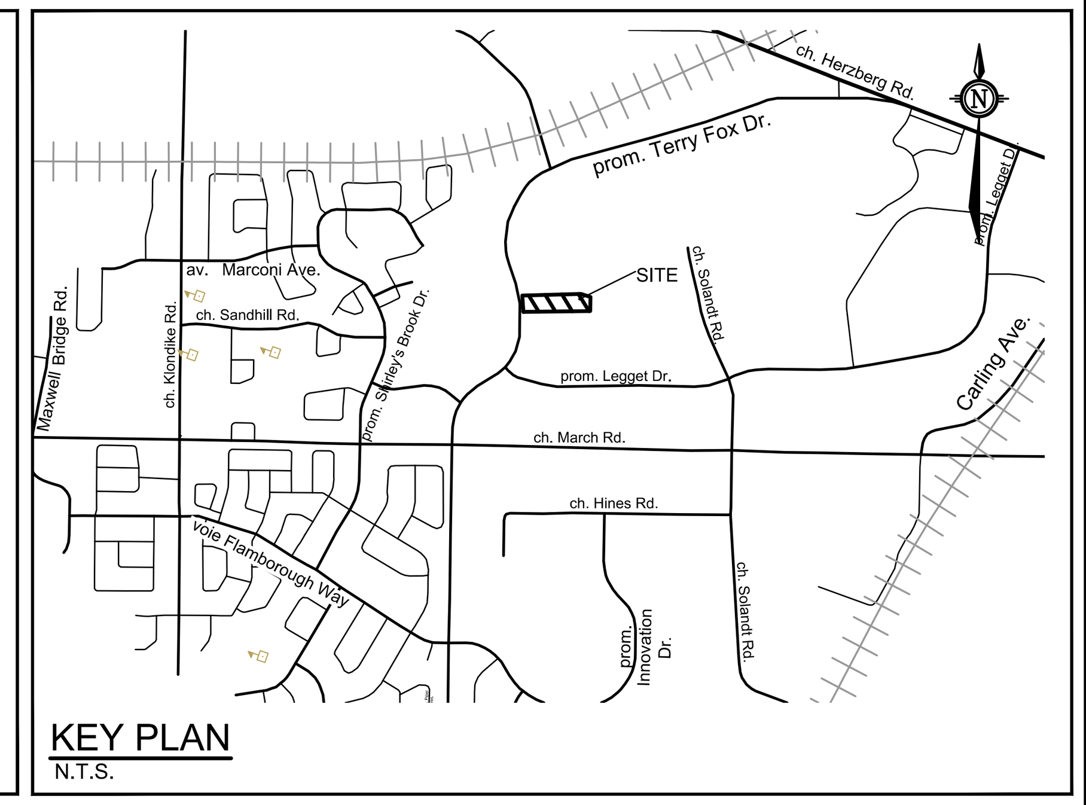

LEGEND

- PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)
- PROPOSED RETAINING WALL C/W GUARD RAIL
- PROPOSED PATIO TERRACE
- PROPOSED CAP
- PROPOSED SANITARY SEWER C/W MANHOLE
- PROPOSED STORM SEWER C/W MANHOLE
- PROPOSED SEWER INSULATION (REFER TO ND.DWG FOR DETAILS)
- PROPOSED WEEPING TILE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED SIAMESE CONNECTION
- PROPOSED WATER MAIN
- PROPOSED VALVE AND VALVE BOX
- PROPOSED REMOTE WATER METER
- PROPOSED WATER METER
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF FLOW
- PIPE CROSSING
- PROPOSED TRANSFORMER PAD LOCATION
- PROPOSED TERRACING
- LIMIT OF CONSTRUCTION
- PROPOSED SUPPORT COLUMN
- CROSS-SECTION (REFER TO DETAIL ON 120202-GP1)
- PROPOSED TRANSFORMER DETAIL
- PROPOSED GAS METER
- 100-YEAR FLOODLINE (75.74)
- MVCA REGULATORY LIMIT
- EXISTING WATERMAIN C/W WATER VALVE
- EXISTING HYDRANT C/W VALVE & LEAD
- EXISTING SANITARY MANHOLE & SEWER
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- EXISTING MONITORING WELL
- EXISTING GAS MAIN
- EXISTING UNDERGROUND BELL LINE
- EXISTING UNDERGROUND TELECOMMUNICATIONS LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING STREETLIGHT
- EXISTING PARKING LINE PAINTING TO REMAIN
- EXISTING PARKING LINE PAINTING TO BE REMOVED
- EXISTING PARKING SIGNAGE
- EXISTING POND WALL

STM MANHOLE TABLE

MANHOLE ID	SIZE (mm)	T/G ELEV (m)	INVERT (m)
CBMH 106	1200mmØ	75.75	NW=74.08 SW=74.16
CBMH 108	1200mmØ	75.78	SE=74.40 NE=74.34
STMMH 105	1200mmØ	75.86	SE=74.06 NW=73.98 SW=74.53 NE=74.66
STMMH 109	1200mmØ	75.95	SW=74.55 NW=74.44

SAN MANHOLE TABLE

MANHOLE ID	SIZE (mm)	T/G ELEV (m)	INVERT (m)
SAN MH 200	1200mmØ	77.74	NE=73.67 SW=73.68
SAN MH 201	1200mmØ	77.55	SW=73.77 NW=74.27

LANDSCAPE DRAIN TABLE

CB No.	T/G ELEVATION	INVERT
LS1	75.75	SW=74.75
LS2	75.70	SW=74.70
LS4	75.78	SW=74.20 NE=74.19

REFER TO 120202-ND FOR ADDITIONAL NOTES AND DETAILS

NOTE:
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Owner:
Wesley Clover International
c/o Richard Goldstein
KRP Propoerties
300-555 Legget Drive, Tower B,
Kanata, ON K2K 2X3

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1.	ISSUED WITH ZONING AND SITE PLAN APPLICATION	OCT 01/21	GJM

SCALE 1:250

DESIGN	GJM
CHECKED	GJM
DRAWN	RJG
CHECKED	GJM
APPROVED	GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
GENERAL PLAN OF SERVICES (EAST)

PROJECT No. 120202-00
REV: REV 4
DRAWING No. 120202-GP2

D07-12-21-0160

PLAN # 18607

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NORTH

KEY PLAN
N.T.S.

PAVEMENT STRUCTURE:

- PARKING STALLS
  50mm HL3 OR SUPERPAVE 12.5
  150mm GRAN "A"
  300mm GRAN "B"

- DRIVING AISLES
  40mm HL3 OR SUPERPAVE 12.5
  50mm HL8 OR SUPERPAVE 19,0
  150mm GRAN "A"
  450mm GRAN "B"

LEGEND

- PROPERTY LINE
- 77.50 PROPOSED ELEVATION
- 76.35(S) PROPOSED SWALE ELEVATION
- 76.35TW PROPOSED TOP OF WALL ELEVATION
- 76.35BW PROPOSED BOTTOM OF WALL ELEVATION
- 76.35TC PROPOSED TOP OF CURB ELEVATION
- *76.45* EXISTING ELEVATION
- PROPOSED BUILDING ENTRANCE
- DIRECTION OF MAJOR OVERLAND FLOW
- PROPOSED SAN MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE CATCHBASIN
- V&VB PROPOSED VALVE AND VALVE BOX
- DMA PROPOSED WATER DISTRICT METER AREA CHAMBER
- PROPOSED RETAINING WALL C/W RAILING
- H.P. PROPOSED HIGH POINT
- PROPOSED CURB
- DC PROPOSED DEPRESSED CURB
- PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)
- PROPOSED SUPPORT COLUMN
- PROPOSED SWALE AND DIRECTION OF FLOW
- TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- 2.0% SLOPE AND DIRECTION
- PONDING LIMITS
- 100-YEAR FLOODLINE (75,74)
- MVCA REGULATORY LIMIT
- PROPOSED TRANSFORMER DETAIL
- GM PROPOSED GAS METER
- *EXISTING UTILITY POLE C/W GUY WIRES*
- WV *EXISTING WATER VALVE*
- *EXISTING HYDRANT*
- SAN MH *EXISTING SANITARY MANHOLE*
- STM MH *EXISTING STORM MANHOLE*
- *EXISTING CATCHBASIN MANHOLE*
- M.W. *EXISTING MONITORING WELL*
- CB *EXISTING CATCHBASIN*
- X *EXISTING FENCE*
- OHW *EXISTING OVERHEAD WIRES*
- LS *EXISTING STREETLIGHT*
- *EXISTING PARKING LINE PAINTING TO REMAIN*
- *EXISTING PARKING LINE PAINTING TO BE REMOVED*
- *EXISTING PARKING SIGNAGE*
- *EXISTING POND WALL*

REFER TO 120202-ND FOR ADDITIONAL NOTES AND DETAILS

NOTE:
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Owner:
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c/o Richard Goldstein
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300-555 Legget Drive, Tower B,
Kanata, ON K2K 2X3
Phone: (613)591-0594

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SCALE
1:250
1:250
0 2 4 6 8 10

DESIGN GJM
CHECKED GJM
DRAWN RJG
CHECKED GJM
APPROVED GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
GRADING PLAN
(WEST)

PROJECT No. 120202-00
REV REV 4
DRAWING No. 120202-GR1

D07-12-21-0160

PLAN # 18607

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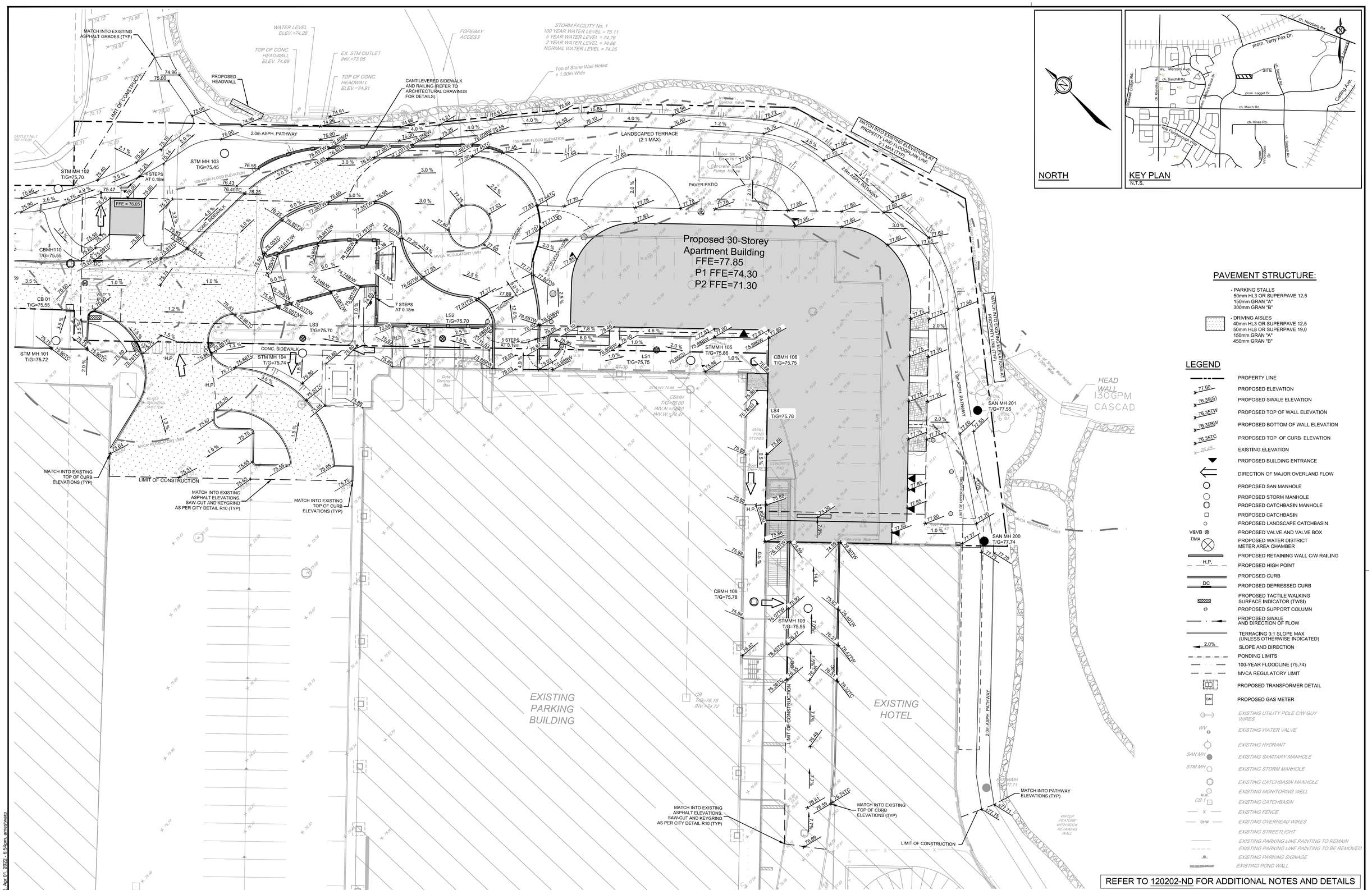

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1:250
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DESIGN GJM
CHECKED GJM
DRAWN RJG
CHECKED GJM
APPROVED GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
GRADING PLAN
(EAST)

PROJECT No. 120202-00
REV REV 4
DRAWING No. 120202-GR2

PLAN # 18607

D07-12-21-0160

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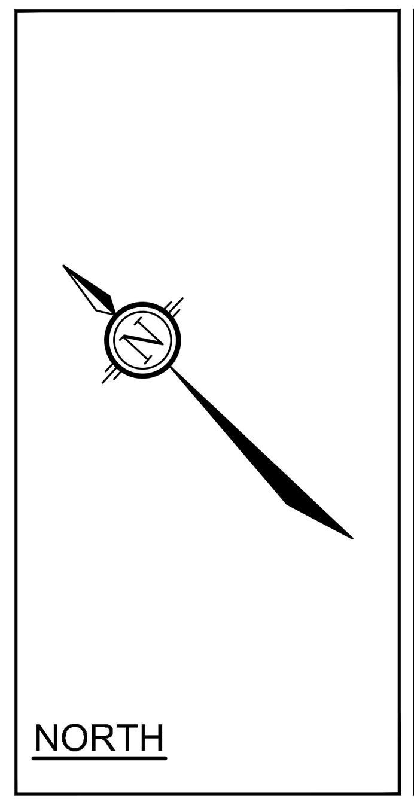
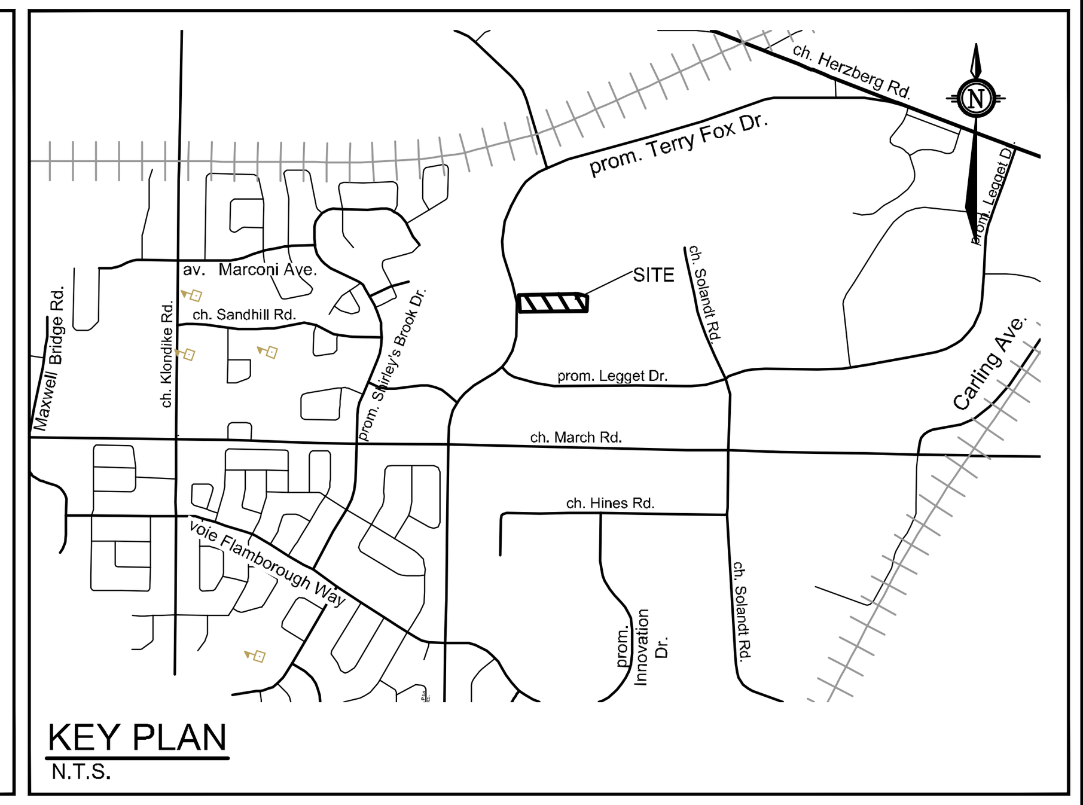
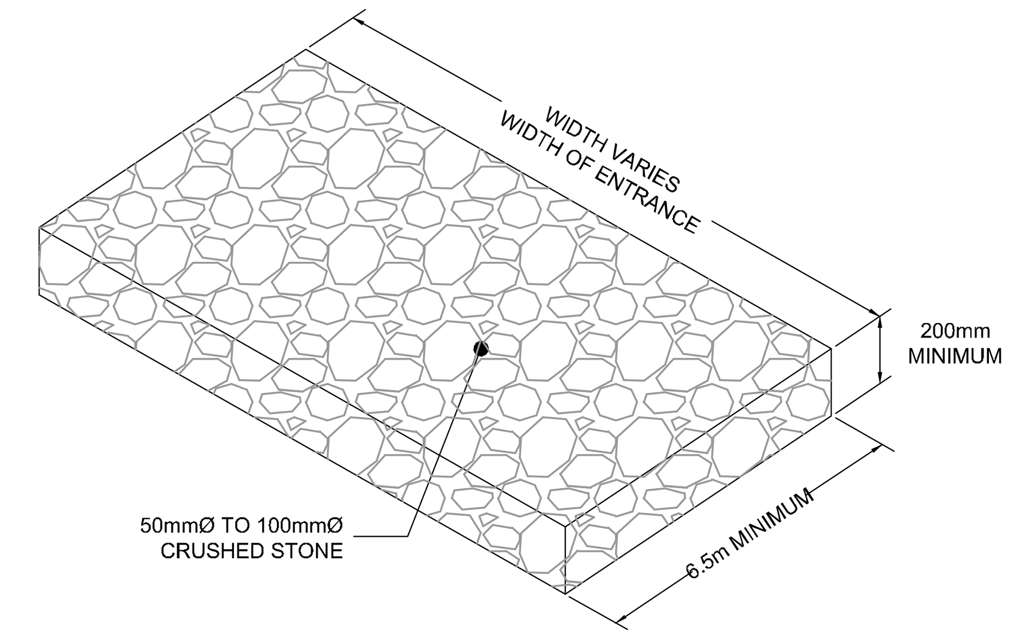




LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TRENCH DRAIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED BUILDING ENTRANCE
- PROPOSED RETAINING WALL C/W GUARD RAIL
- PROPOSED TRANSFORMER DETAIL
- GM — PROPOSED GAS METER
- TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- PROPOSED FILTER BAGS AT CATCHBASINS, CATCHBASIN MANHOLES AND TRENCHDRAINS
- M M — PROPOSED MUD MAT
- LIGHT DUTY SILT FENCE (OPSD 219.110)
- STM MH — EXISTING STORM MANHOLE
- CB 1 — EXISTING CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- 100 YEAR FLOOD ELEVATION
- MVCA REGULATORY LIMIT
- EXISTING POND WALL



MUD MAT DETAIL
NOT TO SCALE

EROSION AND SEDIMENT CONTROL NOTES :

1. ALL EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, CITY OF OTTAWA AND THE CONSERVATION AUTHORITY. THEY SHALL BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, FILTER SOCKS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED IN SELECTED LOCATIONS, AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
4. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. THE CONTRACTOR SHALL PROVIDE DUST CONTROL WITH THE APPLICATION OF WATER AND/OR CALCIUM CHLORIDE AS REQUIRED.

REFER TO 120202-ND1 & ND2 FOR ADDITIONAL NOTES

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Owner:
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SCALE 1:500

1:500
0 5 10 15 20

DESIGN	ARM
CHECKED	GJM
DRAWN	RJG
CHECKED	ARM
APPROVED	GJM

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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-ESC

D07-12-21-0160

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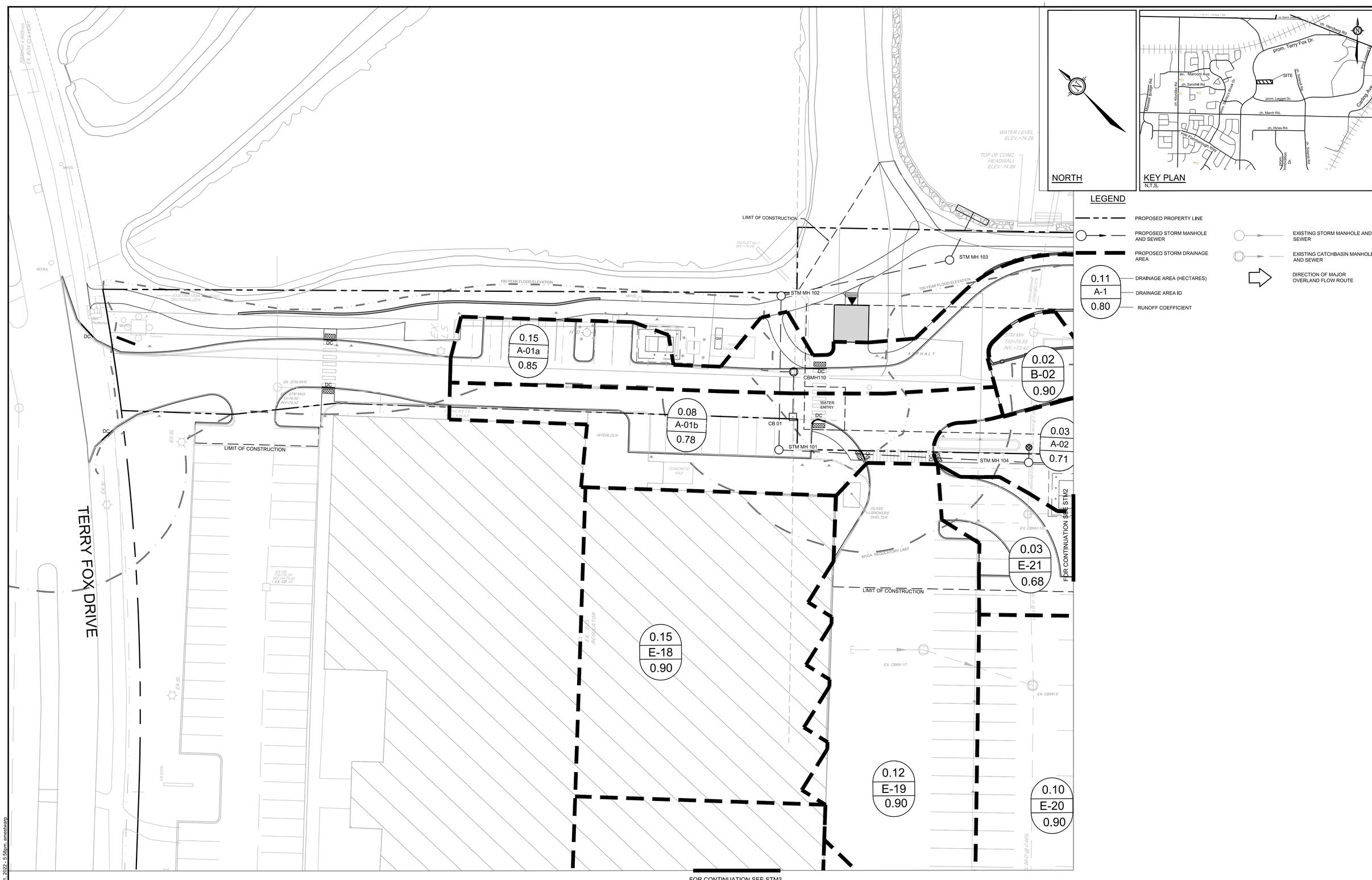
PLAN # 18607

APPENDIX B
Storm Servicing



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1.	ISSUED WITH ZONING AND SITE PLAN APPLICATION	OCT 01/21	GJM

SCALE: 1:250 (1:250, 0 2 4 6 8 10)

DESIGN GJM | CHECKED GJM | DRAWN RJG | CHECKED GJM | APPROVED GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER — G.J. MacDONALD — PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
STORM DRAINAGE AREA PLAN

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-STM1

PLAN # 18607

D07-12-21-0160

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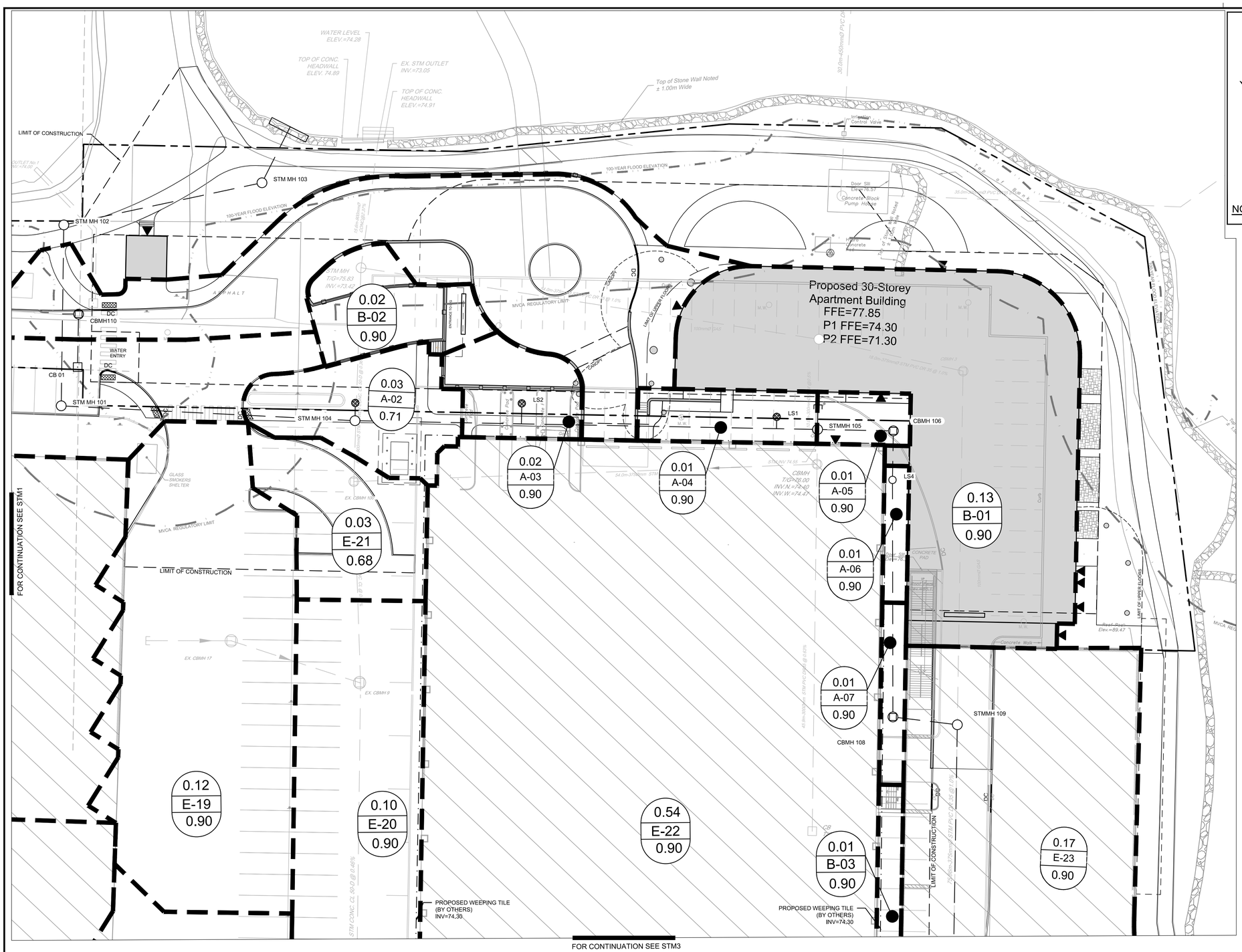

NORTH

KEY PLAN
N.T.S.

LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED STORM MANHOLE AND SEWER
- PROPOSED STORM DRAINAGE AREA
- 0.11 / A-1 / 0.80 — DRAINAGE AREA (HECTARES) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- EXISTING STORM MANHOLE AND SEWER
- EXISTING CATCHBASIN MANHOLE AND SEWER
- DIRECTION OF MAJOR OVERLAND FLOW ROUTE

NOTE:
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c/o Richard Goldstein
KRP Properties
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SCALE
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0 2 4 6 8 10

DESIGN GJM
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CHECKED GJM
APPROVED GJM

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LICENSED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

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LOCATION
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DRAWING NAME
STORM AREA DRAINAGE PLAN

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-STM2

PLAN # 18607

D07-12-21-0160

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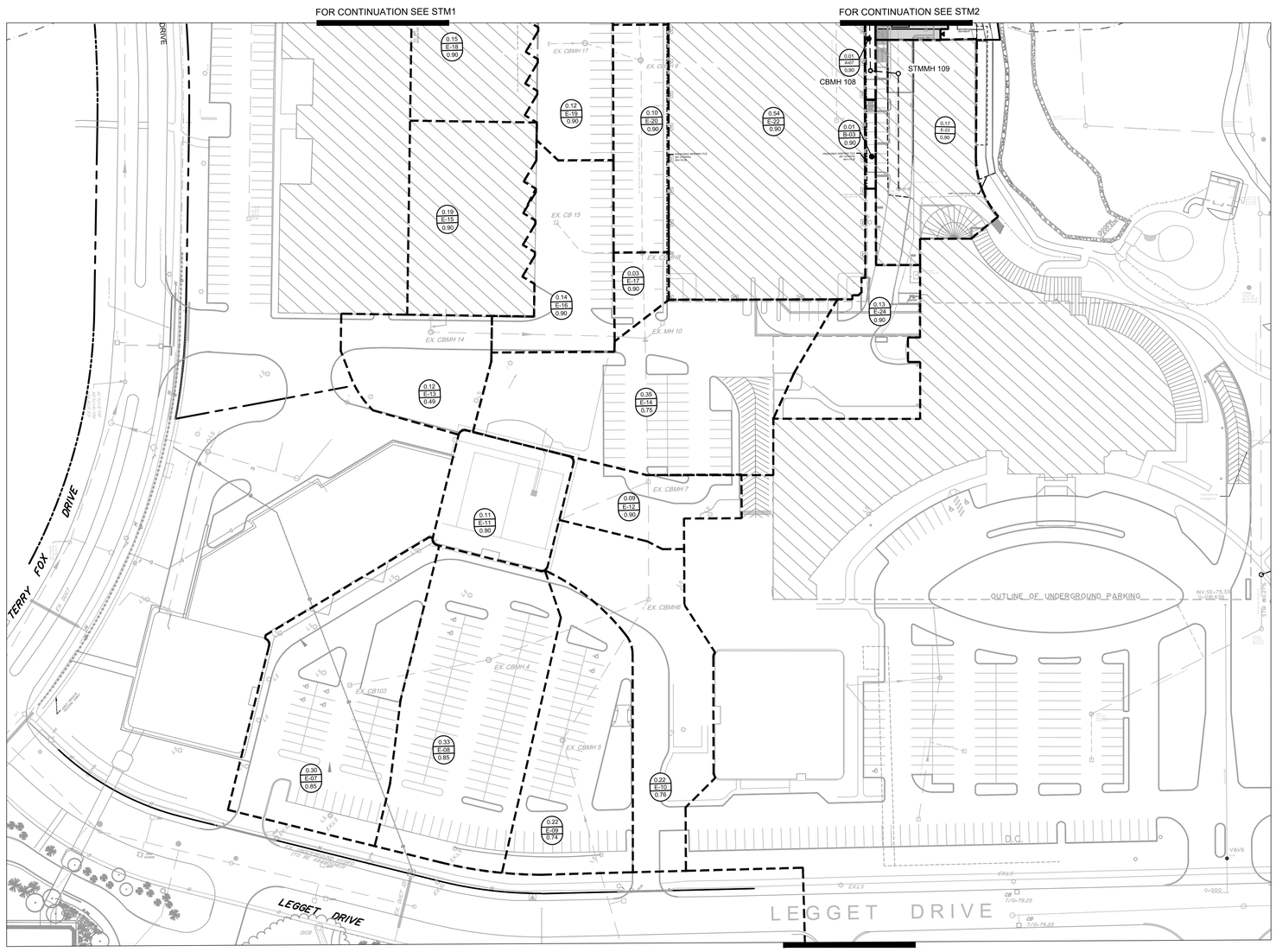

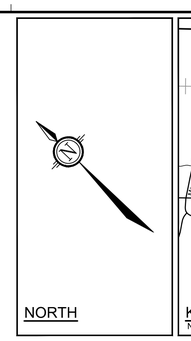

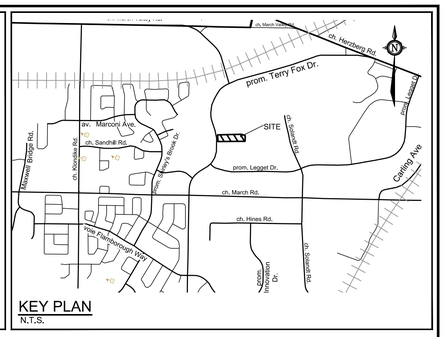

LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED STORM MANHOLE AND SEWER
- PROPOSED STORM DRAINAGE AREA
- 0.11 / A-1 / 0.80 — DRAINAGE AREA (HECTARES) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- EXISTING STORM MANHOLE AND SEWER
- EXISTING CATCHBASIN MANHOLE AND SEWER
- DIRECTION OF MAJOR OVERLAND FLOW ROUTE

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

Owner:
Wesley Clover International
c/o Richard Goldstein
KRP Propoerties
300-555 Legget Drive, Tower B,
Kanata, ON K2K 2X3

No.	REVISION	DATE	BY
3.	REVISED PER CITY COMMENTS	APR 04/22	GJM
2.	REVISED PER CITY COMMENTS	JAN 28/22	GJM
1.	ISSUED WITH ZONING AND SITE PLAN APPLICATION	OCT 01/21	GJM

SCALE
1:750
1:750
0 10 20 30

DESIGN GJM
CHECKED GJM
DRAWN RJG
CHECKED GJM
APPROVED GJM

FOR REVIEW ONLY

LICENCED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
STORM AREA DRAINAGE PLAN

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-STM3

PLAN # 18607

D07-12-21-0160

NORTH

KEY PLAN
N.T.S.

LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED STORM MANHOLE AND SEWER
- PROPOSED STORM DRAINAGE AREA
- 0.11 / A-1 / 0.80 — DRAINAGE AREA (HECTARES) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- EXISTING STORM MANHOLE AND SEWER
- EXISTING CATCHBASIN MANHOLE AND SEWER
- DIRECTION OF MAJOR OVERLAND FLOW ROUTE

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

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3.	REVISED PER CITY COMMENTS	APR 04/22	GJM
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SCALE
1:750
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0 10 20 30

DESIGN GJM
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LOCATION
CITY of OTTAWA
BROOKSTREET APARTMENTS

DRAWING NAME
OVERALL STORM AREA DRAINAGE PLAN

PROJECT No. 120202-00
REV REV 3
DRAWING No. 120202-STM4

PLAN # 18607

D07-12-21-0160

C:\temp\AcPublish_6544\120202-STM.dwg, STM4, Apr 01, 2022 - 5:58pm, amestwarp

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 120202
Project Name: BrookStreet
Date Prepared: 3/15/2022
Date Revised:
Input By: Anthony Mestwarp
Reviewed By: Greg MacDonald
Drawing Reference: 120202-GP and 120202-STM

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION		DEMAND											CAPACITY							
		AREA					FLOW						PROPOSED SEWER PIPE SIZING / DESIGN							
From	To	Area ID	IMPERVIOUS AREA	PERVIOUS AREA	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr)			Peak Flow	PIPE PROPERTIES					CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
										2yr	5yr	100yr		LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE				
			(ha) 0.90	(ha) 0.20	(ha)				(min.)				(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
EX.CB1	EX.CB3	E-01	0.22	0.07	0.29	0.74	0.59	0.59	10.00	76.81			45.54	45.0	200 PVC	0.2032	0.013	0.50	24.2	0.75	1.01	188.2%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CB3	EX.CB4	E-02	0.24	0.09	0.33	0.71	0.65	1.24	11.01	73.15			90.82	45.5	200 PVC	0.2032	0.013	1.10	35.9	1.11	0.69	253.1%
							0.00	0.00	11.01				0.00									
							0.00	0.00	11.01				0.00									
EX.CB2	EX.CB4	E-03	0.21	0.01	0.22	0.87	0.52	0.52	10.00	76.81			40.27	45.0	200 PVC	0.2032	0.013	0.50	24.2	0.75	1.01	166.5%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CB4	EX.CB5	E-04	0.21	0.03	0.24	0.81	0.55	2.32	11.69	70.87			164.11	57.0	300 PVC	0.3048	0.013	0.40	63.8	0.87	1.09	257.2%
							0.00	0.00	11.69				0.00									
							0.00	0.00	11.69				0.00									
EX.CB5	EX.CBMH1	E-05	0.26	0.09	0.35	0.72	0.69	3.01	12.78	67.57			203.30	45.0	300 PVC	0.3048	0.013	0.70	84.4	1.16	0.65	240.9%
							0.00	0.00	12.78				0.00									
							0.00	0.00	12.78				0.00									
EX.CBMH1	EX. CBMH 5	E-06	0.23	0.07	0.30	0.74	0.62	3.63	13.43	65.75			238.85	90.0	375 PVC	0.381	0.013	0.40	115.7	1.01	1.48	206.5%
							0.00	0.00	13.43				0.00									
							0.00	0.00	13.43				0.00									
EX. CBMH 5	EX.CBMH6	E-09	0.17	0.05	0.22	0.74	0.45	4.08	14.90	62.00			253.17	46.0	375 PVC	0.381	0.013	1.62	232.8	2.04	0.38	108.7%
							0.00	0.00	14.90				0.00									
							0.00	0.00	14.90				0.00									
EX.CB103	EX.CBMH4	E-07	0.28	0.02	0.30	0.85	0.71	0.71	10.00	76.81			54.24	39.4	300 PVC	0.3048	0.013	1.10	105.8	1.45	0.45	51.3%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CBMH4	EX.CBMH6	E-08	0.31	0.02	0.33	0.85	0.78	1.49	10.45	75.11			111.68	59.7	375 PVC	0.381	0.013	0.60	141.7	1.24	0.80	78.8%
							0.00	0.00	10.45				0.00									
							0.00	0.00	10.45				0.00									
EX.CBMH6	EX.CBMH7	E-10	0.18	0.04	0.22	0.76	0.47	6.04	15.28	61.12			369.04	34.9	450 PVC	0.4572	0.013	0.67	243.5	1.48	0.39	151.6%
							0.00	0.00	15.28				0.00									
							0.00	0.00	15.28				0.00									
BLDG	EX.CBMH7	E-11	0.11		0.11	0.90	0.28	0.28	10.00	76.81			21.14	28.0	300 PVC	0.3048	0.013	0.50	71.3	0.98	0.48	29.6%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CBMH7	EX.MH10	E-12	0.09		0.09	0.90	0.23	6.54	15.67	60.23			393.81	37.2	450 PVC	0.4572	0.013	2.40	460.8	2.81	0.22	85.5%
							0.00	0.00	15.67				0.00									
							0.00	0.00	15.67				0.00									
BLDG	EX.CBMH14	E-15	0.19		0.19	0.90	0.48	0.48	10.00	76.81			36.51	4.0	250 PVC	0.254	0.013	1.00	62.0	1.22	0.05	58.9%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CBMH14	EX.MH10	E-13	0.05	0.07	0.12	0.49	0.16	0.64	10.05	76.60			48.94	52.5	250 PVC	0.254	0.013	0.43	40.7	0.80	1.09	120.3%
							0.00	0.00	10.05				0.00									
							0.00	0.00	10.05				0.00									
EX.MH10	EX.CBMH8	E-14	0.27	0.07	0.35	0.75	0.73	7.90	15.89	59.74			472.12	24.0	450 PVC	0.4572	0.013	2.66	485.1	2.95	0.14	97.3%
							0.00	0.00	15.89				0.00									
							0.00	0.00	15.89				0.00									
EX.CBMH8	EX.CBMH9	E-16,E-17	0.19		0.19	0.90	0.48	8.38	16.03	59.44			498.05	65.0	900 CONC	0.9144	0.013	0.46	1280.9	1.95	0.56	38.9%
							0.00	0.00	16.03				0.00									
							0.00	0.00	16.03				0.00									
BLDG	EX.CBMH 17	E-18	0.15		0.15	0.90	0.38	0.38	10.00	76.81			28.82	11.0	200 PVC	0.2032	0.013	0.86	31.7	0.98	0.19	90.8%
							0.00	0.00	10.00				0.00									

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 120202
Project Name: BrookStreet
Date Prepared: 3/15/2022
Date Revised:
Input By: Anthony Mestwarp
Reviewed By: Greg MacDonald
Drawing Reference: 120202-GP and 120202-STM

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION		DEMAND												CAPACITY							
		AREA					FLOW							PROPOSED SEWER PIPE SIZING / DESIGN							
From	To	Area ID	IMPERVIOUS AREA	PERVIOUS AREA	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr)			Peak Flow	PIPE PROPERTIES					CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
										2yr	5yr	100yr		LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE				
			(ha) 0.90	(ha) 0.20	(ha)				(min.)				(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
EX.CBMH 17	EX.CBMH 9	E-18	0.12		0.12	0.90	0.30	0.68	10.19	76.09			51.40	16.6	250 PVC	0.254	0.013	1.00	62.0	1.22	0.23	82.9%
							0.00	0.00	10.19				0.00									
							0.00	0.00	10.19				0.00									
EX.CBMH 9	EX.CBMH100	E-20	0.08		0.08	0.90	0.20	9.25	16.58	58.27			539.21	24.4	900 CONC	0.9144	0.013	0.57	1425.9	2.17	0.19	37.8%
							0.00	0.00	16.58				0.00									
							0.00	0.00	16.58				0.00									
EX.CBMH100	STMMH104	E-21	0.02	0.01	0.03	0.68	0.06	9.31	16.77	57.88			539.14	7.4	900 CONC	0.9144	0.013	0.36	1133.2	1.73	0.07	47.6%
							0.00	0.00	16.77				0.00									
							0.00	0.00	16.77				0.00									
BLDG	EX.CBMH	E-23	0.17		0.17	0.90	0.43	0.43	10.00	76.81			32.67	3.3	250 PVC	0.254	0.013	1.00	62.0	1.22	0.04	52.7%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
EX.CBMH	STMMH109	E-24	0.13		0.13	0.90	0.33	0.75	10.04	76.63			57.52	32.7	375 PVC	0.381	0.013	2.23	273.1	2.40	0.23	21.1%
							0.00	0.00	10.04				0.00									
							0.00	0.00	10.04				0.00									
STMMH109	CBMH108		0.00				0.00	0.75	10.27	75.77			56.88	7.9	375 PVC	0.381	0.013	0.50	129.3	1.13	0.12	44.0%
							0.00	0.00	10.27				0.00									
							0.00	0.00	10.27				0.00									
CBMH108	LS7	A-07	0.01		0.01	0.90	0.02	0.77	10.39	75.34			57.80	28.9	375 PVC	0.381	0.013	0.50	129.3	1.13	0.42	44.7%
							0.00	0.00	10.39				0.00									
							0.00	0.00	10.39				0.00									
LS7	CBMH106	A-06	0.01		0.01	0.90	0.01	0.78	10.81	73.82			57.55	6.0	375 PVC	0.381	0.013	0.50	129.3	1.13	0.09	44.5%
							0.00	0.00	10.81				0.00									
							0.00	0.00	10.81				0.00									
CBMH106	STMMH 105	A-05	0.01		0.01	0.90	0.02	0.80	10.90	73.51			58.64	9.8	450 PVC	0.4572	0.013	0.25	148.7	0.91	0.18	39.4%
							0.00	0.00	10.90				0.00									
							0.00	0.00	10.90				0.00									
EX. BLDG	STMMH105	E-22	0.54		0.54	0.90	1.36	1.36	10.00	76.81			104.59	4.2	300 PVC	0.3048	0.013	0.50	71.3	0.98	0.07	146.6%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
PROP. BLDG	STM105	B-01,B-02,B-03	0.16		0.16	0.90	0.40	0.40	10.00	76.81			30.75	1.0	250 PVC	0.254	0.013	1.00	62.0	1.22	0.01	49.6%
							0.00	0.00	10.00				0.00									
							0.00	0.00	10.00				0.00									
STMMH105	STMMH104	A-03,A-04	0.03		0.03	0.90	0.08	2.64	11.08	72.89			192.25	56.5	525 PVC	0.5334	0.013	0.20	200.6	0.90	1.05	95.8%
							0.00	0.00	11.08				0.00									
							0.00	0.00	11.08				0.00									
STMMH104	STMMH 101	A-02	0.02	0.01	0.03	0.71	0.06	12.01	16.84	57.74			693.35	35.9	975 CONC	0.9906	0.013	0.24	1145.4	1.49	0.40	60.5%
							0.00	0.00	16.84				0.00									
							0.00	0.00	16.84				0.00									
STMMH 101	STMMH102	A-01	0.21	0.02	0.23	0.83	0.53	12.54	17.24	56.93			713.79	22.1	975 CONC	0.9906	0.013	0.24	1145.4	1.49	0.25	62.3%
							0.00	0.00	17.24				0.00									
							0.00	0.00	17.24				0.00									
STMMH102	STMMH103		0.00				0.00	12.54	17.49	56.45			707.74	24.7	975 CONC	0.9906	0.013	0.24	1145.4	1.49	0.28	61.8%
							0.00	0.00	17.49				0.00									
							0.00	0.00	17.49				0.00									
STMMH103	HEADWALL		0.00				0.00	12.54	17.77	55.92			701.10	7.7	975 CONC	0.9906	0.013	0.24	1145.4	1.49	0.09	61.2%
							0.00	0.00	17.77				0.00									
							0.00	0.00	17.77				0.00									

DEMAND EQUATION
Q = 2.78 AIR

Where : Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
R = Weighted runoff coefficient (increased by 25% for 100-year
I = Rainfall intensity in millimeters per hour (mm/hr)
Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

CAPACITY EQUATION
Q full= (1/n) A R^(2/3)So^(1/2)

Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **APRIL 04, 2022**

TO: **MS. JESSICA VALIC, P.ENG.**

FROM: **VAHID MEHDIPOUR**

RE: **BROOKSTREET APARTMENTS**
HYDRAULIC ANALYSIS OF STORM SEWERS (2-YEAR EVENT)
120202

CC: **RICHARD GOLDSTEIN – KRP PROPERTIES**

This memo has been prepared in response to the City of Ottawa request for hydraulic analysis of the Brookstreet Apartments storm sewer network to demonstrate that the proposed modifications to the existing storm sewers will not result in surface ponding during the 2-year design storm event.

Model Development

The following provides a brief overview of the data sources used in the hydraulic analysis:

- Pipe networks and elevations for each node/pipe were exported as a LandXML file from Civil 3D to PCSWMM. The imported pipe data (inverts, slopes, lengths) were checked against multiple drawings (120202-SWM.dwg, 120202-GP.dwg).
- The ground surface (T/G elevations for CBs and MHs) were taken from 1:1000 mapping and as-built survey data.
- The downstream boundary condition (74.66 m) used in the hydraulic analysis is the 2yr water level in the SWMF, as shown on Novatech Drawing 120202-GP2.dwg. For the purposes of this analysis, the boundary condition was applied as a fixed water elevation at the outlet to the pond.
- Subcatchment areas and parameters (area, slope, %impervious, etc.) are based on the proposed conditions storm drainage area plan (Drawing 120202-STM.dwg). The percent impervious was calculated using the Runoff Coefficients from the drainage area plan. Flow path lengths are measured for each Subcatchment.

Figure 1 illustrates the overall schematic of the PCSWMM model. Modelling files are packed and added to the package.

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Figure 1: Overal PCSWMM Model Schematics

Design Storm Selection

As the scope of this analysis is focused on the conveyance capacity of the storm sewers, the most important factor in selecting the appropriate design storm event is the peak rainfall intensity. The 3hr, 4hr and 6hr Chicago storm distributions most commonly used in the City of Ottawa all have the same 10-minute peak intensity, so the storm duration is not a factor in this analysis.

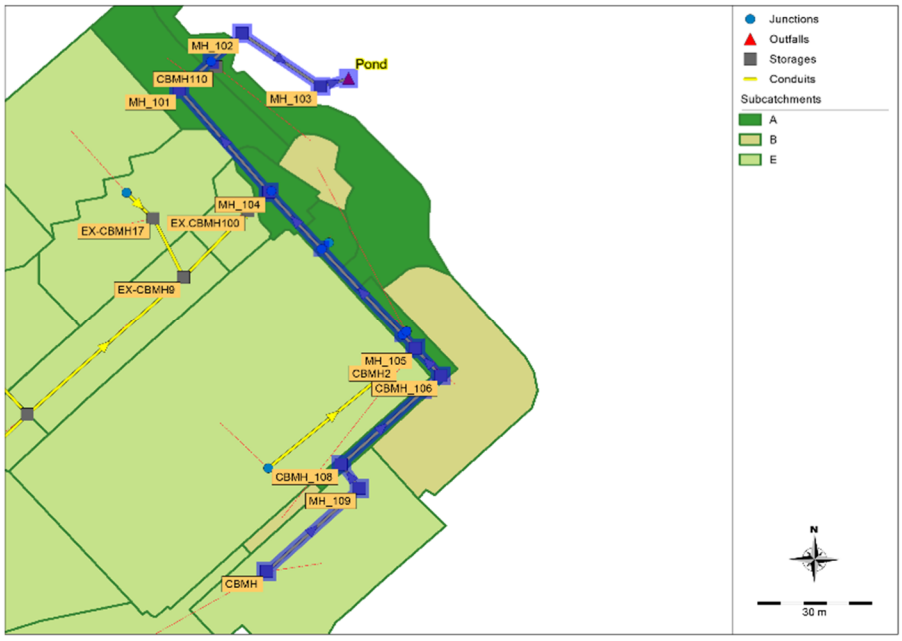
The 12hr and 24hr SCS and AES storm distributions have lower peak intensities and generate lower peak flows for highly impervious areas compared to the Chicago distribution.

Based on these factors, the hydraulic analysis was completed using the Chicago 6-hour storm distribution for the 2yr return period.

Model Results (2yr Event)

The 2-year HGL profile in the storm sewers is shown on the following profiles generated by PCSWMM, which show the top of the ground and maximum HGL elevations for selected and shown entities in **Figure 2** and **Figure 3**.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com



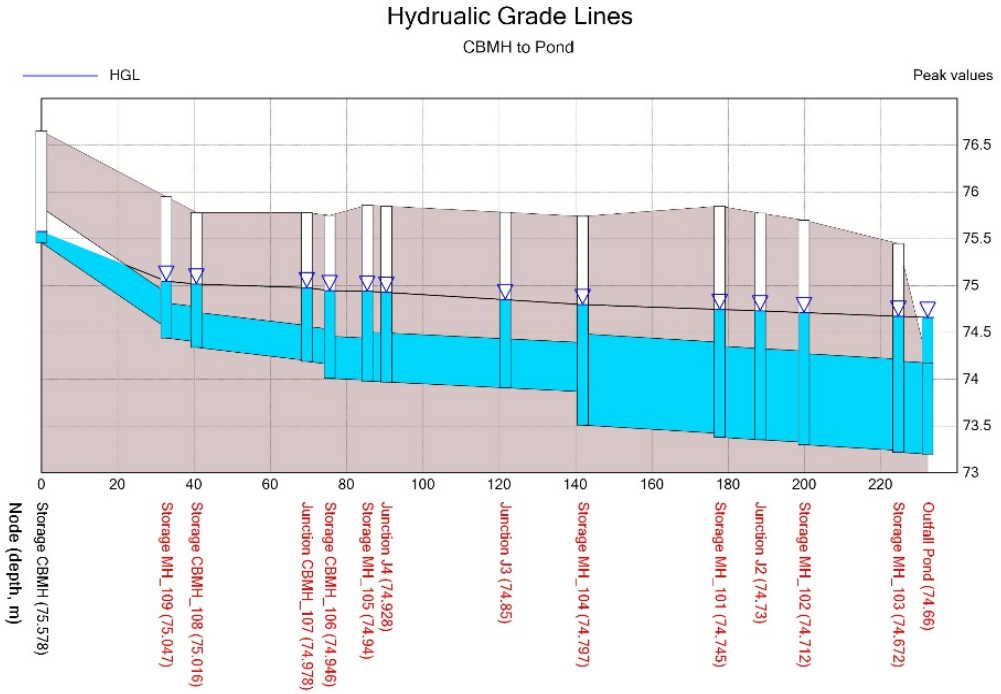
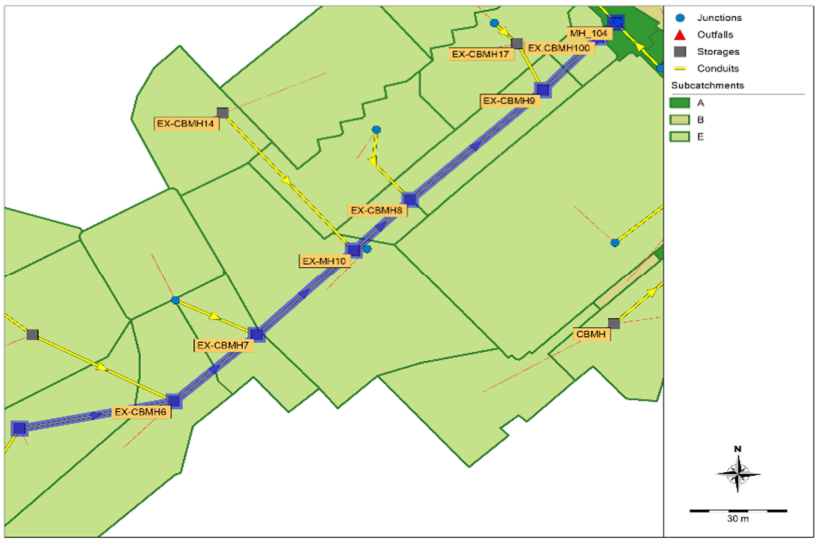


Figure 2: HGL Profile in Pipes from CBMH to Outlet

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com



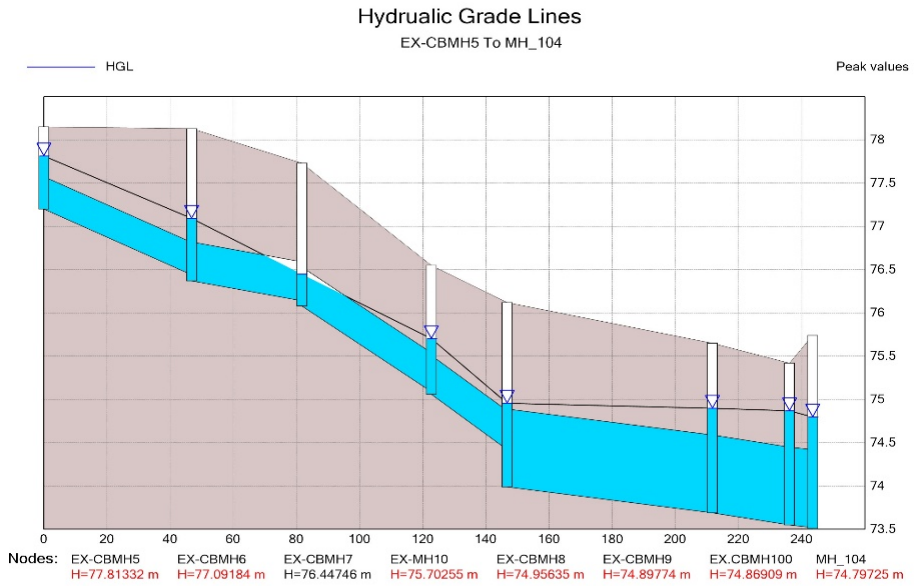


Figure 3: HGL Elevation in Pipe from CBMH5 to MH104

CONCLUSION

The HGL elevation within pipes close to the outlet are affected by the 2-year storm elevation in the existing SWM pond. The maximum HGL stays below the ground elevation for all nodes, and thus ponding will not be present during the 2-year storm event.

ATTACHMENT

PCSWMM Modelling File

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

APPENDIX C
Stormwater Management Calculations

STORMWATER MANAGEMENT PLAN
KANATA RESEARCH PARK, CITY OF KANATA

Prepared For:
KANATA RESEARCH PARK CORPORATION

Prepared By:
NOVATECH ENGINEERING CONSULTANTS LTD.

Submitted October 1999
Revised April 2000
Project No.: 93063

NOVATECH ENGINEERING CONSULTANTS LTD.

CONSULTING ENGINEERS AND PLANNERS

April 14, 2000

COURIER

Mississippi Valley Conservation
P.O. Box 268,
Lanark, Ontario
K0G 1K0

Attention: Mr. John Price, P. Eng.

Dear Sir:

Re: Kanata Research Park
Stormwater Management Plan
Our File: 93063

In July 1999 a preliminary SWM design brief outlining the scope of the Kanata Research Park Stormwater Management measures was submitted to the Regional Municipality of Ottawa Carleton (RMOC), City of Kanata, City of Nepean, National Capital Commission (NCC) and Mississippi Valley Conservation (MVC) for their comments. Thereafter, a preliminary stormwater management report entitled "Kanata Research Park Stormwater Management Report" was to the approval agencies for their review. The October 1999 report has been revised to reflect the comments of the approval agencies and is being resubmitted for final approval.

The report has been prepared in accordance with:

- "Shirley's Brook and Watts Creek Subwatershed Study" (Dillon, 1999);
- "Master Drainage Study Kanata North Urban Expansion Area Duck Pond Lands" (NECL, November 1992);
- "Stormwater Management Practices and Planning Design Manual" (MOE, June 1994); and,
- "Guidelines for Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario (G of O), May 1987).

The report details the:

- Stormwater quantity control measures, in particular the pre and post development flows and the allowable release rates and storage volumes for the 2-year through 100-year return periods;
- Stormwater quality treatment measures; in particular the required storage volumes to ensure Level 2 treatment of TSS;

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- Realignment and proposed cross section for Shirley's Brook, Kizell Drain and channel upstream of 4th Line Road;
- Impact on the water levels, routing and velocities as a result of the channel realignment and revised cross section; and,
- Erosion and sediment control measures.

A separate design brief will be submitted in support of the MOE storm and stormwater management Certificate of Approval applications detailing the design of the storm sewers and SWM facilities in accordance with the design criteria outlined in this report.

Monitoring of the SWM facilities is a condition of the Certificate of Approval (C of A). Completion of an operations and maintenance manual detailing monitoring procedures will be completed and circulated to the approval agencies upon acceptance of the SWM report and the design brief.

We trust this is to your satisfaction. If there are any further questions please do not hesitate to contact us.

Yours truly,

NOVATECH ENGINEERING CONSULTANTS LTD.

Fairouz Wahab, E.I.T.

FW/fw

C.c. Bronwen Heins, KRPC
Stu Moxley, City of Kanata
Patrick Leblanc, RMOC
L. Michaud, NCC
D. Boyter, DFO

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF PLANS

Plan Number	Title
93063-SWM 93063-SWM2	Stormwater Management Concept Plan
99004-RSB	KRP Golf Course Realigned Shirley's Brook General Plan
99004-RKD	KRP Golf Course Realigned Kizell Drain General Plan
99004-XS	KRP Golf Course Cross-Sectional Detail Sheet
99004-D1	KRP Golf Course Detail Sheet
99004-D2	KRP Golf Course Detail Sheet
93063-FL1	Existing Shirley,s Brook, Kizell Drain and Duck Pond Channel Flood Plain
93063-FL2	Realigned Shirley,s Brook, Kizell Drain and Duck Pond Channel Flood Plain
93063-XS1 93063-XS2	Realigned Shirley's Brook and Kizell Drain Cross-Section
93063-PD	Land Areas with Drainage to Pond 2 and Pond 3

* This Table added to report November 2, 2007

1.0 INTRODUCTION

1.1 Background

Novatech Engineering Consultants Ltd. (NECL) has been retained to conduct the necessary studies and designs to proceed with the development of the Kanata Research Park Corporation lands.

The subject property, owned by the Kanata Research Park Corporation (KRPC), is located within the City of Kanata and forms part of the Kanata North Business Park. The 188 ha site is bound by Fourth Line Road and the CNR tracks to the north, Legget Drive to the east and south and Terry Fox Drive to the west and is zoned light industrial.

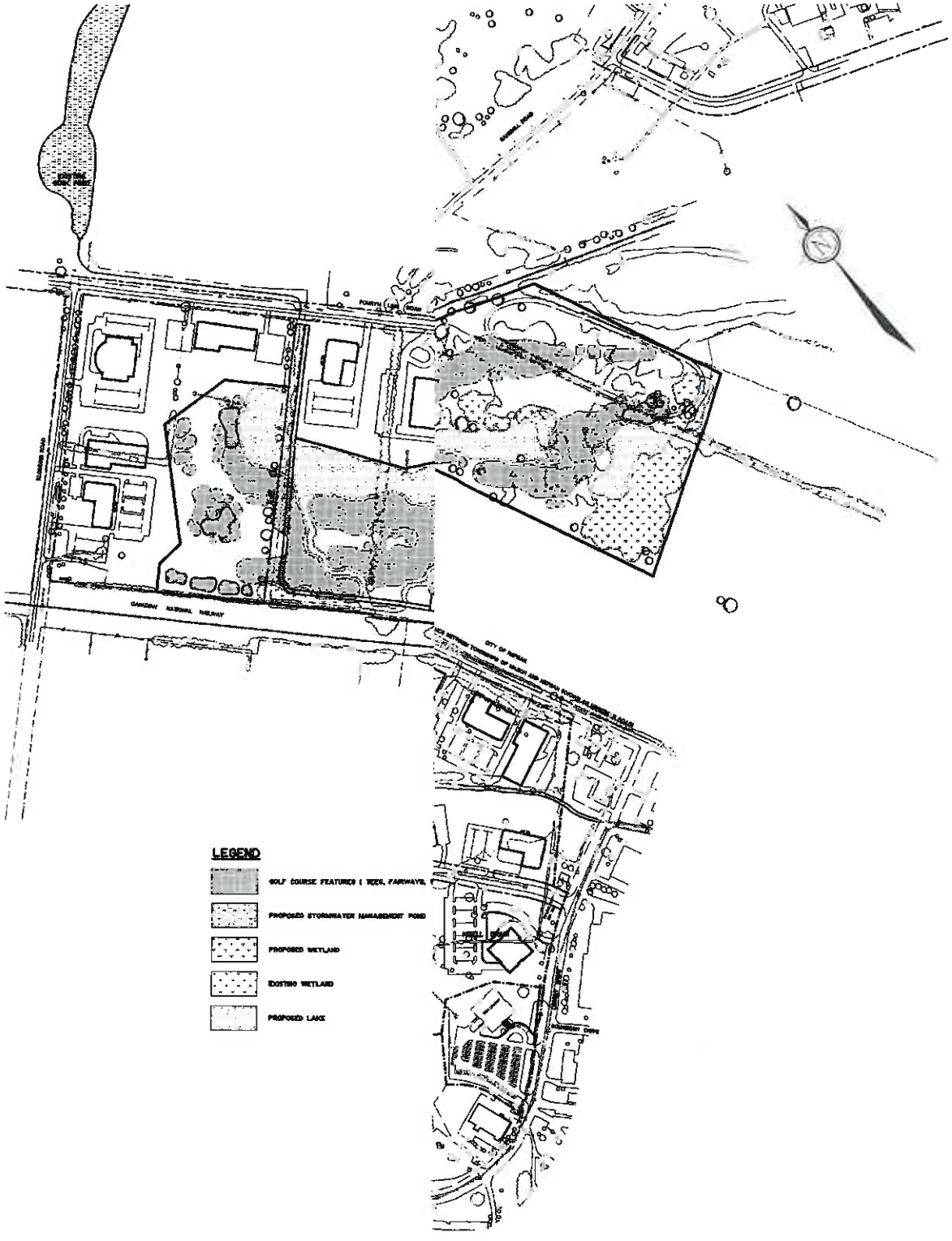
For the most part the site is undeveloped with the exception of a few office buildings fronting onto Terry Fox Drive and Legget Drive. The majority of the lands are still vacant agricultural fields, including a swamp and marsh wetland in the southeast corner nearest to Legget Drive.

A portion of the lands, approximately 94ha, have been allotted for the construction of a championship 18 hole golf course, with the balance of the lands being a business park, including a hotel, restaurant and office buildings. Portions of the golf course, approximately 17.7ha, are located north of Herzberg Road within the National Capital Greenbelt, which is owned by the National Capital Commission (NCC). Refer to Figure 1 for a conceptual site plan.

In July 1999 a preliminary SWM design brief outlining the scope of the project and the proposed SWM measures was submitted to the Regional Municipality of Ottawa Carleton (RMOC), City of Kanata, City of Nepean, National Capital Commission (NCC) and Mississippi Valley Conservation (MVC) for their comments. Thereafter, a preliminary stormwater management report entitled "Kanata Research Park Stormwater Management Report" was issued in October 1999 to the RMOC, City of Kanata, and MVC for their review. The October 1999 report has been revised to reflect the comments of the approval agencies, refer to Appendix A for approval agency comments.

The stormwater management plan (SWMP) has been prepared in accordance with:

- "Shirley's Brook and Watts Creek Subwatershed Study" (SBWCSS), (Dillon, 1999);
- "Master Drainage Study Kanata North Urban Expansion Area Duck Pond Lands" (NECL, November 1992);
- "Stormwater Management Practices and Planning Design Manual" (SMPPDM), (MOE, June 1994);
- "Environmental Assessment of Proposed Golf Course, Kanata Research Park Corporation" (ESG International Inc., August 1999); and,
- "Guidelines for Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario (G of O), May 1987).



NCEPT PLAN

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An analysis of the expected impact on the water levels, routing and velocities as a result of the proposed realignment of the reaches of Shirley's Brook and Kizell Drain passing through the proposed development was completed at the request of the MVC.

Analyses of the storage volumes required to control post-development flows to pre-development levels and provide Level 2-quality treatment were completed.

In addition Best Management Practices (BMPs) and erosion and sediment control measures consistent with current ministry guidelines have been incorporated into the design of the drainage works.

The proposed development requires the approval of the following agencies:

- City of Kanata;
- City of Nepean;
- National Capital Commission;
- Mississippi Valley Conservation (MVC); and,
- Regional Municipality of Ottawa-Carleton (RMOC), Environmental and Transportation Division (ETD)

Submissions were made in September 1999 to: the Department of Fisheries and Oceans (DFO) to obtain a permit for the "Authorization of Harmful Alteration, Disruption or Destruction of Fish Habitat" to proceed with the realignment of Kizell Drain and Shirley's Brook; and the MVC to obtain a permit to commence works within the current designated fill and flood areas. Authorization has since been issued by the DFO to proceed with the realignment of the watercourses within the subdivision and the MVC to initiate works within the designated fill areas. Refer to Appendix B for permit copies.

1.2 Previous Reports

***"Shirley's Brook and Watts Creek Subwatershed Study"* (Dillon Consulting Ltd., 1999)**

Table 1 is a summary of the environmental protection targets outlined in the subwatershed study pertaining to the KRPC lands within Shirley's Brook and Kizell Drain. The subcatchments are illustrated on the drawing 93063-SWM.

Table 1.0: Environmental Protection Targets – Shirley's Brook and Kizell Drain

	Shirley's Brook S4	**Kizell Drain K2**
Surface Water Quality and Quantity		
• Provide Level 2 water quality treatment of urban stormwater runoff.	yes	yes
• Maintain post-development peak flows to existing levels.	yes	yes

Instream Water Quality

• Dissolved oxygen > 3.0mg/L, Temperature < 2° C change (in stormwater discharge), pH 6.5-9.0, TSS 10 mg/L, un-ionized ammonia 0.02 mg/L, Total phosphorus 0.03mg/L, Aluminum 0.3mg/L, Cadmium 0.0005 mg/L, Copper 0.005 mg/L, Lead 0.025 mg/L and Zinc 0.03 mg/L.	yes	yes

Stormwater Management Practices

• Provide water quality storage to meet instream and level 2 criteria.	yes	yes
• Peak flows for the 2-100 year events to be controlled to pre-development levels.	yes	yes

Morphology

• No regulation of low flow events.	yes	yes
• Protect low order tributary channels.	yes	yes
• No reduction in the length of the main channel.	yes	yes
• Maintain drainage density.	yes	yes
• Stream corridor based on meander belt width.	yes	yes
• Enhance diversity of riparian zone vegetation.	yes	yes
• Ensure that the entrenchment exceeds 4.	yes	yes
• Develop set back limits to the stream corridor.	yes	yes
• Spacing of SWM along length of channel.	yes	yes
• In-channel works to address existing erosion issues; improve variability of bed morphology (inter-pool gradient should be within 10% of bankfull gradient)	yes	yes
• Protect on-line ponds, wetlands, artesian wells and low order streams so that the natural hydrologic function is not impaired.	yes	yes
• Minimize watercourse crossing.	yes	yes

Natural Area Protection and Restoration

• Restoration of reach 9 through natural design.	yes	N/A
• Improve natural habitat through reach 3.	N/A	yes
• Enforce 15m buffer for future development	yes	yes

"Master Drainage Study Kanata North Urban Expansion Area Duck Pond Lands" **(NECL, November 1992)**

- Water quality treatment for all areas can be adequately provided in the existing Duck Pond, therefore there is no need for on-site water quality treatment for areas A1, A2, A5, A7, A8 and A9.

- Maximum water level in the Duck Pond level is 66.23m, corresponding to an outflow of 8.24m^3/s.

- The existing Duck Pond can adequately regulate water quantity for all areas, including area A9, provided that areas A1, A2, A5, A7 and A9 are controlled to an average of 52L/s/ha, with the roadways going uncontrolled.

- The 12-hour, 5yr and 100yr SCS design storms should be used for on-site storage design.

Excerpts of the master drainage plan showing the subcatchment boundaries and the allowable release rates are provided in Appendix C.

The drainage areas modeled in the 1992 NECL report have been modified to accommodate the golf course and commercial development. Areas A1, A5, A6, A7 and A9 are now identified as areas 2, 4 and 11, refer to Table 9.0 and drawing 93063-SWM for further details. The 1992 NECL OTTHYMO model has been revised using SWMHYMO98 to reflect the new drainage boundaries and the future land uses while maintaining the water level and release rate in the Duck Pond specified 1992 study. Refer to sections 2.1.2 and 3.2 for further explanation.

1.3 Objective

The objective of this study is to provide a SWMP, which satisfies the requirements of the review and approval agencies and provide a guide for the detailed design of the drainage works.

This study identifies the principal components of the SWMP required for quantity control, quality treatment, realignment of Shirley's Brook and Kizell Drain and erosion and sediment control protection measures.

2.0 STORMWATER MANAGEMENT DESIGN CRITERIA

The following assumptions and criteria were used in the preliminary design of the stormwater management facilities.

2.1 Flows

2.1.1 Shirley's Brook and Kizell Drain

- Control the 2-year through the 100-year post-development flows to pre-development levels, as recommended in the subwatershed study (Dillon, 1999).

- Use the 2–year, 5-year, 10-year, 25-year and 100-year design storms from the subwatershed study (Dillon, 1999).
- Use the curve numbers (CN) given in the 1989 A.J.R study "Water Management Plan for Shirley's Brook, Kizell Drain, Watts Creek, Harwood Creek".
- Estimate the time to peak (t_p) using the equations $t_p=0.0086A^{0.422}S^{-0.46}(L/W)^{0.133}$ for slope <2% and $t_p=0.0016A^{0.31}S^{-0.50}$ for slopes >2%, given in the MTO drainage manual.
- 80% imperviousness (C=0.75) for future development blocks.
- Pre and post-development golf course runoff is the same, i.e. no increase in peak flow from the golf course as compared to existing conditions, an explanation for which is provided in section 3.1.1.

2.1.2 Duck Pond Lands

- Use the 5-year and the 100-year design storms and CN given in the NECL study.
- The hydrological characteristics for areas A2, A3, A4 and A8 remain unchanged.
- Control, if necessary, the 100 year post-development peak flow from the golf course and the commercial development such that the water level in the Duck Pond does not exceed 66.23m and outflow does not exceed 8.24m^3/s.
- 80% imperviousness (i.e. C=0.75) for future development blocks.
- Pre and post-development golf course runoff is the same, i.e. no increase in peak flow from the golf course as compared to existing conditions, an explanation for which is provided in section 3.1.1.
- No increase in the 100-year hydraulic grade line at the CNR tracks calculated in the 1992 NECL study.

2.2 Water Quality

2.2.1 Shirley's Brook and Kizell Drain

- Level 2 treatment of the first flush runoff, i.e. 70% removal of TSS, is required prior to discharging into Shirley's Brook and Kizell Drain (Dillon, 1999).
- Water quality storage volumes are as per Table 4.1 "Water Quality Storage Requirements based on Receiving Waters" of the SWMPPDM (MOE, June 1994).
- Pond 1 and Pond 3 require 144m^3/ha of quality storage, 40m^3/ha for active storage and 104m^3/ha for permanent pool storage. Refer to section 3.2.2 for further details.
- Pond 2 requires 242m^3/ha of quality storage, 40m^3/ha for active storage and 202m^3/ha for permanent pool storage. Refer to section 3.2.2 for further details.
- A Stormceptor® STA 2000 will be installed to treat the runoff from the 4.0ha of the Swansea development, as per the approved SWM report "Operations Centre Newbridge – Kanata Research Park Stormwater Management Report" (NECL, December 8, 1993) will be provided runoff. Treatment of the additional 1.25ha of parking that were not included in the December 8, 1993 report will be provided via additional treatment in Pond 1. Refer to section 3.2.2 for further details.
- Stormceptors type structures will be installed in areas 8 and 10 as a precautionary measure for additional oil and grit removal. Refer to sections 3.0 and 3.2.2 for further explanation.

- BMPs and a turfgrass management plan will be used to treat golf course runoff.

A copy of the "Turfgrass Management Plan for the Proposed Golf Course, Kanata Research Park Corporation" completed by ESG International Inc. (September 1999) is provided in Appendix D.

2.2.2 Duck Pond Lands

- No on-site quality treatment is required for the areas draining into the Duck Pond (NECL, 1992). Refer to section 1.2 and Appendix C for supporting documentation.

2.3 Erosion and Sediment Control

- Minimize the volume of erosion and sediment during construction (MOEE, May 1987)

3.0 PROPOSED SWM

Drawing 93063-SWM provides an overview of the drainage areas, SWM techniques (i.e. on-site, end-of-pipe or BMPs) and the type (quantity, quality or both) of treatment to be provided. A brief explanation of the proposed SWM works is summarized below and detailed in subsequent sections:

- SWM Pond 1 provides quantity control for area 1 and quality treatment for area 1 and 1.25ha of the parking from the Swansea development. The parking area adjacent to the Swansea development is not directly connected to Pond 1, therefore additional treatment (i.e. 80% removal of TSS) of the runoff from area 1 in Pond 1 will be provided to allow the parking area to discharge untreated into Shirley's Brook.
- SWM Pond 2 provides quantity and quality control for the development blocks in areas 2 and 8. Area 8 is not directly connected to Pond 2, therefore over-control and additional treatment of the runoff from area 2 is provided in Pond 2 to allow area 8 to discharge uncontrolled and untreated into Kizell Drain. In addition an oil and grit separator will be installed in area 8.
- SWM Pond 3 provides quantity control and quality treatment for area 3 and area 10. Area 10 is not directly connected to Pond 3, therefore over-control of the runoff from area 3 in Pond 3 will be provided to allow area 10 to discharge uncontrolled. Approximately 120ha from upstream of Legget Drive will drain towards Pond 3 through the proposed storm sewer. Pond 3 has been designed to treat the runoff from a combined area equivalent to areas 3 and 10. Therefore treatment of an area equivalent to area 10 from upstream of the KRP lands has been provided in lieu of the lands within the subdivision. In addition an oil and grit separator will be installed in area 10.
- Duck Pond provides quantity and quality control for area 4. Refer to section 3.3.1 and 3.3.2 for further details.
- No on-site quantity or quality control measures will be provided for Area 11.
- No quantity control of the golf course runoff, i.e. areas 2 (golf course portion only), 5, 6, 7 and 11 is required.
- Quality treatment of golf course runoff, i.e. areas 2 (golf course portion only), 5, 6, 7 and 11 is provided through implementation of the turfgrass management plan.

- Pond 1, 2 and 3 function independently of the watercourse hydraulics (i.e. water levels in the ponds are not influenced by the water levels in the watercourses).

3.1 Golf Course

Treatment of runoff from the golf course both from a quantity and quality perspective have been addressed in detail in the "Turfgrass Management Plan for Proposed Golf Course, Kanata Research Park Corporation" (ESG International Inc., September 1999) provided in Appendix D.

3.1.1 Quantity Control

On-site or end of pipe stormwater quantity measures are not required to control runoff from the golf course tees, greens, fairways and roughs. The playing surfaces will be constructed with soils with a high infiltration capacity to ensure good turfgrass quality, as well as mitigate water quality and quantity impacts.

As stated in the turfgrass management plan: "turfgrass ecosystems result in soils with a high infiltration capacity thereby reducing the potential for nutrient loss and subsequent water quality deterioration by runoff. Even on sites with 9 to 12 percent slopes with silt loam soils, in a 2 year study, only one natural precipitation event led to runoff (USGA 1990)."

3.1.2 Quality Treatment

Brief descriptions of the relevant BMPs pertaining to the treatment of stormwater runoff are provided below:

- Selection of turfgrass such that it is aesthetic, requires minimal irrigation and maintenance and has low susceptibility to disease thereby reducing the need for pesticides and herbicides and reducing surface runoff.
- Proper selection and the selective application of slow release fertilizers with low solubility, made of both organic and synthetic compounds, to encourage maximum plant uptake and reduce the potential of dissolution in surface runoff or leaching into the groundwater.
- Proper selection and the selective application of pesticides with a shorter half-life and a greater adsorption to soil and vegetative surfaces; therefore reducing leaching to wetlands, SWM ponds and watercourses.
- Incorporation of BMPs into the design of the golf course to address water quality, in particular:
  - Treatment of runoff by wetland benches and vegetative buffers around SWM ponds and streams.
  - Identification of transition and riparian zones where fertilizers and pesticides will not be applied.
  - Reduced grading to minimize surface runoff and the impact of pesticides and fertilizers.
  - Use of perforated catchbasins to encourage the infiltration of minor event runoff.
- Minimal irrigation.

Refer to the turfgrass management plan provided in Appendix D for further details.

Where feasible golf course drainage will be directed to the stormwater management facilities thereby providing some treatment of the runoff prior to entering the natural watercourse. For areas that can not, due to elevational constraints, outlet to a SWM facility and discharge directly to Shirley's Brook or Kizell Drain a buffer strip (10m±) will be provided to promote runoff infiltration.

3.2 Business Park

3.2.1 Quantity Control

The pre and post-development conditions were modeled using SWMHYMO98 and the design criteria outlined in section 2.1. A summary of the pre and post development hydrologic parameter is provided in Table 2.0. Under post-development conditions the future development blocks were separated into rural (golf course) and urban areas (commercial development). The parameters used to determine the pre-development flow hydrographs were used to simulate the golf course lands under post-development conditions.

Table 2.0: Pre and Post-Development Hydrologic Parameters

Area	Pre-Development Conditions		Post-Development Conditions				
	Pervious Area		Impervious Area			Pervious Area	
	Area (ha)	CN	Area (ha)	% Imp.	Slope (%)	Area (ha)	CN
1	19.85	70	19.85	80	1	-	-
2	11.6	81	21.14	80	1	19.50	70
3	23.48	81	23.48	80	1	-	-
4	52.49	57	34.17	80	1	18.32	57
8	2.85	81	2.85	80	1	-	-
10	6.53	81	6.53	80	1	-	-

A summary of the pre-development peak flows from each of the subcatchments for various rainfall events is provided in Table 3.0. Refer to Appendix E for the detailed modeling.

Table 3.0: Pre-Development Peak Flows

Area I.D.	Pre-Development Flow Rates				
	2 year (m^3/s)	5 year (m^3/s)	10 year (m^3/s)	25 year (m^3/s)	100 year (m^3/s)
1	0.370	0.547	0.822	1.089	1.514
2	0.329	0.470	0.678	0.872	1.167
3	0.653	0.934	1.352	1.740	2.334
8	0.089	0.125	0.179	0.229	0.305
10	0.199	0.282	0.405	0.518	0.690

The post-development peak flows from each of the subcatchments for various rainfall events are summarized in Table 4.0. Refer to Appendix F for the detailed modeling.

Table 4.0: Post-Development Peak Flows

Area I.D.	Outlet	Post-Development Flow Rates				
		2 year (m^3/s)	5 year (m^3/s)	10 year (m^3/s)	25 year (m^3/s)	100 year (m^3/s)
1	Pond 1	0.978	1.284	1.715	2.094	2.647
2	Pond 2	1.379	1.864	2.583	3.236	4.225
3	Pond 3	1.155	1.512	2.026	2.474	3.128
8	Creek	0.141	0.186	0.250	0.304	0.383
10	Creek	0.323	0.426	0.569	0.694	0.876

The COMPUTE VOLUME command in SWMHYMO98 was used to calculate the storage volume required assuming a maximum release rate equal to the pre-development flow rate for each return period.

For Pond 2 the allowable release rate was calculated by subtracting the uncontrolled flow from area 8 from the pre-development flow from areas 2 and 8 ($Q_{\text{Allowable Pond 2}} = Q_{\text{Pre Area 2\&8}} - Q_{\text{Post Area 8}}$). The same logic described above was used to calculate the allowable release rate from Pond 3, ($Q_{\text{Allowable Pond 3}} = Q_{\text{Pre Area 3\&10}} - Q_{\text{Post Area 10}}$). Therefore, over-control has been provided in Ponds 2 and 3 to allow areas 8 and 10 to drain uncontrolled into Kizell Drain.

As explained above under post-development flow conditions the future development blocks are separated into rural (golf course) and urban areas (commercial development). The parameters used to determine the predevelopment flow hydrographs were used to simulate the golf course lands under post-development conditions. Therefore, the storage volumes account for the volume of water that will "flow through" the pond from the golf course lands.

Table 5.0 provides a summary of the maximum allowable release rates and Table 6.0 a summary of the required storage volumes. Refer to Appendix F for the detailed modeling.

Table 5.0: Maximum Allowable Release Rates from Ponds 1, 2 and 3

SWM Facility	Release Rate				
	2-year (m^3/s)	5-year (m^3/s)	10-year (m^3/s)	25-year (m^3/s)	100-year (m^3/s)
Pond 1	0.370	0.547	0.822	1.089	1.514
Pond 2	0.277	0.409	0.607	0.797	1.089
Pond 3	0.529	0.790	1.188	1.564	2.148

Table 6.0: Storage Volumes for Ponds 1,2 & 3

SWM Facility	Storage Volume				
	2-year	5-year	10-year	25-year	100-year
Pond 1	2460m^3	2990 m^3	3740 m^3	4350 m^3	5210 m^3
Pond 2	4730 m^3	6070 m^3	8060 m^3	9950 m^3	12850 m^3
Pond 3	2620 m^3	3090 m^3	3790 m^3	4390 m^3	5250 m^3

3.2.2 Quality Treatment

Pond 1 will provide quality treatment for area 1 and part of the Swansea development located north of Pond 1. The Swansea development is approximately 5.25ha. Quality treatment of the runoff from the additional 1.25ha of parking adjacent to the Swansea development that was not part of the approved SWM report "Operations Center Newbridge – Kanata Research Park Stormwater Management Report" (NECL, December 8, 1993) will be provided in Pond 1. A Stormceptor STA 2000 will provide treatment of the runoff from balance of the Swansea development, in accordance with the approved SWM report entitled "Operations Center Newbridge – Kanata Research Park Stormwater Management Report" (NECL, December 8, 1993).

The 1.25ha parking area adjacent to the Swansea development is not directly connected to Pond 1 and outlets directly into Shirley's Brook. Therefore, additional treatment, i.e. 80% removal of TSS, of the runoff from area 1 is provided in Pond 1 to allow the parking area to discharge untreated into Shirley's Brook and ensure Level 2 treatment as per the subwatershed study (Dillon, 1999). Detailed TSS removal calculations are provided in Appendix G. Table 7.0 outlines the storage volumes required in Pond 1 to provide Level 2 treatment in accordance with the subwatershed study.

Pond 2 will provide quality treatment for areas 2 and 8. Area 8 is not directly connected to Pond 2 and discharges directly into Kizell Drain upstream of Pond 2. As a result additional treatment, i.e. 80% removal of TSS, of the runoff from area 2 is provided in Pond 2 to allow area 8 to discharge untreated into Shirley's Brook and ensure Level 2 treatment as per the subwatershed study (Dillon, 1999). Notwithstanding the above, at the request of the DFO and Environment Canada (EC) an oil and grit separator will be installed in area 8 as an additional precaution. Detailed TSS removal calculations are provided in Appendix G. Table 7.0 outlines the storage volumes required in Pond 2 to provide Level 2 treatment in accordance with the subwatershed study.

Pond 3 will provide quality treatment for areas 3 and 10. Area 10 is not directly connected to Pond 3, but outlets directly into Kizell Drain downstream of Pond 3. Pond 3 is different than Pond 2 in that in addition to the 23.48ha (area 3) draining into Pond 3, approximately 110ha from upstream of Legget Drive will drain towards Pond 3 through the storm sewer. The pond has been designed to provide quality storage for 32.14ha, 23.48ha from area 3, 6.53ha from upstream of area 3 in lieu of the drainage from area 10 and 2.14ha to account for the proposed future urbanization of Legget Drive. Therefore treatment of 6.53ha from upstream of the KRP

lands has been provided in lieu of the 6.53ha within the subdivision. Therefore additional treatment, i.e. greater than 70% removal of TSS, Pond 3 is not required. Notwithstanding the above, at the request of the DFO and EC an oil and grit separator will be installed in area 10 as an additional precaution. Detailed calculations of the storage volume required are provided in Appendix G. Table 7.0 outlines the storage volumes required in Pond 3 to provide Level 2 treatment in accordance with the subwatershed study.

Table 7.0: Water Quality Treatment Volumes

Location	Drainage Area (ha)	Criteria (m^3/ha)	Storage Volume (m^3)	Active Storage (m^3)	Permanent Storage (m^3)
Pond 1	21.15	242	4118	846	4272
Pond 2	21.14	242	5116	846	4270
Pond 3	32.14	144	4629	1286	3343

Tables 8.0 provides a description of the drainage areas contributing to each of the SWM ponds and represent the commercial development areas only. As stated in section 3.0 and explained further in sections 3.1.1 and 3.1.2 quality control of the runoff from the golf course areas (areas 2 (golf course portion only), 5, 6, 7 and 11) will be addressed through the turfgrass management plan. Therefore, no quality storage has been provided in the SWM ponds for the golf course lands.

Table 8.0: Explanation of Drainage Areas Requiring Water Quality Treatment

SWM Facility	Total Area	Comments
Pond 1	21.15ha	Area 1 = 19.1ha, Parking Area Swansea Bldg. = 1.25ha
Pond 2	21.14ha	Commercial Block in Area 2 = 21.14ha
Pond 3	32.14ha	Area 3 = 23.5ha, Area 10 = 6.5ha, Legget Dr. ROW = 2.14ha

3.3 Duck Pond Lands

3.3.1 Quantity Control

The 1992 NECL OTTHYMO model from the "*Master Drainage Study Kanata North Urban Expansion Area Duck Pond Lands*" was revised using SWMHYMO to reflect the new drainage boundaries and future land uses. In the 1992 submission 144.5ha was modeled draining into the Duck Pond. Current development plans suggest 122.7ha will drain into the Duck Pond. A comparison of drainage areas used in the 1992 Master Drainage Plan and the revised drainage areas as per the current development plan is provided in Table 9.0 below.

Table 9.0 Duck Pond Tributary Areas

Master Drainage Study (NECL, 1992)	Outlet	KRP SWM Report (NECL, March 2000)	Outlet
A1 = 2.0ha	Duck Pond	2 = 4.51ha (Area 1 and part of A9)	Pond 2
A2 = 6.1ha	Duck Pond	A2 = 6.1ha	Duck Pond
A3 = 32ha	Duck Pond	A3 = 32ha	Duck Pond
A4 = 20.2ha	Duck Pond	A4 = 20.2ha	Duck Pond
A5 = 16.3ha	Duck Pond	4 = 52.5ha (Areas A6,A7 & Part of A5)	Duck Pond
A6 = 27.9ha	Duck Pond		
A7 = 19.3ha	Duck Pond		
A8 = 11.9ha	Duck Pond	A8 = 11.9ha	Duck Pond
A9 = 8.8ha	Duck Pond	11 = 12.7ha (Part of area A9 & A5)	4th Line Rd.
Total = 144.5ha		***Total = 139.1ha***	

There is a slight discrepancy in the drainage area used in the master drainage study as compared to the areas used in the KRP SWM report and is attributed to more detailed information.

The master drainage plan (NECL, 1992) allowed for a peak flow into the Duck Pond of 16.70m^3/s, resulting in an outflow of 8.24m^3/s from the Duck Pond, a storage volume of 4.143ha-m and an operating level of 66.23m. The revised drainage scheme (refer to table above for further details) suggests that 122.7ha will drain to the Duck Pond at a peak flow rate of 18.96m^3/s, resulting in an outflow of 8.03m^3/s, a storage volume of 4.11ha-m and an operating level of 66.22m. Therefore no additional quantity control measures are required. Refer to Appendix H for the detailed modeling.

As stated in sections, 3.0 and 3.1.1, quantity control of the golf course runoff is not required. The 1992 master drainage study recommended that if area A9, assumed to be industrial development, ultimately discharged to the Duck Pond then control of on-site runoff to 50L/s/ha would be required using on-site quantity control measures. It is proposed to leave area 11, formerly referred to as A9 (NECL, 1992), landscaped resulting in no net change in pre and post-development conditions, therefore requiring no on-site quantity control measures. In the event that a portion of this area becomes hard surface post-development flows will be controlled to pre-development levels through on-site quantity control measures or if feasible in the Duck Pond at which time the SWMHYMO analysis would be revisited.

3.3.2 Quality Treatment

As explained in section 1.2, the Duck Pond can provide quality treatment for all upstream areas and as a result no additional on-site water quality treatment is required. Therefore, no on-site quality treatment is required for area 4; treatment will be provided in the Duck Pond. Refer to Appendix A for supporting documentation and drawing 93063-SWM for the location of area 4.

As explained in sections 3.0 and 3.1.2, treatment of the golf course runoff will be addressed through implementation of the turfgrass management plan. It is proposed to leave area 11

landscaped, thereby requiring no additional on-site quality control measures. In the event that a portion of this area becomes hard surface quality treatment will be addressed through on-site measures or if feasible in the Duck Pond.

3.4 Stormwater Management Design

The following is a description of the stormwater management design guidelines for ponds 1, 2 and 3. Ponds 1, 2 and 3 will be designed as per the guidelines for wet ponds outlined in the SMPPDM (MOE, June 1994) and the guidelines set out in the SBWCSS (Dillon, September 1999).

***"Stormwater Management Practices and Planning Design Manual"* (June 1994)**

- Minimum length to width ratio of 3:1.
- Permanent pool depth of 1 to 2m with a maximum depth of 3m.
- Active pool depth of 1 to 1.5m maximum.
- Minimum slope of 5:1 at the edge of the permanent pool that extends 3m into the pond and up the slope.
- Outlet will be larger than 75mm ø if not protected by a perforated riser, otherwise it will larger than 50mm ø, in order to provide 24hr of detention.
- Surcharge upstream, deposition and re-suspension will be addressed if a submerged inlet is proposed.
- Minimum length to width ratio of 2:1 within the sediment forebay.
- Sediment forebay should a minimum of 1m deep.
- Sediment forebay should not be larger than 1/3 of the wet pond surface area.
- Forebay berm should be within 300mm of the permanent pool elevation.
- All inlet and outlet pipes through the sediment forebay berm should be set 0.6m above the bottom of the pond.
- Line sediment forebay below the permanent pool with open block/stone to facilitate sediment removal.
- Placement of approved plantings within the deep water, shoreline fringe, flood fringe and upland areas.
- Provision of an access road for maintenance.

***"Shirley's Brook and Watts Creek Subwatershed Study"* (Dillon Consulting Ltd., 1999)**

- Facility designs should follow the general design guidelines as outlined in the "Stormwater Management Practices and Planning Design Manual" prepared by the MOE.
- A geotechnical investigation should be carried out at proposed pond locations to assess the suitability of the site with respect to groundwater levels, bedrock and slope stability concerns (where applicable).
- The end-of-pipe facilities should be treated as complementary landscape features, enhancing the adjacent natural features, parklands or the general landscape.

- A landscape plan should be prepared for each end-of pipe facility. In addition to aesthetics, shading provided by plantings around the facility will assist in minimizing of thermal impacts of outflows in the receiving watercourses.
- A planing plan should be prepared for each end-of-pipe facility to complements and enhance its quality control functions. Plant species should be selected to meet the wide gradient in soil moisture conditions anticipated in and around the ponds.
- An access road to each end-of-pipe facility should be provided. In addition, a maintenance strip should be included around the perimeter of the pond to allow for maintenance and operational activities such as grass mowing and the removal of trapped debris.
- All end-of-pipe facilities should be constructed with a sediment forebay to trap larger particles near the inlet of the pond. In general, the sediment forebay should be no more than one-third the surface area of the pond surface area and should have a minimum length to width ratio of 2:1.
- An access road extending into the sediment forebay should be incorporated into the pond side slopes to facilitate removal of accumulated sediment by mechanized equipment.
- Maximum side slopes of 5H: 1V should be provided for wet ponds and artificial wetlands below the permanent pool.
- Consideration should be given for terraced grading around the perimeter of the pond extending up from the water's edge of the permanent pool, based on accessibility, maintenance and safety considerations.
- All ponds should have a minimum length to width ratio of 3:1.

Suitable stormwater BMPs will be incorporated where feasible into the development of the commercial blocks, taking into consideration that water quantity control and quality treatment have already been provided for in the end-of-pipe facilities.

4.0 REALIGNMENT OF SHIRLEY'S BROOK, KIZELL DRAIN AND THE DUCK POND CHANNEL

A study has been completed in accordance with the MVC criteria assessing the hydraulic and hydrologic impacts upstream and downstream of the proposed development due to the realignment of Shirley's Brook, Kizell Drain and the Duck Pond channel to ensure that:

- Flood levels upstream of the proposed site are not increased.
- Routing of flows through the site and floodplain storage within the realigned channels is similar to existing conditions.
- Proposed flow velocities are non-erosive.
- Establish future development lot grades.

A copy of the study entitled "Floodplain and Channel Realignment Study, Kanata Research Park" (NECL, Revised March 2000) is provided in Appendix I.

5.0 EROSION AND SEDIMENT CONTROL

Temporary and permanent erosion and sediment control measures will be implemented during construction in accordance with the *"Guidelines on Erosion and Sediment Control for Urban Construction Sites"* (MOEE, May 1987), *"Environmental Assessment of Proposed Golf Course, Kanata Research Park Corporation"* (ESG International Inc., August 1999). These measures include:

- Confining work areas within silt fences.
- Locating stockpiles away from watercourses and stabilizing stockpiles against erosion.
- Refueling, storing and undertaking the maintenance of machinery, equipment, etc. in designated areas, away from the watercourses where spills can be contained.
- Installing a bulk head in all storm sewer outlets until substantial construction is completed.
- Establishing vibration pads of coarse stone at each access point for washing of construction vehicle tires to remove sediment and prevent it from being carried off-site.
- Placing filter fabric under all catchbasins and manholes.
- Staking straw bales covered in filter fabric to the ground along the full width of roadside ditch.
- Having additional materials (e.g. rip rap, filter cloth and silt fencing) readily available if needed for erosion and sediment control.
- Placement of brush barriers composed of tree branches and roots in windrows at the base of the slope for sediment treatment.
- Conducting regular street sweeping once the roads are completed.
- Seeding of exposed areas as soon as possible in areas where construction is completed or will be reinstated after an extending period such as six weeks.
- If required, placement of temporary sediment traps composed of an earth embankment with a gravel outlet across a drainage swale in areas where large earthmoving will occur such as in the vicinity of holes 10, 11, 16, 17 and 18.

Temporary erosion and sediment control measures must be implemented in accordance with Ontario Provincial Standard (OPSS) 577.

Temporary and permanent erosion and sediment control measures for the realignment of the reaches of Shirley's Brook and Kizell Drain within the subdivision are specified on drawings 99004-RSB, 99004-RKD, 99004-XS, 99004-D1 and 99004-D2.

These erosion and sediment control measures will be implemented prior to construction and will remain in place during all phases of construction until vegetation is established. Regular inspection and maintenance will be required to ensure their continued efficient operation and additional measures undertaken where warranted. Detailed erosion and sediment control plans will be completed at the detailed design stage of each development block.

6.0 COMPLIANCE WITH STORMWATER MANAGEMENT CRITERIA

Section 1.2 of this study outlined the requirements from the subwatershed study pertaining to channel erosion and morphology. A brief description of how these criteria are met is provided below:

6.1 Surface Water Quality and Quantity/Stormwater Management Practices

- *Provide Level 2 water quality treatment of urban stormwater runoff.*

As recommended in the Dillon subwatershed study (1999) 103m^3/ha of storage is provided for areas discharging into Shirley's Brook via Pond 1 and 118m^3/ha of storage is provided for areas discharging into Kizell Drain via Pond 2.

- *Peak flows for the 2-100 year events to be controlled to pre-development levels.*

The proposed end-of-pipe facilities have been designed to provide sufficient storage to control the 2yr to 100yr event post-development flows to pre-development levels.

6.2 Instream Water Quality

- *Dissolved oxygen > 3.0mg/L, Temperature < 2 ° C change (in stormwater discharge), pH 6.5-9.0, TSS 10 mg/L, un-ionized ammonia 0.02 mg/L, Total phosphorus 0.03mg/L, Aluminum 0.3mg/L, Cadmium 0.0005 mg/L, Copper 0.005 mg/L, Lead 0.025 mg/L and Zinc 0.03 mg/L.*

The proposed stormwater management facilities will be designed in accordance with pond dimension, grading, operating level, inlet and outlet configuration, quantity and quality control measure and planting strategy guidelines outlined in the "Stormwater Management Practices and Planning Design Manual" (MOE, 1994). The wet ponds will provide:

- the recommended storage volumes, length to width ratio, detention time and incorporate sedimentation forebays to provide Level 2 treatment, i.e. 70% removal of TSS;
- the suggested deep water, shoreline fringe, flood fringe and upland area plantings to minimize the change in water temperature and enhance pollutant removal;

BMPs for the protection of water quality due to golf course runoff have been outlined in the turfgrass management report.

6.3 Morphology

- *No regulation of low flows events.*

There will be no dams, weirs or direct water taking from the watercourses that will result in a regulation of low flow events. Only control of the 2 to 100yr post-development flows to pre-development levels is proposed in the SWM ponds.

- *Protect low order tributary channels.*

Low order tributary channels will be protected in the wetland, forest and native planting areas. With the exception of watercourse crossings and the watercourses to be realigned, no existing tributaries containing water during baseflow or minor storm events are within the fairways, green or tee areas of the proposed golf course design.

- *No reduction in the length of the main channel.*

It is proposed to realign the reach of Kizell Drain from Legget Drive to Legget Drive and Shirley's Brook upstream of the SWM pond south east of Terry Fox Drive to Legget Drive. Currently, the section of Kizell Drain is 1,134 meters in length and will be 1,410 meters once realigned. The existing section of Shirley's Brook is 776 meters and will be 941 meters once realigned. The sections of Kizell Drain and Shirley's Brook will increase in length by 25% and 20% respectively.

- *Maintain drainage density*

An effort has been made to preserve the existing drainage boundaries contributing to Shirley's Brook and Kizell Drain.

- *Establish a stream corridor based on the meander belt width or equivalent measure.*

As discussed above, the sinuosity in the stream corridor will be improved, resulting in an increase of between 20% and 25% in the watercourse length within the stream corridor. As part of the channel realignment and improvement in sinuosity, natural channel design will be employed to enhance fish habitat and improve water quality within the stream corridor.

- *Enhance diversity of riparian zone vegetation.*

The riparian zones along the banks of the watercourses will be planted with native woody plant species to stabilize streambanks, improve groundwater regime, provide shade, increase vegetative diversity and enhance the terrestrial habitats. Live native willow, maple, serviceberry, dogwood, nannyberry and ash stakes, as well as additional plantings, will be placed along the banks of both realigned watercourses. Willow shrubs and the other genera identified are present in areas of the golf course where vegetation clearing will be undertaken for greens, tees and fairways.

- *Ensure that entrenchment ratio exceeds 4.*

The revised cross-sections for both watercourses provide additional fish habitat with a two metre wide channel and 3:1 bank slopes. An additional low flow channel will be provided within the two metre wide channel to provide aquatic habitat during drier periods. This channel design will result in an entrenchment ratio greater than 4. The entrenchment ratio is defined as the flood prone width (9 m) divided by the bankfull width (2 m). Based on the silt/clay channel material,

slope range, high sinuosity, very low width to depth ratio and slightly entrenched characteristics, from a geomorphology perspective, the proposed realignments would be classified as E6.

- *Develop set back limits to stream corridor.*

There will be a zone of no maintenance activities adjacent to each watercourse, except for grass mowing where the fairways cross the watercourses. To minimize the mowing near watercourses, the golf course has been designed to ensure that fairway crossings are generally perpendicular to the watercourses.

The remainder of the riparian areas will become naturalized. There will be no application of fertilizers or pesticides within a zone of at least six metres on either side of watercourses or ponds. Although the grass will be cut where fairways cross the watercourses, there will be no other maintenance activities in proximity to the watercourses. In addition, the banks of the watercourses and ponds will be naturally vegetated on the slope between the water's surface and the edge of the playable turf. The approach to the watercourse on the fairway will be graded with a swale before the watercourse, which will direct surface water runoff away from the watercourse and treat the runoff through infiltration. No fertilizer will be applied in areas of retained, enhanced and constructed wetlands, in areas of retained forests and woodlands and the native planting zones.

- *Spacing of SWM along length of channel rather than downstream control.*

In the golf course design and operation, stormwater management will be provided through a combination of the following potential BMPs to provide as much protection of water quality and quantity as possible along the length of the channel:

- Vegetative BMPs including infiltration, swales and vegetative buffers throughout the golf course.
- Flat grading throughout the golf course.
- Use of perforated catchbasins, riser and possible use of perforated pipes to convey golf course runoff to SWM ponds throughout the golf course.
- Wetland benches or vegetative buffers around the SWM ponds, adjacent to streams and throughout the golf course.
- Discharge of development runoff to three off-line stormwater management ponds spaced along the realigned channels.

- *In-channel works to address existing erosion issues; improve variability of bed morphology (inter-pool gradient should be within 10% of bankfull gradient)*

Bank stability will be provided through the use of natural materials such as root wads, brush bundles and live willow stakes, transplanted from on-site existing vegetation to be removed.

The low flow characteristics and energy dissipation of the watercourses will be improved through the restoration of natural sinuosity and reinstatement of a regular riffle pool complex. The goal here is to restore in-stream habitat structure that has been blown out by erosive action.

Key restoration elements include the creation of pools and riffles and the confinement and deepening of the low flow channels as indicated on the attached cross-sections.

Pools will be added approximately every fifty metres (approximately seven times the bankfull width, and therefore within ten percent of the bankfull gradient) in portions of the realigned reaches. The pool habitat will be created on the outside bank of the bends, to provide additional fish habitat and to provide some energy dissipation. The pool habitat will be dug to provide a typical water depth of one metre below the low flow channel. The riffle habitat will consist of 10 m^3 of crush stone and rubble ranging in size from 5 to 10 cm. The riffle habitat will be created in sequence with the pool habitat, along the straight portions of the wavelength. Log checkdams and boulder clusters will be used to assist in the creation and maintenance of the riffle habitat. The riffle habitat is important for fish spawning and aquatic insect production. The low flow water depth at the riffle habitat should be approximately 15 cm.

Additional fish habitat will be provided through the placement of boulders and logs. Small logs (up to six metres in length) with intact root wads will be placed in trenches cut into the bank, such that the root wads will extend beyond the bank face at the toe. The logs will be braced with boulders and finer stone to ensure stability, and the protruding rootwads should effectively reduce flow velocities at the toe and over a range of flow elevations. These logs will be placed at each larger bend in the realigned channels as shown on the attached plan. The logs will trap organic material, provides colonization substrates for invertebrates and refuge habitats for fish. The logs will eventually rot, resulting in a more natural bank. By the time the logs rot, the woody vegetation should have matured. The source of the logs will be adjacent to portions of the Kizell Drain which were previously flooded by beaver dams, and which will be realigned. The logs are well removed from the present channel of the drain;

- *Maintain on-line ponds and protect artesian well.*

There is one on-line pond upstream of Terry Fox Drive within Shirley's Brook that has no SWM functions. No work is proposed within this area. The proposed realignment of Shirley's Brook is upstream of the on-line facility.

- *Minimize watercourse crossing.*

To minimize the watercourse crossings, the golf course has been designed to ensure that fairway crossings are generally perpendicular to the watercourses, and the number of cart crossings are minimized. The realigned reaches were designed to ensure that no additional road crossings would be required.

6.4 Natural Area Protection and Restoration

- *Restoration of Reach 9 through natural design and improve natural habitat through Reach 3.*

As discussed in detail above, the realigned reaches of Shirley's Brook and the Kizell Drain in reaches 9 and 3, respectively, will be designed to ensure continuity with respect to fish movement and to provide natural channel attributes. The objectives for the design of the

channels include capacity requirements, fisheries habitat and erosion protection. The channel designs will include pool and riffle habitat, which is currently lacking in the existing reaches. The realignment of the watercourses will allow for a more natural meandering path. The planting of trees, shrubs and grasses along the watercourses will increase stream cover, provide temperature mitigation, food sources and habitat creation. A naturalized riparian zone, including the trees, shrubs and ground cover, will improve bank stability

The natural channel design concepts presented above have been used in the design of the watercourse realignments to improve aquatic habitat through a diversity of riffle, pool and reach habitat; placement of coarse substrate; use of logs, boulders and plantings of aquatic macrophytes to increase instream cover and decrease erosion potential. The natural features will be spaced to avoid large areas of uniform conditions, and be positioned in physically stable locations. To mimic the positive attributes of the existing reaches as much as possible the existing logs, rubble and boulders will be utilized in the realigned reaches. Aquatic plants will be transplanted to the new reaches. Before the water flow is directed to the realigned reach, the minnows in the existing reach will be netted and carefully transferred to a downstream portion of the watercourse.

- *Enforce 15m buffer for future development.*

The required 15m buffer between the top of bank and future development block will be enforced refer to drawing 93063-SWM for further details.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions are as follows:

- Control of 2-year through 100-year post-development flows to pre-development levels is required for all future development blocks, excluding areas 4, 8, 10 and 11.
- Level 2 treatment of the runoff from the future development blocks is required.
- Quantity control of golf course runoff is not required.
- Treatment of runoff from the golf course is addressed through the turfgrass management plan.
- Quantity control and quality treatment of the runoff from area 4 is provided in the Duck Pond.
- Quantity control and quality treatment of the runoff from area 8 is provided in Pond 2.
- Quantity control and quality treatment of the runoff from area 10 is provided in Pond 3.
- Installation of oil and grit separators within areas 8 and 10.
- Realignment of Shirley's Brook, Kizell Drain and the Duck Pond channel is required.
- No change in the: upstream water levels, routing, storage or velocities due to the realignment of Shirley's Brook, Kizell Drain and Duck Pond channel.
- Erosion and sediment control measures must be implemented during all phases of construction.

For the proposed development it is recommended that all components of this stormwater management plan be implemented, in particular:

- Pond 1 provides quantity control and quality treatment for area 1 and quality control for the 1.25ha of parking adjacent to the Swansea building.
- A Stormceptor STA 2000 be installed on the Swansea site as recommended in the "Operations Centre Newbridge – Kanata Research Park Stormwater Management Report" (NECL, December 1993) for treatment of the first flush.
- Pond 2 provides quantity and quality control for the development blocks in areas 2 and 8.
- Pond 3 provides quantity control and quality treatment for area 3 and 10.
- Oil and grit separators in areas 8 and 10.
- No on-site quantity or quality control measures are required for areas 4 and 11.
- Implement the turfgrass management plan to treat runoff from the golf course.
- Realign Shirley's Brook, Kizell Drain and the Duck Pond as per the proposed alignment and cross section.
- Implement the proposed erosion and sediment control measures.

8.0 CONSTRUCTION PHASING

The proposed drainage works, including the stormwater management ponds, BMPs, storm sewers and realigned channels, will be constructed as part of the golf course works. The works are schedules to begin upon receipt of the "Authorization of Harmful Alteration, Disruption or Destruction of Fish Habitat" from DFO, "Permit for Fill, Construction, Alteration to Waterways Regulation" from MVC and the C of A from the MOE. The necessary permits from the DFO and MVC have been received.

In terms of the phasing, the realigned watercourse reaches and stormwater management ponds will be constructed off-line of the existing watercourses to minimize impacts on the aquatic habitat and to provide sediment control facilities for other construction phases. No instream construction work will take place between April 1 and July 15 to provide protection for the warm water fish habitat. Refer to Appendix B: Permits for DFO authorization 525-5243. The construction schedule will allow for seeding of exposed areas before the end of the growing season.

The development schedule for the Business Park component would proceed as the market dictates with an initial phase of construction scheduled for this year.

NOVATECH ENGINEERING CONSULTANTS LTD.

Prepared by:

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Reviewed by:

Ido Bochme, P. Eng.

9.0 REFERENCES

1. "Environmental Assessment of Proposed Golf Course, Kanata Research Park Corporation", ESG International Inc., August 1999.

2. "Guidelines on Erosion and Sediment Control for Urban Construction Sites", Government of Ontario, May 1987.

3. "Master Drainage Study Kanata North Urban Expansion Area Duck Pond Lands", Novatech Engineering Consultants Ltd., November 1992.

4. "MTO Drainage Management Manual", Ministry of Transportation, 1997

5. "Shirley's Brook and Watts Creek Subwatershed Study", Dillon Consulting Ltd., 1999.

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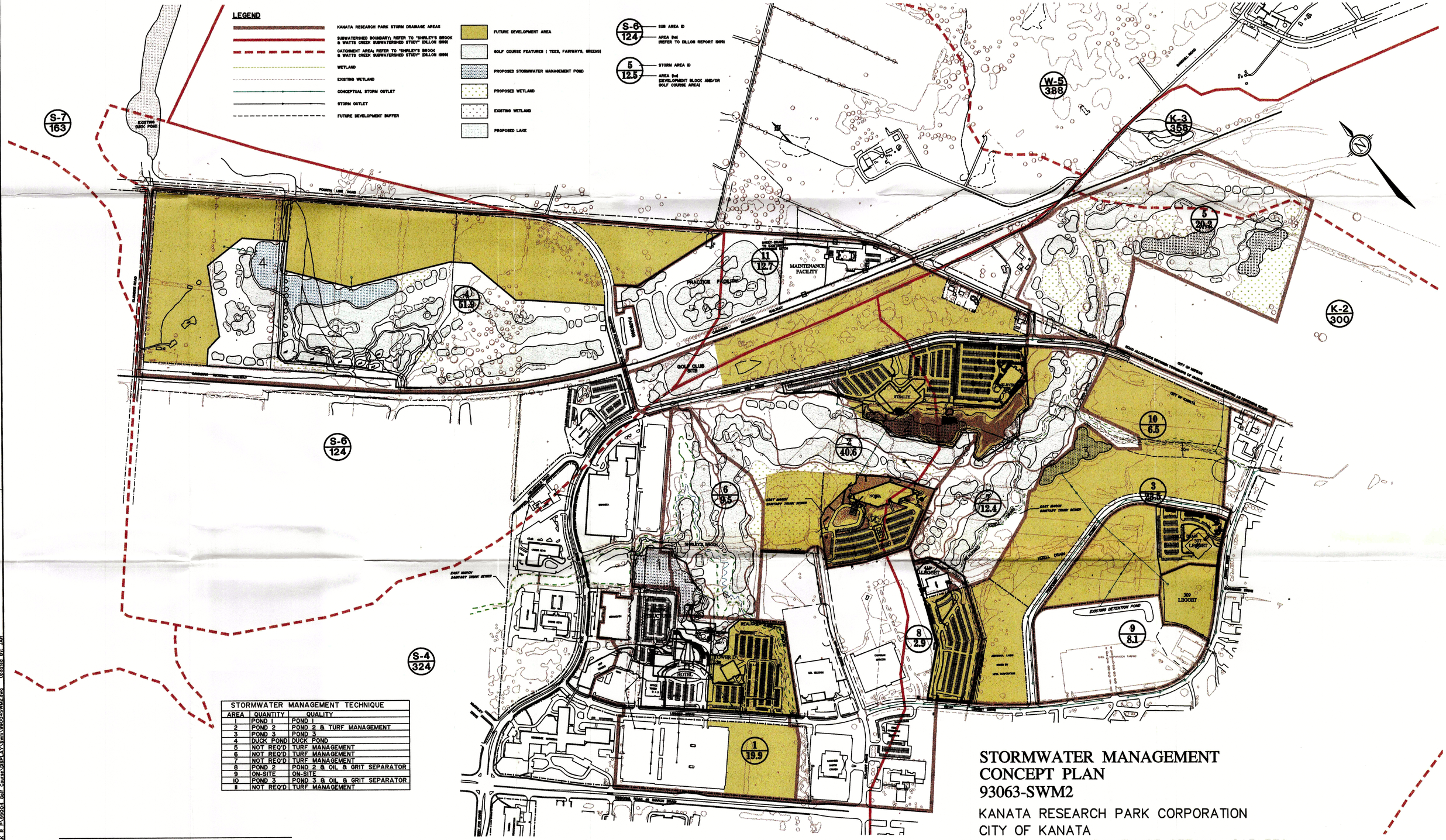
7. "Water Management Plan for Shirley's Brook, Kizell Drain, Watts Creek, Harwood Creek", A.J. Robinson, 1989.



STORMWATER MANAGEMENT TECHNIQUE		
AREA	QUANTITY	QUALITY
1	POND 1	POND 1
2	POND 2	POND 2 & TURF MANAGEMENT
3	POND 3	POND 3
4	DUCK POND	DUCK POND
5	NOT REQ'D	TURF MANAGEMENT
6	NOT REQ'D	TURF MANAGEMENT
7	NOT REQ'D	TURF MANAGEMENT
8	POND 2	POND 2 & OIL & GRIT SEPARATOR
9	ON-SITE	ON-SITE
10	POND 3	POND 3 & OIL & GRIT SEPARATOR
11	NOT REQ'D	TURF MANAGEMENT

STORMWATER MANAGEMENT CONCEPT PLAN 93063-SWM2

KANATA RESEARCH PARK CORPORATION
CITY OF KANATA
REGIONAL MUNICIPALITY OF OTTAWA–CARLETON
APRIL 2000

SCALE 1 : 4000

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NOVATECH
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OTTAWA, ONTARIO

Calculation Summary

Project: 120202 - Brookstreet Apartment Building

Quantity Control SWMF No. 1:

Additional Volume:

1100m^2 additional impervious area $V = CAd$

$$V = (0.9) \times (1100m^2) \times (100mm\ rainfall)$$

$$V = 99\ m^3$$

Pond Impacts:

$$Volume\ Increase\ = \frac{Added\ Volume}{Existing\ Volume}$$

$$= \frac{99\ m^3}{5210m^3}$$

= 0.019 = 1.9 %

Depth Increase, $d = \frac{Added\ Volume}{Surface\ Area}$

$d = \frac{99\ m^3}{11{,}000m^2}$ = 9 mm

Surface Area of SWMF at NWL 74.25 m = 10,025 m^2

Surface Area of SWMF at maximum 100-year level of 75.11 m = 11,025 m^2.

Available 100-year storage = (10,025 + 11,025)/2 x (75.11 – 74.25) = 9,052 m^3.

Required storage = 5,210 m^3 + 99 m^3 = 5,309 m^3.

Quality Control SWMF No. 1:

Additional Volume:

1100m^2 additional impervious area $Ext.\ Detention = 40\frac{m3}{ha} X\ 0.11\ ha = 4.4\ m3$

$$Permenant\ Pool = \frac{202m3}{ha}\ x\ 0.11\ ha = 22.2\ m3$$

Surface Area of Water at NWL 74.25 m = 10 025 m2.

Depth Increase, $d = \frac{Added\ Volume}{Surface\ Area}$

$d = \frac{4.4\ m^3}{10{,}025\ m^2}$

d = 0.4 mm

Provided Permanent Pool Volume (Under-estimate) = 10,254 m^3

Required Permanent Pool = 4,272 m3 + 22.2 m3 = 4,294 m^3

LEGEND

- 200mmø — PROPOSED WATERMAIN AND DIAMETER
- PROPOSED VALVE LOCATION
- VBVB — VALVE & VALVE BOX
- VBVC — VALVE & VALVE CHAMBER
- HYD — PROPOSED HYDRANT C/W VALVE & LEAD
- T/F=98.45 — PROPOSED TOP OF BOTTOM FLANGE
- BEND — PROPOSED BEND AND THRUSTBLOCK 11.25°, 22.5°, 45° or TEE (SEE PLAN AND PROFILES)
- MH 101 — PROPOSED SANITARY MH & SEWER
- MH 1000 — PROPOSED STORM MH & SEWER
- CB 2 — PROPOSED ROAD CATCHBASIN
- DIRECTION OF FLOW
- MH 101 — *EXISTING SANITARY MH & SEWER*
- MH 102 — *EXISTING STORM MH & SEWER*
- 200mmø WM — *EXISTING WATERMAIN*

- AUGERHOLE 86-5 — ORIGINAL GROUND ELEVATION
- BOREHOLE 86-4 — ORIGINAL GROUND ELEVATION
- TESTPIT 76-6 — ORIGINAL GROUND ELEVATION
- PZ 98-5 — ORIGINAL GROUND ELEVATION
- RIP RAP AS NOTED
- BOTTOM OF SHELF AS NOTED
- 1.0m WIDE ARMOUR STONE RETAINING WALL

NOTES

1. FOREBAY HARD BOTTOM CONSISTS OF RIPRAP (0.3m³ -1.0m ƒ, (0.2m THICKNESS) AND GRANULARS TO FILL VOIDS, (0.5m THICKNESS MIN.)
2. RIP RAP TO BE INSTALLED AT ALL OUTLETS & INLETS FOR EROSION PROTECTION. C/W GEOTEXTILE. AS PER OPSD 810.01. THICKNESS AS SPECIFIED.
3. CONCRETE HEADWALLS PER 804.030 & 804.02. GRATING FOR HEADWALLS PER OPSD 804.05. BAR SPACING PER OPSD 804.05.
4. CONTRACTOR TO CO-ORDINATE CONSTRUCTION OF POND, FLOW-SPLITTER CHAMBER, ETC. WITH CONTRACTOR CARRYING OUT SUBDIVISION CONSTRUCTION.
5. EROSION AND SEDIMENT CONTROL SHALL BE AS DETAILED OR NOVATECH ENGINEERING CONSULTANTS LTD. DWG. NO. 99004-P4 TO 99004-P7 AND AS PER ONTARIO PROVINCIAL STANDARDS.

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

KANATA RESEARCH PARK
[illegible] Research Park
[illegible] Corporation
555 Legget Dr[illegible], Kanata, Ontario, Canada, K2K 2X3
(613)591-8384

AS-BUILT

No.	REVISION	DATE	BY
3	AS-BUILTS	APR 30/07	SAB
2.	GENERAL REVISION	APR 13/00	UB
1	ISSUED FOR MOEE	FEB. 2000	LSM

J.G. RIDDELL — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

NOVATECH
ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novatech@novatech-eng.com

DESIGN	LSM
CHECKED	UB
DRAWN	GMH/DU
CHECKED	LSM
APPROVED	UB

SCALE: 1 : 500

CITY OF KANATA
KANATA RESEARCH PARK GOLF COURSE
STORMWATER MANAGEMENT FACILITY No. 1

PROJECT No.	99004-0
DATE	MARCH 31, 2000
DRAWING No.	93063-SWMF1

PLAN8LOW.G - 1000mmX770mm

DrawingMLV: R:\93063\design\cadd\SWMF1.dwg, Layout:SWMF1 Updated APR 26, 2007 at 12:45pm by shuller

3.3.2 Water Quality Sizing Criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m³/ha is extended detention, while the remainder represents the permanent pool.

Table 3.2 Water Quality Storage Requirements based on Receiving Waters[1, 2]

Protection Level	SWMP Type	Storage Volume (m³/ha) for Impervious Level			
		35%	55%	70%	85%
! 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
" 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
# 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

[illegible]

[illegible]

APPENDIX D
Floodplain Compensation

From: Erica Ogden <eogden@mvc.on.ca>
Sent: Thursday, March 17, 2022 2:18 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: Zoning By-law and Site Plan Control Application – 525 Legget and 359 Terry Fox Drive – 2nd Review Comments

Hello Anthony,

Following up on our meeting, I have copied below for you Appendix D of our Regulation Policies regarding cut and fill guidelines.

MVCA would like to request that the interval be a minimum of 0.3 metres.

Appendix D: Cut and Fill Guidelines

Site Grading

Within a floodway, MVCA may approve site grading/site alteration, in limited circumstances, in situations that meet the following conditions:

1) Minor Site Grading (Cut and Fill Balance Works)

The site grading/site alteration will be considered minor and generally can be approved without further detailed hydraulic analysis if:

a) The modification of the flood plain is required to obtain a useable area for building above (outside) of the Regulatory (1:100 year) flood plain. (i.e. part of the property is presently outside of the Regulatory flood plain but the distribution or orientation of this area is not suitable for development.
b) Does not create a new building area at a location that is presently totally within the flood plain.
c) The property is located in an area of existing development.
d) The site alteration is confined to lands with existing ground elevations that are no more than 0.3 metres lower than the estimated 1:100 year water surface elevation of the river or stream.
e) The area of the proposed cut or fill zones will be roughly equal to one another.
f) Safe access is available.
g) The loss of flood plain storage volume within the 1:100 year flood plain which will result from the placement of fill shall be fully compensated for by an incrementally balanced cut (or excavation) to be carried out in close proximity to and concurrently with the placement of the fill. This cut and fill operation must occur on the same property.
h) The resulting development meets all flood proofing requirements.

If you have any other questions, please feel free to contact me.

Thank you,

Erica C. Ogden, MCIP, RPP | Environmental Planner | Mississippi Valley Conservation Authority

10970 Highway 7, Carleton Place, ON K7C 3P1

www.mvc.on.ca |c. 613 451 0463 |o. 613 253 0006 ext. 229| eogden@mvc.on.ca

From: Erica Ogden
Sent: March 11, 2022 4:33 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: Zoning By-law and Site Plan Control Application – 525 Legget and 359 Terry Fox Drive – 2nd Review Comments

Hello Anthony,

I am available any time after 10:00am on Tuesday March 15th or after 1:00pm on March 17th.

Thank you,

Erica C. Ogden, MCIP, RPP | Environmental Planner | Mississippi Valley Conservation Authority

10970 Highway 7, Carleton Place, ON K7C 3P1

www.mvc.on.ca |c. 613 451 0463 |o. 613 253 0006 ext. 229| eogden@mvc.on.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: March 7, 2022 4:36 PM
To: Erica Ogden <eogden@mvc.on.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: Zoning By-law and Site Plan Control Application – 525 Legget and 359 Terry Fox Drive – 2nd Review Comments

Hi Erica,

The Project Manager (Greg MacDonald) for the Brook Street Apartments development would like to set-up a meeting to discuss the impacts of the development to the floodplain and how to remedy them. He is currently on vacation and will return next week.

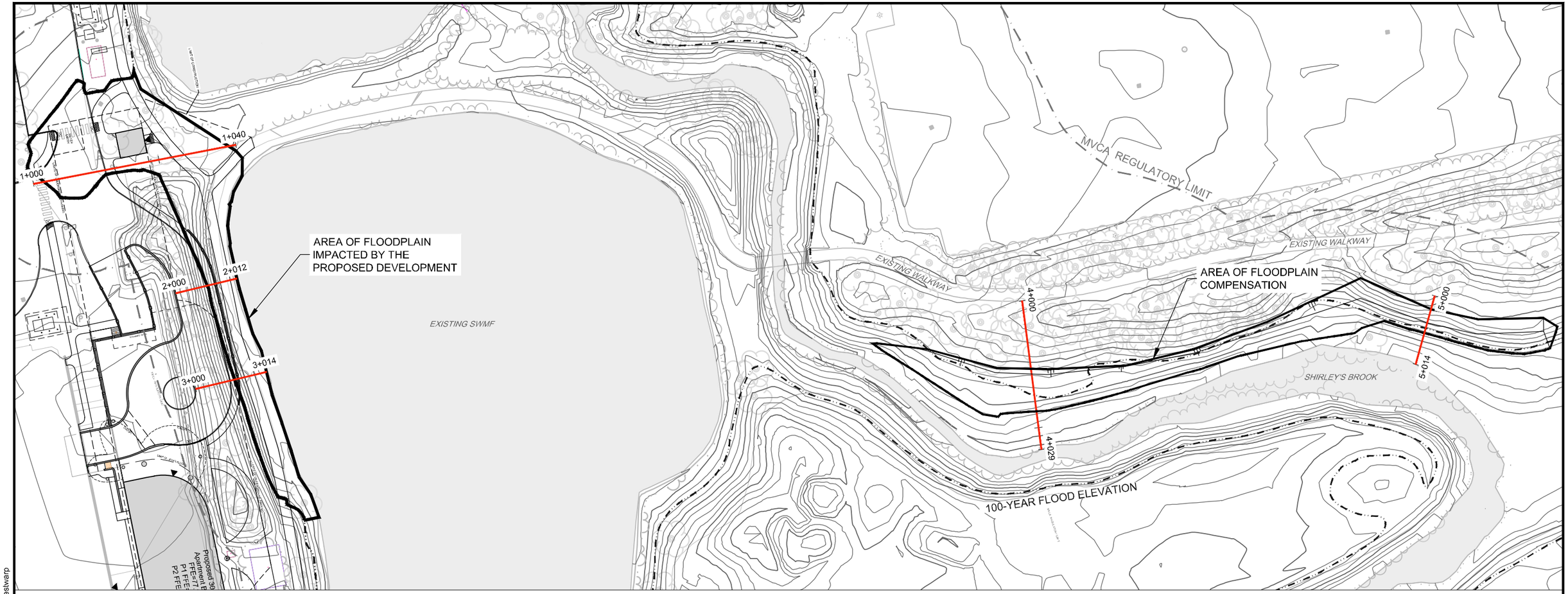
Do you have availability mid-next week to discuss? If so I will set-up a teams meeting.

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering

NOVATECH Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867



FLOODPLAIN REDUCTION				
ELEVATION (m)		PRE (m^3)	POST (m^3)	VARIANCE (m^3)
74.81	75.11	48.15	30.06	18.09
75.11	75.41	119.47	99.24	20.23
75.41	75.71	210.26	150.38	59.88
75.71	75.74	30.63	21.69	8.94
TOTAL				107.14

FLOODPLAIN COMPENSATION				
ELEVATION (m)		PRE (m^3)	POST (m^3)	VARIANCE (m^3)
74.81	75.11	20.56	41.79	21.23
75.11	75.41	67.71	118.70	50.99
75.41	75.71	129.67	194.61	64.94
75.71	75.74	16.19	20.79	4.6
TOTAL				141.76

LEGEND

- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- TERRACING 2:1 SLOPE MAX
- 2.0% — SLOPE AND DIRECTION
- 100-YEAR FLOODLINE (75.74)
- MVCA REGULATORY LIMIT
- SECTION LOCATION

NOVATECH
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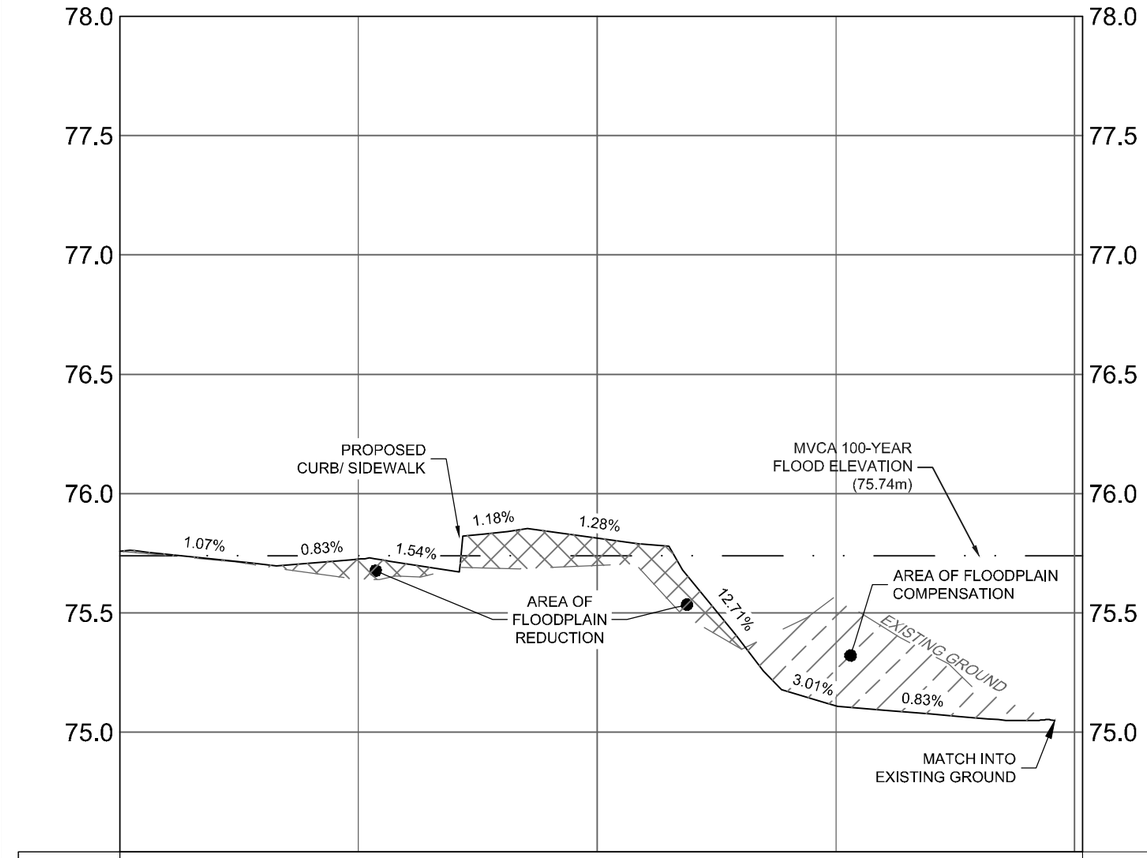
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
BROOKSTREET APARTMENTS

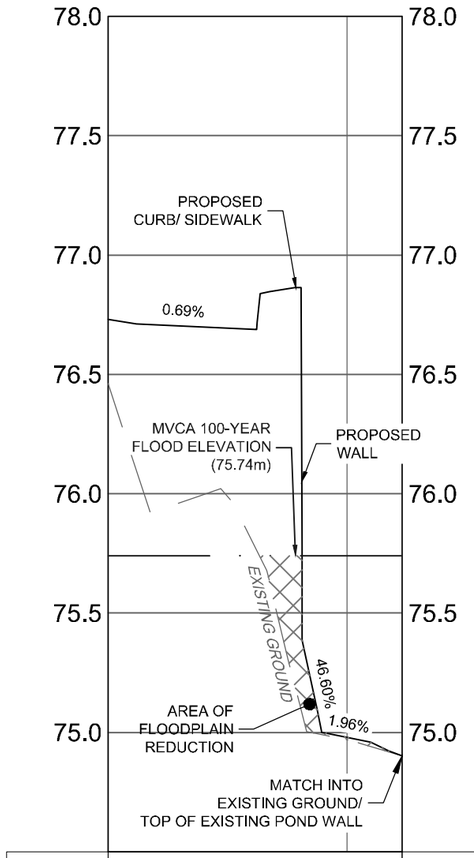
FLOODPLAIN COMPENSATION

1 : 750 (0, 10, 20, 30)

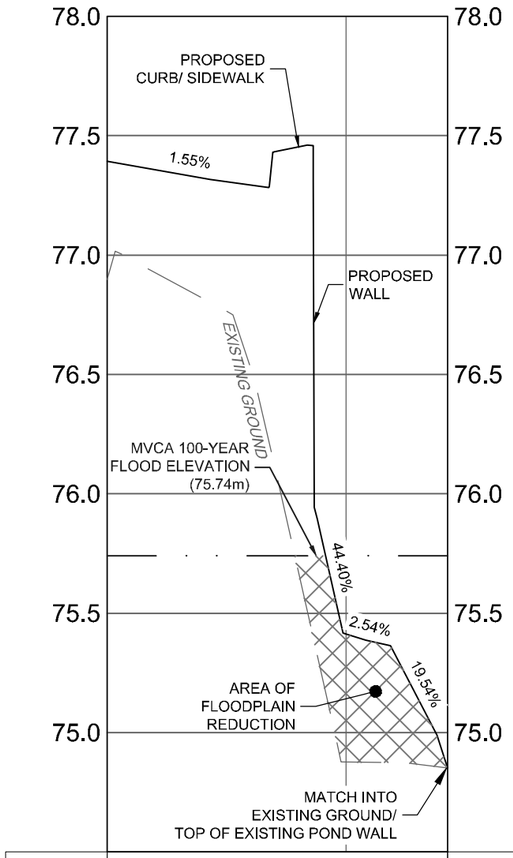
DATE	JOB	FIGURE
MAR 2022	120202	1



PROPOSED ELEVATION		75.71	75.73	75.84	75.81	75.79	75.26	75.11	75.09	75.05
EXISTING ELEVATION	75.76		75.64		75.70			75.56		
CHAINAGE	1+000		1+010		1+020			1+030		1+040.33



PROPOSED ELEVATION	76.69	74.98	74.92	
EXISTING ELEVATION	76.46	74.97		
CHAINAGE	2+000	2+010	2+012.30	



PROPOSED ELEVATION	77.28	75.41	75.36	
EXISTING ELEVATION	76.90	74.88	74.85	
CHAINAGE	3+000	3+010	3+014.26	

SCALE	
1:250	0 2.5 5 7.5 10 HORIZONTAL
1:25	0 0.25 0.5 0.75 1.0 VERTICAL

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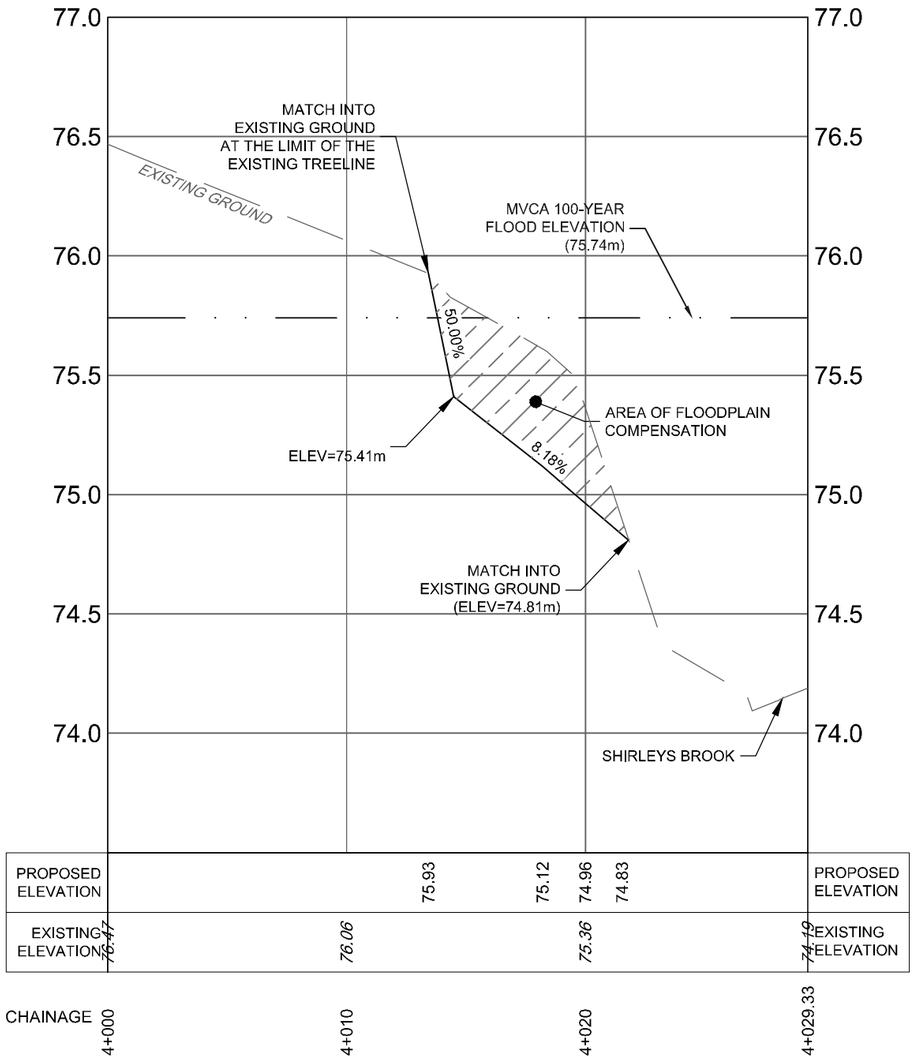
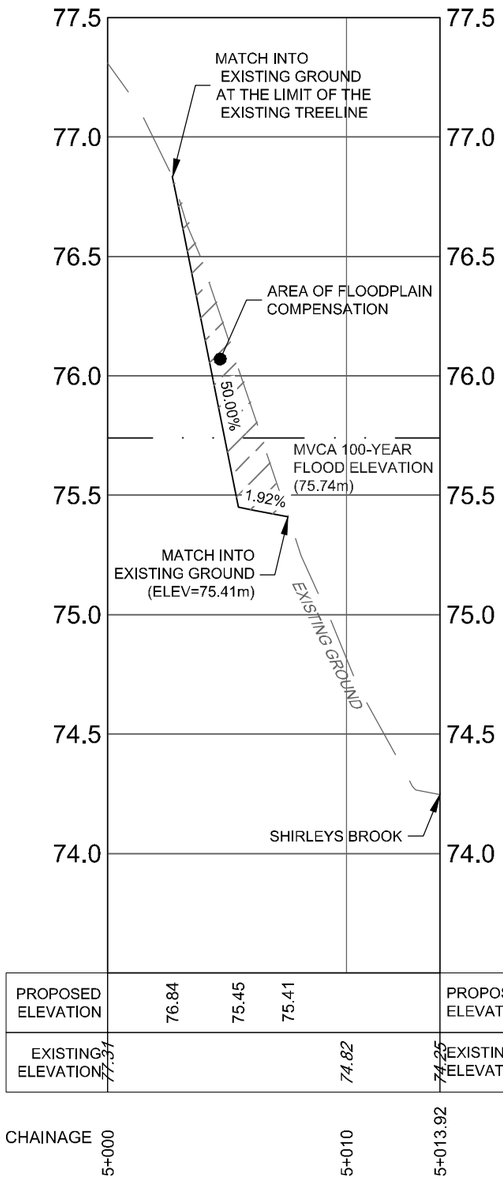
Website www.novatech-eng.com

CITY OF OTTAWA
BROOKSTREET APARTMENTS

FLOODPLAIN SECTIONS (REDUCTION)

DATE	JOB	FIGURE
MAR 2022	120202	2





SCALE
1:250 0 2.5 5 7.5 10 HORIZONTAL
1:25 0 0.25 0.5 0.75 1.0 VERTICAL

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CITY OF OTTAWA
BROOKSTREET APARTMENTS

FLOODPLAIN - SECTIONS (COMPENSATION)

DATE	JOB	FIGURE
MAR 2022	120202	3

APPENDIX E
Sanitary Sewer Design Sheets and Drawings

LEGEND

- 2.02 / 101-103 / 1.5 | 2.6 — AREA IN HECTARES; AREA IDENTIFIER; PEAK FLOW RATE (L/s), incl. Extraneous Flows; PEAKING FACTOR
  *Refer to Sanitary and Storm Sewer Design Brief for detailed calculations of flow rates for each development
- SANITARY DRAINAGE AREA BOUNDARY
- DIRECTION OF FLOW
- SANITARY TRUNK SEWER AND MH
- TRIBUTARY SANITARY SEWER AND MH

MONMOUTH

MARCH ROAD

BROOKSTREET

LEGGET DRIVE

THE MARSHES GOLF COURSE

SELECTRON

1.23 TOWER 'C' 1.5 | 1.79

1.28 PARKING 1.5 | 0.36

4.49 HOTEL 1.5 | 0.40 | 8.33

4.05 NEWBRIDGE 1.5 | 3.67

3.37 TOWER 'D' 1.5 | 2.39

2.20 4-EX 'A' 5.7 | 2.62

PROPOSED 2-STOREY BUILDING FFE=80.00

EX. SAN INV=76.34

EX. SAN MH INV=75.94

EX. SAN INV=73.20

EX. SAN MH INV=70.29

EX. SAN MH INV=76.75

EX. SAN MH 'C' INV=76.68

EX. SAN INV=73.26

EX. SAN MH 'D' INV=75.13

EX. SAN MH 'E' INV=74.09

EX. SAN MH 'F' INV=73.74

EX. SAN MH 'G' INV=72.86

EX. SAN MH 'H' INV=72.74

EX. SAN MH 'I' INV=71.53

EX. SAN MH INV=70.11

SAN MH 1 INV=75.27

SAN MH 2 INV=76.04

SAN MH 3 INV=76.35

EX. SAN MH 'B' INV=76.44

EX. SAN MH 'A' INV=76.64

SAN MH 4 INV=76.80

SAN INV=77.00

EX. SAN INV=75.05

EX. SAN MH INV=69.93

EX. SAN MH INV=69.70

250mm-SANITARY SEWER

200mm-SAN SEWER

750mm-SANITARY SEWER

200mm SAN SERVICE

250 Ø SAN

CONC. PAD & BOLLARDS

FIRE ROUTE

No	DATE	EMISSION POUR / OBJECT
1	2014.05.28	ISSUED WITH DSS & SWM REPORT
2	2014.08.08	ISSUED WITH REVISED DSS & SWM REPORT
3	2014.09.25	ISSUED WITH REVISED DSS & SWM REPORT
4	2014.11.12	ISSUED FOR CITY / MOE APPROVAL

CLÉ / KEY :

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

MECHANICAL, ELECTRICAL ENGINEER :

CIVIL ENGINEER :

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

MECHANICAL, ELECTRICAL ENGINEER :

STRUCTURAL ENGINEER :

CLIENT :

ARCHITECT :

Architects
190 Somerset St. W
Suite 206
Ottawa , Ontario
K2P 0J4
T.613.695.6122
F.514.861.5383
www.rubinrotman.com
Rubin & Rotman architects

SEAL :

LICENSED PROFESSIONAL ENGINEER
F.S. THAUVETTE
100041992
Nov. 12, 2014
PROVINCE OF ONTARIO

NOTE :

L'entrepreneur doit vérifier toutes les informations et dimension sur le site et aviser immédiatement l'architecte de toutes erreurs ou omissions.

Contractor shall verify all information and dimensions on site and immediately report any errors or omissions to the architect.

PROJECT NAME :

Sanmina
500 March Rd.
Kanata, Ontario

TITLE :

SANITARY DRAINAGE AREA PLAN

ISSUE DATE : 2014.11.12	DRAWN BY : SM
SCALE : 1 : 750	VERIFIED BY : FST
NECL FILE : 114060-SAN	DRAWING NO : C200
	REVISION : 4

M:\2014\114060\CAD\DESIGN\114060-SAN.DWG
Date de tracage : 2014/11/12
par dmb

SANITARY TRUNK SEWER (EXISTING)
Sanitary Sewer Design Sheet

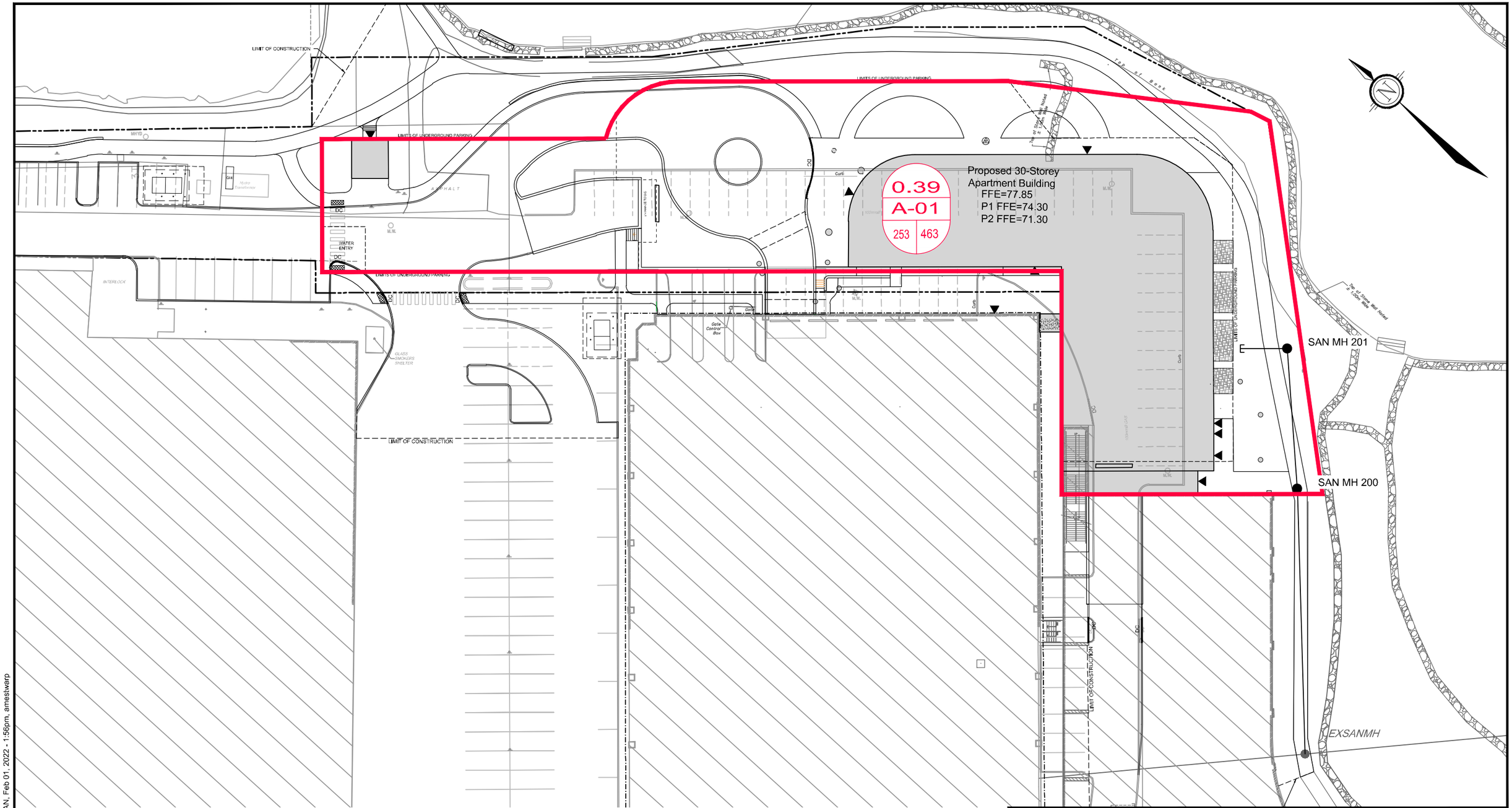
PROJECT : 114060
DESIGNED BY: SM/FST
CHECKED BY: FST
DATE: 25-Sep-14

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			INDIVIDUAL		CUMULATIVE		PEAK FLOWS				PROPOSED SEWER						
AREA	FROM MH	TO MH	FLOW RATE (L/s)	Infiltration Area (ha)	FLOW RATE (L/s)	Infiltration Area (ha)	PEAK FACTOR M	PEAK FLOW Q (p) (L/s)	PEAK EXTRAN.FLOW Q(i) (L/s)	***PEAK DESIGN FLOW Q (d) (L/s)***	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design /Qcap
528 March Road Site	SAN MH 4	EX. SAN MH A	0.35	2.20	0.35	2.20	5.7	2.00	0.62	***2.61***	25.4	250	PVC	0.50	43.87	0.87	6.0%
Legget Drive	EX. SAN MH A	EX. SAN MH B	0.00	0.00	0.35	2.20	5.7	2.00	0.62	***2.61***	55.1	250	PVC	0.33	35.64	0.70	7.3%
Legget Drive (Newbridge)	EX. SAN MH	EX. SAN MH C	1.69	4.05	1.69	4.05	1.5	2.54	1.13	***3.67***	60.3	250	PVC	0.31	34.54	0.68	10.6%
Legget Drive	EX. SAN MH C	EX. SAN MH B	0.00	0.00	1.69	4.05	1.5	2.54	1.13	***3.67***	68.0	250	PVC	0.29	33.41	0.66	11.0%
Legget Drive	EX. SAN MH B	SAN MH 3	0.00	0.00	2.04	6.25	1.5	3.06	1.75	***4.81***	26.7	250	PVC	0.25	31.02	0.61	15.5%
KRP Site	SAN MH 3	SAN MH 2	0.00	0.00	2.04	6.25	1.5	3.06	1.75	***4.81***	50.4	250	PVC	0.50	43.87	0.87	11.0%
KRP Site	SAN MH 2	SAN MH 1	0.00	0.00	2.04	6.25	1.5	3.06	1.75	***4.81***	44.0	250	PVC	0.50	43.87	0.87	11.0%
KRP Site	SAN MH 1	EX. SAN MH D	0.00	0.00	2.04	6.25	1.5	3.06	1.75	***4.81***	9.1	250	PVC	1.00	62.04	1.22	7.8%
KRP Site (Tower C)	TOWER C	EX. SAN MH D	0.96	1.23	0.96	1.23	1.5	1.44	0.34	***1.79***	114.3	250	PVC	0.40	39.24	0.77	4.6%
KRP Site	EX. SAN MH D	EX. SAN MH E	0.00	0.00	3.00	7.48	1.5	4.50	2.09	***6.60***	9.5	250	PVC	1.00	62.04	1.22	10.6%
KRP Site	EX. SAN MH E	EX. SAN MH F	0.00	0.00	3.00	7.48	1.5	4.50	2.09	***6.60***	48.1	250	PVC	0.67	50.78	1.00	13.0%
KRP Site (Tower D)	TOWER D	EX. SAN MH F	0.96	3.37	0.96	3.37	1.5	1.44	0.94	***2.39***	34.0	200	PVC	1.30	39.01	1.20	6.1%
KRP Site	EX. SAN MH F	EX. SAN MH G	0.00	0.00	3.96	10.85	1.5	5.95	3.04	***8.98***	61.9	250	PVC	0.35	36.70	0.72	24.5%
KRP Site (Brookstreet Hotel)	HOTEL	EX. SAN MH G	2.21	4.49	2.21	4.49	1.5 - 4.0	7.07	1.26	***8.33***	22.0	200	PVC	0.90	32.46	1.00	25.7%
KRP Site	EX. SAN MH G	EX. SAN MH H	0.00	0.00	6.17	15.34	1.5	9.26	4.30	***13.56***	21.0	250	PVC	0.38	38.24	0.75	35.4%
KRP Site (Parking Structure)	PRKG STRUCT	EX. SAN MH H	0.00	1.28	0.00	1.28	1.5	0.00	0.36	***0.36***	91.1	250	PVC	0.40	39.24	0.77	0.9%
KRP Site	EX. SAN MH H	EX. SAN MH I	0.00	0.00	6.17	16.62	1.5	9.26	4.65	***13.91***	88.9	250	PVC	0.38	38.24	0.75	36.4%
KRP Site	EX. SAN MH I	EX. 750 TRUNK	0.00	0.00	6.17	16.62	1.5	9.26	4.65	***13.91***	100.1	250	PVC	0.52	44.74	0.88	31.1%

Notes:
1. Q(d) = Q(p) + Q(i) , where
   Q(d) = Design Flow (L/sec)
   Q(p) = Population Flow (L/sec)
   Q(i) = Extraneous Flow (L/sec)
2. Q(i) = 0.28 L/sec/ha
3. Daily Sewage Flow from Office Towers = 75 L/person/day (Appendix 4-A, Ottawa Sewer Design Guidelines)
4. Commercial Peaking Factor = 1.5 (Figure 4.3 Ottawa Sewer Design Guidelines)
5. Refer to Sanitary Drainage Area Plan (114060-SAN, C200) for details of drainage areas
6. Refer to the 'Sanitary and Storm Sewer Design Brief' for a breakdown of Daily Sewage Flow components and applicable peaking factors from the Brookstreet Hotel

† Total peak sanitary flow from hotel site = 8.33 L/s, including Extraneous Flows (Also refer to Note 6 above for further details)



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER AND MANHOLE
- *SAN MH — EXISTING SANITARY MANHOLE & SEWER*
- SANITARY SEWER DRAINAGE AREA BOUNDARY

0.47
20A-19A
71 | 128

DRAINAGE AREA (ha)
SAN SEWER PIPE RUN
POPULATION / NO. UNITS

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

BROOKSTREET APARTMENTS

SANITARY DRAINAGE AREA PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)
DATE MAR 2022 | JOB 120202 | FIGURE SAN

SHT11X17.DWG - 279mmX432mm

M:\2020\120202\CADD\design\120202-SAN.dwg, SAN, Feb 01, 2022 - 1:56pm, amestwarp

SANITARY SEWER DESIGN SHEET

Novatech Project #:	120202
Project Name:	Brookstreet Apartments
Date Prepared:	1/30/2022
Date Revised:	3/31/2022
Input By:	Anthony Mestwarp
Reviewed By:	Greg MacDonald
Drawing Reference:	120202 - SAN

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMULATIVE CELL
- CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND																	DESIGN CAPACITY							
			RESIDENTIAL FLOW									COMMERCIAL FLOW					EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
AREA	FROM MH	TO MH	1 Bed Apartment	1 Bed + Den	2 Bed Apartment	2 Bed+ Den/ Executive/ Penthouse Apartment	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	COMMERICAL Seats	CUMULATIVE COMMERICAL Seats	DESIGN COMMERICAL FLOW (L/s)	COMMERICAL PEAK FACTOR	PEAKED COMMERICAL FLOW	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
A-01	Stub	201	85	72	83	13	0.463	0.463	3.39	1.50	5.09	207.000	207.000	0.30	1.00	0.30	0.39	0.39	0.13	5.52	6.4	250 PVC	0.254	0.013	2.00	87.7	1.73	6.3%
	201	200					0.000	0.463	3.39	1.50	5.09		207.000	0.30	1.00	0.30		0.39	0.13	5.52	19.0	250 PVC	0.254	0.013	0.50	43.9	0.87	12.6%
	200	ex					0.000	0.463	3.39	1.50	5.09		207.000	0.30	1.00	0.30		0.39	0.13	5.52	35.9	250 PVC	0.254	0.013	0.50	43.9	0.87	12.6%
TOTAL			85		83	13	0.463	0.463				207.000	207.000				0.39											

Design Parameters:

1. Residential Flows
   - -1 Bed Apartment 1.4 Person/ Unit
   - -1 Bed + DenApartment 1.8 Person/ Unit
   - -2 Bed Apartment 2.1 Person/ Unit
   - -3 Bed Apartment 3.1 Person/ Unit
2. Commercial Flow
   - -Restaurant/Lounge 125 L/day/seat
3. q Avg capita flow 280 L/per/day
4. M = Harmon Formula (maximum of 4.0)
5. K = 0.8
6. Commercial Peak Factor
   - -area > 20% of development 1.5
   - -area < 20% of development 1.0
7. Extraneous Flows = 0.33 L/sec/ha

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)

Where : Q full = Capacity (L/s)

n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

SANITARY TRUNK SEWER (WITH PROPOSED FLOWS)
Sanitary Sewer Design Sheet
Brookstreet Apartments

PROJECT : 120202
DESIGNED BY: GMAC

DATE: Sept. 23, 2021
REVISED: 30-Jan-22

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			INDIVIDUAL		CUMULATIVE		PEAK FLOWS				PROPOSED SEWER						
AREA	FROM MH	TO MH	FLOW RATE (L/s)	Infiltration Area (ha)	FLOW RATE (L/s)	Infiltration Area (ha)	PEAK FACTOR M	PEAK FLOW Q (p) (L/s)	PEAK EXTRAN.FLOW Q(i) (L/s)	***PEAK DESIGN FLOW Q (d) (L/s)***	LENGTH (m)	PIPE SIZE (mm)	TYPE OF PIPE	GRADE %	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design /Qcap
528 March Road Site	SAN MH 4	EX. SAN MH A	0.35	2.20	0.35	2.20	5.7	2.00	0.62	*2.61*	25.4	250	PVC	0.50	43.87	0.87	6.0%
Legget Drive	EX. SAN MH A	EX. SAN MH B	0.00	0.00	0.35	2.20	5.7	2.00	0.62	*2.61*	55.1	250	PVC	0.33	35.64	0.70	7.3%
Legget Drive (Newbridge)	EX. SAN MH	EX. SAN MH C	1.69	4.05	1.69	4.05	1.5	2.54	1.13	*3.67*	60.3	250	PVC	0.31	34.54	0.68	10.6%
Legget Drive	EX. SAN MH C	EX. SAN MH B	0.00	0.00	1.69	4.05	1.5	2.54	1.13	*3.67*	68.0	250	PVC	0.29	33.41	0.66	11.0%
Legget Drive	EX. SAN MH B	SAN MH 3	0.00	0.00	2.04	6.25	1.5	3.06	1.75	*4.81*	26.7	250	PVC	0.25	31.02	0.61	15.5%
KRP Site	SAN MH 3	SAN MH 2	0.00	0.00	2.04	6.25	1.5	3.06	1.75	*4.81*	50.4	250	PVC	0.50	43.87	0.87	11.0%
KRP Site	SAN MH 2	SAN MH 1	0.00	0.00	2.04	6.25	1.5	3.06	1.75	*4.81*	44.0	250	PVC	0.50	43.87	0.87	11.0%
KRP Site	SAN MH 1	EX. SAN MH D	0.00	0.00	2.04	6.25	1.5	3.06	1.75	*4.81*	9.1	250	PVC	1.00	62.04	1.22	7.8%
KRP Site (Tower C)	TOWER C	EX. SAN MH D	0.96	1.23	0.96	1.23	1.5	1.44	0.34	*1.79*	114.3	250	PVC	0.40	39.24	0.77	4.6%
KRP Site	EX. SAN MH D	EX. SAN MH E	0.00	0.00	3.00	7.48	1.5	4.50	2.09	*6.60*	9.5	250	PVC	1.00	62.04	1.22	10.6%
KRP Site	EX. SAN MH E	EX. SAN MH F	0.00	0.00	3.00	7.48	1.5	4.50	2.09	*6.60*	48.1	250	PVC	0.67	50.78	1.00	13.0%
KRP Site (Tower D)	TOWER D	EX. SAN MH F	0.96	3.37	0.96	3.37	1.5	1.44	0.94	*2.39*	34.0	200	PVC	1.30	39.01	1.20	6.1%
KRP Site	EX. SAN MH F	EX. SAN MH G	0.00	0.00	3.96	10.85	1.5	5.95	3.04	*8.98*	61.9	250	PVC	0.35	36.70	0.72	24.5%
KRP Site (Brookstreet Hotel)	HOTEL	EX. SAN MH G	2.21	4.49	2.21	4.49	1.5 - 4.0	7.07	1.26	*8.33*	22.0	200	PVC	0.90	32.46	1.00	25.7%
KRP Site	EX. SAN MH G	EX. SAN MH H	0.00	0.00	6.17	15.34	1.5	9.26	4.30	*13.56*	21.0	250	PVC	0.38	38.24	0.75	35.4%
KRP Site (Parking Structure)	PRKG STRUCT	EX. SAN MH H	0.30	1.28	0.30	1.28	1.5	0.45	0.36	*0.81*	91.1	250	PVC	0.40	39.24	0.77	2.1%
KRP Site	EX. SAN MH H	EX. SAN MH I	0.00	0.00	6.47	16.62	1.5	9.71	4.65	*14.36*	88.9	250	PVC	0.38	38.24	0.75	37.6%
Brookstreet Apartments	200	EX SAN MH 1	Refer to The Proposed Sewer design sheet for details					5.39	0.13	*5.52*	35.9	250	PVC	0.50	43.87	0.87	12.6%
KRP Site	EX. SAN MH I	EX. 750 TRUNK	0.00	0.00	6.47	16.62	1.5	15.10	4.78	*19.88*	100.1	250	PVC	0.52	44.74	0.88	44.4%

Notes:
1. Q(d) = Q(p) + Q(i) , where
   Q(d) = Design Flow (L/sec)
   Q(p) = Population Flow (L/sec)
   Q(i) = Extraneous Flow (L/sec)
2. Q(i) = 0.28 L/sec/ha
3. Daily Sewage Flow from Office Towers = 75 L/person/day (Appendix 4-A, Ottawa Sewer Design Guidelines)
4. Commercial Peaking Factor = 1.5 (Figure 4.3 Ottawa Sewer Design Guidelines)
5. Refer to Sanitary Drainage Area Plan (114060-SAN, C200) for details of drainage areas
6. Refer to the 'Sanitary and Storm Sewer Design Brief' for a breakdown of Daily Sewage Flow components and applicable peaking factors from the Brookstreet Hotel

† Total peak sanitary flow from hotel site = 8.33 L/s, including Extraneous Flows (Also refer to Note 6 above for further details)

APPENDIX F
Water Calculations

Project No. 120202
Project Name: Brookstreet Apartments
Project Location:City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

Date: January, 2022

Table 1
Water Demand

Unit Type							Residential Flows				Commercial Flows							Total Demand (L/s)		
1 Bed/ Studio	1 Bed + Den	2 Bed	2 Bed + Den	Executive Appartment	Penthouse Apartment	Total Units	Total Population	Avg Day	Max. Day	Peak Hour	Restaraunt Area (m^2)	Lounge Area	Approx. Seats (Restaurant)	Approx. Seats (Lounge)	Avg Day	Max. Day	Peak Hour	Avg Day	Max. Daily	Peak Hour
85	72	83	2	7	4	253	463	1.50	3.75	8.25	274.00	87.00	137.00	70.00	0.30	0.45	0.81	1.80	4.20	9.06

Design Parameters (City of Ottawa Water Distribution Guidelines):

- 1 Bed Apartment **1.4 persons/unit**
- 1 Bed + Den Apartment **1.8 persons/unit**
- 2 Bed Apartment **2.1 persons/unit**
- 2 Bed + Den Apartment **3.1 persons/unit**
- Executive Apartment **3.1 persons/unit**
- Penthouse Apartment **3.1 persons/unit**
- Restaurant **125 L/day/seat** **(assume 1 seat per 2m^2)**
- Lounge **125 L/day/seat** **(assume 1 seat per 1.25m^2)**
- Average Domestic Flow **280 L/person/day**

Residential Peaking Factors City of Ottawa Water Distrubution Guidelines:

Conditions	Peaking Factor		Units
Maximum Day	2.5	x avg day	L/c/day
Peak Hour	2.2	x max day	L/c/day

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 120202
Project Name: Brookstreet Appartments
Date: 9/15/2021
Revised 1/27/2022
Input By: Jazmine Gauthier
Revised By: Anthony Mestwarp
Reviewed By: Greg MacDonald

Legend: Input by User; No Information or Input Required

Building Description: 30 story building (incl. 4 story podium)
Fire Resistive Construction

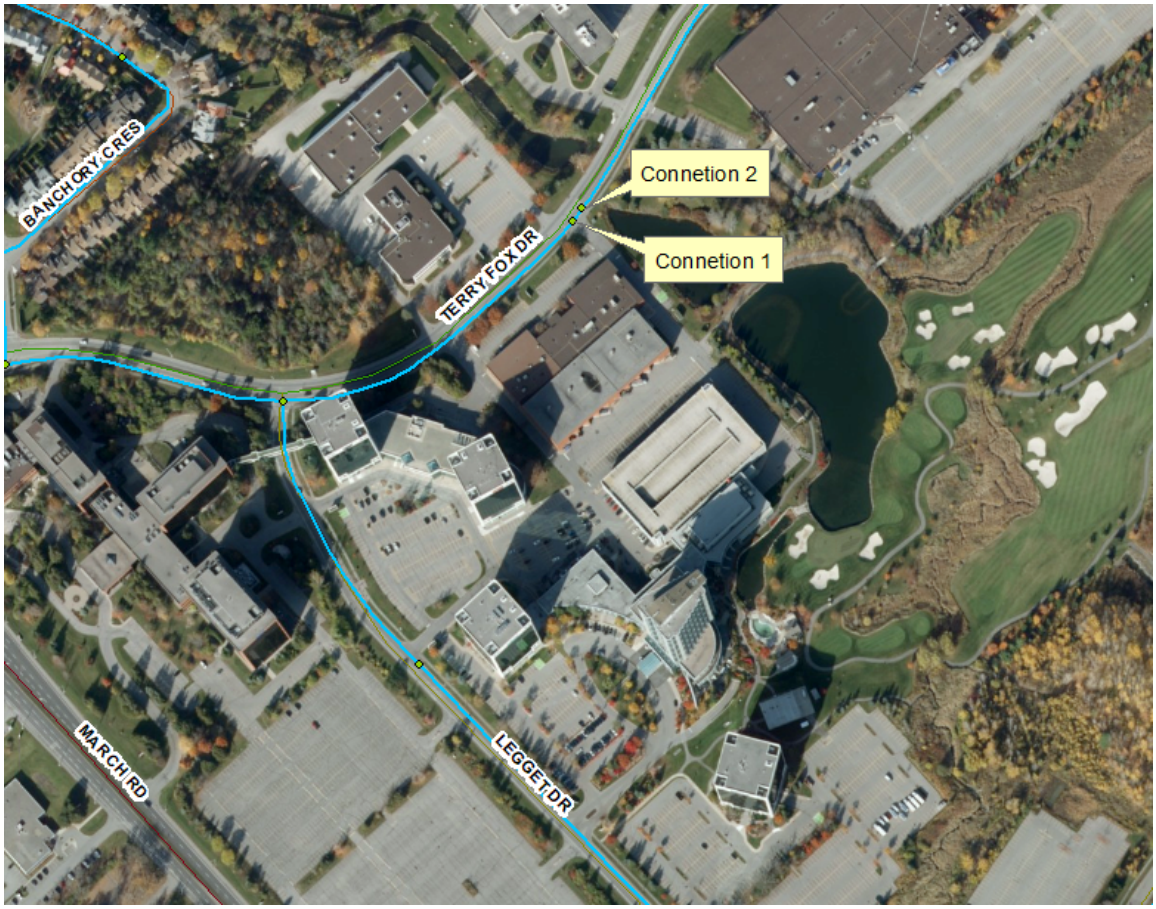
Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Wood frame		1.5	0.6	
		Ordinary construction		1		
		Non-combustible construction		0.8		
		Modified Fire resistive construction (2 hrs)	Yes	0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	**Podium Level**				
		Ground Floor	1332	25% of Floor Area		
		2 Floor	1538	100% of Floor Area		
		3 Floor	1269	25% of Floor Area		
		4 Floor	1269			
		Tower Footprint (m^2)	887			
		Total Floors/Storeys (Tower)	27			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,188**	
	F	**Base fire flow without reductions**				**6,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**5,100**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-2,550**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**3,060**
		East Side	> 45.1m		0%	
		South Side	20.1 - 30 m		10%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**60%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	720

Boundary Conditions
555 Leget Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	105	1.75
Maximum Daily Demand	261	4.35
Peak Hour	574	9.57
Fire Flow Demand #1	7,000	116.67

Location



Results

Connection 1 – Terry Fox Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	129.9	74.1
Peak Hour	126.3	68.9
Max Day plus Fire 1	125.9	68.4

Ground Elevation = 77.8 m

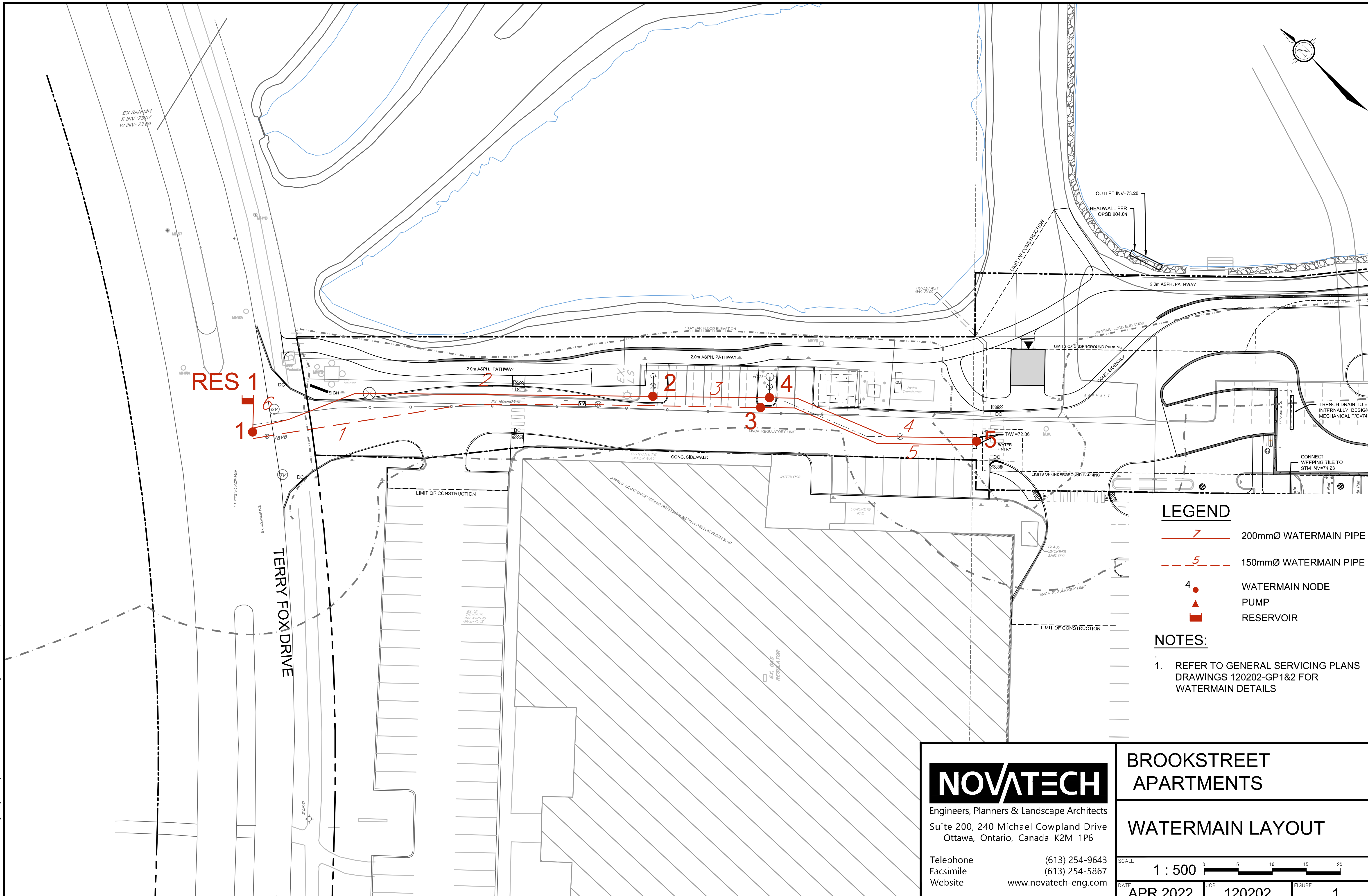
Connection 2 – Terry Fox Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	129.9	74.1
Peak Hour	126.3	68.9
Max Day plus Fire 1	125.9	68.4

Ground Elevation = 77.8 m

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.



LEGEND

7 (solid line)	200mmØ WATERMAIN PIPE
5 (dashed line)	150mmØ WATERMAIN PIPE
4 ●	WATERMAIN NODE
▲	PUMP
▬	RESERVOIR

NOTES:

1. REFER TO GENERAL SERVICING PLANS DRAWINGS 120202-GP1&2 FOR WATERMAIN DETAILS

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
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Website www.novatech-eng.com

BROOKSTREET APARTMENTS

WATERMAIN LAYOUT

SCALE 1 : 500

DATE APR 2022 | JOB 120202 | FIGURE 1

M:\2020\120202\CAD\Design\Figures\Hydraulic\EPA-NET-FIGURE.dwg, 11x17 landscape, Feb 04, 2022 - 12:02pm, amestwarp

```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
*                         Version 2.0                            *
******************************************************************
```

Link - Node Table (AVERAGE DAY):

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	119	150
2	1	2	59.8	200
3	2	4	17.1	200
4	4	5	32.8	200
5	3	5	33.8	200
6	RES1	1	1	400

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.00	129.90	54.30	0.00	
2	0.00	129.90	52.95	0.00	
3	0.00	129.90	53.30	0.00	
4	0.00	129.90	53.15	0.00	
5	1.80	129.90	54.33	0.00	
RES1	-1.80	129.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	0.51	0.03	0.02	Open
2	1.29	0.04	0.02	Open
3	1.29	0.04	0.02	Open
4	1.29	0.04	0.02	Open
5	0.51	0.02	0.00	Open
6	1.80	0.01	0.00	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.0                           *
******************************************************************
```

Node Results (MAX DAY + FIRE FLOW):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.00	125.90	50.30	0.00	
2	50.00	123.35	46.40	0.00	
3	0.00	123.46	46.86	0.00	
4	50.00	123.22	46.47	0.00	
5	4.20	123.32	47.75	0.00	
RES1	-104.20	125.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	23.23	1.31	20.48	Open
2	80.97	2.58	42.68	Open
3	30.97	0.99	7.20	Open
4	-19.03	0.61	2.92	Open
5	23.23	0.74	4.23	Open
6	104.20	0.83	1.98	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.0                           *
******************************************************************

Node Results (PEAK HOUR):
----------------------------------------------------------------
Node                Demand      Head  Pressure   Quality
ID                     LPS         m         m
----------------------------------------------------------------
1                      0.00    126.30     50.70      0.00
2                      0.00    126.28     49.33      0.00
3                      0.00    126.26     49.66      0.00
4                      0.00    126.27     49.52      0.00
5                      9.06    126.26     50.69      0.00
RES1                  -9.06    126.30      0.00      0.00 Reservoir

Link Results:
----------------------------------------------------------------
Link                Flow  VelocityUnit Headloss    Status
ID                    LPS       m/s      m/km
----------------------------------------------------------------
1                      2.57      0.15      0.35      Open
2                      6.49      0.21      0.40      Open
3                      6.49      0.21      0.40      Open
4                      6.49      0.21      0.40      Open
5                      2.57      0.08      0.07      Open
6                      9.06      0.07      0.03      Open
```

APPENDIX G
Development Servicing Checklist

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	**Addressed (Y/N/NA)**	**Comments**
Executive Summary (for larger reports only).	N/A	
Date and revision number of the report.	Y	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Refer to Report Figures
Plan showing the site and location of all existing services.	Y	Refer to Grading and Servicing Plans
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.	Y	Refer to Site Plan
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	
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.	Y	
Statement of objectives and servicing criteria.	Y	Report Sections: 3.0 Storm Servicing, 4.0 Stormwater Management, 6.0 Sanitary Servicing, 7.0 Water Servicing
Identification of existing and proposed infrastructure available in the immediate area.	Y	
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).	N/A	
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 neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	Refer to Grading Plan and Stormwater Management Plan

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content	**Addressed (Y/N/NA)**	**Comments**
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.	N/A	
Proposed phasing of the development, if applicable.	N/A	
Reference to geotechnical studies and recommendations concerning servicing.	Y	Report Section 2.0 Geotechnical Investigation
All preliminary and formal site plan submissions should have the following information:		
Metric scale	Y	
North arrow (including construction North)	Y	
Key plan	Y	
Name and contact information of applicant and property owner	Y	
Property limits including bearings and dimensions	Y	
Existing and proposed structures and parking areas	Y	
Easements, road widening and rights-of-way	Y	
Adjacent street names	Y	

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.2 Water	**Addressed (Y/N/NA)**	**Comments**
Confirm consistency with Master Servicing Study, if available.	N/A	
Availability of public infrastructure to service proposed development.	Y	Report Sections: 3.0 Storm Servicing, 4.0 Stormwater Management, 6.0 Sanitary Servicing, 7.0 Water Servicing
Identification of system constraints.	N/A	
Identify boundary conditions.	Y	Provided by City of Ottawa
Confirmation of adequate domestic supply and pressure.	Y	Refer to Appendix F
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.	Y	Refer to Appendix F
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.	Y	Refer to Appendix F
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N/A	
Address reliability requirements such as appropriate location of shut-off valves.	Y	Refer to Appendix F
Check on the necessity of a pressure zone boundary modification.	N/A	
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.	Y	Report Section 7.0 Water Servicing
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.	Y	Report Section 7.0 Water Servicing
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.	N/A	
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	Report Section 6.0 Water Servicing
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A	

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.3 Wastewater	Addressed (Y/N/NA)	**Comments**
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).	Y	Report Section 6.0 Sanitary Servicing
Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A	
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.	N/A	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	Report Section 6.0 Sanitary Servicing
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)	y	Refer to Appendix E
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A	
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	Report Section 6.0 Sanitary Servicing
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).	N/A	
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A	
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A	
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A	
Special considerations such as contamination, corrosive environment etc.	N/A	

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.4 Stormwater	**Addressed (Y/N/NA)**	**Comments**
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	Report Section 4.0 Stormwater Management
Analysis of the available capacity in existing public infrastructure.	N	Stormwater release rates less than or equal to city allowabale release rate criteria
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	Refer to Stormwater Management Plan
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.	Y	Report Section 4.0 Stormwater Management
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	Report Section 4.0 Stormwater Management
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	Report Section 4.0 Stormwater Management
Set-back from private sewage disposal systems.	N/A	
Watercourse and hazard lands setbacks.	Y	Refer to the grading and servicing plans
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A	
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	Refer to Appendix C
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A	
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.	Y	Refer to Appendix B AND C
Any proposed diversion of drainage catchment areas from one outlet to another.	N/A	
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	N/A	
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.	Y	Report Section 4.0 Stormwater Management

Brookstreet Apartments
525 Legget, Ottawa
DEVELOPMENT SERVICING STUDY CHECKLIST

4.4 Stormwater	Addressed (Y/N/NA)	Comments
Identification of potential impacts to receiving watercourses.	N/A	
Identification of municipal drains and related approval requirements.	N/A	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	Report Section 4.0 Stormwater Management
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	Refer to Stormwater Management Plan
Inclusion of hydraulic analysis including HGL elevations.	N/A	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	Report Section 8.0 Erosion and Sediment Control
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.	Y	
Identification of fill constrains related to floodplain and geotechnical investigation.	Y	

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Comments
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.	Y	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A	
Changes to Municipal Drains.	N/A	
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A	

4.6 Conclusion	Addressed (Y/N/NA)	Comments
Clearly stated conclusions and recommendations.	Y	Report Section 9.0 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.	Y	Comment response letter included with resubmission
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	

APPENDIX H
Pre-Consultation Minutes

525 Legget Drive
Pre-Consultation Meeting Minutes

Location: Microsoft Team

Date: February 22, 2021 between 1 to 2pm

Attendees

Stream Shen, Planner, City of Ottawa

Justyna Garbos, Park Planner, City of Ottawa

Rachel Young, Co-op Student, City of Ottawa

Randolph Wang, Urban Designer, City of Ottawa

Matthew Hayley, Environment Planner, City of Ottawa

Mike Schmidt, Policy Planner, City of Ottawa

Greg Winters, Project Manager, Novatech

Jennifer Luong, Transportation Project Manager, Novatech

Greg MacDonald, Civil, Novatech

James Ireland, Planner, Novatech

Erica Odgen, Planner, MVCA

Richard Goldstein, KRP

Martin Vandewouw, KRP

Nyle, KRP

Bruno St-Jean, Archtiect, NEUF

Marilou Morin, Architect, NEUF

Comments from Applicant

1. The applicant is proposing a 30-storey residential rental building with underground parking.
2. The building will include a direct connection to the conference centre that is attached to the Brookstreet hotel but will not be connected to the open air parking structure.
3. The amenities in the hotel will be available to the apartment building and vice versa.
4. There is a planned rooptop terrace and restaurant at the top of the building.

5. The applicant indicate that the tech park is underserviced with residential and other commercial amenities and the current vision is to have a live, work, play and learn Kanata North Economic District.
6. The applicant indicated that the intent is to submit a concurrent zoning and site plan application prior to the adoption of the new OP by the Minister. The new OP would permit residential use generally within 600m of two nodes and this site would qualify under these criteria.

Planning Comments (Schmidt, Mike Mike.Schmidt@ottawa.ca and Shen, Stream Stream.Shen@ottawa.ca)

1. This is a pre-consultation for a Major Zoning By-law Amendment and Site Plan Control application, Complex, subject to Public Consultation. Application form, timeline and fees can be found here.
2. The proposal generally aligns with the new OP direction for the Kanata North Economic District. Staff generally agrees with the submission timing. However, it will be at the applicant's own risk if any policies were to be revised prior to Council and Minister adoption.
3. Please include a section 37 analysis within the planning rationale. There is currently a work plan to replace section 37 with a new community benefit charge sometimes in 2022, so staff encourages applicant to check back with the City prior to submission.
4. Please consult with the Ward Councillor prior to submission.

Urban Design Comments (Wang, Randolph Randolph.Wang@ottawa.ca)

1. A Design Brief is required as part of the submission package. The Terms of Reference of the Design Brief is attached for convenience. Please note:
    a. A wind study is required for the proposed development;
    b. Further exploration of massing options will be necessary (also see comments below).
2. The applicants mentioned a master planning study of the area. Is it possible to obtain a copy of that document even if it is still in draft form for context?
3. The design presented at the meeting looks quite handsome architecturally. Here are a few suggestions:
    a. The L-shape building looks quite expansive from certain angles. Considerations should be given to sculpting the top floors in order to increase the slenderness of the building. One possible option is to make the two wings at different heights.
    b. The elevator shaft will likely to create a blank wall condition on the facade. Please be mindful that this building is visible from various viewpoints.

Extensive blank walls should be avoided. Could some or all of the elevators be glass lifts?

c. Please make sure elevator over run is integral to the overall architecture expression.

d. The podium + tower approach to design is appreciated. However, the podium and the tower speak two very different architectural languages in the proposed concept. Would a singular architectural language without losing the distinction between the tower and podium be appropriate in this high-tech campus context?

e. The design of the building forecourt and the overall experience of arrival, including the location of the drop-off and the parking ramp require more thinking. At present, the parking ramp and the garage door are visually dominant. The forecourt should be a welcoming place for pedestrians with the building entrance clearly visible and conveniently accessible. Parking ramp and garage door should be at a less dominant location. Considerations should be given to relocating the parking ramp. Given the site grading one possible option is to flip the parking ramp and the drop off.

Engineering Comments (Valic, Jessica jessica.valic@ottawa.ca)

Infrastructure

Water

- Severed property would require own independent service
- Per WDG 4.3.1, where basic demand is greater than 50 m3/day, there shall be a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area
- Per WDG 4.4.7.2, District Meter Area (DMA) Chamber is required for services greater than 150mm in diameter

Boundary Conditions

Request prior to first submission. Contact assigned City Infrastructure Project Manager with the following information:

- Location of service(s)
- Type of development and required fire flow (per FUS method – include FUS calculation sheet with boundary condition request)
- Average Daily Demand (l/s)
- Maximum Hourly Demand (l/s)
- Maximum Daily Demand (l/s)

Sanitary

- Severed property would require own independent service
- Demonstrate capacity of downstream receiving system

Storm

- Severed property would require own independent service
- Relocation of existing storm sewers on proposed site may be required
- There can be no impact on the footprint or access measures of the existing stormwater management pond

Stormwater Management

- Quantity Control
    - Applicant to demonstrate that receiving stormwater management pond has adequate capacity for the proposed development
    - Required for the site up to and including the 100-yr storm event.
    - Control to the 5-year storm event
    - Time of Concentration (Tc): pre-development or maximum=10min
    - Allowable runoff coefficient(c): Lesser of pre-development or c=0.5.
    - If underground/inline stormwater storage is proposed, an average release rate equal to 50% of the determined peak allowable rate must be used. Otherwise, disregard the underground/inline storage as available storage or provide modeling to support the proposed design. The reasoning for this restriction is that the discharge rate at full storage is not representative of the discharge rate for more frequent storm events. Halving the discharge rate compensates for the inaccuracies of the modified rational method when underground storage is used.
    - Provide both pre and post development stormwater management plans, showing individual drainage areas and their respective coefficients.
    - If roof storage is proposed, please provide a roof drainage plan showing the 5 and 100-year storm ponding levels. Include the roof drain type, opening settings, and flow rate.
    - Roof drains to be connected downstream of any incorporated ICD within the SWM system.
- Quality Control: Please consult with the Mississippi Valley Conservation Authority (MVCA) regarding water quality control restrictions for the subject site. Include correspondence in report.
- Ministry of Environment, Conservation, and Parks (MECP): Designer to determine if approval for sewage works under Section 53 of OWRA is required and to determine the type of application required. Reviews will be done through Transfer of Review or Direct Submission.

Phase I and Phase II ESA

- Phase I ESA is a requirement; Phase II ESA requirement will be dependent on the result of the Phase I ESA.
- Phase I ESA must include Ecolog ERIS Report.
- Phase I ESAs and Phase II ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- Phase I/II ESA to comment on the need for a Record of Site Condition for property development.

Geotechnical Investigation

- Required for entire development area
- Retaining walls greater than 1.0m must be designed by a Professional Engineer. Plans to be submitted with the Application
- Due to proximity to existing structures and surface water features, report must speak to possible negative effects, monitoring, and mitigation measures during/after construction

Exterior Lighting

- If exterior light fixtures are proposed, provide a plan showing the location of all exterior fixtures and include a table providing fixture details (make, model, mounting heights). All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), resulting in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). Provide certification from a relevant Professional Engineer.

Required Studies

- Servicing/Stormwater Management Report (Submit completed Servicing Study Checklist with Servicing Report)
- Geotechnical Study
- Phase I ESA
- Phase II ESA (depends on outcome of Phase I)

Required Plans

- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan (Can be combined with grading plan)
- SWM Plans

General Information

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications
2. Servicing and site works shall be in accordance with the following documents:
   - ⇨ Ottawa Sewer Design Guidelines (October 2012) (including subsequent Technical Bulletins)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010) (including subsequent Technical Bulletins)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ⇨ Ottawa Standard Tender Documents (latest version)
3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
4. Any proposed work in utility easements requires written consent of easement owner.
5. All submitted report and plan pdf documents to be flattened and unsecured to allow for editing.
6. All documents prepared by Engineers shall be signed and dated on the seal.

Transportation Comments (Giampa, Mike Mike.Giampa@ottawa.ca)

1. Please complete the Transportation Impact Assessment process prior to Site Plan submission.

Environment Comments (Hayley, Matthew Matthew.Hayley@ottawa.ca)

The site will need the following to support the application:

- EIS to address species at risk, similar to 2016 – particular attention to Blanding's turtle habitat. In the meeting it was indicated that SWM ponds are not habitat and that this was the position of the province at the time of last application. I should have brought this up in the meeting but the City is aware of several SWM ponds (some on this same watercourse) and others that have been mapped by the Province has regulated habitat. The new EIS will need to indicate the limit of Blanding's turtle habitat and it will need to be accepted by the MECP. Presumably if this position was accepted previously it will be again, however we need to be careful since we have several SWM ponds that are regulated under the Endangered Species Act.

- Bird-Safe Design Guidelines https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans need to be incorporated into the EIS and design of the building.

Other comments:

Ecological enhancements to the building. Please consider the existing policies in the OP Section 4.9 (Energy Conservation Through Design) and also the new Energy Evolution policies as well as the new OP policies as they pertain to 10.3 including the retention of trees were feasible; mitigation of heat island impacts; green roofs (perhaps adding a green roof and green wall to the parking garage).

Consider how to enhance the environmental attributes of this area as a way to attract tenants and residents. Many of the ideas that come up when thinking of environmental development are already underway in the Kanata North Special District (e.g., EV charging, Autonomous transportation, IT connectivity) other ideas could be considered like zero carbon buildings, active transportation and high performance buildings.

MVCA Comments (Erica Ogden eogden@mvc.on.ca)

- The Mississippi Valley Conservation Authority (MVCA) confirms that a portion of the proposed development area is regulated under Ontario Regulation 153/06, *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Under Ontario Regulation 153/06, written permission is required from the MVCA prior to the initiation of development (which includes construction, site grading and the placement or removal of fill) within an area regulated by the Conservation Authority (regulation limit delineated in yellow on the enclosed regulation mapping) as well as straightening, changing, diverting or interfering in any way with the existing channel or the shoreline of a watercourse.
- Portions of the property are located within the 1:100 year flood plain (delineated in orange on the enclosed mapping) of Shirley's Brook, which was approved by the MVCA Board of Directors in 2017. We note this updated mapping has not yet been carried forward in the City of Ottawa Zoning By-law. A digital copy of the flood plain mapping are available upon request.
- MVCA requests that a technical analysis be submitted with the application to assess the potential impacts resulting from the proximity of the proposed development to the flood plain, the potential grading works within the flood plain for the proposed access and the proposed underground parking. Given the proximity to the existing stormwater management facilities, during a flood event the surrounding area could remain saturated for an extended period of time.
- The stormwater management facility located south of Terry Fox Drive accepts runoff from approximately 13 ha of the surrounding commercial development.

The outlet of the facility is located within the Regulation Limit. Therefore, any potential modifications to the pond outlet will require a prior approval from the MVCA under Ontario Regulation 153/06.

- The stormwater water quality requirement for Shirley's Brook is an enhanced level of protection, which requires 80% total suspended solids removal.
- Low Impact Development techniques are recommended for stormwater management and water temperature controls should also be taken into consideration.
- MVCA requests that a Stormwater Management Report, including an Erosion and Sediment Control Plan and a Grading Plan be submitted.

Park Comments (Garbos, Justyna Justyna.Garbos@ottawa.ca)

- Parks will collect cash-in-lieu of parkland (CILP) for this development based upon the rates below prorated proportionally to the gross floor area allocated to each use
    - 10% for the residential apartment
    - 2% for the restaurant (and any other commercial uses)
- Additionally, the applicant is to pay a $565 land appraisal fee
- Please provide the gross floor areas for each use so that the exact CILP amount can be calculated

Forestry Comments (Richardson, Mark Mark.Richardson@ottawa.ca)

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    a. an approved TCR is a requirement of Site Plan approval.
2. As of January 1 2021, any removal of privately or publicly (City) owned trees 10cm or larger in diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site by species, diameter and health condition

5. the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
7. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
    a. the location of tree protection fencing must be shown on a plan
    b. show the critical root zone of the retained trees
    c. if excavation will occur within the critical root zone, please show the limits of excavation
8. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site and Ottawa's long-term urban forest canopy.
9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

For additional information on the following please contact Adam.Palmer@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing.
- Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and

warranty as described in the specification (can be provided by Forestry Services).

- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please ensure adequate soil volumes are met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,

Stream Shen MCIP RPP

Planner II

Development Review - West