Planning

Design and Design Review

Seismic Assessment

Structural Evaluation

Condition Surveys

Structural Rehabilitation

Feasibility Studies

Construction Engineering

Contract Administration and Tendering

Construction Inspection

Quality Verification Engineering (QVE)

Chateau Laurier Expansion
1 Rideau Street
Ottawa, ON

SERVICING AND STORM WATER MANAGEMENT REPORT

Larco Investments Ltd.
100 Park Royal S
West Vancouver, BC V7T 1A2
TEL.: (604) 925-2700

April 17th, 2019
REVISION 5

REMISZ **Consulting Engineers**

REMISZ Consulting Engineers Ltd.
57 Auriga Drive, Suite 102
Ottawa, Ontario, K2E 8B2

April 17, 2019 File No. 2016-146

Larco Investments Ltd
100 Park Royal S
West Vancouver, BC
V7T 1A2

RE: Chateau Laurier Expansion
Ottawa, ON
Servicing and Storm Water Management Report

---

1) Introduction

Remisz Consulting Engineers Ltd. has been retained by Larco Investments to develop a site servicing plan, grade control plan, drainage plan, storm water management report, and a site servicing report for the proposed expansion of the Chateau Laurier. The site is located at 1 Rideau Street in Ottawa, ON at the north-west corner of Rideau Street and Mackenzie Avenue. This report is a summary of the data and calculations required for the site servicing of this project, along with the necessary design drawings and supporting documentation.

Our servicing and site works design is done in accordance with the following documents and standards:

- *City of Ottawa Sewer Design Guidelines;*
- *City of Ottawa Design Guidelines – Water Distribution;*
- *City of Ottawa Standard Tender Documents;*
- *Ontario Provincial Standards for Road and Public Works;*
- *MTO Drainage Management Manual;*
- *MTO Highway Drainage Design Standards*

This report has been prepared in consideration of the above mentioned guidelines and with the site plan prepared by Architects Alliance for the proposed development. Should there be any changes in the design features affecting site servicing conditions, RCE should be accordingly notified to review the design recommendations.
The present report is focusing on the technical part of the work only. For legal aspects, i.e. Front Ending Agreement with the City of Ottawa, NCC approvals etc., will be submitted separately by the project planner.

2) Project Data

The site is located north of Rideau Street, West of Mackenzie Avenue. The new addition will be constructed north of the existing Chateau Laurier Hotel. The new addition to the historic landmark consists of a new courtyard, forecourt, glass link, and 7-storey building. Also included is a new underground parking garage with

5 levels of parking space available to hotel guests and the general public. Existing and designed site grades are provided in Grading Plan, see Appendix C.

3) Storm Water Management

General storm water management parameters were discussed with the City of Ottawa and conditions are provided in Appendix B. The storm water runoff for the site must be controlled to a 5 year storm at C=0.5 or the existing C value (whichever is less) and hold up to a 100 year storm event on site.

The pre-development site surface consists of a parking garage, terrace, and entrance areas with coefficient C=0.95. As per City of Ottawa requirements for storm water calculations, coefficient C=0.5 is taken. Post-development site surface consists of hotel roofs of 7th storey roof, 5th storey roof, ground floor roof, courtyard, glass link, and forecourt. Coefficient C for 5 years storm is 0.95, and for 100 years storm is 1.00. Terrace and entrance provide uncontrolled runoff which is subtracted from the allowable storm water release rate. Calculations are shown in Appendix D; results are summarized below.

Allowable Controlled Runoff	47.47 L/s
Required storage of water on site (5 year storm)	20.47 m^3
Required storage of water on site (100 year storm)	58.91 m^3
Total Roof and Courtyard Area	3280 m^2 (3169.8 m^2 inside property)

To provide the allowable water release, a total of 17 adjustable control units (see Appendix E) have been designed with closed weir opening. The devices have 10 gal/min flow rate, providing total release of 10.7 L/s. Schematic device placement is shown on Detail A of DWG S-01 in Appendix C. Flood depth for 5 years event is 80mm and stored amount of water is 0.5 x 1522m^2 (flood area) x 0.08m (flood depth) = 60.9m^3. Flood depth for 100 years event is 100mm and stored amount of water is 0.5 x2326m^2 (flood area) x 0.1m (flood depth) = 116.3m^3. Allowable depth for 5 years event is 100mm; for 100 years event is 300mm. This meets the required conditions and amount of stored water is exceeding the requirements.

In case of flood exceeding 100 year event, storm water is designed to flow in West direction towards existing depressed area. There is no need to install additional back-up storm water management devices.

Existing storm and sanitary is connected to manhole located at the entrance of Major Hill's Park. There are three options for connecting the new sanitary and storm service lines. For each option once the lines reach the manhole, the new sanitary and storm services will connect to existing lines in existing deeper service tunnels.

Option one includes a 500mm diameter tunnel, sloped at 10% with gravity driven sanitary and storm lines within it extending from below the lowest level of the new hotel building to the existing manhole in Major Hill's Park. The sanitary and storm lines are 150mm in diameter.

Option two includes the use of a force main and pump to extend up from the lowest level of the new building up to the respective gravity driven lines located 2 meters below grade. The sanitary and storm lines may be 150mm or 200mm in diameter. Use of a 150mm diameter line may result in clogging and therefore increased maintenance costs. Pressurized sections of pipes diameter is as per manufacturer requirements in order to provide a lift of approximately 15 meters. Required storm water storage for this option, for one hour rain duration is 40m^3 with a set of pumps (one working and one standby) with a capacity of 11 L/sec. Sanitary storage is to be 10-12m^3 complete with a set of pumps (one working and one standby) with max flow capacity of 1.43 L/s.

Option three includes a gravity line for the hotel 2 meters below grade and the garage sewer to be collected at the lower level into smaller tank which is then pumped up to the gravity line. This reduces the size of the tank and the pumps. Required storm water storage for this option, for one hour rain duration is $10m^3$ with a set of pumps (one working and one standby) with a capacity of 3 L/sec. Sanitary storage is to be $3m^3$ complete with a set of pumps (one working and one standby) with max flow capacity of 0.6 L/s.

We recommend the use of **option one**. During our previous discussion with the City, option one was approved for implementation. For detailed design of the site servicing please see drawing S-02 and S-02.1 in Appendix H.

4) Water Supply

General water supply parameters were discussed with the City of Ottawa and conditions are provided in Appendix B. The proposed site can be serviced via one connection to existing water main along Mackenzie Avenue, a second connection to the existing Hotel water main, and will require a looped system for redundancy. The water connection to the existing Hotel will require a water meter to track consumption of the new building. Calculations for water supply rates based on the City of Ottawa Design Guidelines are provided in Appendix F; results are summarized below.

Average Daily Flow	29.53 L/min or 0.49 L/s
Maximum Day Flow	44.30 L/min or 0.74 L/s
Peak Hour Flow	79.73 L/min or 1.33 L/s
Total Required Fire Flow	13,000 L/min or 217 L/s

Water demands have been submitted to the City of Ottawa and the following boundary conditions were provided:

Minimum HGL = **106.1m**
Maximum HGL = **118.1m**
Max. Day + Fire Flow = **103.2m**

The water analysis results are summarized in the table below.

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	0.49	80 (Max)	65.5
Maximum Daily Demand and *Fire Flow*	217.4	20 (Min)	44.4
Peak Hour	1.33	40 (Min)	48.5

Therefore, based on the boundary conditions provided by the City, the existing water main system can provide adequate domestic flows sufficient for minimum requirements. According to current design of the proposed development, structures are anticipated to reach a maximum height of 99.96m, while the available pressure for water supply for peak hour demand is 103.2m. This meets the required conditions.

The required size of the water service looped connection is 200mm. The proposed service connection is shown on the Site Services Plan, see Appendix H.

5) Sanitary Drainage

General sanitary drainage parameters were discussed with the City of Ottawa and conditions are provided in Appendix B. The new addition will not be allowed to drain into the existing combined sewer (on Mackenzie Avenue). The addition will require a new 500mm diameter tunnel to be constructed to connect to the existing manhole at the entrance of Major Hill's Park.

Calculations for sanitary flow are provided in Appendix G. The sanitary servicing design was provided accordingly. The design flows were calculated as per Ottawa Sewer Design Guidelines.

Average Flow	0.50 L/s
Peak Flow	0.50 L/s
Peak Flow (Wet Weather)	0.63 L/s

Existing storm and sanitary is connected to manhole located at the entrance of Major Hill's Park. There are three options for connecting the new sanitary and storm service lines. For each option once the lines reach the manhole, the new sanitary and storm services will connect to existing lines in existing deeper service tunnels.

Option one includes a 500mm diameter tunnel, sloped at 10% with gravity driven sanitary and storm lines within it extending from below the lowest level of the new hotel building to the existing manhole in Major Hill's Park. The sanitary and storm lines are 150mm in diameter.

Option two includes the use of a force main and pump to extend up from the lowest level of the new building up to the respective gravity driven lines located 2 meters below grade. The sanitary and storm lines may be 150mm or 200mm in diameter. Use of a 150mm diameter line has risk of clogging and therefore increased maintenance costs. Pressurized sections of pipes diameter is as per manufacturer requirements in order to provide a lift of approximately 15 meters. Required storm water storage for this option, for one hour rain duration is 40m^3 with a set of pumps (one working and one standby) with a capacity of 11 L/sec. Sanitary storage is to be 10-12m^3 complete with a set of pumps (one working and one standby) with max flow capacity of 1.43 L/s.

Option three includes a gravity line for the hotel 2 meters below grade and the garage sewer to be collected at the lower level into smaller tank which is then pumped up to the gravity line. This reduces the size of the tank and the pumps. Required storm water storage for this option, for one hour rain duration is 10m^3 with a set of pumps (one working and one standby) with a capacity of 3 L/sec. Sanitary storage is to be 3m^3 complete with a set of pumps (one working and one standby) with max flow capacity of 0.6 L/s.

We recommend the use of **option one**. During our previous discussion with the City, option one was approved for implementation. For detailed design of the site servicing please see drawing S-02 and S-02.1 in Appendix H. City of Ottawa Standard Drawings S11, S11.1, and S11.2 were referred on the drawing S-02.1 for information purposes only to show general approach to designing the connections. More detailed specific design will be provided at a later stage when we will have full set of drawings for the manhole rehabilitation along with access to the manhole in order to fully and accurately asses the needs for work.

6) Site Servicing

Based on site configuration, the proposed new addition to the Chateau Laurier is facing north and the existing manhole in Major Hill's Park is located on the north side of the building. We propose to construct storm water and sanitary sewer lines north of the building, through Major Hill's Park and to connect these services to deeper existing service tunnels via the existing manhole. Water servicing will utilize the existing lines east of the new addition, along Mackenzie Avenue and also connect to the existing Hotel water main on the south side of the new addition. Detailed layout and slopes are provided on the Site Services Plan drawings S-02 and S-02.1 in Appendix H.

7) Erosion and Sediment Control

The following measures should be implemented as part of the Erosion and Sediment Control Plan. A copy of this plan is to be posted on the site. As a part of the requirements of this plan, we confirm that no wetlands exist on site and this site is not located on a flood plain.

The contractor shall implement best management practices, to provide for protection of the area drainage system and the receiving watercourse, during construction activities. The contractor acknowledges that failure to implement appropriate erosion and sediment control measures may be subject to penalties imposed by any applicable regulatory agency.

Erosion and Sediment Control

- Silt fences are to be installed along the canal pathway and between the excavation area and Major Hill's Park.
- The contractor hired by the site owner is responsible for installation, inspections, maintenance and removals of control measures.
- Daily inspections of this fence will be carried out by owner's representative and any repair work will be done as soon as a problem is noticed.
- Run-off from construction materials and stockpiles will be contained and discharged so as to prevent entry of sediment into the watercourses. Accumulated silt material will be removed as required and disposed of off-site.
- Heavy-duty silt fence will be installed as per the attached OPSD 219.130. Silt fence is to be a woven Class I geotextile as per location shown on Erosion and Sediment Control Plan Drawing S04.
- Grading and placement of granular materials will be carried out in an expeditious manner and confined to the affected locations.
- Cut and fill slopes will be stabilized by seeding and mulching within 15 days of any phase of grading.
- All openings in manholes and catch basins are to be covered by filter cloth during construction to prevent the entrance of sediments.

Equipment Refueling, Maintenance and Washing

- All equipment will be cleaned of any excess surface oil, grease and dirt prior to its arrival on site.
- Equipment will be kept in good working order.
- Equipment with any leaks will stop work immediately until it is repaired.
- Streets in front of the project will be kept clean at all times.

Fire Protection Contingency

- There will be no burning of materials on the site. Construction debris will be picked up and placed in dump boxes and/or pick-up truck boxes.

These measures are to be considered a **"Living Document"** which may be modified in the event that the control measures are insufficient.
Erosion and Sediment Control Plan shall be permanently posted on site and made available for review by inspecting authorities. For erosion and sediment control plan see Appendix J.

8) Conclusion

In this report, Remisz Consulting Engineers Ltd. have presented the calculations made for storm water management, water demand, and sanitary services. The storm water management measures proposed will result in a 100 year release rate of 47.47 L/s which is equal to the allowable 5 year predevelopment release rate. The expected sanitary peak flow 1.18 L/s. The water demand for peak hour and maximum daily with fire flow is 1.55 L/s and 250.86 L/s, respectively. The average daily water demand is expected to be 0.57 L/s. We also provided site grading and site services layout including storm water sewer, sanitary sewer, and water service lines.

For pre-consultations and comments from reviewing agencies see Appendix K.

For the Development Servicing Study Checklist see Appendix L.

We trust that this report is sufficient for your requirements. If you have any questions concerning this information or if we can be of further assistance to you on this project, please contact us.

Yours truly,

REMISZ Consulting Engineers Ltd.

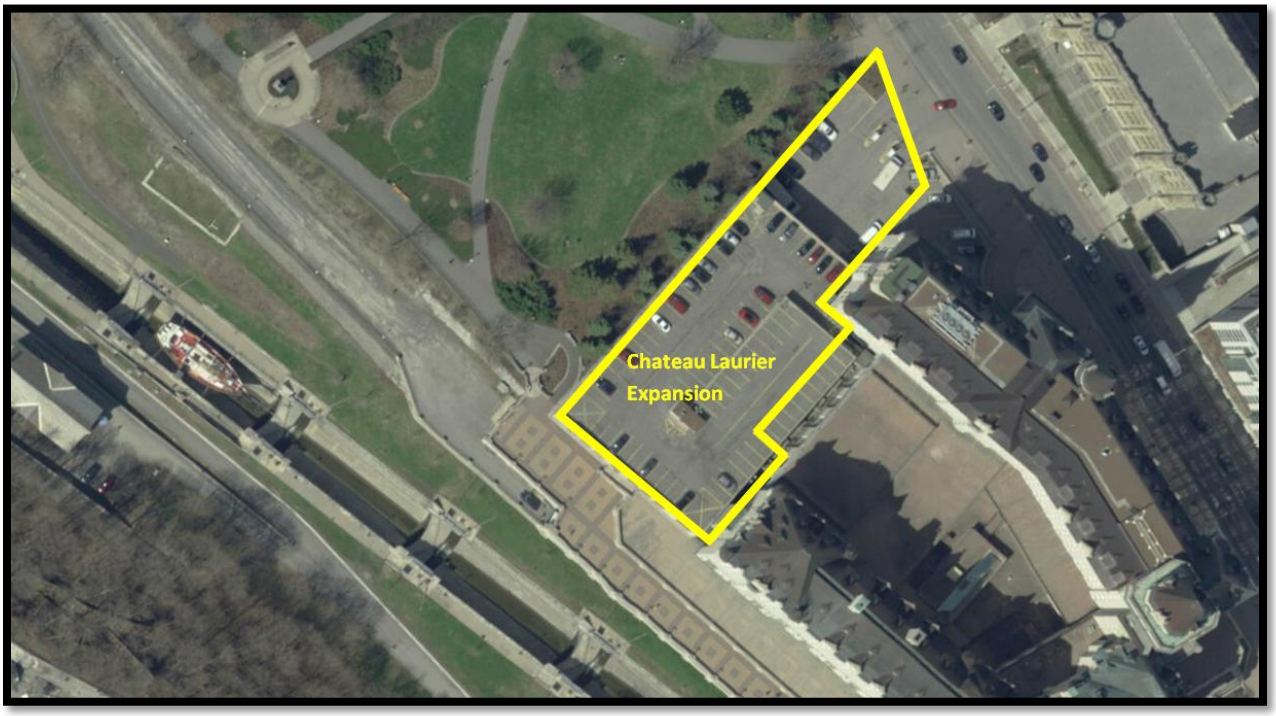
Boris Uriev, M.Sc., P.Eng.
Senior Civil Engineer

Sarah Ladhani, B.Eng., EIT
Project Designer

APPENDIX A

Site Key Plan and Aerial Map


Chateau
Laurier
Expansion
MACKENZIE AVENUE
SUSSEX DRIVE
rue George St
rue Rideau St
prom.
Canal Rideau


Chateau Laurier
Expansion

APPENDIX B

Pre-Application Consultation
Meeting Notes

From: Hamlin, Allison [mailto:Allison.Hamlin@ottawa.ca]
Sent: Wednesday, March 16, 2016 3:58 PM
To: 'Art Phillips'; 'Mark Brandt'; 'Rob Cadeau'; 'Dennis Jacobs, MCIP, RPP'
Cc: 'pclewes@architectsalliance.com'; 'Hoyt, Christopher'; 'Chris Warden'
Subject: RE: Pre-application Consultation Meeting - Follow-up Email - Chateau Laurier, 1 Rideau Street

*My email bounced back from many of you so I am resending it without the solid waste guidelines and road design plans attached. I will arrange to send these separately to Mark.

Hello Art, Mark, Rob and Dennis,

Sorry for the delay in getting back to you. Following our pre-application consultation meeting on March 2, 2016 for the proposed addition to the Chateau Laurier at 1 Rideau Street, I offer below a summary of our comments. Preliminary plans, including renderings and elevations, were provided for review in advance.

Official Plan, Zoning and other City Guidelines

- Official Plan – designated 'Central Area", surrounded by scenic entry routes on Schedule I, and distinctive streets (Annex 9)
- Central Area Secondary Plan – the Canal Character Area
- Zoning – Mixed Use Downtown, MD, with a maximum floor space index of 4.5 and subject to the Heritage Overlay
- Links to Urban Design Guidelines for High-Rise Housing and Transit-Oriented Development Guidelines

Applications Required

An application for Site Plan Control (Manager Approval, Public Consultation) and minor variance (or minor rezoning) will be required. The list of plans and studies required for the site plan application is attached. A cover letter should also be submitted with the minor variance application. If a minor rezoning is being contemplated, a new plans and studies list can be provided. You may wish to use this guide to preparing plans and studies as a reference.

Heritage Comments

- Section 60 of the Zoning By-law applies to this site and states that additions to buildings are permitted only if "the height of the walls and the height and slope of the roof of the addition do not exceed those of the building". The proposed towers do not meet this requirement and the height should be reduced. The varied silhouette of the roofline of the Chateau is an important heritage attribute of the building and impacts to this silhouette should be evaluated and mitigated.
- Further consideration should be given to the datum lines of the building and ensuring that the proposed additions are sympathetic to the Chateau style of the building.
- Further study of the window detailing and the ratio of solid to void is required.
- While there are no legally protected views of the Chateau Laurier, there are several iconic views that contribute to the Chateau's heritage value as a landmark building. These views are well

documented in the NCC's 2008 Chateau Laurier Urban Design Guidance document and impacts to these views should be assessed through the design process.

Design Considerations

Urban design comments will be provided separately through the UDRP process. It is recommended that urban design comments be coordinated following the ACPDR meeting.

Engineering Considerations

The site is currently being serviced through a private combined sewer and from the water main on Rideau Street. The new addition will not be allowed to drain into the existing combined sewer. The addition will require a new sanitary sewer to be constructed. This may be accomplished in a number of ways with the most obvious being the extension of the sanitary sewer from Rideau Street, along Mackenzie Street to the frontage of the addition. The storm water runoff for the site must be controlled to a 5 year storm at C=0.5 or the existing C value (whichever is less) and hold up to a 100 year's storm event on site. The site can be serviced from the 305mm water main on Mackenzie Street and will require a looped system for redundancy.

As this area has combined sewers on all streets, Ministry of the Environment (MOE) approval is required and may take as long as 6 months.

- A Servicing Study is required
- Provide the water demands for the site (average day, max day, Peak hour, Fire Flow) so the City may provide boundary conditions for that water main. Fire Flow is based off of the FUS calculation
- A Noise Study is required. Please see updated Environmental Noise Control Guidelines, January 2016.
- A Geotechnical Study is required
- Phase I ESA and (possibly) Phase II ESA required. Please ensure this is completed to O.Reg 153/04 and not the CSA Standard
- A Servicing and Grading plan will be required
- An Erosion and Sediment Control plan is required (and may be on the Servicing and Grading Plan)

Please contact Josh White (extension 15843) for more information regarding available infrastructure for the proposed development.

Brownfields Rehabilitation Grant

This site may be eligible for a Brownfields Rehabilitation Grant or Development Charge Reduction Program. For more information, you may contact Richard Buchanan (extension 27801).

Transportation Considerations

- Wellington Street, Rideau Street and Mackenzie Street are all designated as an Arterial road within the City's Official Plan.

- Mackenzie Avenue is identified as a City-wide route for on-road multi-use pathways (Schedule I of the Official Plan). There are plans for roads works along Mackenzie scheduled for 2016 to add cycling infrastructure and resurface the road. Drawings are attached.
- For the interlock pavers, landscaped areas and public art on City's road right-of-way the developer has to sign a "Maintenance and Liability Agreement" with the City to cover any claims.
- Ensure that the driveway grade does not exceed 2-6% within the private property for a distance of 9.0 metres from the highway line; see Section 25 (s) of the Private Approach By-Law #2003-447.
- The closure of an existing private approach requires reinstatement of the sidewalk, shoulder, curb and boulevard to City standards.
- Ensure that the pedestrian sidewalk along Mackenzie Street be a minimum of 5 metres in width (from building face to curb edge) and has a clear and unobstructed path of 2.0 metres width minimum.
- Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be located in safe, secure places near main entrances and preferably protected from the weather.
- Where the Development Application is expected to generate fewer than 75 vehicles per hour (peak hour, two direction site generated trips) the City would require a Transportation Overview that analyzes the Trip Generation and Non-Auto Modes. The Transportation Overview would facilitate staff review in addressing councillor and public enquiries. Otherwise the trigger points for the type of Transportation Impact Assessment report are as follows; 76 vph-150 vph requires a Transportation Brief, greater than 150 vph requires a Transportation Impact Study.
- If you have questions, please contact Wally Dubyk at ext. 13783

Environmental Planning

A review of the property at 1 Rideau Street has been undertaken and a scoped EIS is required to address any impacts of the proposed development on any potential habitat within the parking structure (e.g., for barn swallow) and in the immediate vicinity of the site (i.e., the escarpment to the north).

The Scoped EIS can take the form of a letter report or the Scoped EIS form contained within the Council-approved EIS Guidelines (a copy of the form linked below). The Scoped EIS will describe the habitat or lack thereof, presence or absence of species of concern, how the project would impact the habitat and be supported with several photographs where appropriate. It is important that the Scoped EIS be completed with a recent site visit that is conducted for the purpose of gathering information for this.

Scoped EIS Form
http://app06.ottawa.ca/online_services/forms/planning/environmentalImpact_en.pdf

Waste Collection

Separate collection areas will be required for the commercial (hotel) and residential units. Please see City guidelines regarding waste collection.

Other requirements – Cash-in-lieu of Parkland

Cash-in-lieu of parkland must be paid in accordance with the Parkland Dedication By-law of the City of Ottawa, as well as the fee for appraisal services. The monies are to be paid at the time of execution of the Site Plan Agreement.

You may also want to reference information available on the City's website for building permits and development charges as well.

Finally, I also encourage you to discuss the proposal with the area Councillor, Mathieu Fleury, and local community associations. An up-to-date list of community associations is attached.

I trust this information is helpful. Please do not hesitate to contact me if you have questions or require clarification.

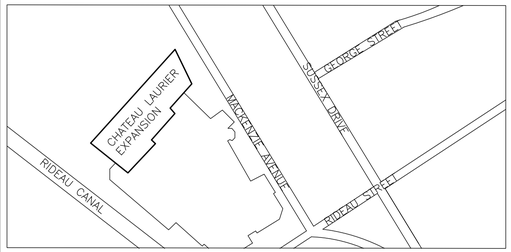
Regards, Allison

Allison Hamlin, MCIP, RPP
Planner, Development Review
Planning and Growth Management
Urbaniste, Examen des demandes d'aménagement
Urbanisme et gestion de la croissance

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 25477
ottawa.ca/planning / ottawa.ca/urbanisme

APPENDIX C

Proposed Site Layout and Grading



KEY PLAN
NTS

	AREA (m²)	5 YR FLOOD (m²) 80mm DEPTH	100 YR FLOOD (m²) 100mm DEPTH
A1	354	201.8	315.3
A2	610.3	353.7	552.7
A3	660	407.2	629.7
A4	273.9	142.7	205
A5	574.2	329.3	512.6
A6	91.8	63.7	79.6
A7	79.4	–	–
A8	59.8	–	–
A9	111.8	–	–
A10	109	–	–
A11	33.8	23.9	30.6
A12	48.5	–	–
A13	273.5	–	–
TOTAL	3280	1522.3	2325.5

DETAIL A
NTS

LEGEND:
- 50.00 + EXISTING ELEVATIONS
- (50.00) + (NEW ELEVATIONS)
- NEW PROPOSED BUILDING
- 2% / 10M STORM WATER DRAINAGE, SLOPE AND DISTANCE
- 5 YEAR FLOOD
- 100 YEAR FLOOD
- ACCUTROL DEVICE

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED.
THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. ELEVATIONS ARE SHOWN IN METRES.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.
3. FINISHED GRADE ELEVATIONS ARE TO BE AS SHOWN ON THE DRAWING.
4. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION,
5. NO EXCESS DRAINAGE IS TO BE DIRECTED TO NEIGHBORING PROPERTIES DURING OR AFTER CONSTRUCTION.
6. NO ALTERATIONS TO EXISTING GRADE ARE PERMITTED ON OR BEYOND PROPERTY LINE.
7. ALL TREES TO BE PROTECTED BEFORE AND DURING CONSTRUCTION.
8. EXISTING DRIVEWAY TO BE REMOVED AND REPLACED WITH INTERLOCK AS PER ARCHITECTURAL DESIGN.
9. STORM WATER MANAGEMENT DEVICES TO BE CLOSED WEIR OPENING.

D07-12-16-0193

No.	Date	Revision	By:
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

REMISZ Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client
LARCO INVESTMENTS LTD.

Project
CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing
GRADING PLAN

Designed BU	Date 08/06/17
Drawn SL	Scale 1:250
Checked BU	Sheet 1 OF 6
Project No. 2016-146	Dwg. No. S-01

frame 790x505 mm
www.remisz.com Frame.dwg – Jan. 2009
0 10 20 40 60 80 100 120 140 160 180 200

APPENDIX D

Storm Water Flow Drawings and Calculations

before such a system can be implemented. The use of this type of system will be reviewed on a case-by-case basis.

5.2.6 Perforated Pipes

Perforated pipes are used in various types of applications including the following:

- Rear yard drainage
- Ditch pipe systems
- Exfiltration/Infiltration systems
- Sub-base drainage
- Road ditch drainage

5.2.7 Ditch Pipe Systems

A ditch pipe system refers to a system that utilizes a combination of roadside ditches, perforated pipes, and storm sewers to provide both runoff conveyance and treatment. These systems are typically used as a best management practice for runoff quality control. The systems work by capturing runoff in the ditches and allowing it to seep into a perforated system under the ditches. The flow is then directed to a storm sewer system. During larger storm events, maintenance holes (slightly raised to promote flow storage) allow for direct flow capture and convey the runoff to the storm sewers.

Since these systems are also used for stormwater quality purposes, approval from the Ministry of the Environment will also be required. The City has implemented a Ditch Alteration Policy in order to provide a process for the City to permit filling or alteration of drainage ditches and drainage courses within City road rights-of-way and those in registered and unregistered easements that convey stormwater from public lands. Therefore approval from the City through this process on a case-by-case basis is required before such a system can be implemented. Due to additional maintenance costs associated with this type of system, the designer will have to provide the City with a cost benefit analysis. See Section 5.9 for more details.

5.3 NON-CONVENTIONAL SYSTEMS

Where variation and/or the introduction of innovative solutions will achieve a better technical and economical solution, a proposal should be presented to the City for approval. All new alternatives must be presented to the City for approval at the conceptual stage of design. Examples of non-conventional systems are ditch pipe systems and foundation drain collectors.

5.4 DESIGN FLOWS/HYDROLOGY

5.4.1 General

All design flows for storm and combined sewer systems shall meet level of service / return period requirements outlined in Section 5.1.

5.4.2 IDF Curves and Equations

An IDF (Intensity Duration Frequency) curve is a statistical description of the expected rainfall intensity for a given duration and storm frequency. In Ottawa, the IDF curve is derived from Meteorological Services of Canada (MSC) rainfall data taken from the Macdonald-Cartier airport. Rainfall collected from 1967 to 1997 was analyzed using the Gumbel Distribution. The following Table 5.1 shows the analysis results provided by MSC. The IDF equations have been derived on the basis of a regression equation of the form:

$$Intensity = \left[\frac{A}{(Td + C)^{B}} \right]$$

where:

Intensity = mm/hr

Td = time of duration (min)

A,B,C = regression constants for each return period

Table 5.1 Ottawa IDF Table: 1967 to 1997

Time (min)	2 year (mm/hr)	5 year (mm/hr)	10 year (mm/hr)	25 year (mm/hr)	50 year (mm/hr)	100 year (mm/hr)
5	102.80	140.20	165.00	196.00	219.00	242.60
10	77.10	104.40	122.50	145.30	162.20	179.00
15	63.30	85.60	100.40	119.10	133.00	146.80
30	39.90	53.90	63.10	74.70	83.40	91.90
60	24.20	32.00	37.10	43.60	48.50	53.20
120	14.30	18.90	22.00	25.80	28.70	31.50
360	6.20	8.40	9.90	11.70	13.10	14.50
720	3.60	4.80	5.60	6.60	7.30	8.00
1440	2.00	2.60	3.00	3.50	3.90	4.30

IDF curve equations (Intensity in mm/hr)

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity = $1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity = $1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity = $1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

The IDF curves based on the above equations can be found in Appendix 5-A

5.4.3 Design Storms

Computer modeling requires the input of a design storm. The design storm is then used to generate a runoff hydrograph to determine how an area will respond and perform. Numerous types of design storms can be used ranging from historical storms to IDF curve-derived storms. This section briefly discusses the various types of design storms.

5.4.3.1 Application to Hydrologic Models

The design storms presented herein are meant to be used in hydrologic models to simulate runoff from events of various return frequencies. When choosing a design storm, the designer should perform a sensitivity analysis using various storms and use the one that is most conservative.

As noted below, the Chicago distribution is one of the most used storms for urban runoff applications. When dealing with rural areas, the SCS Type II storm is preferred. The AES storm can also be used for urban applications; however, care must be taken when choosing the type of distribution. As a rule of thumb, the 30% distribution should be used unless historical data proves otherwise.

When using a design storm, the designer must be careful in choosing the right storm time step. The storm's duration should be greater than twice the basin's time of concentration. A time step that is too small may overestimate peak flows. Should it be required to maintain a storm time step less than 10 minutes, consideration should be given to averaging the peak intensities to a 10-minute or greater average.

Some historical storms are also presented below and are to be used as a check of how various systems function during extreme events. It is not the intent of these guidelines to require that these storms be used for design purposes.

5.4.3.2 Chicago Design Storm

The Chicago storm distribution was developed by C.J. Keifer and H. Chu and is based on 25 years of rainfall record in the city of Chicago. This storm distribution, which is derived with IDF curves, is generally applied to urban basins where peak runoff rates are largely influenced by peak rainfall intensities.

Project Number: Chateau Laurier Hotel, Ottawa

REMISZ Consulting Engineers Ltd.

PRE-DEVELOPMENT (UNCONTROLLED RUNOFF)

The pre-development time of concentration is 10 minutes

where:

$I_5 = 998.071 / (Tc + 6.053)^{0.814}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

I_5 = 104.2 mm/hr I_{100} = **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Corridor	A1	0.0199	21.4%	1.00	0.020
Parking Access	A3	0.0733	78.6%	1.00	0.073
TOTAL		0.0932	100.0%		0.093
Weighted C =					0.90

1

$Q_{5pre} = (2.78)*(C)*(I_5)*(A)$

$Q_{5pre} = 2.78 \times 0.90 \times 104.2 \times 0.0932$

$Q_{5pre} = 24.30$ L/s

$Q_{100pre} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100pre} = 2.78 \times 1.13 \times 178.6 \times 0.0932$

$Q_{100pre} = 52.06$ L/s

C=0.5 used for predevelopment calculation (City of Ottawa requirement)

POST-DEVELOPMENT (UNCONTROLLED RUNOFF)

The post-development time of concentration is 10 minutes

where:

$I_5 = 998.071 / (Tc + 6.053)^{0.814}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

I_5 = 104.2 mm/hr I_{100} = **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Corridor	A9	0.0112	25.8%	0.95	0.011
Hotel Roof	A12	0.0049	11.2%	0.95	0.005
Hotel Roof	A13	0.0274	63.0%	0.95	0.026
TOTAL		0.0434	100.0%		0.041
Weighted C =					0.95

$Q_{5post} = (2.78)*(C)*(I_5)*(A)$

$Q_{5post} = 2.78 \times 0.90 \times 104.2 \times 0.0434$

$Q_{5post} = 11.31$ L/s

$Q_{100post} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100post} = 2.78 \times 1.00 \times 178.6 \times 0.0434$

$Q_{100post} = 21.54$ L/s

Project Number: Chateau Laurier Hotel, Ottawa

REMISZ Consulting Engineers Ltd.

PRE-DEVELOPMENT (CONTROLIED RUNOFF)

The pre-development time of concentration is 10 minutes

where:

$I_5 = 998.071 / (Tc + 6.053)^{0.814}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

I_5 = 104.2 mm/hr I_{100} = **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Parking roof	A2	0.2381	100.0%	1.00	0.238
TOTAL		0.2381	100.0%		0.238
Weighted C =					0.50

C=0.5 used for predevelopment calculation (City of Ottawa requirement)

$Q_{5pre} = (2.78)*(C)*(I_5)*(A)$

Q_{5pre} = 2.78 x 0.50 x 104.2 x 0.2381

Q_{5pre} = 34.49 L/s

$Q_{100pre} = (2.78)*(C)*(I_{100})*(A)$

Q_{100pre} = 2.78 x 0.90 x 178.6 x 0.2381

Q_{100pre} = 106.40 L/s

POST-DEVELOPMENT (CONTROLLED RUNOFF)

The post-development time of concentration is 10 minutes

where:

$I_5 = 998.071 / (Tc + 6.053)^{0.814}$ $I_{100} = 1735.688 / (Tc + 6.014)^{0.820}$

I_5 = 104.2 mm/hr I_{100} = **178.6 mm/hr**

Surface Type	ID	Area (ha)	Percent of total Area	C	A X C (ha)
Hotel roof	A1	0.0354	12.4%	1.00	0.035
Courtyard	A2	0.0610	21.4%	1.00	0.061
	A3	0.0470	16.5%	1.00	0.047
	A4	0.0274	9.6%	1.00	0.027
	A5	0.0574	20.2%	1.00	0.057
	A6	0.0092	3.2%	1.00	0.009
	A7	0.0079	2.8%	1.00	0.008
	A8	0.0060	2.1%	1.00	0.006
	A10	0.0109	3.8%	1.00	0.011
	A11	0.0224	7.9%	1.00	0.022
TOTAL		0.2846	100.0%		0.285
Weighted C =					1.00

$Q_{5post} = (2.78)*(C)*(I_5)*(A)$

Q_{5post} = 2.78 x 0.90 x 104.2 x 0.2846

Q_{5post} = 74.20 L/s

$Q_{100post} = (2.78)*(C)*(I_{100})*(A)$

$Q_{100post}$ = 2.78 x 1.00 x 178.6 x 0.2846

$Q_{100post}$ = 141.32 L/s

ALLOWABLE RUNOFF

REMISZ Consulting Engineers Ltd.

Predevelopment Runoff:		
Uncontrolled Runoff		
5-year	24.30	l/sec
100-year	52.06	l/sec
Controlled Runoff:		
5-year	34.49	l/sec
100-year	106.40	l/sec

Postdevelopment Runoff:		
Uncontrolled Runoff		
5-year	11.31	l/sec
100-year	21.54	l/sec
Controlled Runoff:		
5-year	74.20	l/sec
100-year	141.32	l/sec

Controlled allowable runoff		
Controlled Runoff:		
5-year	**47.47**	**l/sec**

Comment:

Storage Volumes (5-Year Storm)

Project: Chateau Laurier Hotel

Tc = 10 (mins)
C_{AVG} = 1.00 (dimmensionless)
Area = 0.2846 (hectares)
Storm = 5 (year)
Release Rate = 47.47 (L/sec)
Time Interval = 5 (mins)

Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
1	204	16.1	47.47		
6	132	62.5	47.47	14.99	5.40
11	99	78.5	47.47	31.01	20.47
16	80	63.7	47.47	16.19	15.54
21	68	53.9	47.47	6.43	8.11
26	59	47.0	47.47	-0.52	-0.81
31	53	41.7	47.47	-5.74	-10.68
36	48	37.6	47.47	-9.83	-21.23
41	43	34.4	47.47	-13.12	-32.27
46	40	31.6	47.47	-15.83	-43.69
51	37	29.4	47.47	-18.11	-55.41
56	35	27.4	47.47	-20.05	-67.36
61	33	25.7	47.47	-21.73	-79.51
66	31	24.3	47.47	-23.19	-91.83
71	29	23.0	47.47	-24.48	-104.28
76	28	21.8	47.47	-25.63	-116.86
81	26	20.8	47.47	-26.65	-129.54
86	25	19.9	47.47	-27.58	-142.31
91	24	19.1	47.47	-28.42	-155.16
96	23	18.3	47.47	-29.18	-168.08
101	22	17.6	47.47	-29.88	-181.07
106	21	17.0	47.47	-30.52	-194.12
111	21	16.4	47.47	-31.11	-207.22
116	20	15.8	47.47	-31.66	-220.36
121	19	15.3	47.47	-32.17	-233.55
126	19	14.8	47.47	-32.64	-246.78
131	18	14.4	47.47	-33.08	-260.05
136	18	14.0	47.47	-33.50	-273.35

Notes

1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.

2) Rainfall Intensity, I = 998.071 / (Tc + 6.053)^0.814 (5 year, City of Ottawa)
3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
5) Storage = Duration x Storage Rate

Storage Volumes (100-Year Storm)

Tc = 10 (mins)
C_{AVG} = 1.00 (dimmensionless)
Area = 0.2846 (hectares)
Storm = 100 (year)
Release Rate = 47.47 (L/sec)
Time Interval = 5 (mins)

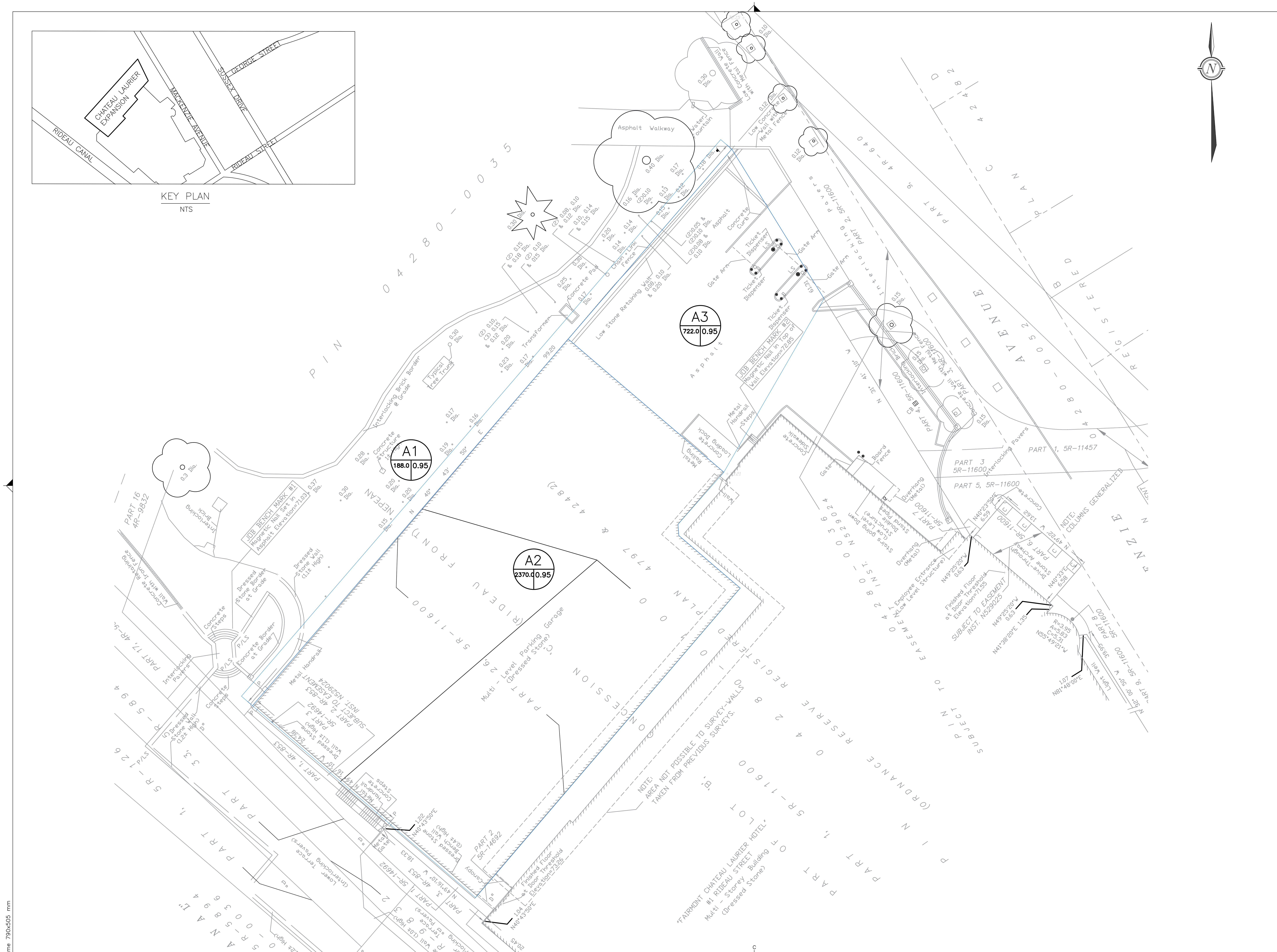
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
1	351	27.8	1.43		
6	226	107.3	47.47	59.82	21.54
11	170	134.4	47.47	86.96	57.40
16	138	108.8	47.47	61.36	58.91
21	116	92.0	47.47	44.54	56.13
26	101	80.1	47.47	32.58	50.83
31	90	71.1	47.47	23.60	43.90
36	81	64.1	47.47	16.59	35.83
41	74	58.4	47.47	10.94	26.92
46	68	53.8	47.47	6.30	17.38
51	63	49.9	47.47	2.40	7.34
56	59	46.6	47.47	-0.92	-3.10
61	55	43.7	47.47	-3.79	-13.87
66	52	41.2	47.47	-6.29	-24.92
71	49	39.0	47.47	-8.50	-36.20
76	47	37.0	47.47	-10.46	-47.69
81	45	35.3	47.47	-12.21	-59.35
86	43	33.7	47.47	-13.79	-71.16
91	41	32.3	47.47	-15.22	-83.11
96	39	31.0	47.47	-16.52	-95.17
101	38	29.8	47.47	-17.71	-107.35
106	36	28.7	47.47	-18.81	-119.62
111	35	27.7	47.47	-19.82	-131.97
116	34	26.7	47.47	-20.75	-144.41
121	33	25.9	47.47	-21.61	-156.92
126	32	25.1	47.47	-22.42	-169.50
131	31	24.3	47.47	-23.17	-182.14
136	30	23.6	47.47	-23.88	-194.83

Notes

1) For a storm duration that is less than the time of concentration the peak flow is equal to the product of 2.78CIA and the ratio of the storm duration to the time of concentration.

2) Rainfall Intensity, I = 1735.688 / (Tc + 6.014)^0.820 (100 year, City of Ottawa)
3) Peak Flow = Duration/Tc x 2.78 x C x I x A (Duration < Tc)
4) Peak Flow = 2.78 x C x I x A (Duration > Tc)
5) Storage = Duration x Storage Rate

REMISZ Consulting Engineers Ltd.



THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. ELEVATIONS ARE SHOWN IN METRES.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.
3. FINISHED GRADE ELEVATIONS ARE TO BE AS SHOWN ON THE DRAWING.
4. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION,
5. NO EXCESS DRAINAGE IS TO BE DIRECTED TO NEIGHBORING PROPERTIES DURING OR AFTER CONSTRUCTION.
6. NO ALTERATIONS TO EXISTING GRADE ARE PERMITTED ON OR BEYOND PROPERTY LINE.
7. ALL TREES TO BE PROTECTED BEFORE AND DURING CONSTRUCTION.
8. EXISTING DRIVEWAY TO BE REMOVED AND REPLACED WITH INTERLOCK AS PER ARCHITECTURAL DESIGN.

D07-12-16-0193

No.	Date	Revision	By:
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

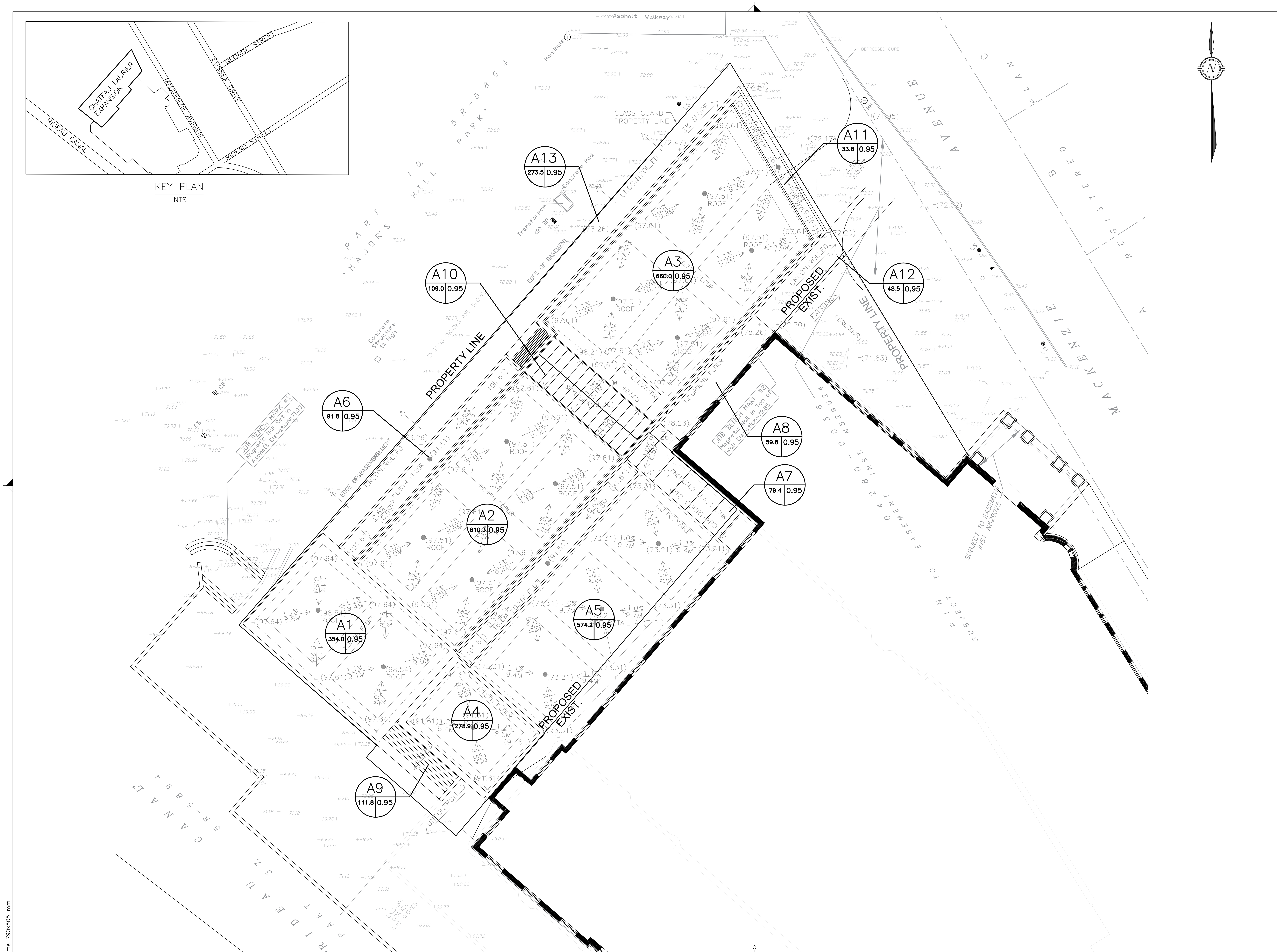
REMISZ
Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client
LARCO INVESTMENTS LTD.

Project
CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing
PRE-DEVELOPMENT
STORM WATER DRAINAGE

Designed	–	Date	08/06/17
Drawn	SL	Scale	1:250
Checked	BU	Sheet	5 of 6
Project No.	2016-146	Dwg. No.	S-04



THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. ELEVATIONS ARE SHOWN IN METRES.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.
3. FINISHED GRADE ELEVATIONS ARE TO BE AS SHOWN ON THE DRAWING.
4. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION,
5. NO EXCESS DRAINAGE IS TO BE DIRECTED TO NEIGHBORING PROPERTIES DURING OR AFTER CONSTRUCTION.
6. NO ALTERATIONS TO EXISTING GRADE ARE PERMITTED ON OR BEYOND PROPERTY LINE.
7. ALL TREES TO BE PROTECTED BEFORE AND DURING CONSTRUCTION.
8. EXISTING DRIVEWAY TO BE REMOVED AND REPLACED WITH INTERLOCK AS PER ARCHITECTURAL DESIGN.

No.	Date	Revision	By:
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

REMISZ
Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client

LARCO INVESTMENTS LTD.

Project

CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing

POST DEVELOPMENT
STORM WATER DRAINAGE

Designed	–	Date	08/06/17
Drawn	SL	Scale	1:250
Checked	BU	Sheet	6 of 6
Project No.	2016–146	Dwg. No.	S–05

APPENDIX E

Storm Water Restriction Devices

WATTS® DRAINAGE

Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

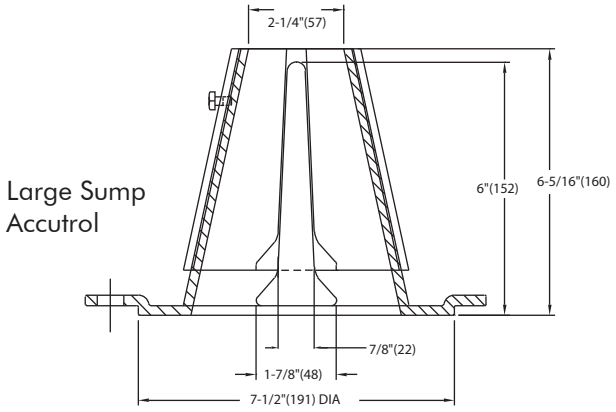
ADJUSTABLE ACCUTROL(for Large Sump Roof Drains only)

For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2" of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm(per inch of head) x 2 inches of head] + 2-1/2 gpm(for the third inch of head) = 12-1/2 gpm.



1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	Head of Water 1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10

17 Units

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

WATTS® DRAINAGE
CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca
CANADA

APPENDIX F

Water Supply Requirements and Data

2. If the above is not possible then the next preferred measure is a pressure reducing valve, as a central unit, to be located in a chamber or facility.

3. As a last resort, pressure reducing valves to be installed immediately downstream of the isolation valve in the home/building, located downstream of the meter so it is owner maintained.

4.2.8 Population Density

Proposed Development Land – When the number and type of housing units within a proposed development are known, the calculation of population for the proposed development shall be based on the following:

Table 4.1 Per Unit Populations

Unit Type	Persons Per Unit
Single Family	3.4
Semi-detached	2.7
Duplex	2.3
Townhouse (row)	2.7
Apartments:	
Bachelor	1.4
1 Bedroom	1.4
2 Bedroom	2.1
3 Bedroom	3.1
Average Apt.	1.8

(Source: custom tabulation of 1996 Census data for units built in the previous five years)

In the absence of any specific information use 60 persons per gross hectare density to estimate average population for suburban type of residential development.

Pre-zoned Land - When lands are already zoned for a specific residential use and detailed information is not available calculate the persons per net hectare by dividing the above persons per unit by the units per net hectares allowed by the zoning designation. Persons per gross hectare are approximately 61% of the persons per net hectare. See City of Ottawa Zoning By-law 2008-250.

Table 4.2 Consumption Rates for Subdivisions of 501 to 3,000 Persons

Demand Type	Amount	Units
Average Day Demand		
Residential	350	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d

Demand Type	Amount	Units
Commercial and Institutional		
- Shopping Centres	2500	L/(1000m^2/d)
- Hospitals	900	L/(bed/day)
- Schools	70	L/(Student/d)
- Trailer Parks no Hook-Ups	340	L/(space/d)
- Trailer Parks with Hook-Ups	800	L/(space/d)
- Campgrounds	225	L/(campsite/d)
- Mobile Home Parks	1000	L/(Space/d)
- Motels	150	L/(bed-space/d)
- Hotels	225	L/(bed-space/d)
- Tourist Commercial	28,000	L/gross ha/d
- Other Commercial	28,000	L/gross ha/d
Maximum Daily Demand		
Residential	2.5 x avg. day	L/c/d
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	1.5 x avg. day	L/gross ha/d
Institutional	1.5 x avg. day	L/gross ha/d
Maximum Hour Demand		
Residential	2.2 x avg. day	L/c/d
Industrial	1.8 x avg. day	L/gross ha/d
Commercial	1.8 x avg. day	L/gross ha/d
Institutional	1.8 x avg. day	L/gross ha/d

Table Notes:

- Use Table 3-3 of the MOE Design Guidelines for Drinking-Water Systems to determine Maximum day and Maximum hour peaking factors for 0 to 500 persons
- For applications not covered by Table 4.2 consult the MOE Guidelines for direction.

Different consumption rates may be warranted for modeling of existing areas. Consult with the Water Resources Unit, Asset Management Branch for demand estimates for specific projects in existing areas.

4.2.9 Areas Zoned Residential

Undeveloped residential areas within the development area shall consider average daily consumption rates of 35 m^3/ha/day for hydraulic design purposes.

develop the source of supply to meet more than the projected maximum daily flow, the storage volume can be reduced accordingly.

Average daily domestic consumption rates can vary from less than 180 L/(cap·d) [48 USgal/(cap·d)] to more than 1,500 L/(cap·d) [396 USgal/(cap·d)]. These values represent the average flow over a 24 hour period and do not reflect the fact that there are maximum day and peak hour/instantaneous demands in the system each day which will exceed the average value by a significant amount. It is essential that the source of supply and the distribution system be capable of meeting these maximum and peak demand rates without overtaxing the source or resulting in excessive pressure loss in the distribution system.

In general, small systems have higher peaking factors for maximum day and peak hour demand than large systems. The minimum rate, maximum day and peak rate factors for the system should be based on existing flow data or data from a similar nearby system where available. Table 3.3 provides peaking factors for use with average day demand when actual data are not available.

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

DWELLING UNITS SERVICED	EQUIVALENT POPULATION	NIGHT MINIMUM HOUR FACTOR	MAXIMUM DAY FACTOR	PEAK HOUR FACTOR
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3

3.4.5.2 Outdoor Water Use

For outdoor water use, it should be assumed that a maximum of 25% of the homeowners could be using an outdoor tap at any one time at a rate of 20 L/min (5.3 USgpm) for one hour per day. Where fire protection is provided, then this outdoor use need not be considered.

3.4.5.3 Fire Protection

The decision as to whether or not fire protection will be provided via the communal water supply system is a municipal responsibility. In deciding upon

PART II

GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW
COPYRIGHT I.S.O.

N.B. It should be recognized that this is a "guide" in the true sense of the word, and requires a certain amount of knowledge and experience in fire protection engineering for its effective application. Its primary purpose is for the use of surveyors experienced in this field, but it is made available to municipal officials, consulting engineers and others interested as an aid in estimating fire flow requirements for municipal fire protection.

Required Fire Flow may be described as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

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

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

where

F = the required fire flow in litres per minute.

C = coefficient related to the type of construction.

= 1.5 for wood frame construction (structure essentially all combustible).

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).

= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).

= 0.6 for fire-resistive construction (fully protected frame, floors, roof).

Note: For types of construction that do not fall within the categories given, coefficients shall not be greater than 1.5 nor less than 0.6 and may be determined by interpolation between consecutive construction types as listed above. Construction types are defined in the Appendix.

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

For fire-resistive buildings, consider the two largest adjoining floors plus 50 percent of each of any floors immediately above them up to eight, when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25 percent of each of the two immediately adjoining floors.

For one family and two family dwellings not exceeding two storeys in height, see **Note J.**

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

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

As guide for determining low or high fire hazard occupancies, see the list in the Appendix. The fire flow determined shall not be less than 2,000 L/min,

3. The value obtained in No.2 above may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. Additional credit of up to 10% may be granted if the water supply is standard for both the system and fire department hose lines required. The percentage reduction made for an automatic sprinkler system will depend upon the extent to which the system is judged to reduce the possibility of fires spreading within and beyond the fire area. Normally this reduction will not be the maximum allowed without proper system supervision including water flow and control valve alarm service. Additional credit may be given of up to 10% for a fully supervised system.

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

   The charge for any one side generally should not exceed the following limits for the separation:

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

   The total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%.

   The fire flow shall not exceed 45,000 L/min nor be less than 2,000 L/min.

Notes to Calculation

Note A: The guide is not expected to necessarily provide an adequate value for lumber yards, petroleum storage, refineries, grain elevators, and large chemical plants, but may indicate a minimum value for these hazards.

Note B: Judgment must be used for business, industrial, and other occupancies not specifically mentioned.

Note C: Consideration should be given to the configuration of the building(s) being considered and accessibility by the fire department.

Note D: Wood frame structures separated by less than 3 metres shall be considered as one fire area.

Note E: Fire Walls: - In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building.

Normally any unpierced party wall considered to form a boundary when determining floor areas may warrant up to a 10% exposure charge.

Note F: High one storey buildings: When a building is stated as 1=2, or more storeys, the number of storeys to be used in the formula depends upon the use being made of the building. For example, consider a 1=3 storey building. If the building is being used for high piled stock, or for rack storage, the building would probably be considered as 3 storeys and, in addition, an occupancy percentage increase may be warranted.

However, if the building is being used for steel fabrication and the extra height is provided only to facilitate movement of objects by a crane, the building would probably be considered as a one storey building and an occupancy credit percentage may be warranted.

Note G: If a building is exposed within 45 metres, normally some surcharge for exposure will be made.

Note H: Where wood shingle or shake roofs could contribute to spreading fires, add 2,000 L/min to 4,000 L/min in accordance with extent and condition.

Note I: Any non-combustible building is considered to warrant a 0.8 coefficient.

Note J: Dwellings: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following short method may be used. (For other residential buildings, the regular method should be used.)

Exposure distances	Suggested required fire flow	
	Wood Frame	Masonry or Brick
Less than 3m	See Note "D"	6,000 L/min
3 to 10m	4,000 L/min	4,000 L/min
10.1 to 30m	3,000 L/min	3,000 L/min
Over 30m	2,000 L/min	2,000 L/min

If the buildings are contiguous, use a minimum of 8,000 L/min. Also consider Note H.

OUTLINE OF PROCEDURE

A. Determine the type of construction.

B. Determine the ground floor area.

C. Determine the height in storeys.

D. Using the fire flow formula, determine the required fire flow to the nearest 1,000 L/min.

E. Determine the increase or decrease for occupancy and apply to the value obtained in D above. Do not round off the answer.

F. Determine the decrease, if any, for automatic sprinkler protection. Do not round off the value.

G. Determine the total increase for exposures, Do not round off the value.

H. To the answer obtained in E, subtract the value obtained in F and add the value obtained in G.

The final figure is customarily rounded off to the nearest 1,000 L/min.

Water Supply Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
must remain within	275kPa and 552kPa (40-80 psi; 28-56m)
During fire flow operating pressure must not drop below	140kPa (20 psi; 14 m)
* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.	

REMISZ
Consulting Engineers Ltd.

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	0	0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4	0	0
2 Bedroom	2.1	0	0
3 Bedroom	3.1	0	0
4 Bedroom	4.2	0	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	0	0.00	0.00	0.00	0.00	0.00	0.00

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5	$L/m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Office	75.0	$L/9.3m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Hotels	225.0	L/(bed-space-d	189	42.53	29.53	63.79	44.30	114.82	79.73
Industrial -Light	35,000.0	L/gross ha/d							
Industrial -Heavy	55,000.0	L/gross ha/d							
Total I/C/I Demand				42.53	29.53	63.79	44.30	114.82	79.73

Total Demand	42.53	29.53	63.79	44.30	114.82	79.73

REMISZ Consulting Engineers Ltd.

Water Demand and Boundary Conditions

Proposed Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] (kPa)
Average Daily Demand	29.53	
Max Day + Fire Flow	13,044.30	
Peak Hour	79.73	

[1)] Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations.

[2)] Boundary conditions supplied by the City of Ottawa. See Appendix B for correspondence with the City.

REMISZ Consulting Engineers Ltd.

FUS Fire Flow Calculations

Project: Chateau Laurier Hotel, Ottawa

Calculations Based on 1999 Publication "Water Supply for Public

Fire Protection " by Fire Underwriters' Survey (FUS)

Project Name: Chateau Laurier Hotel, Ottawa Fire Flow Calculation #: 4

Date: January 14, 2019 Building Type/Description/Name:Hotel

Data input by: Zoran Mrdja, P.Eng.

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	Choose Frame Used for Construction of Unit	Framing Material						
		Coefficient related to type of construction (C)	Wood Frame	1.50	Fire resistive construction (>2 hrs)	0.60	m	
			Ordinary construction	1.00				
			Non-combustible construction	0.80				
			Fire resistive construction (< 2 hrs)	0.70				
			Fire resistive construction (> 2 hrs)	0.60				
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	Floor Space Area						
		Type of Housing	Single Family	1	Single Family	1	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, etc.)	1				
2.2	# of Storeys	Number of Floors/ Storeys in the Unit (do not include basement):			6	1	Storeys	
3	Enter Ground Floor Area of One Unit	Enter Ground Floor Area (A) of One Unit Only :			137			
		Measurement Units	Square Feet (ft^2)	0.093	Square Metres (m2)	12845	Area in Square Meters (m^2)	
			Square Metres (m^2)	1				
			Hectares (ha)	10000				
4	Obtain Required Fire Flow without Reductions	Required Fire Flow(without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						14,960
5	Apply Factors Affecting Burning	Reductions/Increases Due to Factors Affecting Burning						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	0.25	Non-combustible	-0.25	N/A	-3,740
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete Automatic Sprinkler Protection	-0.3	Complete Automatic Sprinkler Protection	-0.30	N/A	-4,488
			None	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	30.1m-45m	0.05	0.45	m	
			East Side	10.1-20.0 m	0.15			
			South Side	3.1-10.0 m	0.20			
			West Side	30.1m-45m	0.05			6,732
6	Obtain Required Fire Flow, Duration & Volume	Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:						13,000
		Total Required Fire Flow (above) in L/s:						217
		Required Duration of Fire Flow (hrs)						2.00
		Required Volume of Fire Flow (m^3)						1560

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline

Legend	
	Drop down menu - choose option, or enter value.
	No Information, No input required.

Note: The structure is considered as non-combustible as separation walls are incorporated and the basement-garage is sprinklered.

The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline.

The basement of the builidng will be used as a garage and it is recommended to be equiped with sprinkler system

REMISZ Consulting Engineers Ltd.

Pressure Drop Online-Calculator

Calculation output

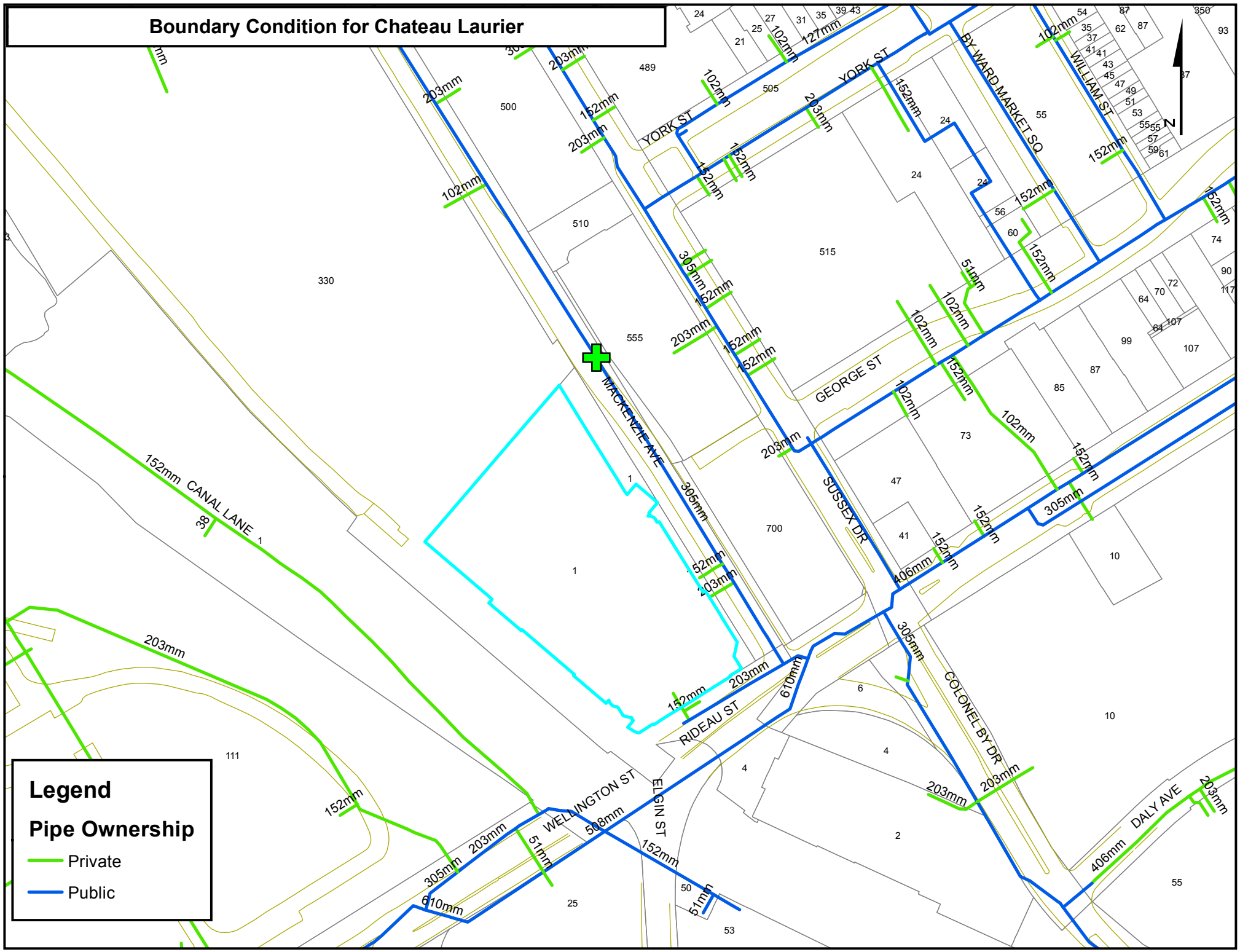
Flow medium:	Water 20 °C / liquid
Volume flow::	234 l/s
Weight density:	998.206 kg/m³
Dynamic Viscosity:	1001.61 10-6 kg/ms
Element of pipe:	circular
Dimensions of element:	Diameter of pipe D: 200 mm
	Length of pipe L: 30 m
Velocity of flow:	7.45 m/s
Reynolds number:	1484628
Velocity of flow 2:	-
Reynolds number 2:	-
Flow:	turbulent
Absolute roughness:	0.0015 mm
Pipe friction number:	0.01
Resistance coefficient:	1.67
Resist.coeff.branching pipe:	-
Press.drop branch.pipe:	-
Pressure drop:	461.51 mbar
	0.46 bar

Note: The pressure drop was calculated by the online calculator of www.pressure-drop.com. We can not warrant the correctness of this software. The software is produced carefully. But no computer software is without bugs. Therefore the calculations are your own risk.

****

****

Boundary Condition for Chateau Laurier



APPENDIX G

Sanitary Services Requirements

4.4 DESIGN FLOWS

Wherever possible, the design of sanitary sewers should be based on the ultimate sewage flows permitted by the zoning, expected from the tributary area (Contact the City Planning and Growth Management Department to obtain projected population and land use data).

The design of sanitary sewers must account for a number of flow contributions in determining an appropriate peak flow design capacity for sizing pipes and/or pumping facilities. It must be noted that this peak design capacity represents a combination of very high customer contribution and a very rare wet weather flow condition and that, most of the time, the facility will operate under significantly lower flow conditions. As an example, separated sanitary sewers usually operate within the typical dry weather flow range for 75% to 90% of the time in a typical year. As such, the design of sanitary collection systems (gravity sewers and pumping stations) must also account for typical flow conditions to provide due consideration to operational and maintenance issues.

The following sub-sections provide guidance for the calculation of design flows on the basis of:

- Standard Peak Flow Design Parameters: Applied for establishing peak design capacity (used for the design of sewers and pumping stations).

- Operational Flow Parameters: Derived from monitoring data and used for establishing the range of operational flows (used in sewer analysis and pumping station design).

Sanitary sewage flows are comprised of a number of flow contributions. These include waste discharges from residential, commercial, institutional, and industrial land uses, as well as extraneous non-waste flow components from such sources as groundwater infiltration and surface runoff.

Figures 4.1 and 4.2 illustrate, respectively, a typical dry weather flow and wet weather flow hydrograph measured on a separated sanitary sewer system. Various components of each flow hydrograph are labeled and illustrated on the figures.

Figure 4.1 Dry Weather Flow Components

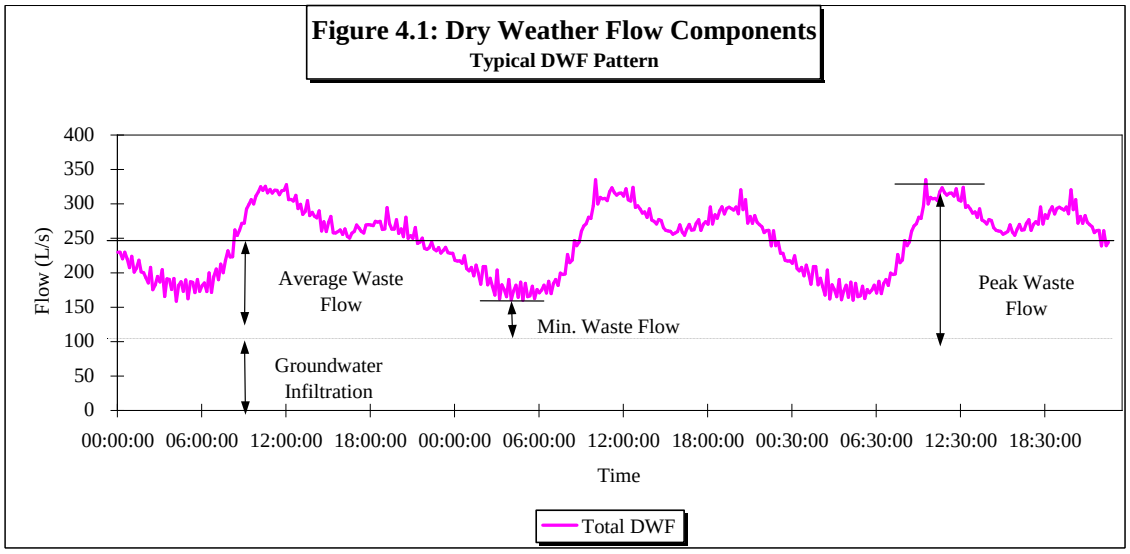
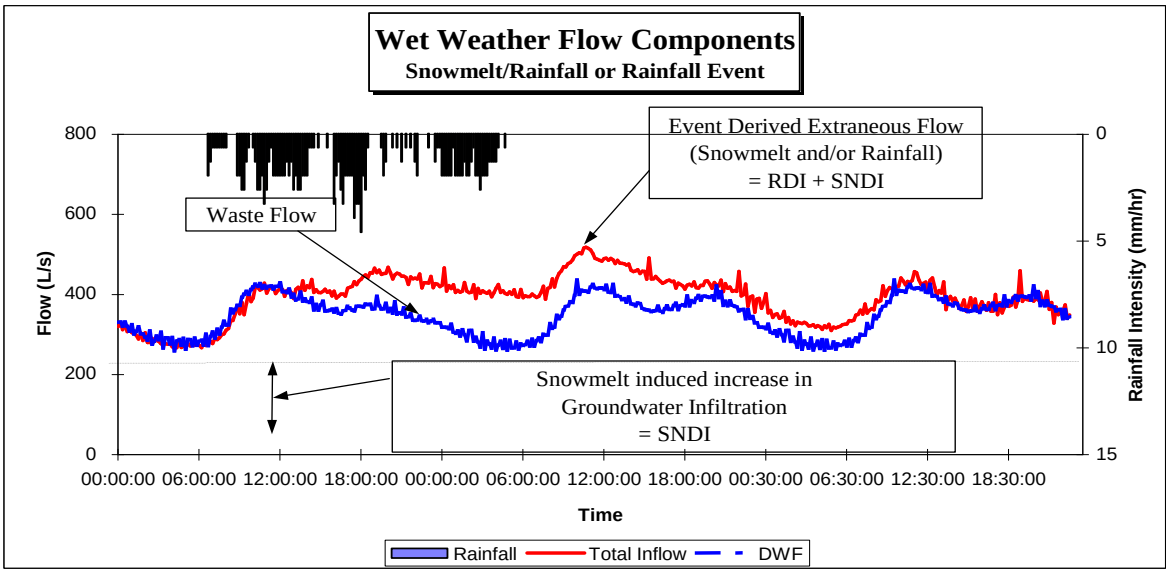


Figure 4.2 Wet Weather Flow Components



4.4.1 Calculation of Peak Design Flows

The formulae and parameters to be applied in the calculation of peak design flows (standard peak flow design parameters) for new or infill developments are illustrated in Figure 4.3 and described as follows:

Figure 4.3 Peak Flow Design Parameters Summary

AVERAGE WASTEWATER FLOWS:

Residential Average Flow:	350 L/c/day
Commercial Average Flow:	50,000 L/gross ha/d
Institutional Average Flow:	50,000 L/gross ha/d
Average Light Industrial Flow:	35,000 L/gross ha/d
Average Heavy Industrial Flow	55,000 L/gross ha/d

PEAKING FACTORS:

Residential Peak factor: Harmon Equation

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000} \right)^{\frac{1}{2}}} \right) * K$$

where: P=Population
K=Correction Factor = 1

Commercial Peak factor:	1.5
Institutional Peak factor:	1.5
Industrial Peak Factor:	Per Figure in Appendix 4-B

PEAK EXTRANEOUS FLOWS: (design event)

Infiltration Allowance:	0.28 L/s/effective gross ha (for all areas)
Less than 10 ha.	
Foundation Drain Allowance:	5.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)
10 ha – 100 ha	
Foundation Drain Allowance:	3.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)
Greater than 100 ha	
Foundation Drain Allowance:	2.0 L/s/gross ha (if necessary for existing partially separated and combined areas only)

4.4.1.1 Domestic Flows

The preferred method is to utilize monitoring data. If monitoring data is unavailable use the average residential flow of 350 L/capita per day as noted in Figure 4.3. The peaking factor is derived from the Harmon Formula with the minimum permissible peaking factor being 2.0 and the maximum being 4.0.

4.4.1.2 Commercial and Institutional Flows

The sewage flows from commercial and institutional establishments vary greatly with the type of water-using facilities present in the development, the population using the facilities, the presence of water metering, the extent of extraneous flows entering the sewers, etc. If approved actual flow records are not available, a unit value of 50,000 L/gross ha/d (as outlines in Figure 4.3) should be used (exclusive of extraneous flows) at the functional design level (Master Planning & Servicing Studies).

For individual, commercial, and institutional uses, the sewage flow rates (rates are exclusive of extraneous flows) commonly used for design at the site plan level can be found in Appendix 4-A.

Furthermore, the plumbing code offers guidance with respect to water usage from fixtures.

The peaking factors applicable for sewage flows from commercial and institutional areas shall be 1.5 (as outlined in Figure 4.3) and applied to the average dry weather flow calculation.

A peak extraneous flow allowance for tributary areas related to commercial and institutional land uses is to be added.

4.4.1.3 Industrial Flows

Peak sewage flow rates from industrial areas vary greatly with the extent of the area, the type(s) of industry present, the provision of in-plant treatment or regulation of flows, the presence of cooling waters in the discharge, etc.

If the water usage of the proposed industry is known, such data should be used in the design of the system at the site plan application level. If the water usage for the proposed industry is not known, the following values should be used at the conceptual or functional design level (except for high water users - see Section 4.4.1.6):

- Average Light Industrial Flow: 35,000 L/gross ha/day
- Average Heavy Industrial Flow: 55,000 L/gross ha/day

The peaking factors applicable for sewage flows from Industrial Areas shall be based on the Figure provided in Appendix 4-B of the MOE sanitary sewer design guidelines and applied to the average dry weather flow calculation.

4.4.1.4 Extraneous Flows New Areas

In computing the total peak flow rates for design of sanitary sewers, the designer shall include allowances to account for flow from extraneous sources.

A general allowance of 0.28 L/s/effective gross ha (as noted in Figure 4.3) shall be applied, irrespective of land use classification, to account for wet-weather inflow to maintenance holes (MH) located outside of sag areas and for infiltration into pipes and maintenance holes.

For MH's located in sag areas Appendix 7-A indicates the expected inflow through the cover vent holes for various depths of water. The designers can assume that the covers will not be opened during storm events. To minimize the inflow through the cover vent holes it is recommended that maintenance holes be located at high points. The sewer system should be analyzed for wet weather flow conditions to assess impacts of inflow through the cover vent holes.

Designers are to document all occurrences of maintenance hole placement where excess inflow is anticipated, quantify the inflow volume and assess the HGL elevation impacts against the system designed without the inflow volumes and report on the theoretical changes in pipe size etc. needed to mitigate the higher HGL potential.

Roof downspouts shall not be connected (either directly or indirectly) to sanitary sewers via foundation drains.

4.4.1.5 Extraneous Flows from Existing Areas

The connection of foundation drains to sanitary sewer systems is not permitted; therefore, for new development areas, a specific allowance for foundation drain flow to sanitary sewers is not required. However, the designer is required to account for foundation drain flow when computing sanitary design flows from existing areas that may contain partially separated sewers. In the absence of specific monitored data, the following figures should be used in calculating design flows:

Less than 10 gross ha:	5.0 L/s/gross ha shall be used.
Between 10 and 100 gross ha:	3.0 L/s/gross ha shall be used.
Greater than 100 gross ha:	2.0 L/s/gross ha shall be used

4.4.1.6 High Water Users

The foregoing guidelines do not apply to high-water-consumption land uses, which are those requiring excessive amounts of water over and above the

requirements for Heavy Industry. These users often include high-tech factories, meat packing plants, breweries, etc. In such cases, detailed analysis of the design requirements specific to each development proposal is required at the site plan application level.

4.4.1.7 Total Peak Design Flows

The total peak design flow rates for a sanitary sewer shall be the sum of the peak dry weather flow rates as generated by population and land use for the design contributing area plus all extraneous flow allowances.

4.4.2 Monitored Flows

When determining the capacity of an existing sanitary sewer, the use of existing flow data, such as monitored flow, is permissible. The flow data and applicable parameters must be provided by the City prior to being used in any computation.

4.4.3 Range of Operational Flows

In addition to peak flow capacity requirements, the design of wastewater collection system components (including wastewater pumping stations) should consider the range of typical flow conditions that the system will be expected to accommodate at various stages and over the life cycle of the facility. Consideration of average daily flows, peak daily flows, annual events, and rare events will identify operational and maintenance shortcomings and provide valuable life-cycle costing information in the formation of interim servicing strategies.

These flows can be developed through the application of typical flow monitoring parameters that have been developed by the City of Ottawa. These parameters can be applied in a manner that closely resembles the sanitary sewer peak flow design criteria presented earlier in this section. The following provides an example of typical operational parameters that have been applied by the City of Ottawa, while Section 7.2.1.5 shows an example of an application for wastewater pumping station design. Monitored parameters are available for various areas within the City of Ottawa and should be reviewed with City Staff on a case-by-case basis. Figure 4.4 provides an example of operational flow parameters developed on the basis of flow monitoring data collected in the City of Ottawa.

Wastewater Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/cap/day
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Correction Factor (City of Ottawa Tech.Bulletin ISTB-2018-0	0.8
Commercial Space	28,000 L/ha/day
Infiltration and Inflow Allowance	0.33L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = (1/n)AR^{2/3}S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2012.	

REMISZ
Consulting Engineers Ltd.

Chateau Laurier Hotel

Sanitary Sewer Post Development Outflow

Site Area	**0.4 ha**
Extraneous Flow Allowances	
Infiltration / Inflow	**0.132 L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	**Pop**
Single Family	3.4	0	0
Semi-detached and duplex	2.7		0
Duplex	2.3		0
Townhouse	2.7		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	0	0
2 Bedroom	2.1	0	0
3 Bedroom	3.1	0	0
4 Bedroom	4.2	0	0
Total Population			**0**
Average Domestic Flow			**0.00 L/s**
Peaking Factor			**3.8**
Peak Domestic Flow			**0.00 L/s**

Institutional / Commercial / Industrial Contributions

Property Type*	**Unit Rate**	**No. of Units**	**Avg Wastewater (L/s)**
Commercial	28,000 L/gross ha/d	0	0.00
Hotel with full housekeeping facilities per person	225 l/unit/day	189	0.49
Non resident staff, add per person	40 l/person/day	20	0.01
Institutional	28,000 L/gross ha/d	0	0.00
Industrial - Light**	35,000 L/gross ha/d	0	0.00
Industrial - Heavy**	55,000 L/gross ha/d	0	0.00
Average I/C/I Flow			**0.50**
Peak Institutional / Commercial Flow*			**0.50**
Peak Industrial Flow**			**0.00**
Peak I/C/I Flow			**0.5014**

Total Estimated Average Dry Weather Flow Rate	**0.50**
Total Estimated Peak Dry Weather Flow Rate	**0.50**
Total Estimated Peak Wet Weather Flow Rate	**0.63**

*Ottawa TechBulletin ISTB-2018-01 Section 4.4.1 Page 4.5

**Use Apendix 4B diagram

REMISZ Consulting Engineers Ltd.

Free Online Manning Pipe Flow Calculator

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate, program, or host these calculators? (../contact.php) [Hide this request]

Printable Title

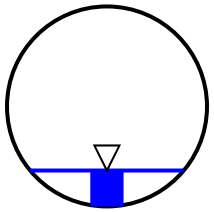
Printable Subtitle

Set units: m | mm | ft | in

Pipe diameter, d_0	200	mm
Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)	.012	
Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), S_0	1	% rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	18	%

Results

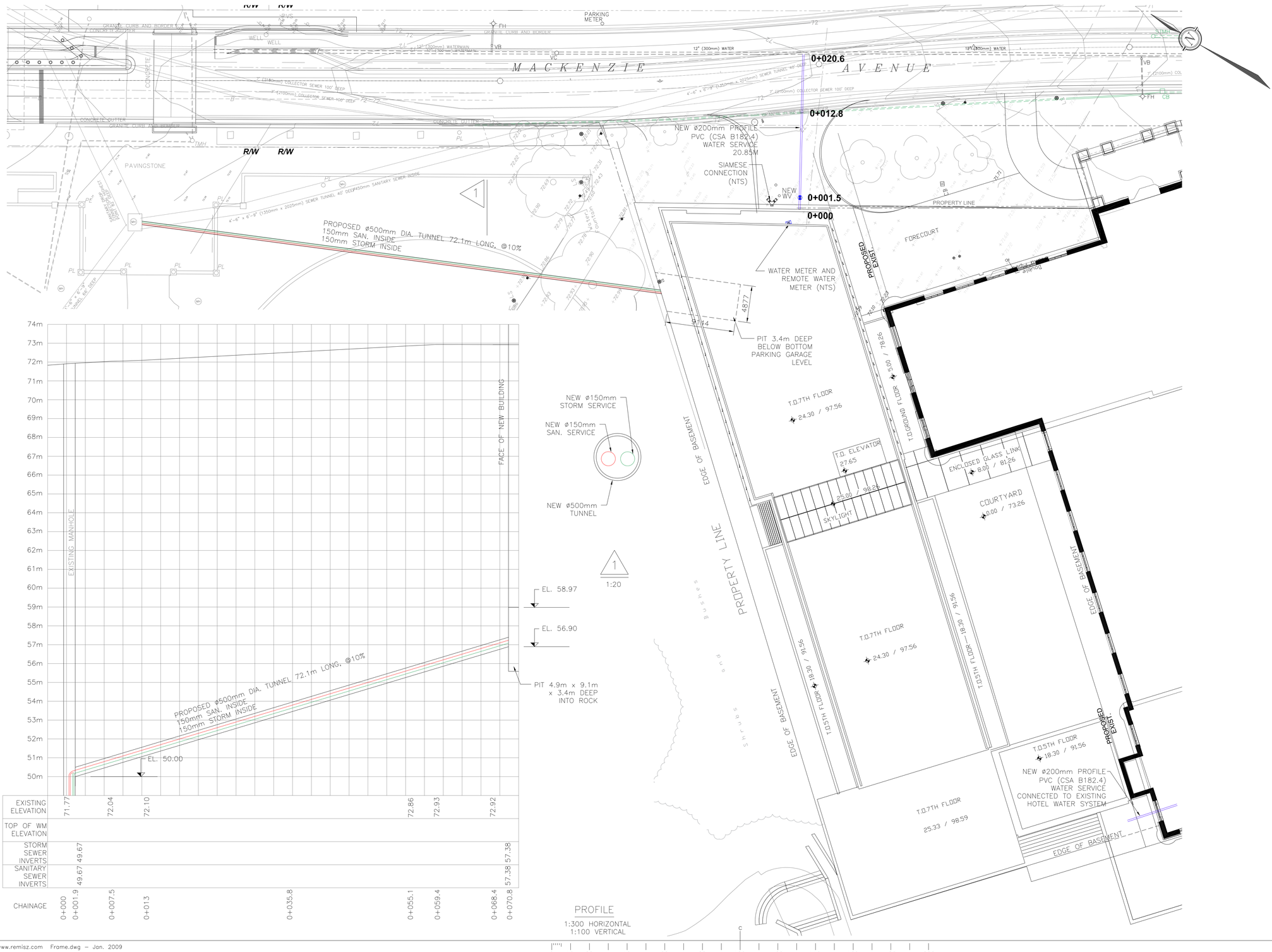
Flow, Q	2.5115	l/s
Velocity, v	0.6531	m/s
Velocity head, h_v	21.7500	mm
Flow area	3845.3812	mm^2
Wetted perimeter	175.2596	mm
Hydraulic radius	21.9411	mm
Top width, T	153.6750	mm
Froude number, F	1.32	
Shear stress (tractive force), tau	3.5302	N/m^2



Please give us your valued words of suggestion or praise. Did this free calculator exceed your expectations in every way? (../contact.php) [Hide this request]

APPENDIX H

Proposed Site Services Plan
and New Sewers Plan and Profile



EXISTING ELEVATION	71.77	72.04	72.10
TOP OF WM ELEVATION			
STORM SEWER INVERTS	49.67	49.67	
SANITARY SEWER INVERTS	49.67		
CHAINAGE	0+000	0+001.9	0+007.5

EXISTING ELEVATION	72.86	72.93	72.92	
TOP OF WM ELEVATION				
STORM SEWER INVERTS			57.38	
SANITARY SEWER INVERTS			57.38	
CHAINAGE	0+013	0+035.8	0+055.1	0+059.4	0+068.4	0+070.8

PROFILE
1:300 HORIZONTAL
1:100 VERTICAL

0 10 20 40 60 80 100 120 140 160 180 200

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED.
THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. DIMENSIONS ARE SHOWN IN METRIC.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.

200mm WATER SERVICE TABLE:

CHAINAGE	EXISTING ELEVATION	TOP OF WS TOP OF WM	DESCRIPTION
0+000	72.28	WS 69.78	New 200mm Water Service Connection to the Building
0+001.5	72.23	WS 69.71	New 200mm Water Valve
0+012.8	71.90	WS 69.66	Curb
0+020.6	72.00	WS 69.60 WM 69.48	New 200mm Water Service Connection to the 300mm Water Main

WS – WATER SERVICE
WM – WATER MAIN

LICENSED PROFESSIONAL ENGINEER
B. JURIEV
100061510
April 17, 2019
PROVINCE OF ONTARIO

D07-12-16-0193

No.	Date	Revision	By:
6	11/04/19	AS PER CITY REVIEW	BU
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

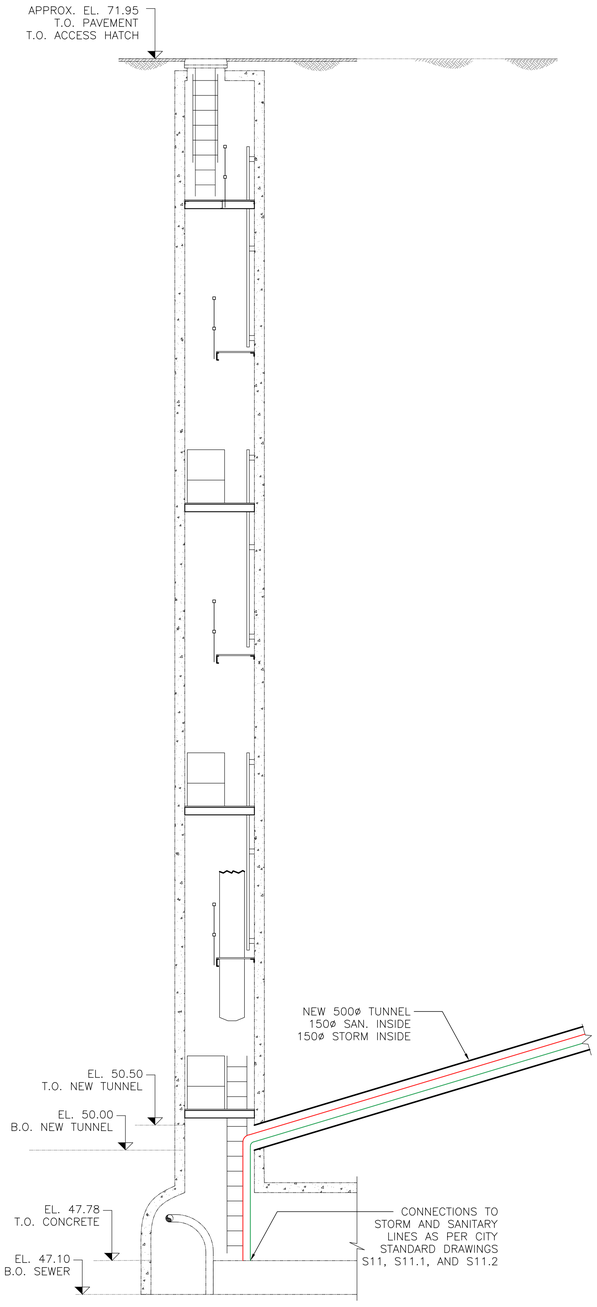
REMISZ
Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client
LARCO INVESTMENTS LTD.

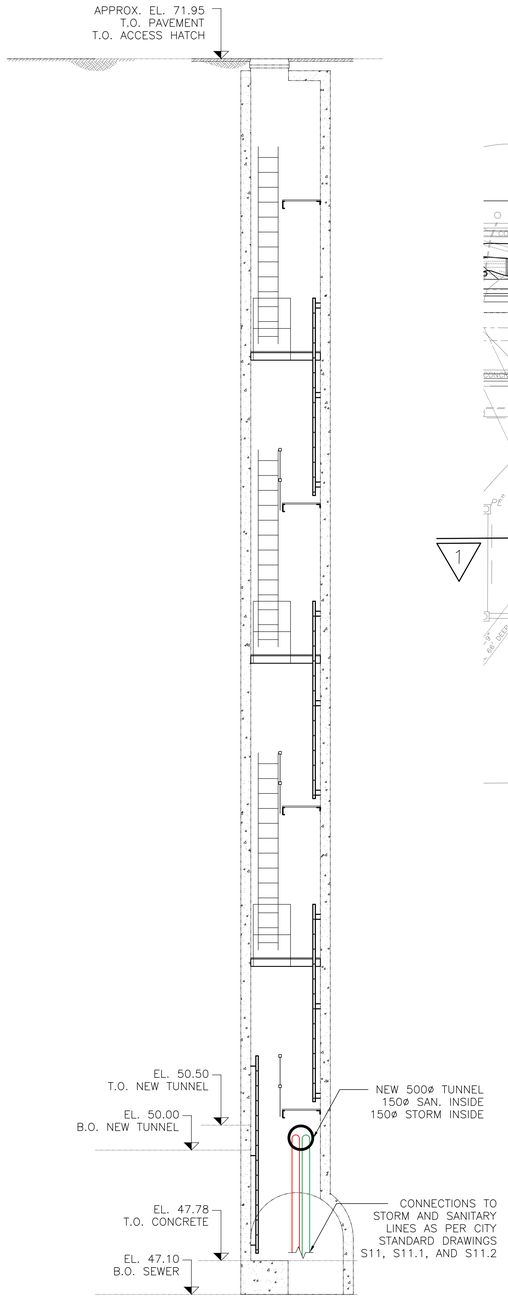
Project
CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing
SERVICING PLAN AND PROFILE

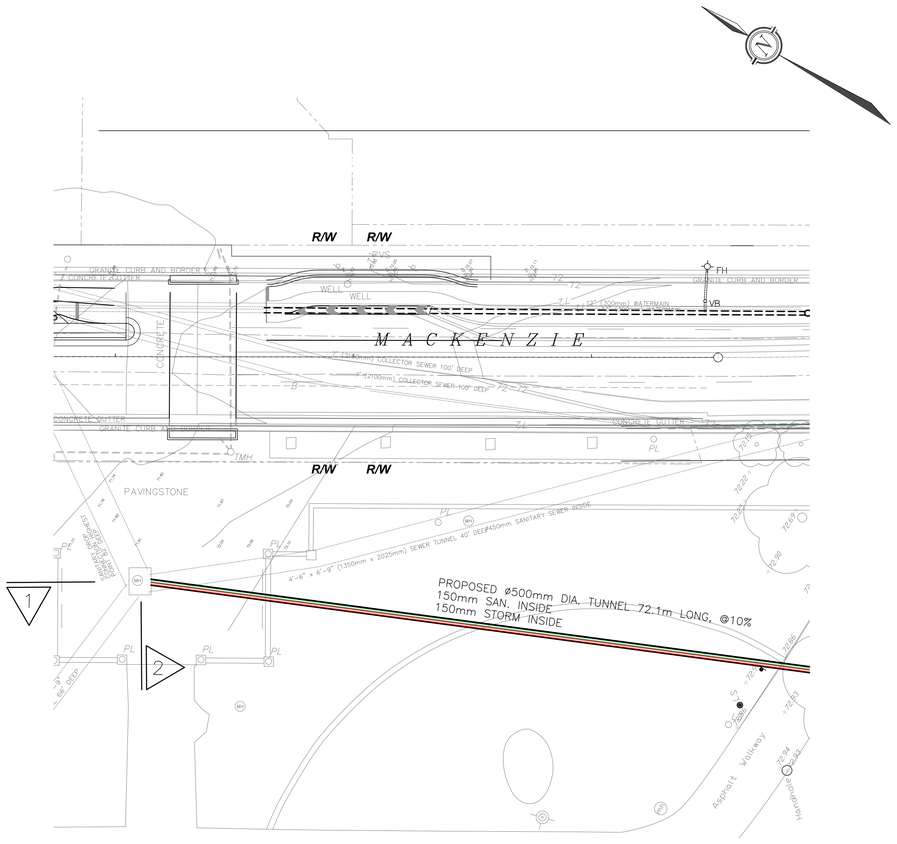
Designed BU	Date 08/06/17
Drawn SL	Scale 1:250
Checked BU	Sheet 2 OF 6
Project No. 2016-146	Dwg. No. S-02



1
1:60



2
1:60



PLAN
1:250

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED.
THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. DIMENSIONS ARE SHOWN IN METRIC.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.
3. EXISTING MANHOLE DRAWINGS WERE PREPARED BY CIMA+.

LICENSED PROFESSIONAL ENGINEER
B. URIEV
100051510
FEB 14, 2019
PROVINCE OF ONTARIO

D07-12-16-0193

No.	Date	Revision	By:
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

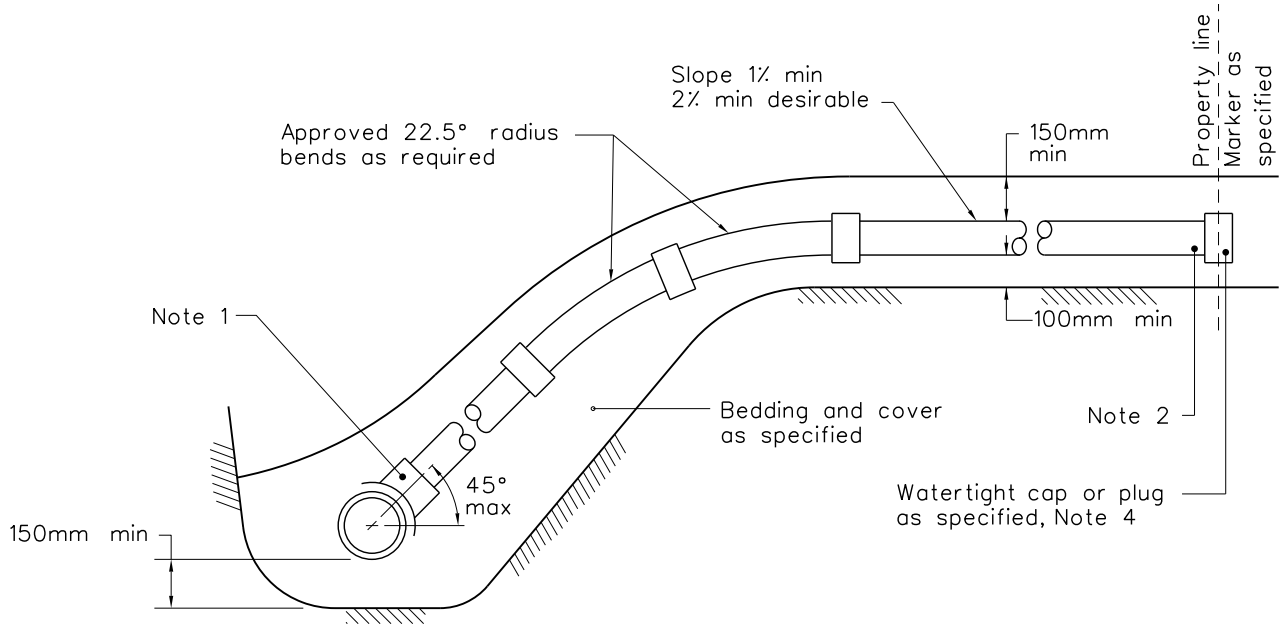
REMISZ
Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client
LARCO INVESTMENTS LTD.

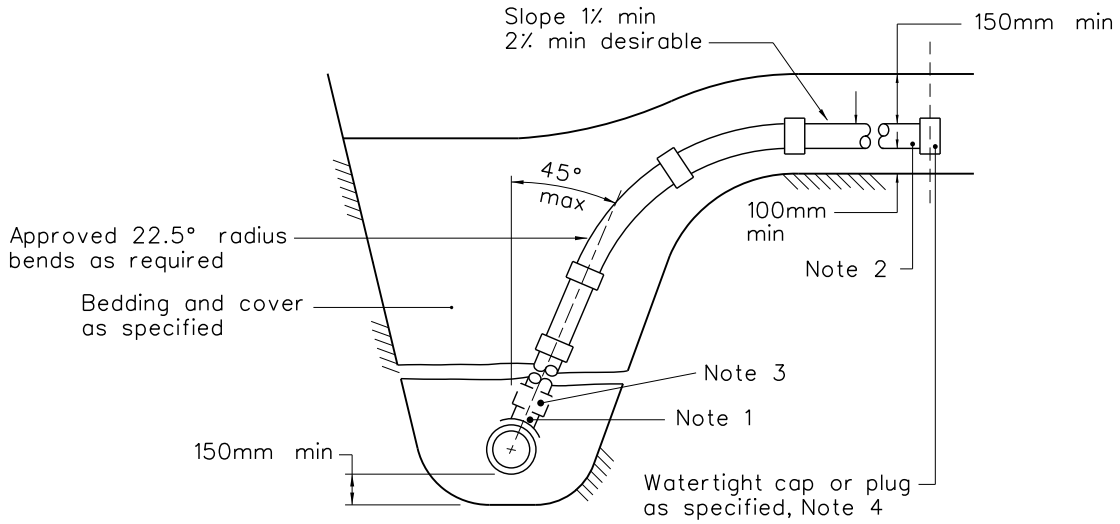
Project
CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing
SERVICING CONNECTION TO EXISTING MANHOLE

Designed: BU	Date: 08/06/17
Drawn: SL	Scale: AS SHOWN
Checked: BU	Sheet: 3 OF 6
Project No.: 2016-146	Dwg. No.: S-02.1



CONNECTION WITHOUT VERTICAL RISER



VERTICAL RISER

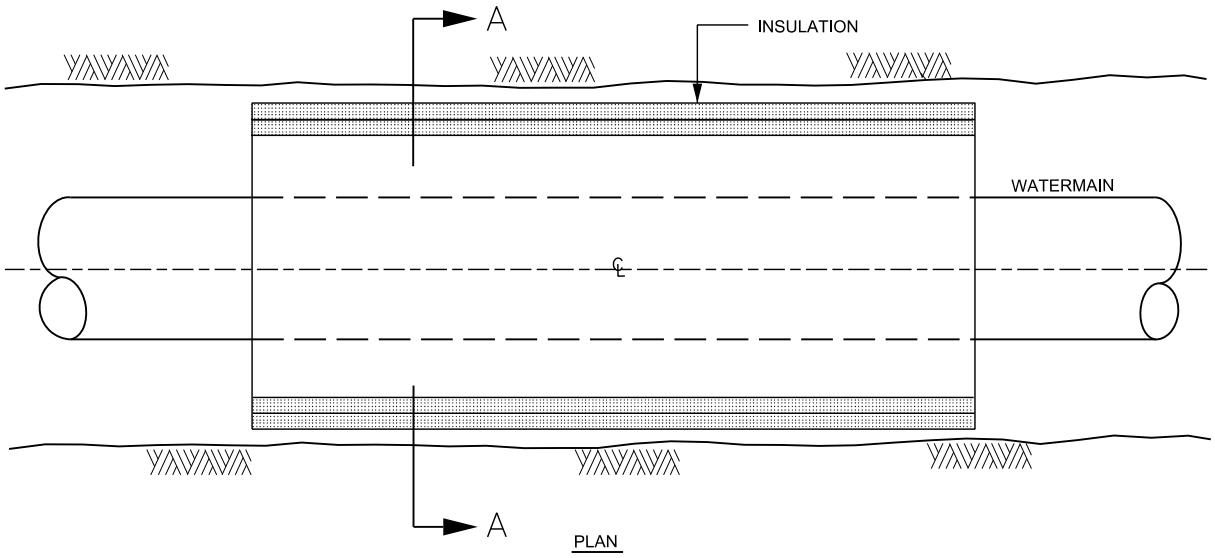
NOTES:

1. ALL DIAMETERS OF SERVICE CONNECTIONS TO FLEXIBLE MAIN SEWER SHALL BE MADE USING APPROVED TEE OR WYE FITTINGS.
2. SANITARY SERVICES TO BE 135mm AND STORM SERVICES TO BE 100mm FOR NEW RESIDENCES UNLESS SPECIFIED OTHERWISE. SERVICE PIPE AND RADIUS BENDS TO BE APPROVED CSA B182.2, SDR28 PRODUCTS UNLESS SPECIFIED OTHERWISE.
3. APPROVED CONTROLLED SETTLEMENT JOINTS OPTIONAL FOR SERVICE CONNECTIONS TO MAIN SEWERS UP TO 5m DEEP. WHERE APPROVED, CONNECTIONS TO SEWERS OVER 5m DEEP REQUIRE APPROVED CONTROLLED SETTLEMENT JOINTS.
4. CAP OR PLUG AT THE PROPERTY LINE SHALL BE ADEQUATELY BRACED TO WITHSTAND TESTING PRESSURE.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

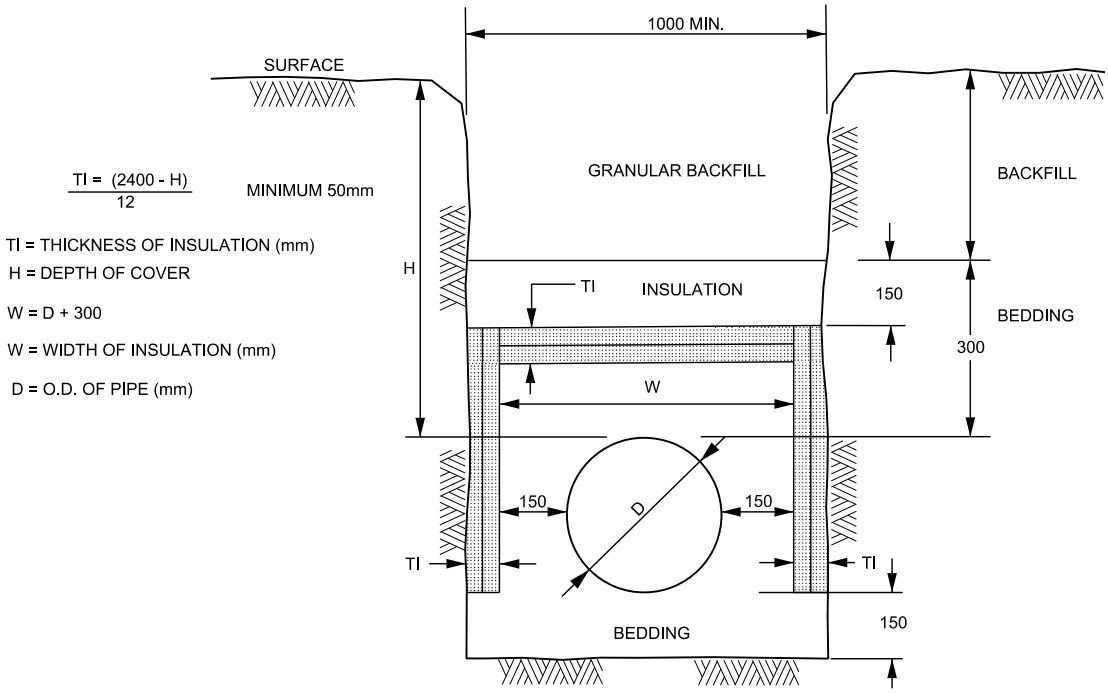
Ottawa

SEWER SERVICE CONNECTIONS FOR FLEXIBLE MAIN SEWER PIPE (MODIFIED OPSD-1006.020)

DATE:	MARCH 2006
REV. DATE:	MARCH 2013
DWG. No.:	S11.1



PLAN



SECTION A - A

NOTES

FOR 150 - 400mm (NOMINAL DIAMETER) WATERMAINS, WHERE THE DEPTH OF COVER IS LESS THAN 2400mm

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 25mm.
2. IN PROXIMITY OF MAINTENANCE HOLES, CULVERTS, CATCHBASINS, ETC., INSULATION SHALL BE PLACED PER DETAIL W23
3. DEPTH OF COVER LESS THAN 1200mm REQUIRES SPECIAL DESIGN
4. STAGGER JOINTS OF MULTIPLE SHEETS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

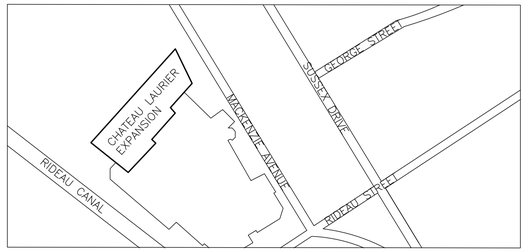
Ottawa

THERMAL INSULATION FOR WATERMAINS IN SHALLOW TRENCHES

DATE:	MAY 2001
REV. DATE:	MARCH 2013
DWG. No.:	W22

APPENDIX J

Erosion and Sediment Control Plan



KEY PLAN
NTS

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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev	1
HEAVY-DUTY SILT FENCE BARRIER			OPSD 219.130

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED.
THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

GENERAL NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATER COURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCIES.
2. THIS PLAN IS TO BE CONSIDERED A LIVING DOCUMENT WHICH MAY BE MODIFIED IN THE EVENT THAT THE CONTROL MEASURES ARE INSUFFICIENT.
3. EROSION AND SEDIMENT CONTROL PLAN SHALL BE PERMANENTLY POSTED ON SITE AND MADE AVAILABLE FOR REVIEW BY INSPECTING AUTHORITIES.

LICENSED PROFESSIONAL ENGINEER
B. URIEV
100161510
Feb 19, 2019
PROVINCE OF ONTARIO

D07-12-16-0193

No.	Date	Revision	By:
5	14/02/19	GENERAL REVISION	BU
4	18/07/18	AS PER CITY REVIEW	BU
3	19/01/18	AS PER CITY REVIEW	BU
2	20/07/17	AS PER DESIGNER REVISION	BU
1	08/06/17	AS PER CITY REVIEW	BU

REMISZ
Consulting Engineers Ltd.
57 Auriga Dr. Suite 102
Ottawa, ON, K2E 8B2
tel.: (613) 225-1162
fax: (613) 225-4529

Client
LARCO INVESTMENTS LTD.

Project
CHATEAU LAURIER EXPANSION
1 RIDEAU STREET
OTTAWA, ON

Drawing
EROSION AND SEDIMENT CONTROL PLAN

Designed BU	Date 08/06/17
Drawn SL	Scale 1:250
Checked BU	Sheet 4 OF 6
Project No. 2016-146	Dwg. No. S-03

frame 790x505 mm
www.remisz.com Frame.dwg – Jan. 2009
0 10 20 40 60 80 100 120 140 160 180 200

APPENDIX K

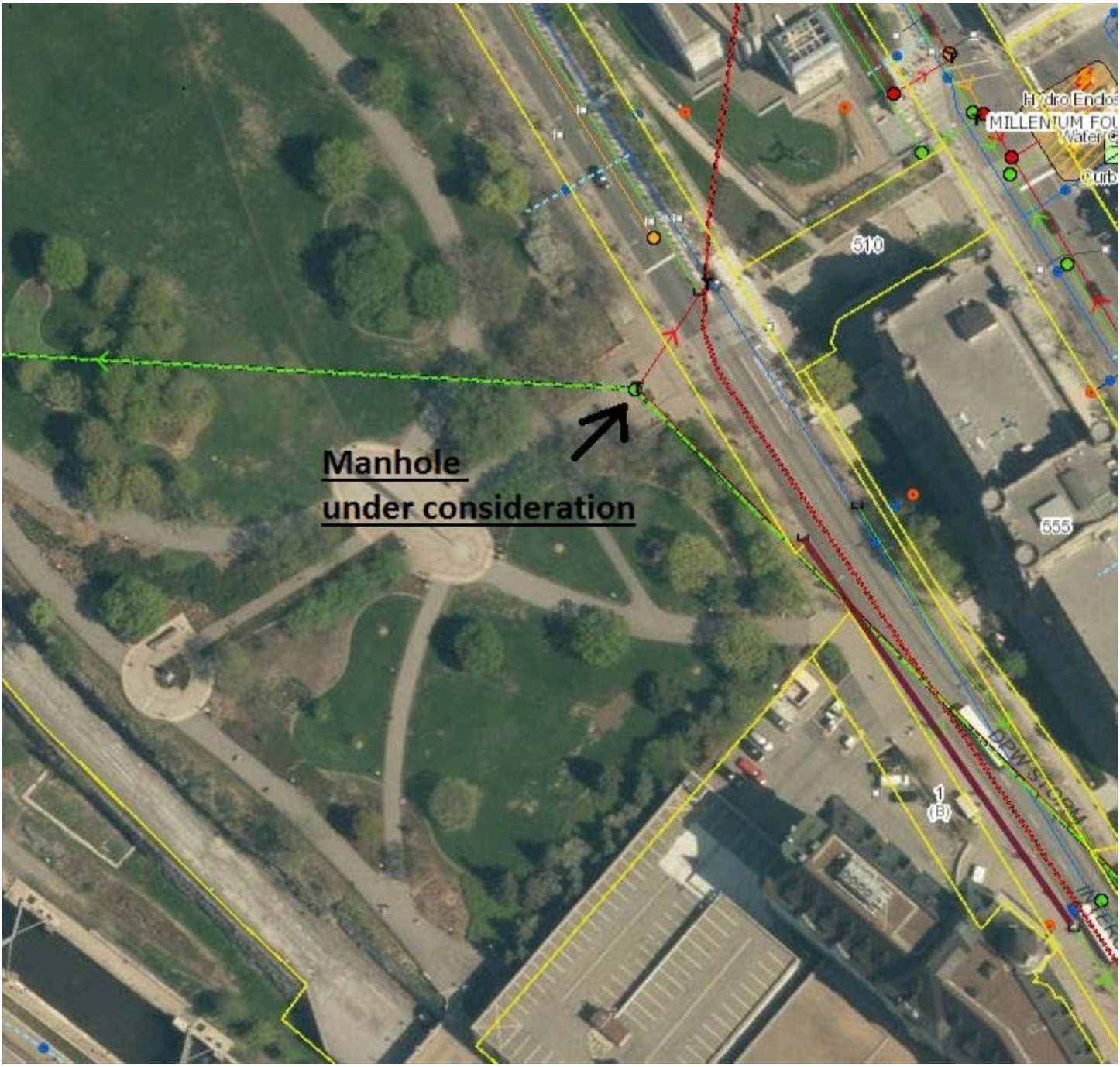
Pre-Consultations and Comments
From Reviewing Agencies

Boris Uriev

From: Buchanan, Richard [Richard.Buchanan@ottawa.ca]
Sent: Thursday, January 11, 2018 11:18 AM
To: 'Dennis Jacobs'; Greg Remisz; Boris Uriev
Cc: Hamlin, Allison; Art Phillips
Subject: Storm and Sanitary Servicing

Hi Dennis

We followed up with our Asset Management group as to the option of doing a directional drill for each sanitary and storm service into the deep existing infrastructure (storm over 60 feet and Sanitary 100 feet deep) since this was how the US embassy was serviced. They had indicated that they would not support this approach. They did however indicate that they are working on a Manhole upgrade at the entrance to Majors Hill Park and would consider the option of connecting services to this structure to provide servicing. I included an Aerial photo of the manhole.



The extent of work proposed on the manhole is simply upgrades to meet access issues building codes. This would represent replacing ladders, platforms and other appurtenances. All works would be internal to the manhole short of replacing the manhole cover. They indicated that while Federal approval is required, due to its minimal works required, it would be a quick Federal Land Use Approval.

To accommodate your idea, they would need a high level servicing proposal/sketch with what you would need to service your development. I indicated that the service would need to go through Majors Hill Park and as such there would be a need to obtain approval from the NCC and define the required easement. The easement portion would be your responsibility to pursue with the NCC.

Please submit a plan/sketch of the proposed servicing of your site and include anticipated depth of directional drill (to determine elevation of entry of services into the existing manhole and indicate sizes of services. You may consider a force main verses gravity since the ability to provide necessary gradient could be a challenge and would result in a deep excavation around the pipe).

They would review and determine if it can be incorporated into their design. At this time, they indicated there would be no fee to review this but would be subject to review once you submit your servicing proposal.

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

'

'

Boris Uriev

From: Buchanan, Richard [mailto:Richard.Buchanan@ottawa.ca]
Sent: Tuesday, January 16, 2018 10:32 AM
To: 'Dennis Jacobs'
Cc: Boris Uriev; Greg Remisz; Hamlin, Allison
Subject: RE: Storm and Sanitary Servicing - Chateau Laurier

Hi Dennis

We have had an opportunity to review your consultants design and have the following questions/comments;

1. Confirm the size of proposed services. The sanitary service seems excessively large.
2. Have you considered each service being a forcemain? This would make the steel casing a lot smaller.
3. Proposed casing seems fairly large. Would recommend your consultant review with the intent of reducing size.

Based on your drawing, it is your intention to enter the existing manhole at a fairly deep point. It is obvious that there cannot be an open cut excavation around the manhole to make the connection, since the surrounding material is rock. All work will be done internally to the manhole. Ensure your contractor reviews this before bidding on project.

Once finalized, we will have our Asset Management team review and provide us with what the next steps will be. It is important to note that the easement across Majors Hill Park will be dependent on the casing size and once confirmed, you will need to start the formal process of obtaining the necessary easement.

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Dennis Jacobs [mailto:djacobs@momentumplancom.ca]
Sent: Monday, January 15, 2018 10:19 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Cc: Boris Uriev <boris.uriev@remisz.com>; Greg Remisz <greg.remisz@remisz.com>
Subject: FW: Storm and Sanitary Servicing - Chateau Laurier

H Richard

Further to our discussion last week, here is the preliminary sketch for a connection to the manhole in the park. We will be submitting a revised servicing plan based on the new design for the hotel addition as part of the resubmission this week. This revised design will be incorporate this proposed connection.

Please let us know if you need anything further at this time. Thanks.

Dennis Jacobs MCIP, RPP
Principal Planner
Momentum - Planning & Communications
1165 Greenlawn Crescent
Ottawa ON K2C 1Z4
Office: 613.729.3773
Cell: 613.862.0799
momentumplancom.ca

From: Boris Uriev [mailto:boris.uriev@remisz.com]
Sent: Monday, January 15, 2018 9:45 AM
To: Dennis Jacobs <djacobs@momentumplancom.ca>
Cc: Greg Remisz <greg.remisz@remisz.com>; Art Phillips <aphillips@larco.ca>
Subject: RE: Storm and Sanitary Servicing

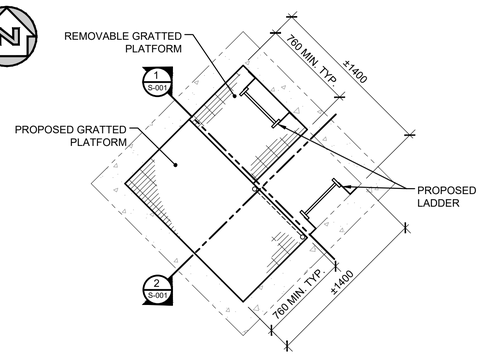
Dennis, good day!

Please find attached the requested proposal / drawing for storm and sanitary connections to Majors Hill Park manhole.

Regards,

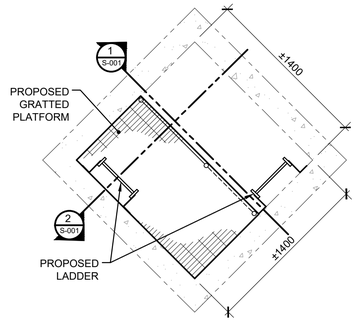
Boris Uriev, M. Sc., P. Eng.

REMISZ Consulting Engineers Ltd
57 Auriga Drive, Suite 102
K2E 8B2, Ottawa, ON
Phone: (613) 225-1162
Fax: (613) 225-4529
bu@remisz.com



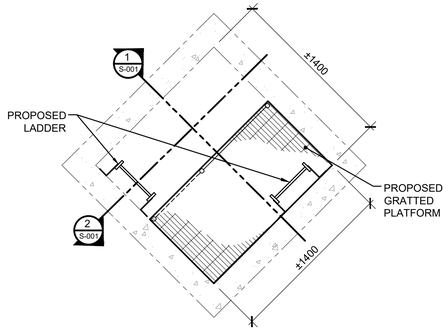
PLAN VIEW - PLATFORM 1 - PROPOSED

1:25



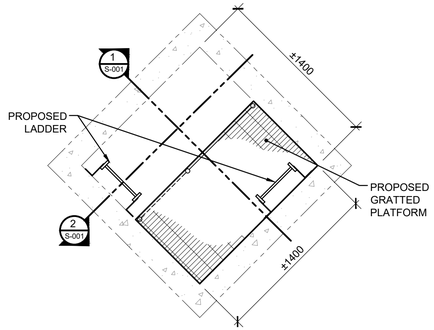
PLAN VIEW - PLATFORM 5 - PROPOSED

1:25



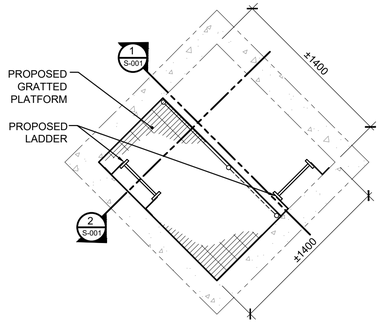
PLAN VIEW - PLATFORM 2 - PROPOSED

1:25



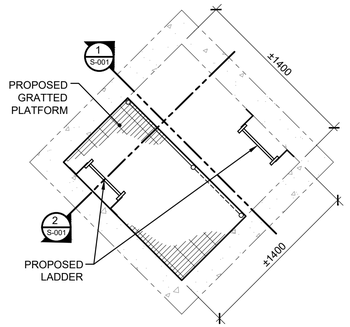
PLAN VIEW - PLATFORM 6 - PROPOSED

1:25



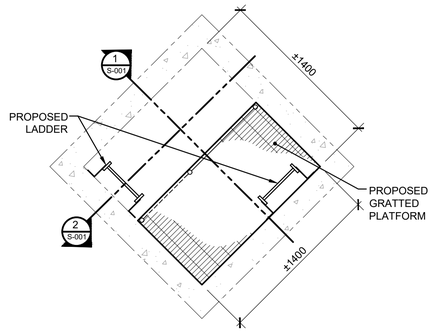
PLAN VIEW - PLATFORM 3 - PROPOSED

1:25



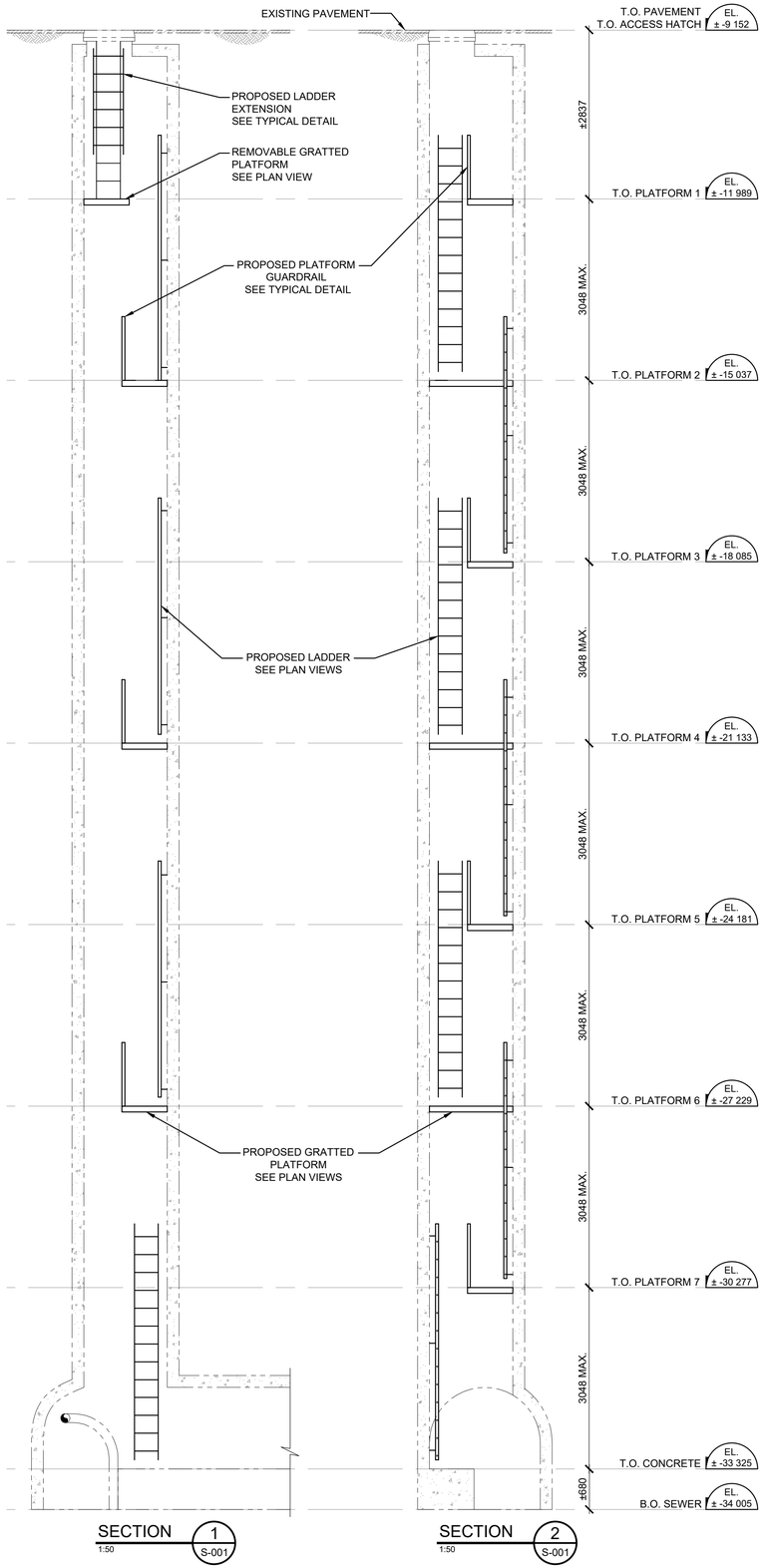
PLAN VIEW - PLATFORM 7 - PROPOSED

1:25



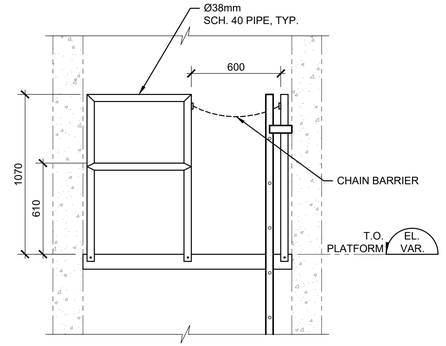
PLAN VIEW - PLATFORM 4 - PROPOSED

1:25



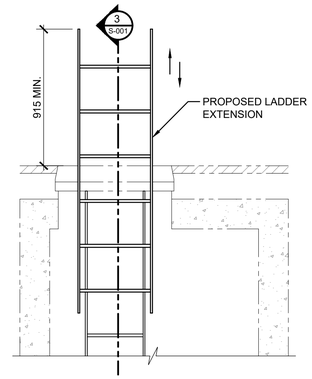
SECTION 1 / 1:50 / S-001

SECTION 2 / 1:50 / S-001



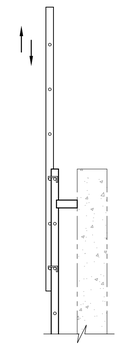
TYPICAL DETAIL - PLATFORM GUARDRAILS

1:20



TYPICAL DETAIL - LADDER EXTENSION

1:20



SECTION 3 / 1:20 / S-001

CITY OF OTTAWA

CWWF Maintenance Hole Rehab.

Proposed Plan View, Sections & Details
MHST01093 - Majors Hill Park

Designer	J-F PARIS
	Approved by

Contract No.

Drawing No. S-001

Sheet No. 1 of 4

Asset No.

Asset Group

Des: J-F PARIS	Chk'd: J-F PROULX
Dwn: A. FERREIRA	Chk'd: F. DUBOIS
Utility Circ. No.:	Index No.:
Const. Inspector:	

Scale: AS SHOWN

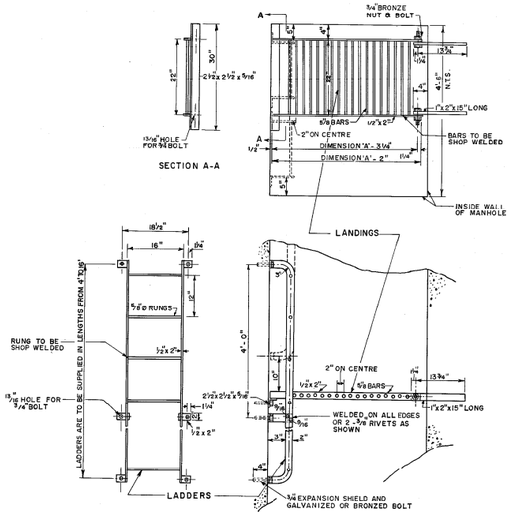
NOTE:
The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

CIMA
240, Catherine st, suite 110
Ottawa (Ontario) K2P 2G8
Tel: (613) 860-2462
Fax: (613) 860-1670
www.cima.ca
Project : A0005026

REVISIONS

No.	Description	By	Date (dd/mm/yy)
A	ISSUED FOR INFORMATION	AF	09/26/2017
B	PRELIMINARY	AF	10/06/2017

Plot Date: 5 octobre 2017 09:34:28
Last Saved: 5 octobre 2017 08:43:34
Drawing Frame: 790mm x 534mm City of Ottawa 2008 (Rev.0)
Page Setup: ---
Consultant's Information: O:\AA0005020Q_City Of Ottawa – CWWF Maintenance Hole Rehab\400\430\Majors Hill Park_S-001\A0005020Q_Majors_Hill_Park.dwg

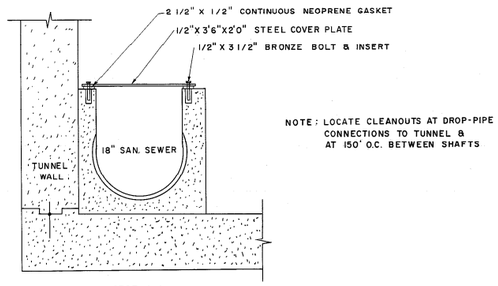


TYPICAL LANDING AND LADDER DETAIL

SCALE 3/4" = 1'-0"

NOTES :

1. MAXIMUM DISTANCE BETWEEN LANDINGS TO BE 12 FEET.
2. MANHOLE LADDERS & LANDINGS TO BE HOT DIP GALVANIZED



SECT. 1-1

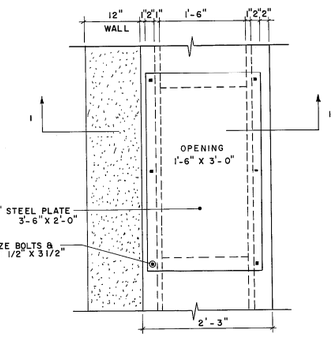
SANITARY CLEANOUT DETAIL

ELEVATION

SCALE 1" = 1'-0"

NOTE : LOCATE CLEANOUTS AT DROP-PIPE CONNECTIONS TO TUNNEL & AT 150' O.C. BETWEEN SHAFTS

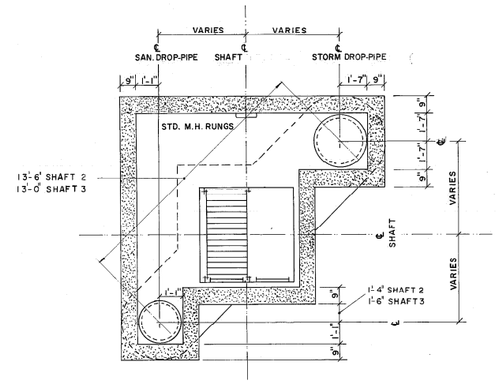
NOTE : ALL STEEL FOR CLEANOUT & LANDING ASSEMBLIES TO BE HOT-DIP GALVANIZED



SANITARY CLEANOUT DETAIL

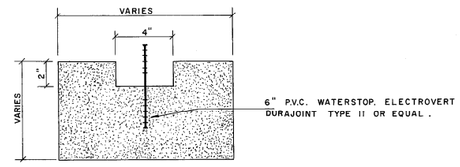
PLAN

SCALE 1" = 1'-0"



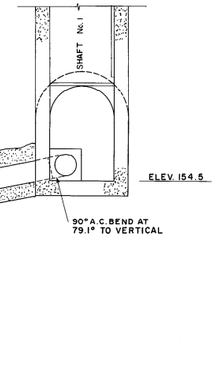
ENTRANCE CHAMBER DETAIL (TYP.)

SCALE 3/8" = 1'-0"



CONSTRUCTION JOINT DETAIL (TYP.)

N.T.S.



SANITARY CONNECTION FROM TUNNEL TO EXISTING INTERCEPTOR

SCALE 1/4" = 1'-0"

A.L.M.	ENTRANCE CHAMBER DETAIL AMENDED		14/7/70
By	Revisions		Date

NATIONAL CAPITAL COMMISSION

CONFEDERATION SQUARE
EAST BANK DEVELOPMENT

STORM & SANITARY SEWER TUNNEL

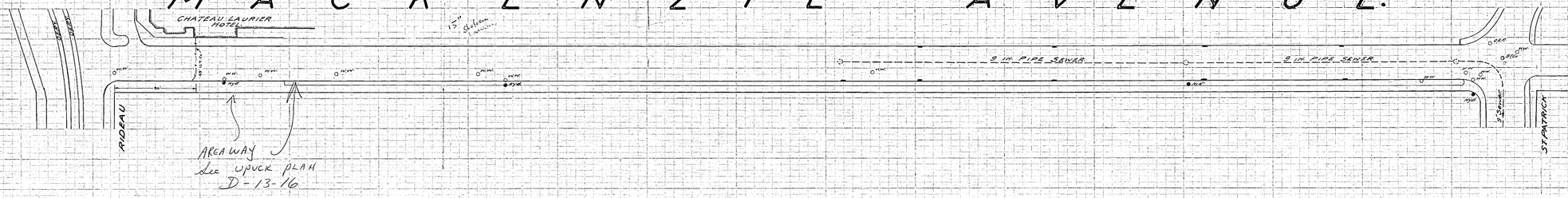
MISCELLANEOUS DETAILS

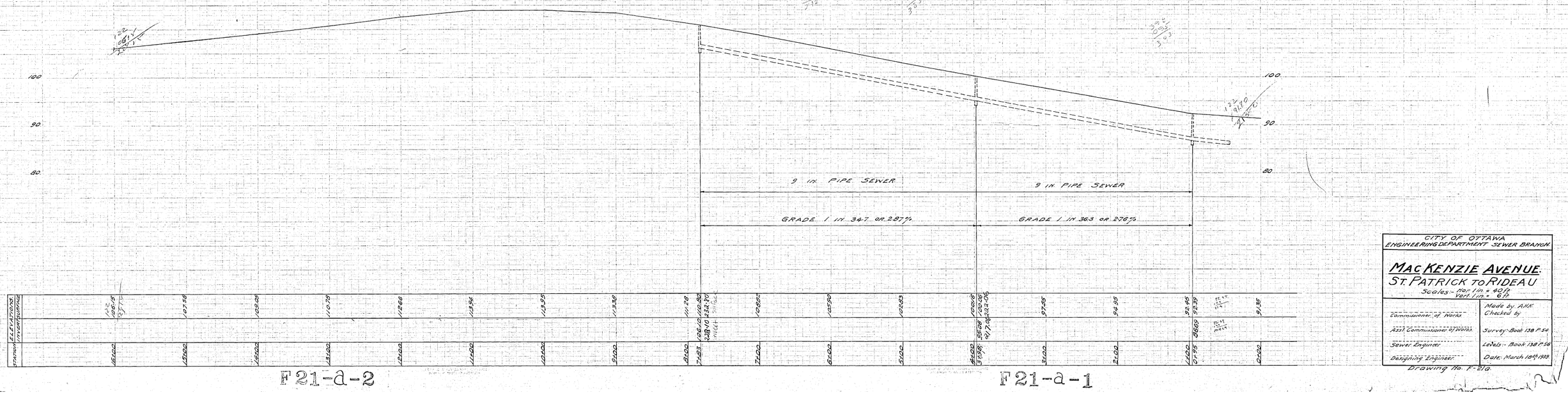
DESIGN R.B.	CHECK A.J.W.		Scale : as shown
DRAWN R.B.	CHECK A.J.W.		Project No. C.N. 243-67
TRACING B.R.	DATE NOV. /69		SHEET 11

WYLLIE & UFNAL LTD.
CONSULTING ENGINEERS
Toronto Hamilton Ottawa

REGISTERED PROFESSIONAL ENGINEER — CIVIL — A. J. WAITS — PROVINCE OF ONTARIO

M A C K E N Z I E A V E N U E.



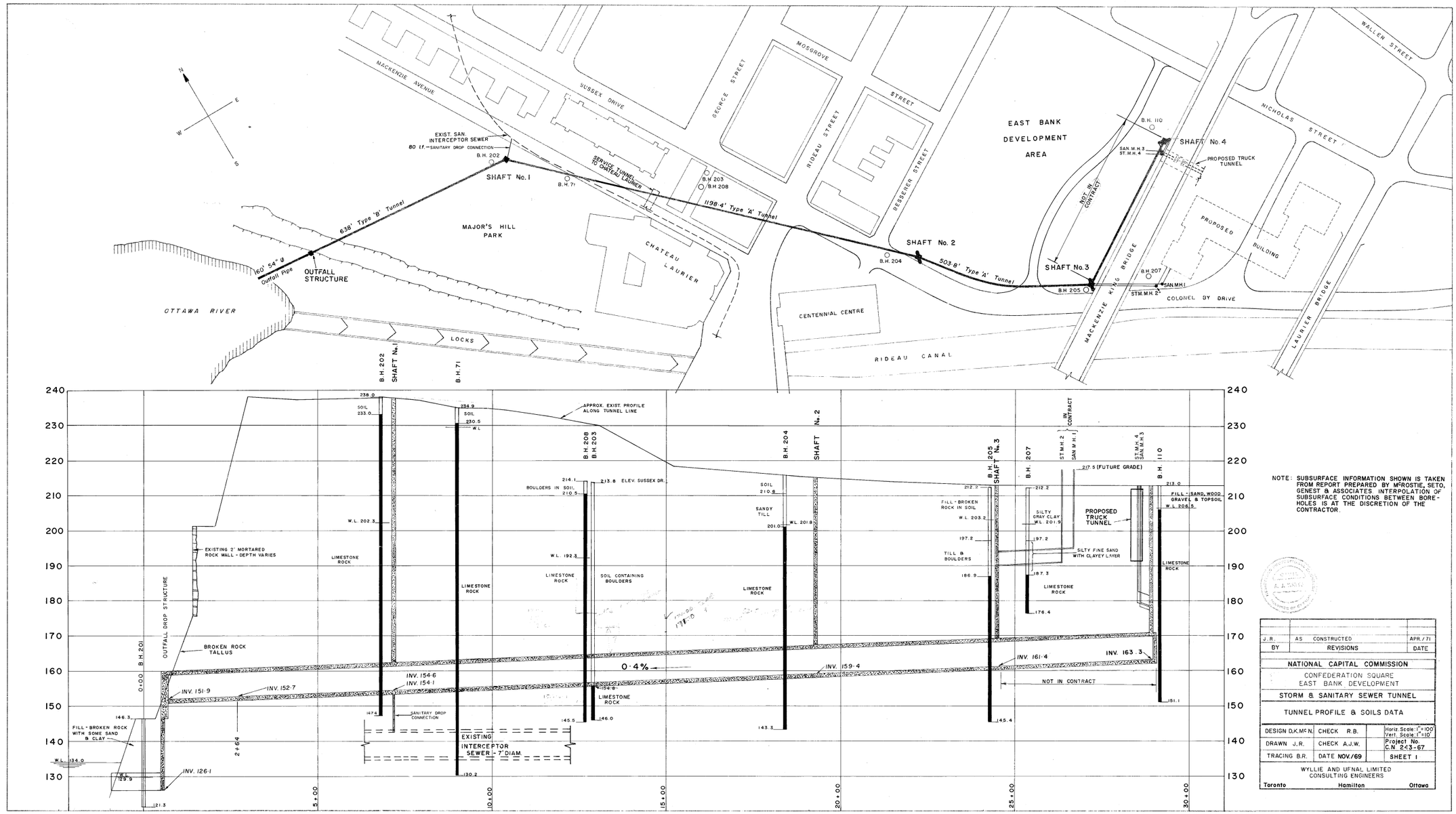


CITY OF OTTAWA
ENGINEERING DEPARTMENT SEWER BRANCH.

MAC KENZIE AVENUE.
ST. PATRICK TO RIDEAU
Scales:- Hor. 1 in. = 40 ft.
Vert. 1 in. = 8 ft.

Commissioner of Works	Made by A.M.K. Checked by
Asst. Commissioner of Works	Survey:- Book 138 P. 54
Sewer Engineer	Levels:- Book 138 P. 56
Designing Engineer	Date: March 16th 1939.

Drawing No. F-21a.



NOTE: SUBSURFACE INFORMATION SHOWN IS TAKEN FROM REPORT PREPARED BY McROSTIE, SETO, GENEST & ASSOCIATES INTERPOLATION OF SUBSURFACE CONDITIONS BETWEEN BOREHOLES IS AT THE DISCRETION OF THE CONTRACTOR.

BY	REVISIONS	DATE
J.R.	AS CONSTRUCTED	APR./71

NATIONAL CAPITAL COMMISSION

CONFEDERATION SQUARE
EAST BANK DEVELOPMENT

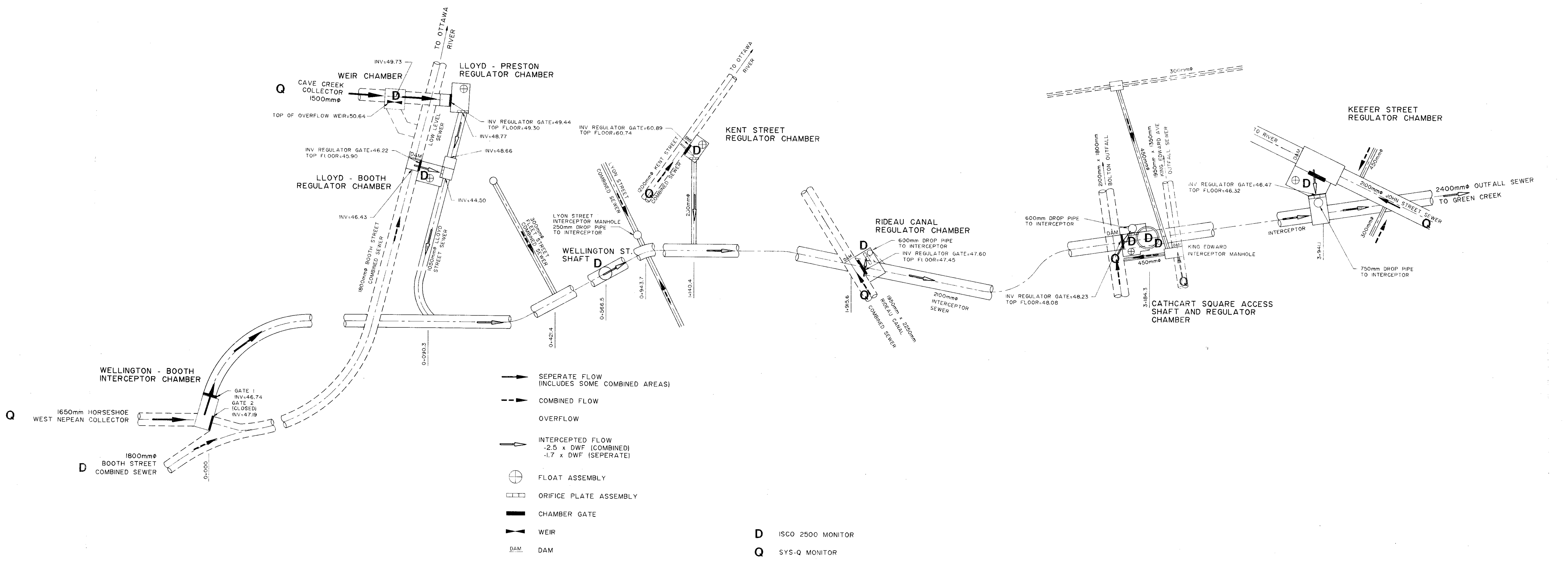
STORM & SANITARY SEWER TUNNEL

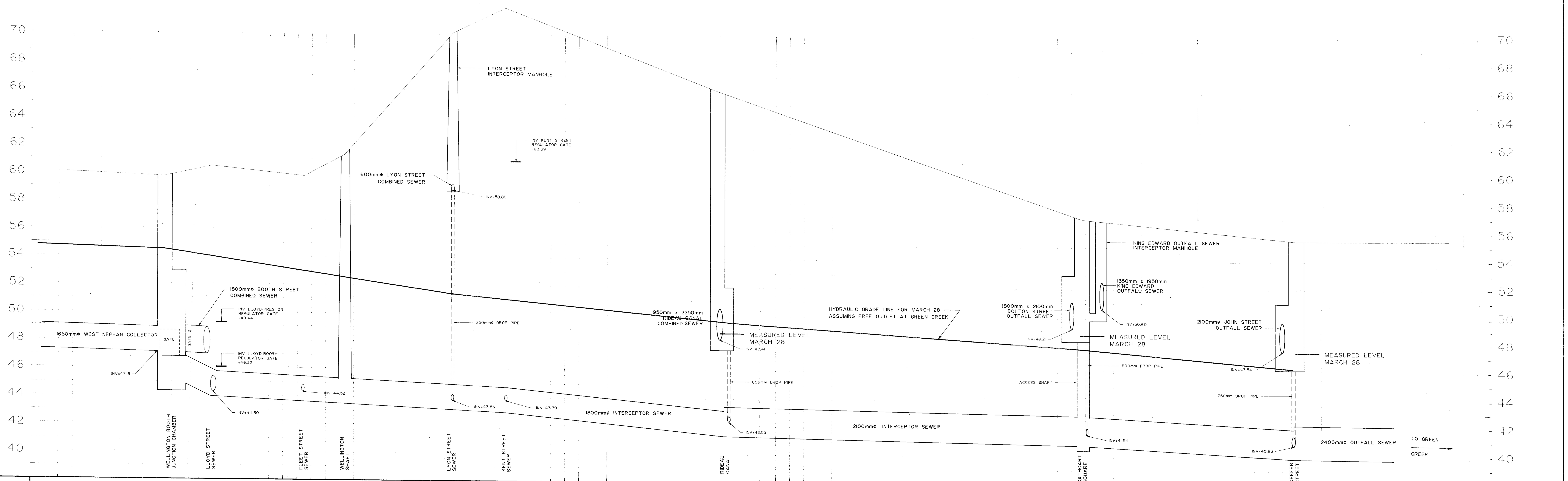
TUNNEL PROFILE & SOILS DATA

DESIGN D.K.McN.	CHECK R.B.	Horiz. Scale: 1" = 100' Vert. Scale: 1" = 10'
DRAWN J.R.	CHECK A.J.W.	Project No. C.N. 243-67
TRACING B.R.	DATE NOV./69	SHEET 1

WYLLIE AND UFNAL LIMITED
CONSULTING ENGINEERS

Toronto Hamilton Ottawa





TOP OF GROUND ELEVATION	59.74	60.50	59.74	61.42	70.10	71.93	66.05	57.00	55.47	TOP OF GROUND ELEVATION
INVERT OF INTERCEPTOR	44.81	43.93	43.60	43.46	43.08	42.88	41.80	40.76	39.86	INVERT OF INTERCEPTOR
CHAINAGE	0+000	0+090.3	0+421.4	0+566.5	0+943.7	1+140.4	1+915.6	3+184.3	3+941.1	CHAINAGE

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.

No.	REVISION	DATE	BY
1.	ISSUED WITH DRAFT REPORT	JAN 16/90	GM

NOVATECH
ENGINEERING CONSULTANTS LTD
OTTAWA, ONTARIO

DESIGN
CHECKED
DRAWN MGB
CHECKED GMD
APPROVED

SCALE
1:5000 (0 50 100 150 200) HORIZONTAL
1:100 (0 1.0 2.0 3.0 4.0) VERTICAL

REGIONAL MUNICIPALITY OF OTTAWA - CARLETON
WORKS DEPARTMENT

OTTAWA INTERCEPTOR SEWER
SCHEMATIC PLAN AND PROFILE

PROJECT No. 8921
FIELD BOOK
DATE DEC/88
DRAWING No. 8921-1

CONFEDERATION BOULEVARD
MacKenzie/Sussex South
PHASE 1

GRADING AND DRAINAGE PLAN
MacKENZIE AVENUE
STATION 0+750 TO STATION 0+875

CONTRACT NO.	RD-2520-16L
DRAWING NO.	103184-GD3
DATE:	APRIL 2004
SHEET NO.	12 OF 56

Scale: 0 2.5 5.0 7.5 10 H; 0 0.5 1.0 1.5 2 V

Dwn: SAM	Chkd: LPD
Des: WKK	Chkd: LPD

NO.	REVISIONS	BY	DATE
7.	RECORD DRAWING	GMac	07/05/11
6.	RECORD DRAWING	LPD	06/02/26

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

NO.	REVISIONS	BY	DATE
5.	ISSUED FOR CONSTRUCTION	LPD	04/09/29
4.	ISSUED FOR TENDER	LPD	04/07/09
3.	RE-ISSUED FOR MOE APPROVAL	LPD	04/05/18
2.	ISSUED FOR MOE APPROVAL	LPD	04/04/21
1.	REVISED STORM SEWER	LPD	04/04/15

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LICENSED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

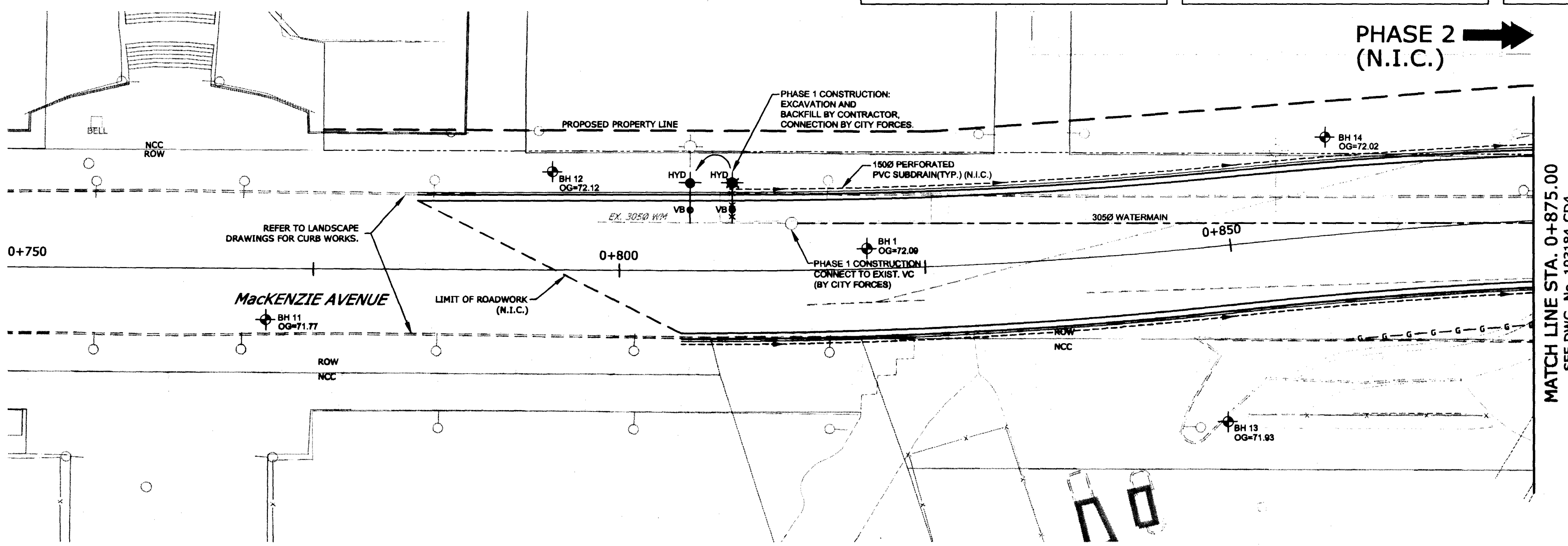
NOVATECH ENGINEERING CONSULTANTS LTD. ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

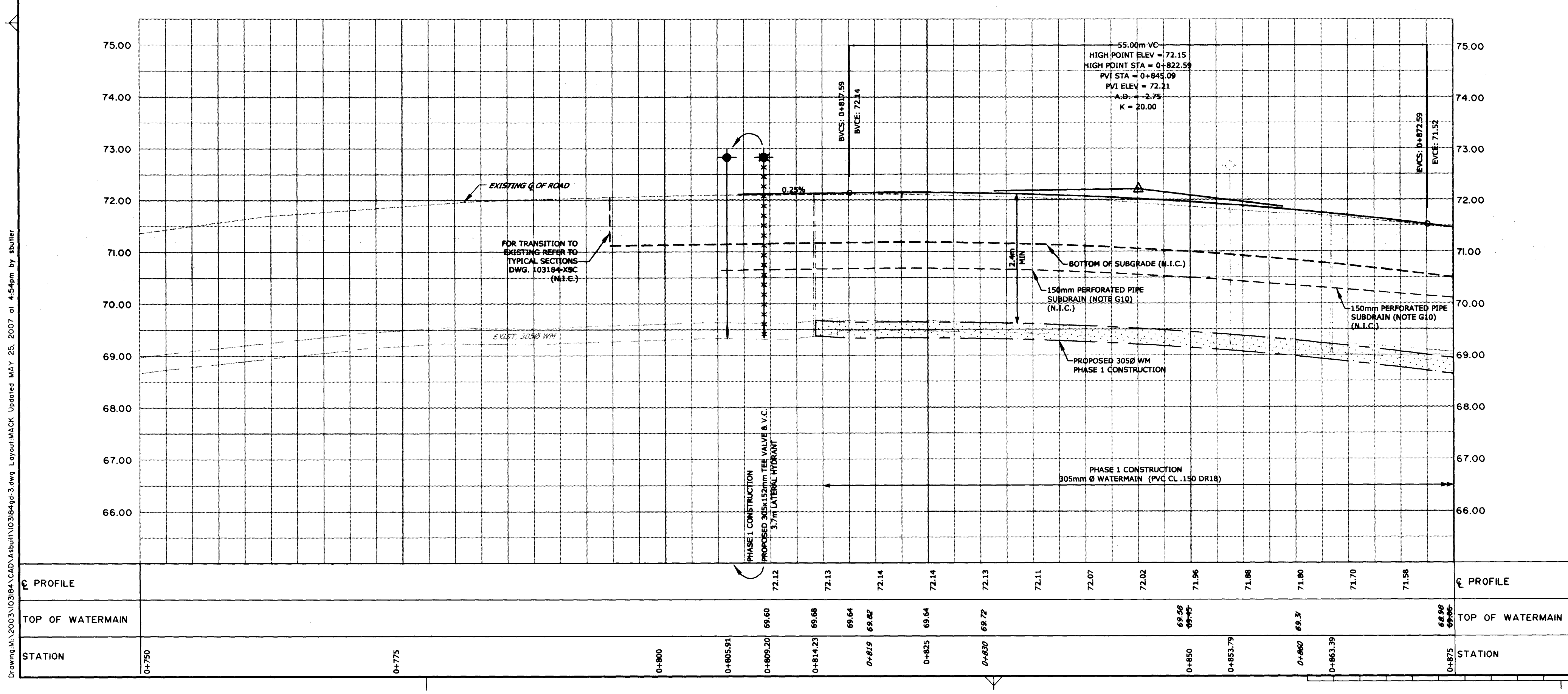
CLARIDGE HOMES

PLA CONSULTANTS

DESSAU SOPRIN

Ottawa





NOTES AND SPECIFICATIONS:

GENERAL

G1. THE ABANDONED WATERMAIN SHALL BE REMOVED DURING EXCAVATION OPERATION AND DISPOSED OF OFF-SITE. THE TRENCH SHALL BE BACKFILLED WITH ACCEPTABLE NATIVE MATERIAL AS DIRECTED BY THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR.

G2. BOREHOLE LOCATIONS ARE SHOWN IN PLAN. FOR FURTHER INFORMATION AND BOREHOLE LOGS REFER TO GEOTECHNICAL REPORT DATED APRIL 5, 2004.

G3. EXACT DEPTH OF UNDERGROUND UTILITY PLANT AND EQUIPMENT, AND ENCASEMENT MATERIAL ARE UNKNOWN. THE CONTRACTOR IS TO TAKE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES.

G4. MANHOLES AND VALVE CHAMBERS ON ABANDONED SEWERS AND WATERMAINS TO BE REMOVED ENTIRELY AND THE SEWER/WATERMAIN TO BE PLUGGED WITH 20 MPa CONCRETE.

G5. MAINTAIN TWO WAY TRAFFIC AT ALL TIMES. CONSTRUCTION IS TO BE STAGED AS DETAILED ELSEWHERE IN CONTRACT.

G6. EXISTING TREES IN THE CONSTRUCTION ZONE AREA TO BE PRESERVED AND PROTECTED DURING THE CONSTRUCTION PERIOD.

G7. LIMITS OF GRADING INDICATED MAY VARY DEPENDING ON FIELD CONDITIONS OR AS DIRECTED BY THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR.

G8. WHERE AVAILABLE, EXISTING SERVICING INFORMATION TO PRIVATE PROPERTY HAS BEEN SHOWN.

G9. EXCESSIVE LEVELS OF CHLORIDE ARE PRESENT IN AREAS THROUGHOUT THE CONTRACT. THEREFORE, THE PROTECTION OF STEEL IN CONCRETE IS REQUIRED.

G10. PROFILE OF 150mm PERFORATED PIPE SUBDRAIN AND BOTTOM OF TREE PIT DRAINAGE LAYERS TO BE ADJUSTED TO PROVIDE DRAINAGE OVER EXISTING SERVICE TUNNEL.

STORM AND SANITARY SEWERS

S1. ALL STORM AND SANITARY SERVICES SHALL BE REPLACED TO PROPERTY LINE, OR FURTHER AS REQUIRED. TIE-IN LOCATION BEYOND PROPERTY LINE TO BE APPROVED BY SUB-ENGINEER WITH CONTRACT ADMINISTRATOR. WHERE STORM LATERALS ARE TO BE PLACED TO PROPERTY LINE, THEY SHALL BE CAPPED WITH A WATER TIGHT SEAL.

S2. ALL CATCH BASINS TO HAVE A SUMP OF 0.9m (MIN.), UNLESS CATCH BASIN MODEL S27 IS SPECIFIED C/W 200mmØ LEAD. STORM MANHOLES TO HAVE 0.3m SUMP.

S3. ALL SEWERS TO HAVE CLASS "B" BEDDING, AND APPROVED NATIVE BACKFILL MATERIAL. (REFER TO GEOTECHNICAL REPORT)

S4. SUBDRAIN OUTLETS INTO MANHOLES AND CATCH BASINS SHALL BE LOCATED TO SUIT FIELD CONDITIONS.

S5. THE CONTRACTOR WILL BE REQUIRED TO LOCATE EXISTING SERVICES & UTILIZING DYE TESTING OR OTHER METHODS (TO THE SATISFACTION OF THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR), VERIFY THE EXISTING SERVICE PIPES STATUS. (ABANDONED OR IN USE)

WATERPLANT

W1. CURB STOPS TO BE INSTALLED 0.3m ON AND FROM BACK OF SIDEWALK OR AT ANOTHER LOCATION APPROVED BY ENGINEER.

W2. ALL WATER SERVICES TO BE INSTALLED WITH 2.4 METRES OF COVER.

W3. ALL FITTINGS REQUIRED FOR CONNECTIONS TO BE SUPPLIED BY THE CITY OF OTTAWA PER SECTION 4, F-7010.

W4. EXISTING WATERMAIN TO BE ABANDONED DURING CONSTRUCTION. A TEMPORARY OVERLAND DISTRIBUTION SYSTEM WILL BE IMPLEMENTED AND MAINTAINED BY CITY OF OTTAWA FORCES.

W5. ALL HYDRANTS AND VALVES AND OTHER APPURTENANCES TO BE REMOVED SHALL BE SALVAGED AND DELIVERED TO CITY OF OTTAWA YARD AT CLYDE AVENUE.

W6. WATER SERVICES CROSSING NEW AND ABANDONED SEWERS SHALL BE INSTALLED UNDER THE SEWER PER W38.

W7. ALL NEW CATCH BASINS AND MANHOLES CLOSER THAN 0.9m TO THE NEW WATERMAIN SHALL BE INSULATED PER W23.

W8. CATHODIC PROTECTION REQUIRED FOR ALL FITTINGS & COMPONENTS PER W40 & W42.

W9. WATERMAIN BEDDING IS TO BE AS PER W17.

W10. ALL WATERMAIN MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF OTTAWA STANDARD SPECIFICATIONS AND STANDARD DRAWINGS.

Drawing:M:\2003\103184\CAD\Asbuilt\103184gd-3.dwg Layout:MACK Updated MAY 25, 2007 at 4:54pm by sbuller

12624

STORM MANHOLE DATA					
NO.	STATION	OFFSET	TYPE	ELEVATION	
				T/GRATE	LOW/INV.
1	0+893.5	1.00 LT	OPSD-701.010	70.97	~~68.85~~ 68.90
2	0+945.2	0.40 LT	OPSD-701.010	~~70.06~~ 65.02	~~68.00~~ 68.04
MH ADD	0+985.4	4.38 LT	OPSD-701.010		67.49
2A	0+995.8	0.20 RT	OPSD-701.010	~~69.40~~ 69.47	~~67.00~~ 67.01

OFFSETS ARE FROM BASELINE TO CENTRE OF STRUCTURE

STORM SEWER DATA					
SEWER	DIA.	TYPE	LENGTH	INVERT ELEVATION	
				UP STR.	DOWN STR.
MH 1 - MH 2	300	PVC SDR35	52.0	~~68.85~~ 68.90	~~68.07~~ 68.09
MH 2 - MH ADD	375	PVC SDR35	51.0	~~68.00~~ 68.04	~~67.00~~ 67.52
MH ADD-MH2A	375	PVC SDR35	0.00	~~68.85~~ 67.49	~~68.07~~ 67.29

CATCH BASIN DATA						
NO.	STATION	OFFSET	TYPE	GRATE	ELEVATION	
					T/GRATE	LOW/INV.
CB1	0+894.4	5.50 RT	OPSD-705.010	S22, S23	70.88	69.46
CB2	0+904.8	5.50 LT	OPSD-705.010	S22, S23	~~70.61~~ 70.72	69.21
CB3	0+937.5	5.50 LT	OPSD-705.010	S22, S23	~~69.99~~ 70.18	68.59
CB4	2+013.9 ~~0+997.7~~	5.49LT ~~5.50 RT~~	OPSD-705.010	S22, S23	~~69.98~~ 70.24	68.58
CB5	0+978.2	5.50 LT	OPSD-705.010	S22, S23	~~69.27~~ 69.45	67.87
CB6	0+977.5	5.50 RT	OPSD-705.020	S22, S23	~~69.71~~ 69.89	68.31

OFFSETS ARE FROM BASELINE TO FACE OF CURB FOR CATCH BASINS
xCURB INLET ELEV.

LICENSED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

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

NO.	REVISIONS	BY	DATE
7.	RECORD DRAWING	GMac	07/05/11
6.	RECORD DRAWING	LPD	06/02/26

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

NO.	REVISIONS	BY	DATE
5.	ISSUED FOR CONSTRUCTION	LPD	04/09/29
4.	ISSUED FOR TENDER	LPD	04/07/09
3.	ISSUED FOR MOE APPROVAL	LPD	04/05/18
2.	ISSUED FOR MOE APPROVAL	LPD	04/04/21
1.	REVISED STORM SEWER	LPD	04/04/15

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

CONFEDERATION BOULEVARD
MacKenzie/Sussex South
PHASE 1

GRADING AND DRAINAGE PLAN
MacKENZIE AVENUE
STATION 0+875 TO STATION 1+000

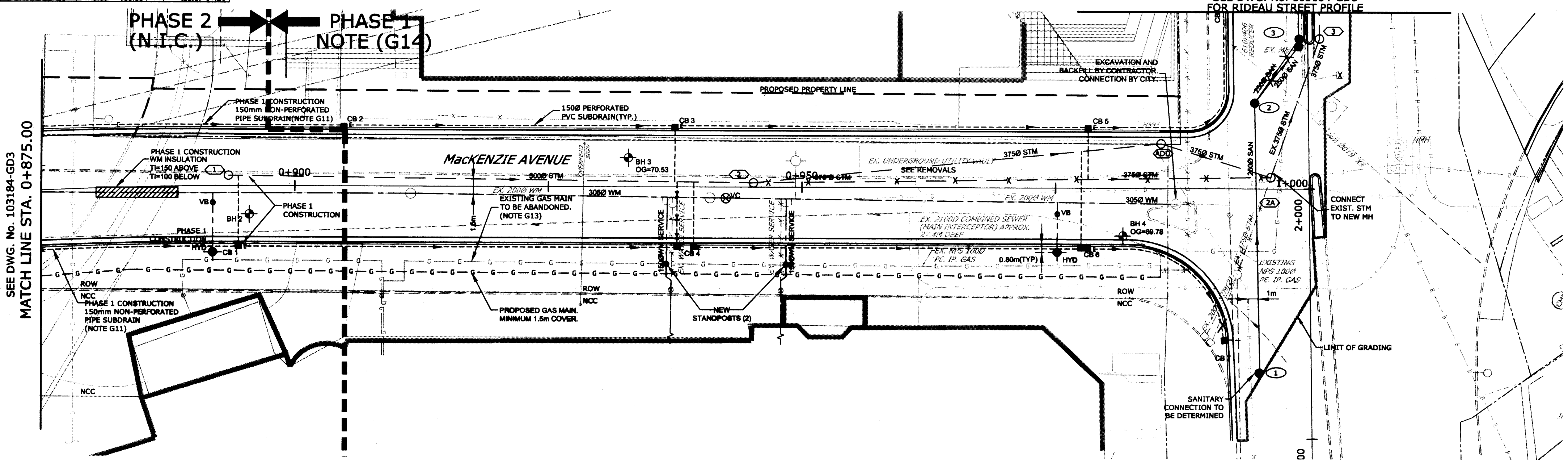
0 2.5 5.0 7.5 10 H / 0 0.5 1.0 1.5 2 V		CONTRACT NO.	RD-2520-16L
		DRAWING NO.	103184-GD4
Dwn: SAM	Chkd: LPD	DATE:	APRIL 2004
Des: WKK	Chkd: LPD	SHEET NO.	13 OF 56

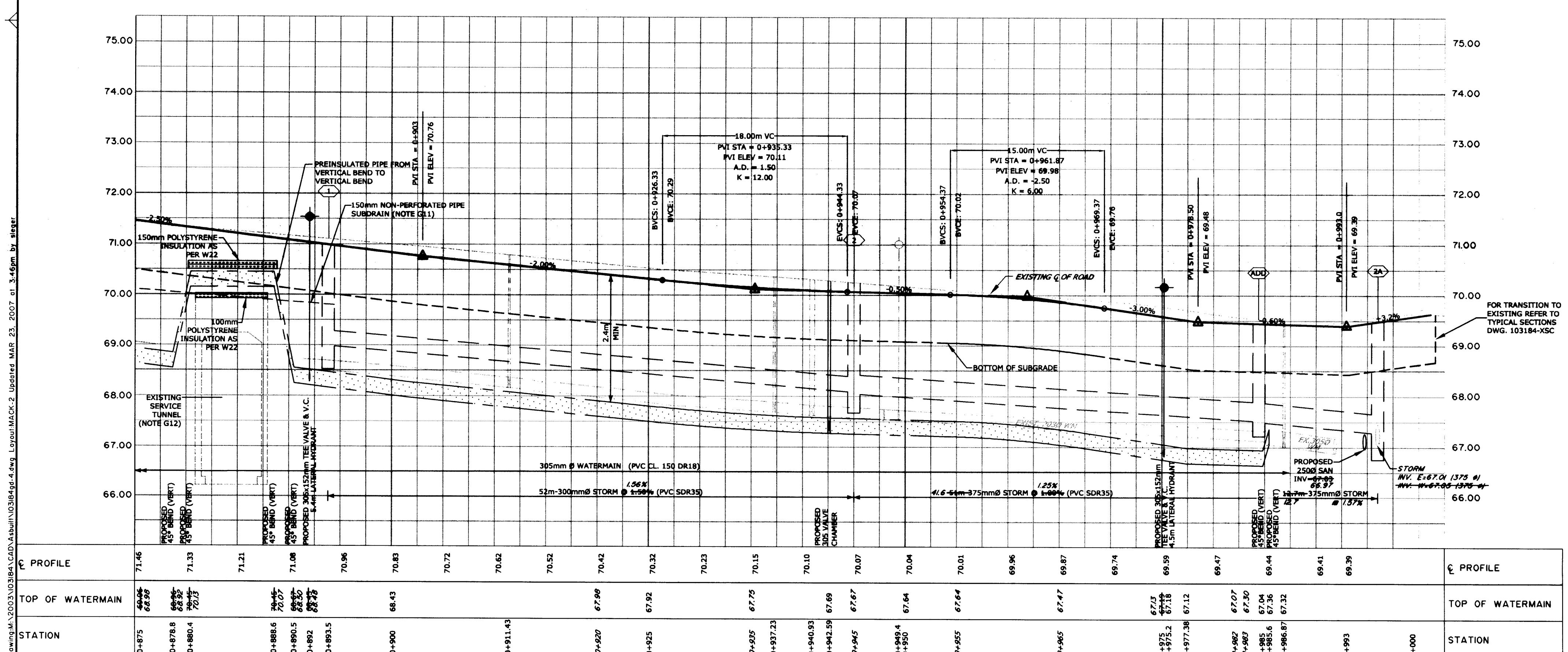
CLARIDGE HOMES

PLA CONSULTANTS

DESSAU SOPRIN

Ottawa





NOTES AND SPECIFICATIONS:

GENERAL

G1. THE ABANDONED WATERMAIN SHALL BE REMOVED DURING EXCAVATION OPERATION AND DISPOSED OF OFF-SITE. THE TRENCH SHALL BE BACKFILLED WITH ACCEPTABLE NATIVE MATERIAL AS DIRECTED BY THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR.

G2. BOREHOLE LOCATIONS ARE SHOWN IN PLAN. FOR FURTHER INFORMATION AND BOREHOLE LOGS REFER TO GEOTECHNICAL REPORT DATED APRIL 5, 2004.

G3. EXACT DEPTH OF UNDERGROUND UTILITY PLANT AND EQUIPMENT, AND ENCASEMENT MATERIAL ARE UNKNOWN. THE CONTRACTOR IS TO TAKE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES.

G4. MANHOLES AND VALVE CHAMBERS ON ABANDONED SEWERS AND WATERMAINS TO BE REMOVED ENTIRELY AND THE SEWER/WATERMAIN TO BE PLUGGED WITH 20 MPa CONCRETE.

G5. MAINTAIN TWO WAY TRAFFIC AT ALL TIMES. CONSTRUCTION IS TO BE STAGED AS DETAILED ELSEWHERE IN CONTRACT.

G6. EXISTING TREES IN THE CONSTRUCTION ZONE AREA TO BE PRESERVED AND PROTECTED DURING THE CONSTRUCTION PERIOD.

G7. LIMITS OF GRADING INDICATED MAY VARY DEPENDING ON FIELD CONDITIONS OR AS DIRECTED BY THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR.

G8. WHERE AVAILABLE, EXISTING SERVICING INFORMATION TO PRIVATE PROPERTY HAS BEEN SHOWN.

G9. EXCESSIVE LEVELS OF CHLORIDE ARE PRESENT IN AREAS THROUGHOUT THE CONTRACT. THEREFORE, THE PROTECTION OF STEEL IN CONCRETE IS REQUIRED.

G10. PROFILE OF 150mm PERFORATED PIPE SUBDRAIN AND BOTTOM OF TREE PIT DRAINAGE LAYERS TO BE ADJUSTED TO PROVIDE DRAINAGE OVER EXISTING SERVICE TUNNEL.

G11. 150mm NON-PERFORATED PIPE TO BE USED FROM 2m UP STREAM OF SERVICE TUNNEL TO CB CONNECTION.

~~G12. FOR DETAIL OF SERVICE TUNNEL INSULATION AND PROPOSED WORK SEE DRAWINGS ELSEWHERE IN CONTRACT.~~

G13. GAS MAIN TO BE RELOCATED BY OTHERS PRIOR TO COMMENCEMENT OF CONFEDERATION BLVD. CONTRACT.

G14. FOR LIMITS OF PERMANENT CONSTRUCTION AND DETAIL OF TEMPORARY PHASE 1 CONNECTION SEE DRAWING 103186-TPC.

STORM AND SANITARY SEWERS

S1. ALL STORM AND SANITARY SERVICES SHALL BE REPLACED TO PROPERTY LINE, OR FURTHER AS REQUIRED. TIE-IN LOCATION BEYOND PROPERTY LINE TO BE APPROVED BY SUB-ENGINEER WITH CONTRACT ADMINISTRATOR.
WHERE STORM LATERALS ARE TO BE PLACED TO PROPERTY LINE, THEY SHALL BE CAPPED WITH A WATER TIGHT SEAL.

S2. ALL CATCH BASINS TO HAVE A SUMP OF 0.9m (MIN.), UNLESS CATCH BASIN MODEL S27 IS SPECIFIED C/W 200mmØ LEAD. STORM MANHOLES TO HAVE 0.3m SUMP.

S3. ALL SEWERS TO HAVE CLASS "B" BEDDING, AND APPROVED NATIVE BACKFILL MATERIAL. (REFER TO GEOTECHNICAL REPORT)

S4. SUBDRAIN OUTLETS INTO MANHOLES AND CATCH BASINS SHALL BE LOCATED TO SUIT FIELD CONDITIONS.

S5. THE CONTRACTOR WILL BE REQUIRED TO LOCATE EXISTING SERVICES & UTILIZING DYE TESTING OR OTHER METHODS (TO THE SATISFACTION OF THE SUB-ENGINEER WITH CONTRACT ADMINISTRATOR), VERIFY THE EXISTING SERVICE PIPES STATUS. (ABANDONED OR IN USE)

WATERPLANT

W1. CURB STOPS TO BE INSTALLED 0.3m ON AND FROM BACK OF SIDEWALK OR AT ANOTHER LOCATION APPROVED BY ENGINEER.

W2. ALL WATER SERVICES TO BE INSTALLED WITH 2.4 METRES OF COVER.

W3. ALL FITTINGS REQUIRED FOR CONNECTIONS TO BE SUPPLIED BY THE CITY OF OTTAWA PER SECTION 4, F-7010.

W4. EXISTING WATERMAIN TO BE ABANDONED DURING CONSTRUCTION. A TEMPORARY OVERLAND DISTRIBUTION SYSTEM WILL BE IMPLEMENTED AND MAINTAINED BY CITY OF OTTAWA FORCES.

W5. ALL HYDRANTS AND VALVES AND OTHER APPURTENANCES TO BE REMOVED SHALL BE SALVAGED AND DELIVERED TO CITY OF OTTAWA YARD AT CLYDE AVENUE.

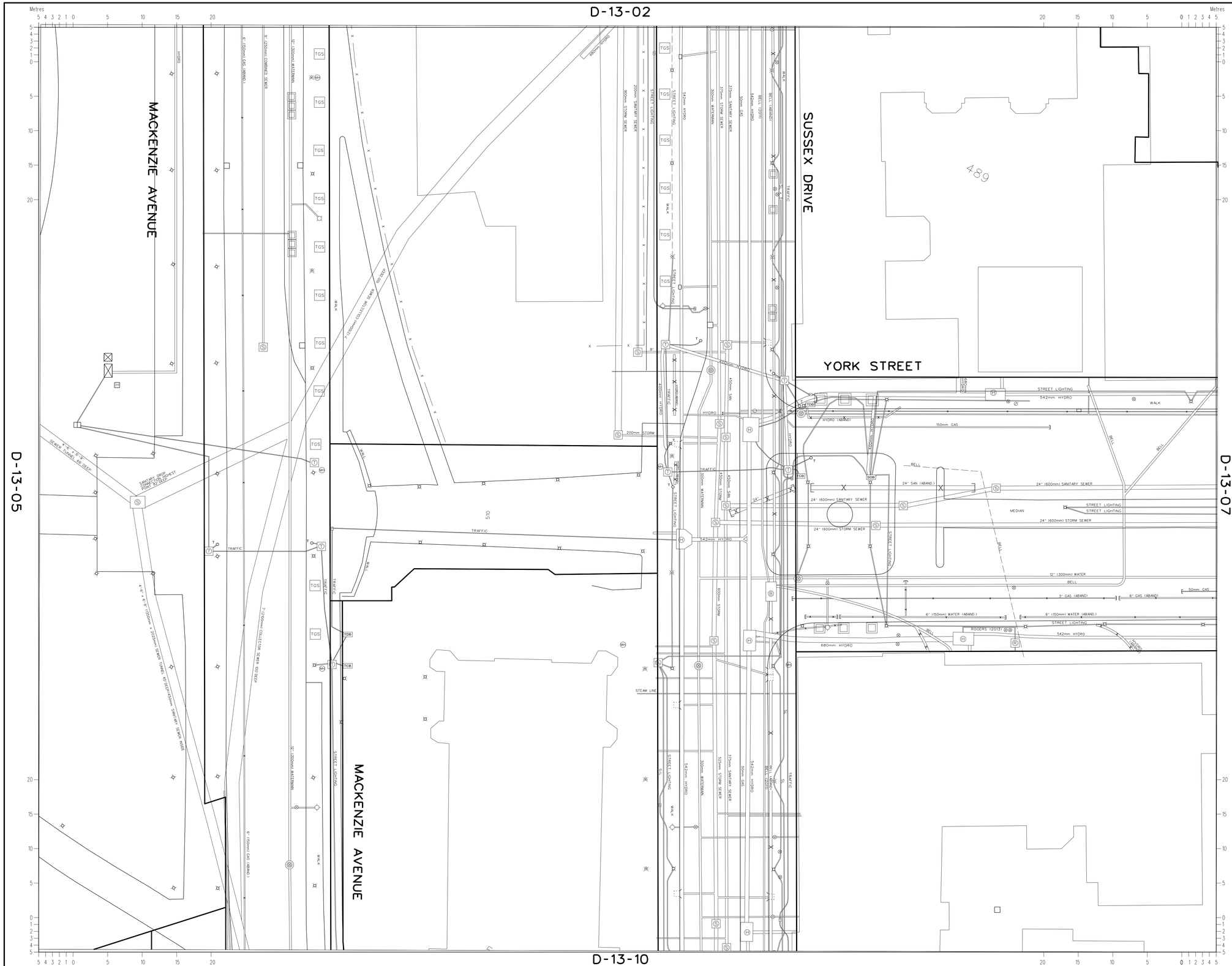
W6. WATER SERVICES CROSSING NEW AND ABANDONED SEWERS SHALL BE INSTALLED UNDER THE SEWER PER W38.

W7. ALL NEW CATCH BASINS AND MANHOLES CLOSER THAN 0.9m TO THE NEW WATERMAIN SHALL BE INSULATED PER W23.

W8. CATHODIC PROTECTION REQUIRED FOR ALL FITTINGS & COMPONENTS PER W40 & W42.

W9. WATERMAIN BEDDING IS TO BE AS PER W17.

W10. ALL WATERMAIN MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF OTTAWA STANDARD SPECIFICATIONS AND STANDARD DRAWINGS.



REVISIONS / RÉVISIONS	DATE	BY
WATER - WATER DISTRIBUTION PLAN, 2002 WATER REVISION APPLIED SUSSEX/YORK	DEC 2002	SR
ENBRIDGE - SUSSEX 6" GAS ACTIVATED (PREV. ABANDONED)	FEB 2005	SR
OTS04032 - BUS PAD (DEC. 2004) CONCRETE PAD ADDED TO E. SIDE OF SUSSEX	APR 2007	DC
15322 - SUSSEX (DEC. 2011) SEWER, WATER, UTILITY & ROAD REVIESED	AUG 2012	DC
BELL - 09-0679 (FEB 2011) BELL CONDUIT REVISED ON SUSSEX	AUG 2012	DC
ROG1310564-ROGERS (SEP 2013) H.H. AND CONDUIT ADDED TO YORK	NOV 2014	JM

LEGEND

- Poles: Rogers, Bell, Hydro, Hydro One, Traffic, Utility
- Poles w/ Light Std.: Bell, Hydro, Hydro-Bell, Traffic, Utility
- Manholes-City: Sanitary,Storm,Water, Catchbasin, Generic
- Manholes-Utility: Bell,Hydro,Traffic,Allstream, Atria, PWGSC, Group Telecom, Rogers, Street Lighting, OC Transpo
- Catch Basins: Heavy Duty, Standard, Curb Inlet, CI for CBMH Ditch Inlet, Rear Yard, Wing Wall
- Pedestals: Allstream, Atria, Bell, Hydro, Gas, Group Telecom, Rogers, Telus, Videotron
- Hand Holes: Allstream, Atria, Group Telecom, Hydro, Hydro One Traffic, Street Lighting, OC Transpo
- Bell: Bell Dip, Guy Wire, Bell Panel, Telephone Booth
- Gas: Reducer, Meter, Valve, Regulator
- Hydro: Thermocouple, Transformer, Tower
- OC Transpo: Bus Shelter-No Power, Energized, Isolated
- Rogers: Power Supply, Panel, Vault, Amplifier
- Street Lighting: Light Standard, Disconnect
- Streetscape: Decorative Light, Planter Box
- Traffic: Connect Box, Disconnect Box, Ground Rod
- Water : Reducer, Fire Hydrant, Water Valve, Meter, Wall Hydrant
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.
Property lines were compiled from plans and documents recorded in the Land Registry System and are for Indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.
Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système de cadastre et sont pour l'indexation seulement.

Ottawa

Department of Public Works and Services / Services et Travaux publics
Infrastructure Services Branch / Direction des services d'infrastructure
Infrastructure Management Division / Division de la gestion de l'infrastructure
100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY
COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

UTILITY COORDINATING COMMITTEE — UCC — Ottawa — CCSP — COMITÉ DE COORDINATION DES SERVICES PUBLICS

N. SCHEPERS, P.Eng. DGM, EICS	W. NEWELL, P. Eng. DIRECTOR, INFRASTRUCTURE SERVICES
C. COLAIACOVO MANAGER, BUSINESS & TECHNICAL SERVICES	R. ZORGEL COORDINATOR, INFORMATION CENTRE
PRODUCED BY: UCC MAPPING STAFF	SHEET NUMBER D-13-06
SCALE: 1:250	

D-13-06

D-13-09

D-13-11

D-13-14

D-13-15

Metres

SUSSEX DRIVE

GEORGE STREET

MACKENZIE AVENUE

525

575

700

47

REVISIONS / RÉVISIONS	DATE	BY
ENBRIDGE - 60-3891-04 (JAN 2005) 4" GASMAIN ADDED TO MacKENZIE	APR 2007	DC
BELL - BEL03OT010 (NOV. 2005) CONDUIT & PED. ADDED TO W. SIDE OF SUSSEX	APR. 2007	DC
OTS04030 - BUS PAD (DEC. 2004) CONCRETE PAD ADDED TO E. SIDE OF SUSSEX	APR. 2007	DC
TELECOM OTTAWA TOL07086(NOV 2007) TRENCH AND HH INSTALLED SUSEX GEORGE	JUNE 2009	MH
REVISION TOL07101 AUG 2007 ATRIA ADDED ON GEORGE	MAY 2010	AJ
15322 - SUSSEX (DEC. 2011) SEWER, WATER, UTILITY & ROAD REVISED	AUG 2012	DC
BELL - 09-0679 (FEB 2011) BELL CONDUIT REVISED ON SUSSEX	AUG 2012	DC
JO4226 - MACKENZIE (JUL 2012) BELL CONDUIT ADDED	AUG 2012	ZB
12624 - MACKENZIE (MAY 2007) WATER / SEWERS APPLIED	AUG 2012	ZB
1700 - GEORGE (MAY 1982) WATER / SEWERS APPLIED	AUG 2012	ZB
HYDRO,BELL,ENBRIDGE,ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	FEB 2015	DC

LEGEND

- Poles: Rogers, Bell, Hydro, Hydro One, Traffic, Utility
- Poles w/ Light Std.: Bell, Hydro, Hydro-Bell, Traffic, Utility
- Manholes-City: Sanitary,Storm,Water, Catchbasin, Generic
- Manholes-Utility: Bell,Hydro,Traffic,Allstream, Atria, PWGSC, Group Telecom, Rogers, Street Lighting, OC Transpo
- Catch Basins: Heavy Duty, Standard, Curb Inlet, CI for CBMH, Ditch Inlet, Rear Yard, Wing Wall
- Pedestals: Allstream, Atria, Bell, Hydro, Gas, Group Telecom, Rogers, Telus, Videotron
- Hand Holes: Allstream, Atria, Group Telecom, Hydro, Hydro One Traffic, Street Lighting, OC Transpo
- Bell: Bell Dip, Guy Wire, Bell Panel, Telephone Booth
- Gas: Reducer, Meter, Valve, Regulator
- Hydro: Thermocouple, Transformer, Tower
- OC Transpo: Bus Shelter-No Power, Energized, Isolated
- Rogers: Power Supply, Panel, Vault, Amplifier
- Street Lighting: Light Standard, Disconnect
- Streetscape: Decorative Light, Planter Box
- Traffic: Connect Box, Disconnect Box, Ground Rod
- Water : Reducer, Fire Hydrant, Water Valve, Meter, Wall Hydrant
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.
Property lines were compiled from plans and documents recorded in the Land Registry System and are for Indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.
Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système de cadastre et sont pour l'indexation seulement.

Department of Public Works and Services / Services et Travaux publics
Infrastructure Services Branch / Direction des services d'infrastructure
Infrastructure Management Division / Division de la gestion de l'infrastructure
100 Constellation Cres., 6th Floor East / 6ème Etage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY

COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

N. SCHEPERS, P.Eng.
DCM, ISCS

W. NEWELL, P. Eng.
DIRECTOR, INFRASTRUCTURE SERVICES

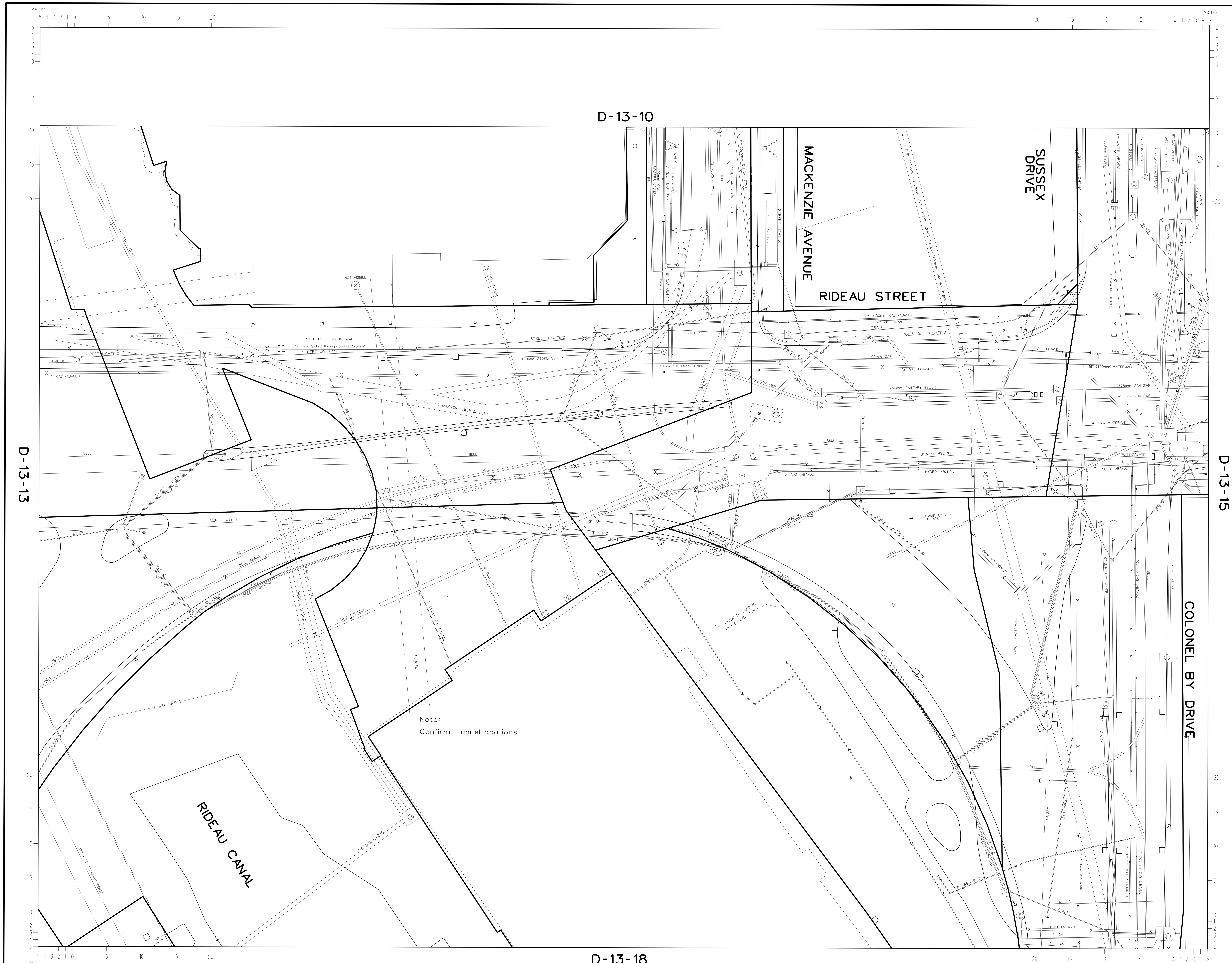
C. COLAIACOVO
MANAGER, BUSINESS & TECHNICAL SERVICES

R. ZORGEL
COORDINATOR, INFORMATION CENTRE

PRODUCED BY: UCC MAPPING STAFF

SCALE: 1:250

SHEET NUMBER
D-13-10



REVISIONS / RÉVISIONS	DATE	BY
14091 - MacKENZIE (SEPT. 2006) BELL CONDUIT ADDED & ABAND	APRIL 2007	DC
ENBRIDGE - ECG04010 (JAN 2006) 4" GASMAIN ADDED TO MacKENZIE	APR 2007	DC
ENBRIDGE - 60-4348-03 (FEB 2003) GAS MAIN ABAND & ADDED TO RIDEAU	APR 2007	DC
ENBRIDGE - 60.1149923 (OCT 2005) GAS MAIN ABAND & ADDED TO RIDEAU	APR 2007	DC
REVISION ATR09002 DEC 2008 ADDED ATRIA ACCROSS COLONEL BY	MAY 2010	AJ
J04226 - MACKENZIE (JUL 2012) BELL CONDUIT ADDED	AUG 2012	ZB
ROG1310142-ROGERS (MAY 2013) CONDUIT ADDED TO MACKENZIE	NOV 2014	JM
HYDRO,BELL,ENBRIDGE,ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	JAN 2015	JM

LEGEND

- Poles: Rogers, Bell, Hydro, Hydro One, Traffic, Utility
- Poles w/ Light Std.: Bell, Hydro, Hydro-Bell, Traffic, Utility
- Manholes-City: Sanitary, Storm, Water, Catchbasin, Generic
- Manholes-Utility: Bell, Hydro, Traffic, Allstream, Atria, PWGSC, Group Telecom, Rogers, Street Lighting, OC Transpo
- Catch Basins: Heavy Duty, Standard, Curb Inlet, CI for CBMH, Ditch Inlet, Rear Yard, Wing Wall
- Pedestals: Allstream, Atria, Bell, Hydro, Gas, Group Telecom, Rogers, Telus, Videotron
- Hand Holes: Allstream, Atria, Group Telecom, Hydro, Hydro One, Traffic, Street Lighting, OC Transpo
- Bell: Bell Dip, Guy Wire, Bell Panel, Telephone Booth
- Gas: Reducer, Meter, Valve, Regulator
- Hydro: Thermocouple, Transformer, Tower
- OC Transpo: Bus Shelter-No Power, Energized, Isolated
- Rogers: Power Supply, Panel, Vault, Amplifier
- Street Lighting: Light Standard, Disconnect
- Streetscape: Decorative Light, Planter Box
- Traffic: Connect Box, Disconnect Box, Ground Rod
- Water: Reducer, Fire Hydrant, Water Valve, Meter, Wall Hydrant
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.
Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.
Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système de cadastre et sont pour l'indexation seulement.

Department of Public Works and Services / Services et Travaux publics
Infrastructure Services Branch / Direction des services d'infrastructure
Infrastructure Management Division / Division de la gestion de l'infrastructure
100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY

COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

UTILITY COORDINATING COMMITTEE
U C C
C C S P
COMITÉ DE COORDINATION DES SERVICES PUBLICS

N. SCHEPERS, P.Eng.
DCM, ISCS

W. NEWELL, P. Eng.
DIRECTOR, INFRASTRUCTURE SERVICES

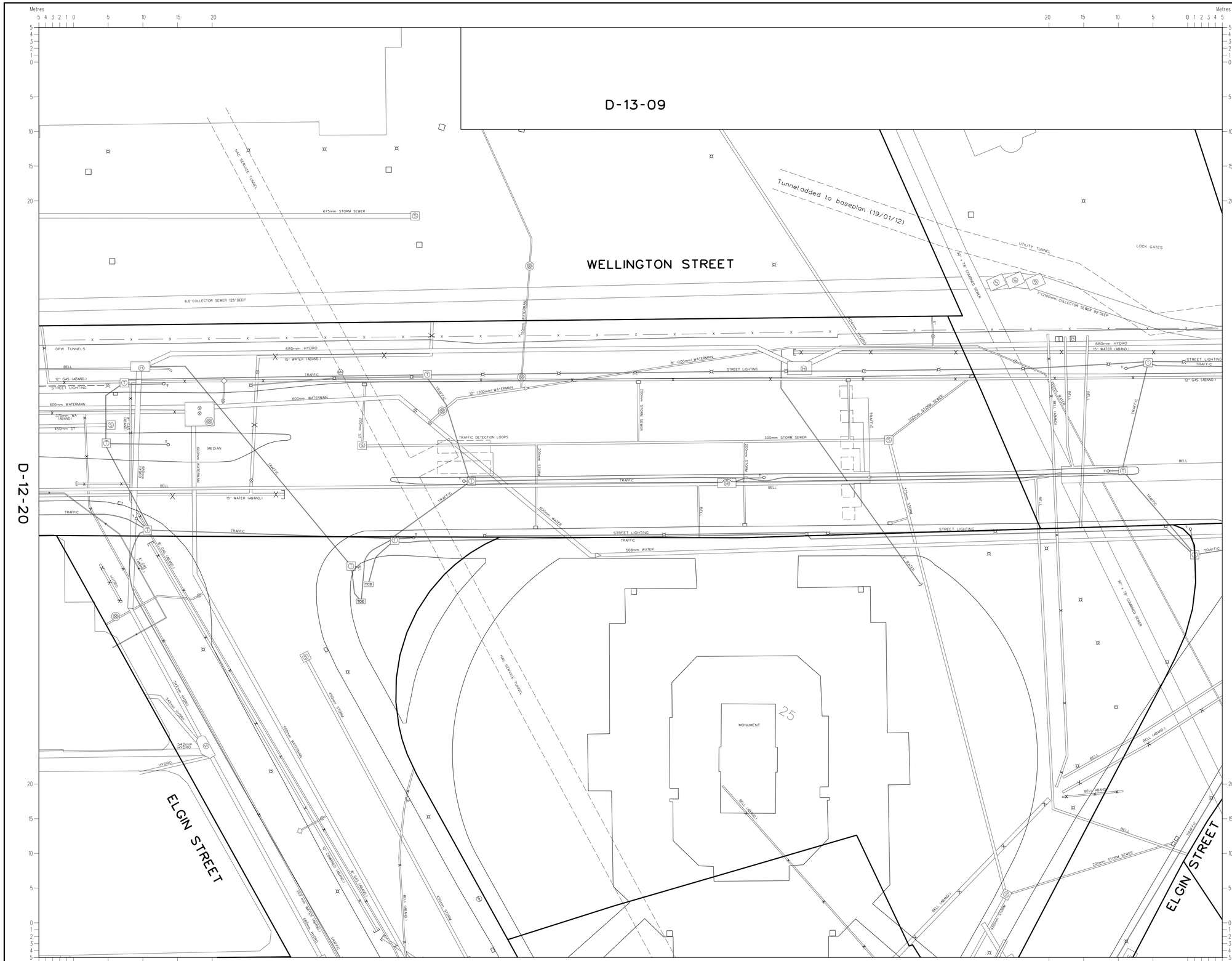
C. COLAIACOVO
MANAGER, BUSINESS & TECHNICAL SERVICES

R. ZORGEL
COORDINATOR, INFORMATION CENTRE

PRODUCED BY: UCC MAPPING STAFF

SCALE: 1 : 250

SHEET NUMBER
D-13-14



REVISIONS / RÉVISIONS	DATE	BY
2861-WELLINGTON WELLINGTON AB APPLIED	SEP 2003	SR
9105-CITY OF OTTAWA WATERMAIN AB APPLIED TO PLAZA BRIDGE	OCT 2003	SR
HYDRO,BELL,ENBRIDGE,ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	APR 2016	DC

LEGEND

- Poles: Rogers, Bell, Hydro, Hydro One, Traffic, Utility
- Poles w/ Light Std.: Bell, Hydro, Hydro-Bell, Traffic, Utility
- Manholes-City: Sanitary,Storm,Water, Catchbasin, Generic
- Manholes-Utility: Bell,Hydro,Traffic,Allstream, Atria, PWGSC, Group Telecom, Rogers, Street Lighting, OC Transpo
- Catch Basins: Heavy Duty, Standard, Curb Inlet, CI for CBMH, Ditch Inlet, Rear Yard, Wing Wall
- Pedestals: Allstream, Atria, Bell, Hydro, Gas, Group Telecom, Rogers, Telus, Videotron
- Hand Holes: Allstream, Atria, Group Telecom, Hydro, Hydro One Traffic, Street Lighting, OC Transpo
- Bell: Bell Dip, Guy Wire, Bell Panel, Telephone Booth
- Gas: Reducer, Meter, Valve, Regulator
- Hydro: Thermocouple, Transformer, Tower
- OC Transpo: Bus Shelter-No Power, Energized, Isolated
- Rogers: Power Supply, Panel, Vault, Amplifier
- Street Lighting: Light Standard, Disconnect
- Streetscape: Decorative Light, Planter Box
- Traffic: Connect Box, Disconnect Box, Ground Rod
- Water : Reducer, Fire Hydrant, Water Valve, Meter, Wall Hydrant
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.
Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.
Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système de cadastre et sont pour l'indexation seulement.

Department of Public Works and Services / Services et Travaux publics
Infrastructure Services Branch / Direction des services d'infrastructure
Infrastructure Management Division / Division de la gestion de l'infrastructure
100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY

COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

N. SCHEPERS, P.Eng. DOM. WCS	**W. NEWELL, P. Eng.** DIRECTOR, INFRASTRUCTURE SERVICES
C. COLAIACOVO MANAGER, BUSINESS & TECHNICAL SERVICES	**R. ZORGEL** COORDINATOR, INFORMATION CENTRE
PRODUCED BY: UCC MAPPING STAFF	SHEET NUMBER
SCALE: 1:250	**D-13-13**

NOTE:
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

"AS-BUILT" INFORMATION OBTAINED FROM R.O.C. RECORDS

BENCH MARK EL. 72.992
NCC BRASS PLUG No.1603
POINT No.2 OF PUBLIC WORKS CANADA SURVEY HORIZONTAL CONTROL MONUMENT

REGISTERED PROFESSIONAL ENGINEER — J. VAN GAAL — PROVINCE OF ONTARIO
REGISTERED PROFESSIONAL ENGINEER — D.W. LISHMAN — PROVINCE OF ONTARIO

McNEELY ENGINEERING CONSULTANTS LTD.

No	REVISION	BY	DATE
1	GENERAL REVISION	J.V.G.	22/10/97
2	BOREHOLE LOCATION	J.V.G.	01/04/98
3	R-4 VALVE CHAMBER	J.V.G.	16/04/98
4	WEST ARCH WM AND MACKENZIE VALVE CHAMBER	J.V.G.	11/06/98
5	ALIGNMENT AND VALVE CHAMBER	J.V.G.	29/06/98
6	AS BUILT-WATERMAIN ONLY	J.V.G.	18/08/99

Ottawa-Carleton

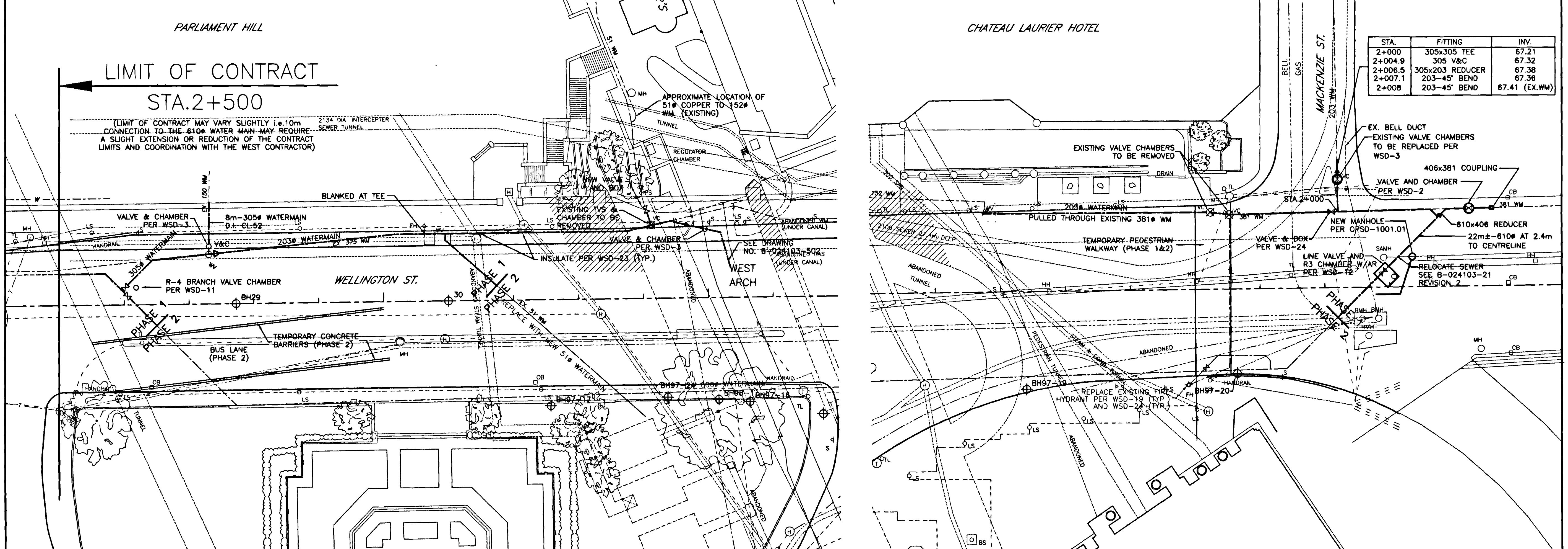
PLAZA BRIDGE

5086

SERVICE WATERMAINS REPLACEMENTS (200mmø)

J. MILLER, P.ENG. — Director of Engineering
D.C. MARETT, P.ENG. — Manager Capital Core Area Projects

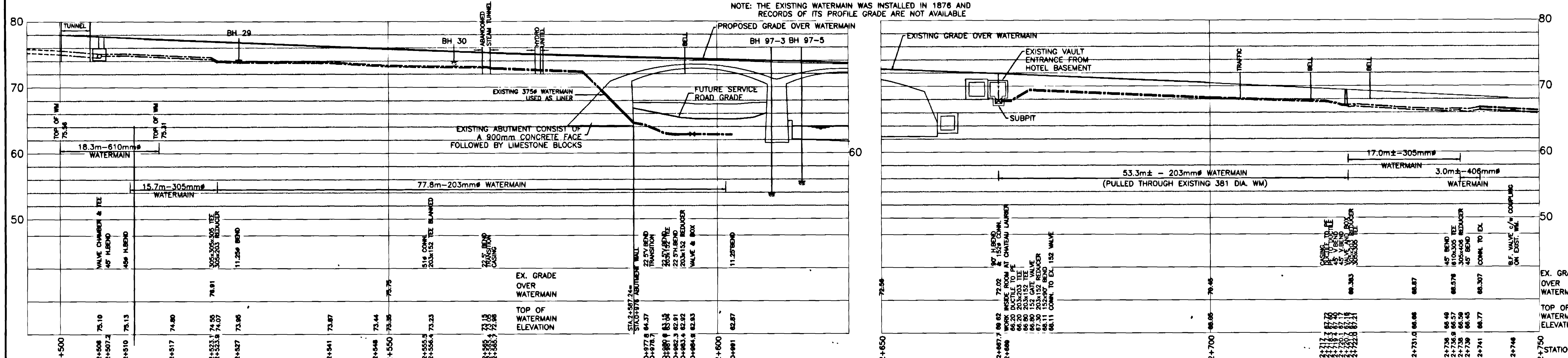
DWG. No.	B-024103-500
Sheet	of
CONTRACT No.	97-517
Des	J.V.G.
Chk	D.W.L.
Dwn.	E.C.
Chk	J.V.G.
Date	SEPT.12, 1997
Scale	1:300



PARLIAMENT HILL
CHATEAU LAURIER HOTEL
LIMIT OF CONTRACT
STA.2+500
(LIMIT OF CONTRACT MAY VARY SLIGHTLY i.e.10m CONNECTION TO THE 610ø WATER MAIN MAY REQUIRE A SLIGHT EXTENSION OR REDUCTION OF THE CONTRACT LIMITS AND COORDINATION WITH THE WEST CONTRACTOR)
2134 DIA INTERCEPTER SEWER TUNNEL
LOCKMASTER'S HOUSE
APPROXIMATE LOCATION OF 51ø COPPER TO 152ø WM. (EXISTING)
REGULATOR CHAMBER
BLANKED AT TEE
VALVE & CHAMBER PER WSD-3
8m-305ø WATERMAIN D.I. CL.52
203ø WATERMAIN
EXISTING TVS & CHAMBER TO BE REMOVED
VALVE & CHAMBER PER WSD-3
INSULATE PER WSD-23 (TYP.)
SEE DRAWING NO. B-024103-502
WEST ARCH
R-4 BRANCH VALVE CHAMBER PER WSD-11
WELLINGTON ST.
PHASE 1
PHASE 2
REPLACE WITH NEW 51ø WATERMAIN
TEMPORARY CONCRETE BARRIERS (PHASE 2)
BUS LANE (PHASE 2)
EXISTING VALVE CHAMBERS TO BE REMOVED
203ø WATERMAIN PULLED THROUGH EXISTING 381ø WM
TEMPORARY PEDESTRIAN WALKWAY (PHASE 1&2)
MACKENZIE ST.
EX. BELL DUCT
EXISTING VALVE CHAMBERS TO BE REPLACED PER WSD-3
406x381 COUPLING
VALVE AND CHAMBER PER WSD-2
STA.2+000
NEW MANHOLE PER OPSD-1001.01
610x406 REDUCER
22m±-610ø AT 2.4m TO CENTRELINE
VALVE & BOX PER WSD-24
LINE VALVE AND R3 CHAMBER W/AR PER WSD-12
RELOCATE SEWER SEE B-024103-21 REVISION 2
REPLACE EXISTING FIRE HYDRANT PER WSD-19 (TYP) AND WSD-24 (TYP.)

STA.	FITTING	INV.
2+000	305x305 TEE	67.21
2+004.9	305 V&C	67.32
2+006.5	305x203 REDUCER	67.38
2+007.1	203-45° BEND	67.36
2+008	203-45° BEND	67.41 (EX.WM)

NOTE: THE EXISTING WATERMAIN WAS INSTALLED IN 1876 AND RECORDS OF ITS PROFILE GRADE ARE NOT AVAILABLE



TUNNEL
BH 29
BH 30
PROPOSED GRADE OVER WATERMAIN
BH 97-3 BH 97-5
EXISTING 375ø WATERMAIN USED AS LINER
FUTURE SERVICE ROAD GRADE
EXISTING ABUTMENT CONSIST OF A 900mm CONCRETE FACE FOLLOWED BY LIMESTONE BLOCKS
18.3m-610mmø WATERMAIN
15.7m-305mmø WATERMAIN
77.8m-203mmø WATERMAIN
EXISTING GRADE OVER WATERMAIN
EXISTING VAULT ENTRANCE FROM HOTEL BASEMENT
SUBPIT
53.3m± - 203mmø WATERMAIN (PULLED THROUGH EXISTING 381 DIA. WM)
17.0m±-305mmø WATERMAIN
3.0m±-406mmø WATERMAIN
EX. GRADE OVER WATERMAIN
TOP OF WATERMAIN ELEVATION
STATION
80
70
60
50
2+500
2+550
2+600
2+650
2+700
2+750

NOTE:
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

"AS-BUILT" INFORMATION OBTAINED FROM R.O.C. RECORDS

BENCH MARK EL. 72.992
NCC BRASS PLUG No.1603
POINT No.2 OF PUBLIC WORKS CANADA SURVEY HORIZONTAL CONTROL MONUMENT

REGISTERED PROFESSIONAL ENGINEER — J. VAN GAAL — PROVINCE OF ONTARIO
REGISTERED PROFESSIONAL ENGINEER — D.W. LISHMAN — PROVINCE OF ONTARIO

McNEELY ENGINEERING CONSULTANTS LTD.

No.	REVISION	BY	DATE
1	GENERAL REVISION PER C.O.1	J.V.G.	22/10/97
2	AS BUILT-WATERMAIN ONLY	J.V.G.	18/08/99

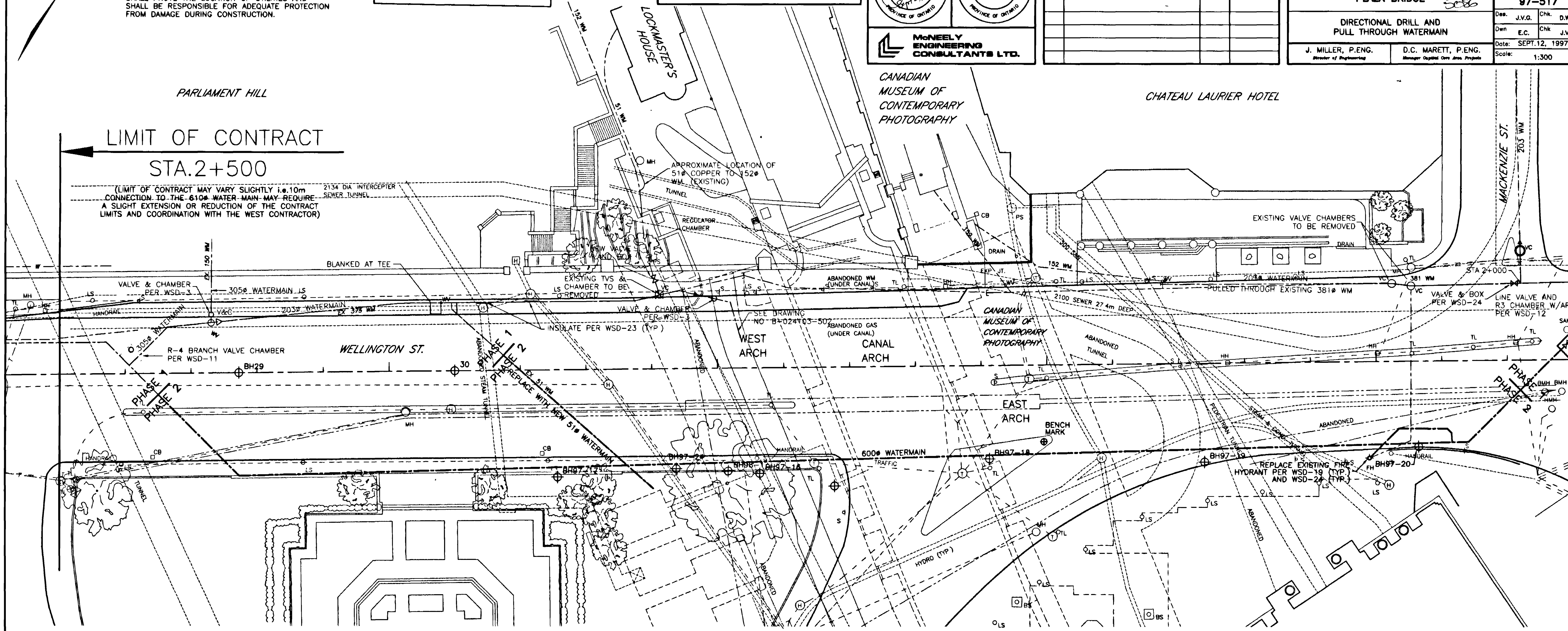
Ottawa-Carleton

PLAZA BRIDGE 5086

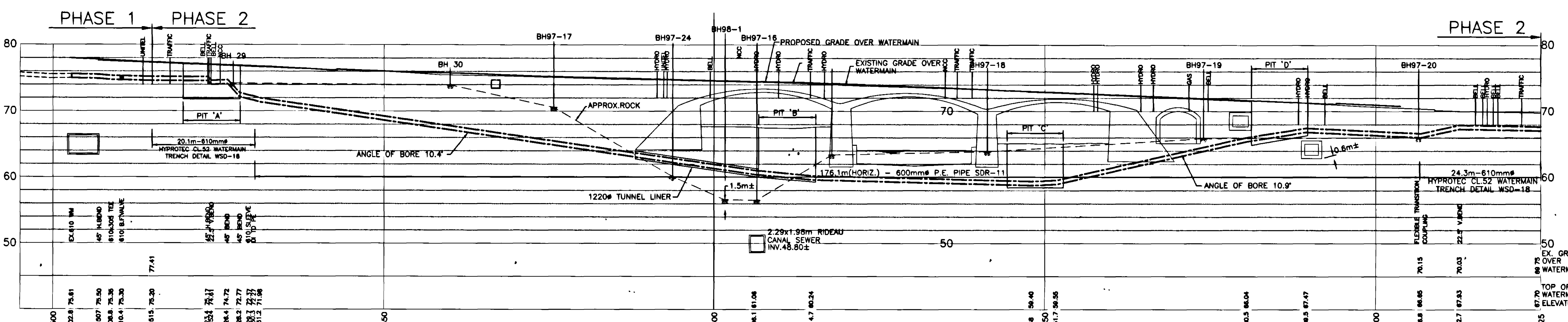
DIRECTIONAL DRILL AND PULL THROUGH WATERMAIN

J. MILLER, P.ENG. Director of Engineering
D.C. MARETT, P.ENG. Manager Capital Core Area Projects

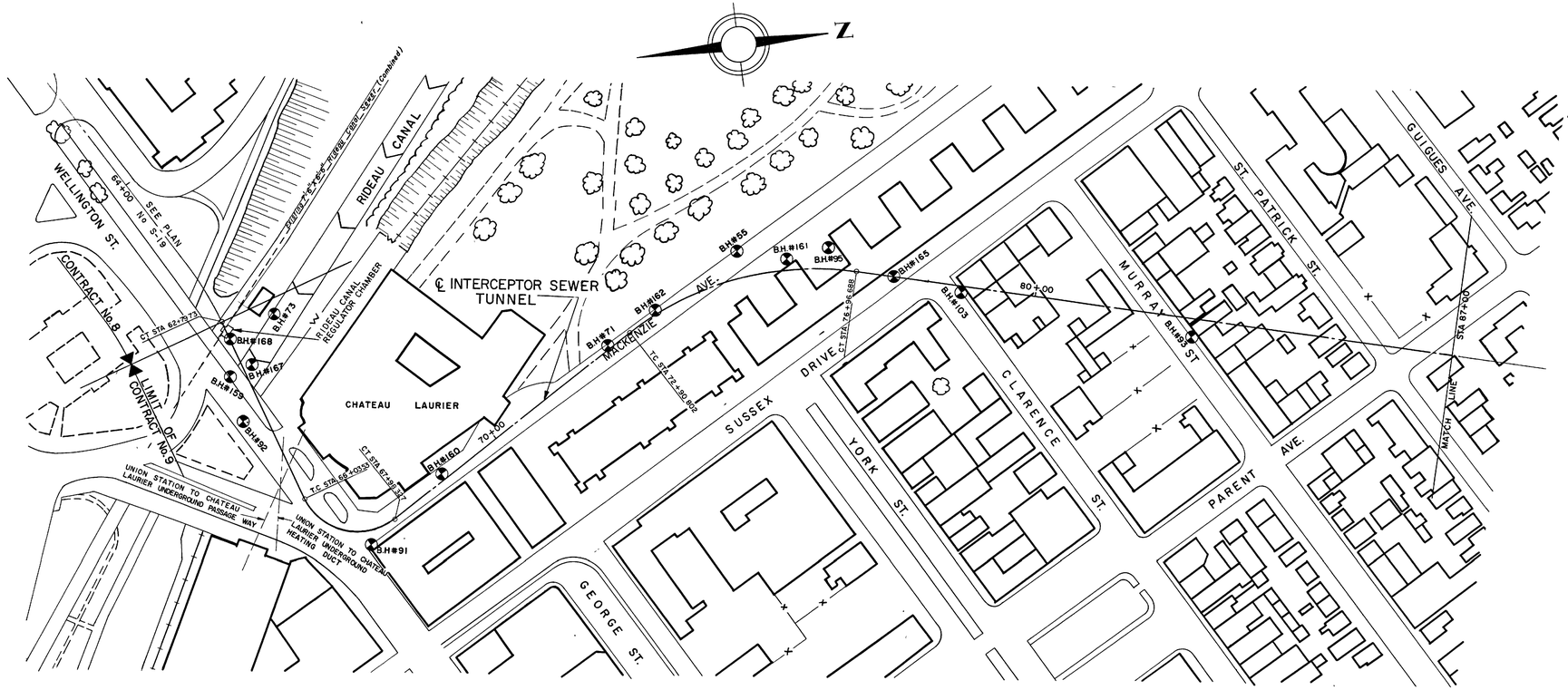
DWG. No. B-024103-501
Sheet of
CONTRACT No. 97-517
Des. J.V.G. Chk. D.W.L.
Dwn E.C. Chk J.V.G.
Date: SEPT.12, 1997
Scale: 1:300



PARLIAMENT HILL
LOCKMASTER'S HOUSE
CANADIAN MUSEUM OF CONTEMPORARY PHOTOGRAPHY
CHATEAU LAURIER HOTEL
LIMIT OF CONTRACT
STA.2+500
(LIMIT OF CONTRACT MAY VARY SLIGHTLY i.e.10m CONNECTION TO THE 610ø WATER MAIN MAY REQUIRE A SLIGHT EXTENSION OR REDUCTION OF THE CONTRACT LIMITS AND COORDINATION WITH THE WEST CONTRACTOR)
BLANKED AT TEE
VALVE & CHAMBER PER WSD-3
305ø WATERMAIN
R-4 BRANCH VALVE CHAMBER PER WSD-11
WELLINGTON ST.
PHASE 1
PHASE 2
REPLACE WITH NEW 51ø WATERMAIN
INSULATE PER WSD-23 (TYP.)
EXISTING TVS & CHAMBER TO BE REMOVED
APPROXIMATE LOCATION OF 51ø COPPER TO 152ø WM. (EXISTING)
SEE DRAWING NO. B-024103-502
WEST ARCH
CANAL ARCH
EAST ARCH
BENCH MARK
600ø WATERMAIN
ABANDONED WM UNDER CANAL
PULLED THROUGH EXISTING 381ø WM
EXISTING VALVE CHAMBERS TO BE REMOVED
MACKENZIE ST.
STA 2+000
VALVE & BOX PER WSD-24
LINE VALVE AND R3 CHAMBER W/AR PER WSD-12
REPLACE EXISTING FIRE HYDRANT PER WSD-19 (TYP.) AND WSD-24 (TYP.)
BH29
BH97-17
BH97-24
BH98-1
BH97-16
BH97-18
BH97-19
BH97-20



PHASE 1
PHASE 2
PROPOSED GRADE OVER WATERMAIN
EXISTING GRADE OVER WATERMAIN
APPROX.ROCK
PIT 'A'
PIT 'B'
PIT 'C'
PIT 'D'
20.1m-610mmø HYPROTEC CL.52 WATERMAIN TRENCH DETAIL WSD-18
ANGLE OF BORE 10.4°
176.1m(HORIZ.) - 600mmø P.E. PIPE SDR-11
1220ø TUNNEL LINER
1.5m±
ANGLE OF BORE 10.9°
0.6m±
24.3m-610mmø HYPROTEC CL.52 WATERMAIN TRENCH DETAIL WSD-18
2.29x1.98m RIDEAU CANAL SEWER INV.48.80±
EX. GRADE OVER WATERMAIN
TOP OF WATERMAIN ELEVATION
80
70
60
50

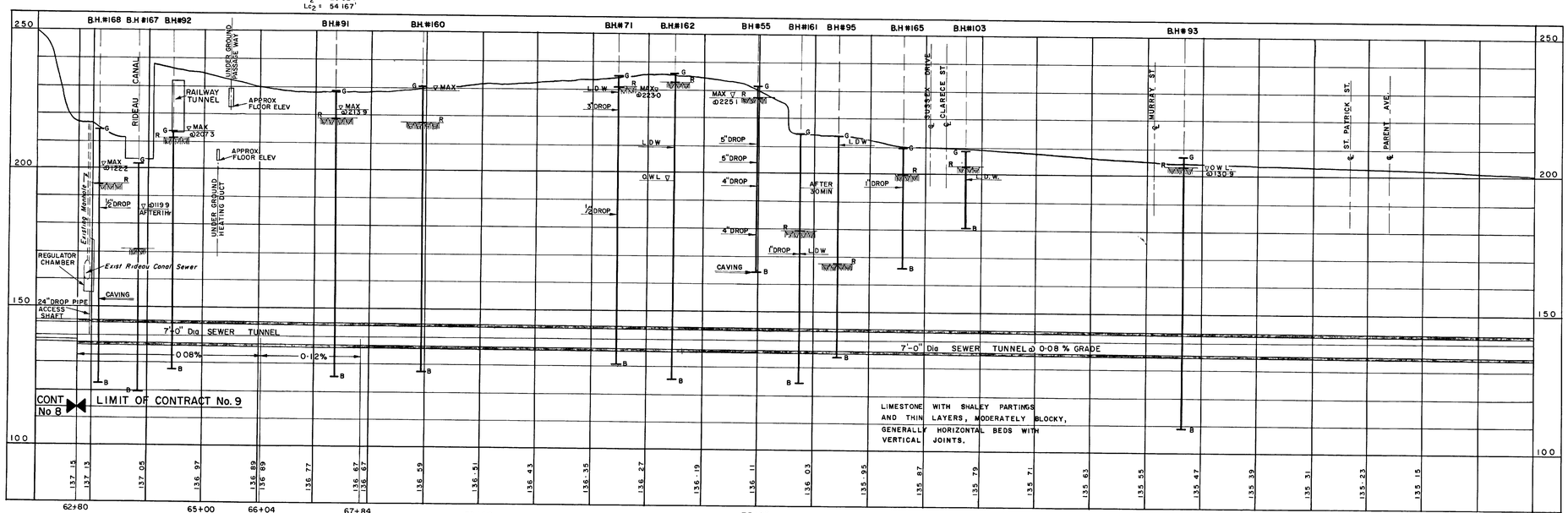


PLAN

SCALE 1" = 100'

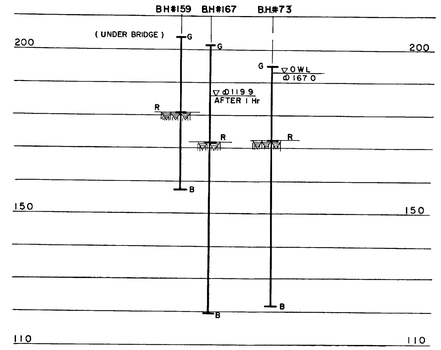
CURVE DATA #6
Δ_1 = 80° 34' 14"
R = 100'
T = 84.762'
Lc = 140.622'
Δ_2 = 23° 59' 59"
R_2 = 124.786'
T_2 = 26.524'
Lc_2 = 54.167'

CURVE DATA #7
Δ = 46° 30' 40" R
R = 500'
T = 214.874'
Lc = 405.886'



PROFILE

SCALE HORZ. 1" = 100'
VERT 1" = 20'



BOREHOLES ALONG RIDEAU CANAL

SCALE HORZ 1" = 100'
VERT. 1" = 20'

LEGEND FOR BOREHOLE DATA.

1. G = GROUND SURFACE
2. R = BEDROCK SURFACE.
3. B = BOTTOM OF HOLE
4. L.D.W. = LOST DRILL WATER AT ELEVATION
5. 2" DROP = RODS DROPPED 2" AT ELEVATION
6. CAVING = DRILLER REPORTED HOLE CAVING WHILE DRILLING AT ELEVATION
7. MAX @ 153.1 = MAXIMUM GROUND WATER LEVEL OF SEVERAL OVERNIGHT OBSERVATIONS, MAXIMUMUM WATER SURFACE AT ELEVATION OF ▽ BOTTOM OF HOLE, WHEN MAXIMUM WATER LEVEL OBSERVED, AT ELEVATION 153.1
8. OWL @ 153.1 = SINGLE GROUND WATER LEVEL OBSERVATION AFTER ALLOWING WATER TO SEEK ITS EQUILIBRIUM LEVEL OVERNIGHT; WATER SURFACE AT ELEVATION OF ▽ BOTTOM OF HOLE, WHEN WATER LEVEL OBSERVED WAS AT ELEVATION 153.1.
9. MAX = MAXIMUM GROUND WATER LEVEL OF SEVERAL OVERNIGHT OBSERVATIONS; MAXIMUM WATER SURFACE AT ELEVATION OF ▽ BOTTOM OF HOLE NOT SPECIFIED.

No.	Revisions	By	Date
1	As-Built	R.E.C.	May 30 '63

CITY OF OTTAWA
DEPARTMENT OF PLANNING AND WORKS
SEWERAGE & DRAINAGE BRANCH

INTERCEPTOR AND OUTFALL SEWER PROJECT.

CONTRACT Nº9

INTERCEPTOR SEWER TUNNEL

PLAN & PROFILE

Sta. 62+80 to Sta. 87+00

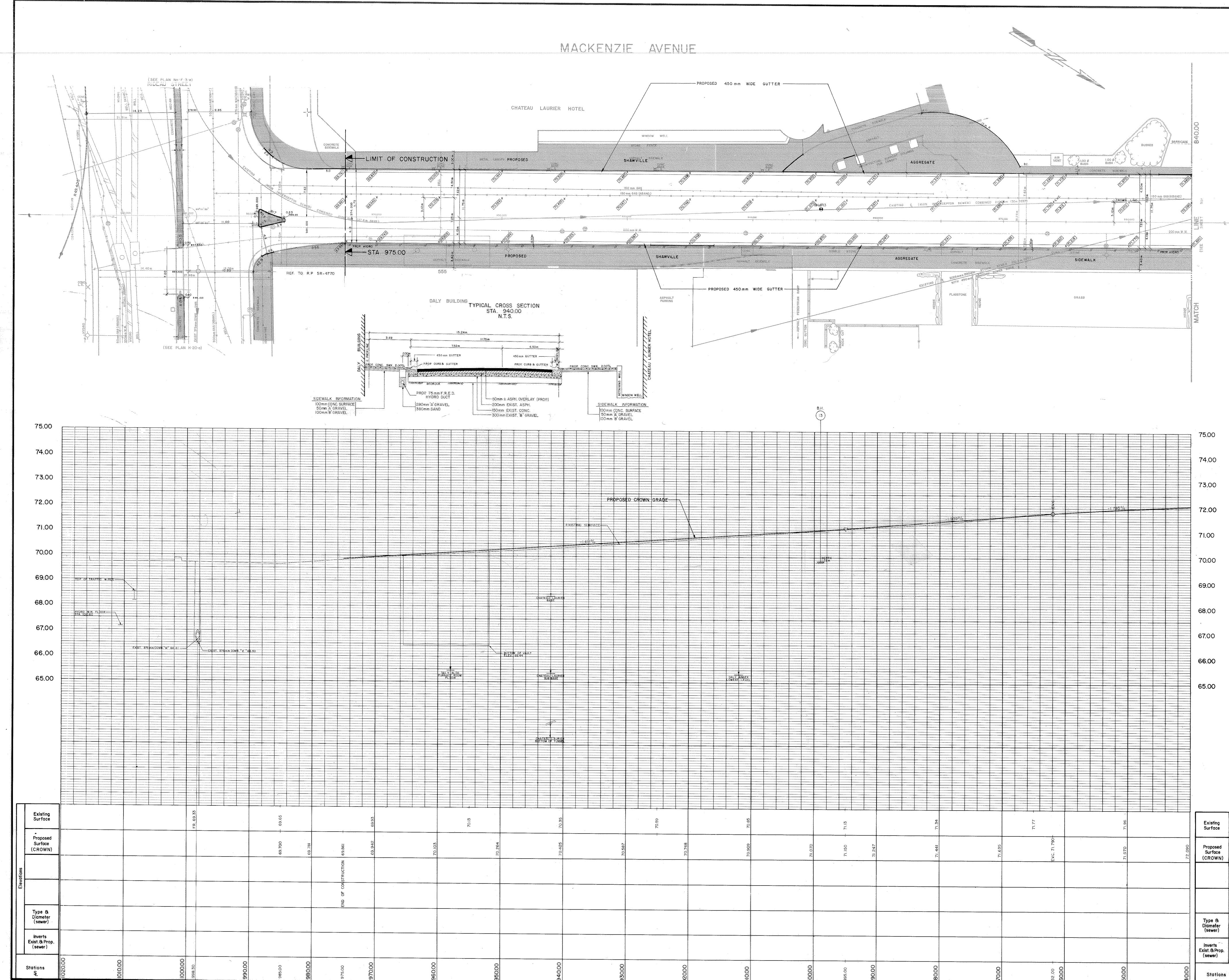
DE LEUW CATHER & CO. OF CANADA LIMITED
Consulting Engineers
Léon J. Marshall

CITY OF OTTAWA
ENGINEER i/c OF SEWERAGE AND DRAINAGE BRANCH
DIRECTOR OF PLANNING AND WORKS

DESIGNED BY D.N. /H.V.M	DATE APRIL, 1961	SCALE AS SHOWN
DRAWN BY A.G.Y		
CHECKED BY H.V.M	SHEET 1 OF 15	

S-20 C356

1633·R MACKENZIE AVENUE



City Of Ottawa
Department Of Physical Environment
Engineering And Surveys Branch

Notes:

- Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
- Date of survey: Detail Dec./79, Cross-sections Feb./80
- Reference bench mark: Top W/arm Hydrant Mackenzie-St. Patrick Elev. 66.041

Notes: (Sewer Construction Only)

- A minimum of 460 mm vertical clearance to be maintained between sewers and watermains where practical.
- Borehole soil descriptions are not based on sieve analysis but on visual inspection only. Except where otherwise noted.
- Soil information taken from
- Existing sewers constructed in: 1935, 1959, 1970
- This plan supercedes (in whole or in part) plan no: F·21·a
- ~~Actual rock line recorded during construction of existing~~ sewer.
- Registered plan no. 5R 4770
- For additional notes see Sheet No: 3

Legend: EXISTING / PROPOSED

- STORM SEWER
- SANITARY SEWER
- STREET LINE
- LOT LINE
- ROADS & DRIVEWAYS: Curb; Asphalt or Concrete; Surface Treated
- WALKS: Concrete or Asphalt; Gravel, Cinder or Dirt
- DEPRESSED ACCESS: On Curb; On Sidewalk
- WATERMAIN
- GASMAIN & VALVE
- BELL
- HYDRO
- TRAFFIC
- FIRE ALARM
- CABLEVISION
- STEAM LINE
- HYDRANT
- WATER VALVE
- STAND PIPE
- WATER VALVE CHAMBER
- SEWER, TRAFFIC, HYDRO & BELL MANHOLES (may be labelled for clarification)
- TRAFFIC HANDHOLE
- GUARD RAIL
- RETAINING WALL
- FENCE
- HYDRO POLE
- HYDRO POLE & LIGHT
- BELL POLE
- TRAFFIC LIGHT
- LIGHT STANDARD
- TRAFFIC SIGN
- STREET SIGN
- CULVERT & DITCH
- STANDARD CATCH BASIN
- HEAVY DUTY CATCH BASIN
- CATCH BASIN TO BE REMOVED & REPLACED WITH STANDARD C.B.
- HEAVY DUTY CATCH BASIN TO BE REMOVED & REPLACED WITH STANDARD CATCH BASIN
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM T.V. INSPECTION
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM RECORDS
- RELOCATION
- REMOVAL
- SQUARE IRON BAR
- STANDARD IRON BAR
- ROUND IRON BAR
- TREE, SHRUB & HEDGE
- BOREHOLE
- ROCK

- IN PLAN SEWERS 600mm & ABOVE ARE SHOWN AS DOUBLE LINE, TO SCALE, USING SAME LINE WEIGHT.
- UTILITIES X-OUT ARE ABANDONED, BELL PLANT SO MARKED MAY BECOME ACTIVE

Revisions:

No	Date	Description	Drawn By	Appr'd By
1	13/5/82	CHATEAU LAURIER PARKING LOT & SIDEWALK WIDTH CHANGED FROM 3m TO 1·2m	K.B.L.	

Storm Sewer Designed By / Date	Sanitary Sewer Designed By / Date
Structural Checked By / Date	
Road Grade Designed By: J. T. Egan, Date: Aug 17/81	Checked By / Date
Survey Detail By: D. BROWN / Date	Checked By: D. Brown, Date: Aug 20/81
Drafting By: John Latour, Date: Aug. 13/81	Checked By: [illegible] Stewart, Date: AUG 20/81

REGISTERED PROFESSIONAL ENGINEER H. V. PASCOE Aug 18/81 PROVINCE OF ONTARIO

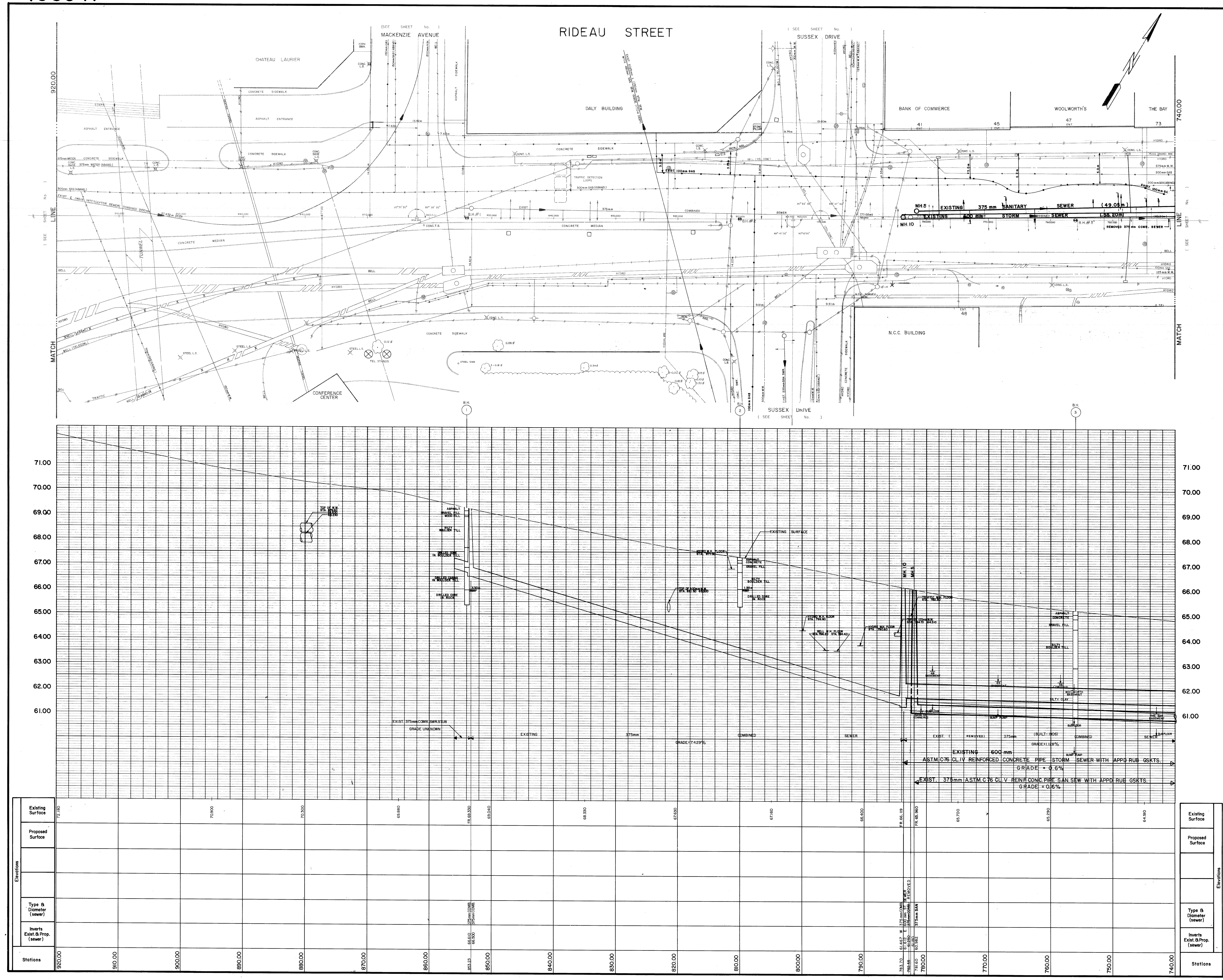
Design And Construction Division
Engineering And Surveys Branch

C. Sim P.Eng. Commissioner		D.K. Donaldson P.Eng. Branch Director
Chief Design & Constr. Eng.	Senior Des. Eng. H. W. Pascoe	Senior Const. Coord.

MACKENZIE AVENUE
FROM STA. 840.00 TO RIDEAU STREET

Contract No:	Survey Books:	Scales:	Plan No:
81·50 R.A.P.	2107·2116	HOR. 1:200 VERT. 1:50	1633·R Sheet 7 of 8

1660·R RIDEAU STREET



City Of Ottawa
Department Of Physical Environment
Engineering And Surveys Branch

Notes:

- Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
- Date of survey: Detail, Feb./80 May/80, Cross-sections Apr./80, Underground May/80.
- Reference bench mark: GBM Chateau Laurier Hotel (71.161)
  See notes sheet 2

Notes: (Sewer Construction Only)

- A minimum of 460 mm vertical clearance to be maintained between sewers and watermains where practical.
- Borehole soil descriptions are not based on sieve analysis but on visual inspection only. Except where otherwise noted.
- Soil information taken from Johnston Drilling Co. Ltd. B.H. Report
- Existing sewers constructed in:
- This plan supercedes (in whole or in part) plan no: H·20·a
- Actual rock line recorded during construction of existing sewer.
- Registered plan no.
  See notes sheet 2

Legend: (EXISTING / PROPOSED)

- STORM SEWER
- SANITARY SEWER
- STREET LINE
- LOT LINE
- ROADS & DRIVEWAYS
  - Curb
  - Asphalt or Concrete
  - Surface Treated
- WALKS
  - Concrete or Asphalt
  - Gravel, Cinder or Dirt
- DEPRESSED ACCESS
  - On Curb
  - On Sidewalk
- WATERMAIN
- GASMAIN & VALVE
- BELL
- HYDRO
- TRAFFIC
- FIRE ALARM
- CABLEVISION
- STEAM LINE
- HYDRANT
- WATER VALVE
- STAND PIPE
- WATER VALVE CHAMBER
- SEWER, TRAFFIC, HYDRO & BELL MANHOLES (may be labelled for clarification)
- TRAFFIC HANDHOLE
- GUARD RAIL
- RETAINING WALL
- FENCE
- HYDRO POLE
- HYDRO POLE & LIGHT
- BELL POLE
- TRAFFIC LIGHT
- LIGHT STANDARD
- TRAFFIC SIGN
- STREET SIGN
- CULVERT & DITCH
- STANDARD CATCH BASIN
- HEAVY DUTY CATCH BASIN
- CATCH BASIN TO BE REMOVED & REPLACED WITH STANDARD C.B.
- HEAVY DUTY CATCH BASIN TO BE REMOVED & REPLACED WITH STANDARD CATCH BASIN
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM T.V. INSPECTION
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM RECORDS
- RELOCATION
- REMOVAL
- SQUARE IRON BAR
- STANDARD IRON BAR
- ROUND IRON BAR
- TREE, SHRUB & HEDGE
- BOREHOLE
- ROCK

- IN PLAN SEWERS 600mm & ABOVE ARE SHOWN AS DOUBLE LINE, TO SCALE, USING SAME LINE WEIGHT.
- UTILITIES X-OUT ARE ABANDONED, BELL PLANT SO MARKED MAY BECOME ACTIVE

Revisions:

No	Date	Description	Drawn By	Appr'd By
1	JAN.14 1982	100mm GAS ADDED	J.GIRARD	
2	DEC. /1991	ENG. 'AS-BUILT' APPLIED, SEWER	BLR (T.E.S.) ✓B.G.	

Storm Sewer Designed By JOHN BRADLEY — Date 4/1/82	Sanitary Sewer Designed By JOHN BRADLEY — Date 4/1/82
Structural Checked By I. Bhatia — Date Jan 27, 82	
Road Grade Designed By — Date	Checked By — Date
Survey Detail By R. VILLENEUVE — Date	Checked By D. Brown — Date 22/1/82
Drafting By James Girard / M. COTE J. Latour — Date 14/1/82	Checked By T.J. Walker — Date Jan. 82

REGISTERED PROFESSIONAL ENGINEER H. V. PASCOE Jan 27/82 PROVINCE OF ONTARIO
REGISTERED PROFESSIONAL ENGINEER I. BHATIA PROVINCE OF ONTARIO

Design And Construction Division
Engineering And Surveys Branch

C. Sim P. Eng. — Commissioner
D.K. Donaldson P. Eng. — Branch Director
Chief Design & Constr. Eng. — Senior Des. Eng. W. Pascoe — Senior Const. Coord.

EXISTING STORM & SANITARY SEWERS
RIDEAU STREET
FROM STA. 740.00 TO STA. 920.00

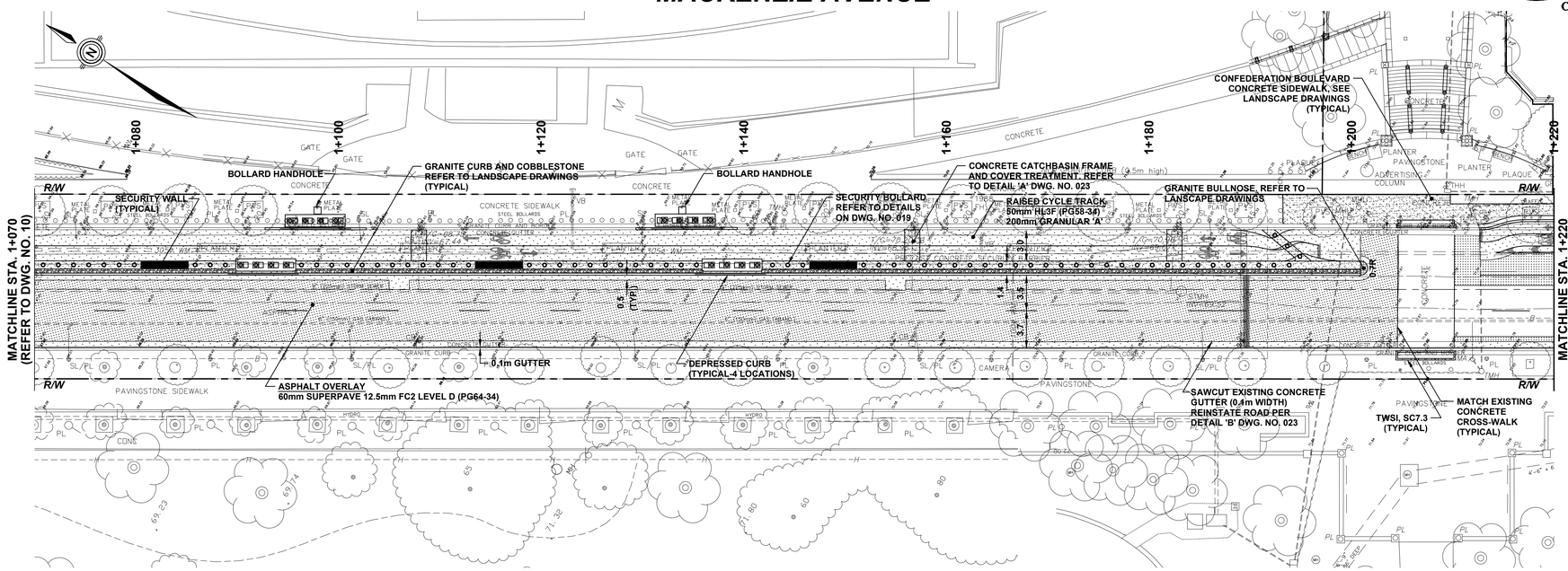
Contract No:	Survey Books:	Scales:	Plan No:
82-11 R.A.P.	2098 · 2107 2125	HOR. 1:200 VERT. 1:50	1660-R Sheet 5 of 6

DRAWING FRAME: 790mm x 534mm City of Ottawa 2014

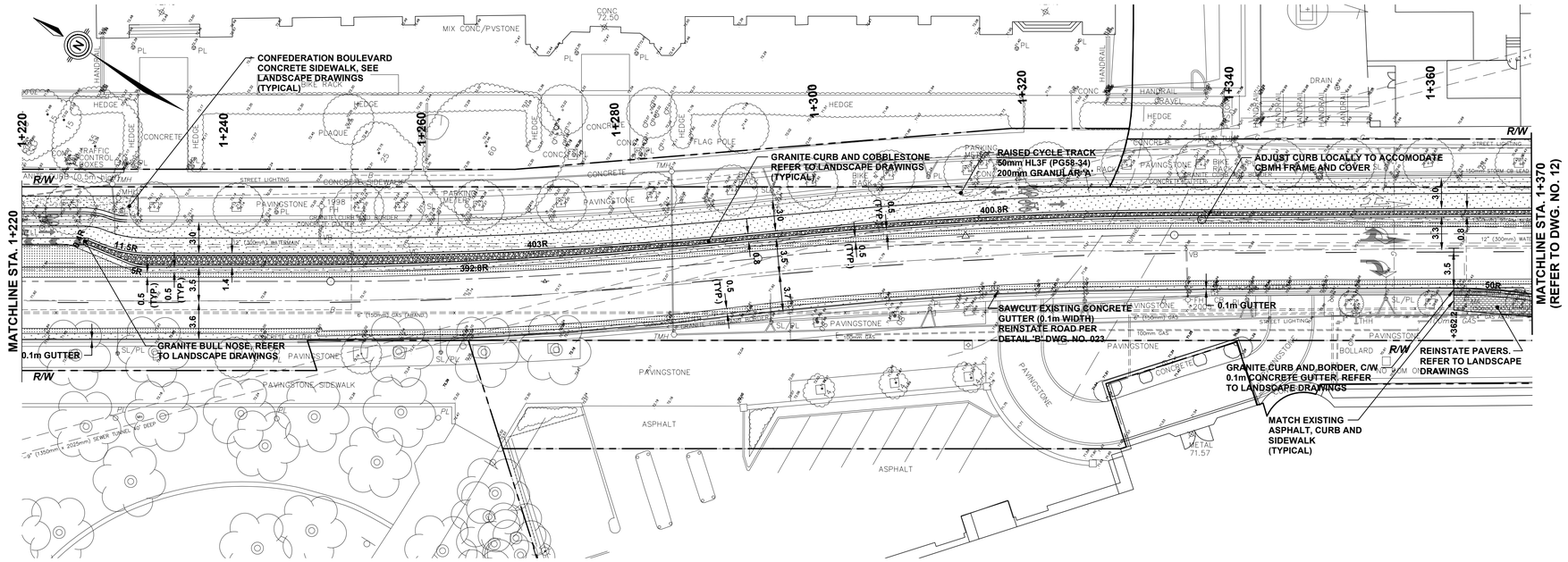
Drawing Number -

2016-04-04, 1:33 PM, w:\active\160601029\design\drawings\isd15-5168-011-cgl2.dwg

MACKENZIE AVENUE



MACKENZIE AVENUE



MACKENZIE AVENUE CYCLING FACILITY AND RESURFACING PROJECT

GEOMETRY AND GENERAL LAYOUT

MACKENZIE AVENUE
STA. 1+070 TO STA. 1+370

W. R. NEWELL, P. ENG.
General Manager
Infrastructure Services Department

J. MACDONALD, P. ENG.
Senior Engineer
Infrastructure Projects

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON Canada
K2C 3G4
Tel. 613.722.4420
www.stantec.com

B. C. HARRIS — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

J. BOULET 100161914 — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

Contract No.	Dwg. No.
ISD15-5168	011

Sheet 11 of 44

Asset No.	
Asset Group	
Des. J.B.	Chk'd. B.C.H.
Dwn. K.D.M.	Chk'd. J.B.
Utility Circ. No.	Index No.
Const. Inspector	

Scale: HORIZONTAL 1:250
0m 2.5 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yyyy)
1	ISSUED FOR DESIGN CIRCULATION	B.C.H.	22/12/2015
2	ISSUED FOR MUNICIPAL CONSENT	B.C.H	11/02/2016
3	ISSUED FOR TENDER	B.C.H	16/02/2016
4	ISSUED FOR CONSTRUCTION	B.C.H	05/04/2016

NOTES:

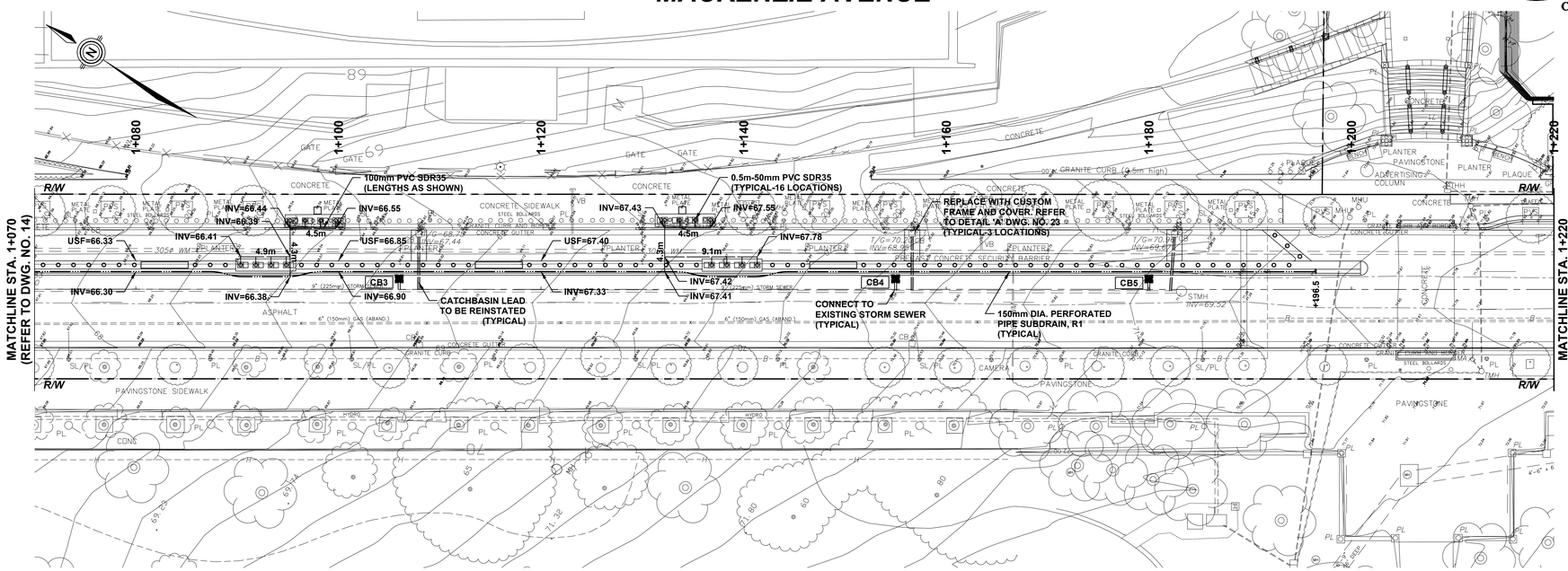
1. **ALL ROADWAY CO-ORDINATES AND RADII SHOWN ARE GIVEN AT EDGE OF PAVEMENT UNLESS OTHERWISE NOTED. WHERE SIDEWALKS INTERSECT CURBLINES, CO-ORDINATES ARE GIVEN AT EDGE OF PAVEMENT.**
2. **CO-ORDINATES FOR SIDEWALKS INTERSECTING CURBLINES ARE GIVEN AT FACE OF CURB.**

DRAWING FRAME: 790mm x 534mm City of Ottawa 2014

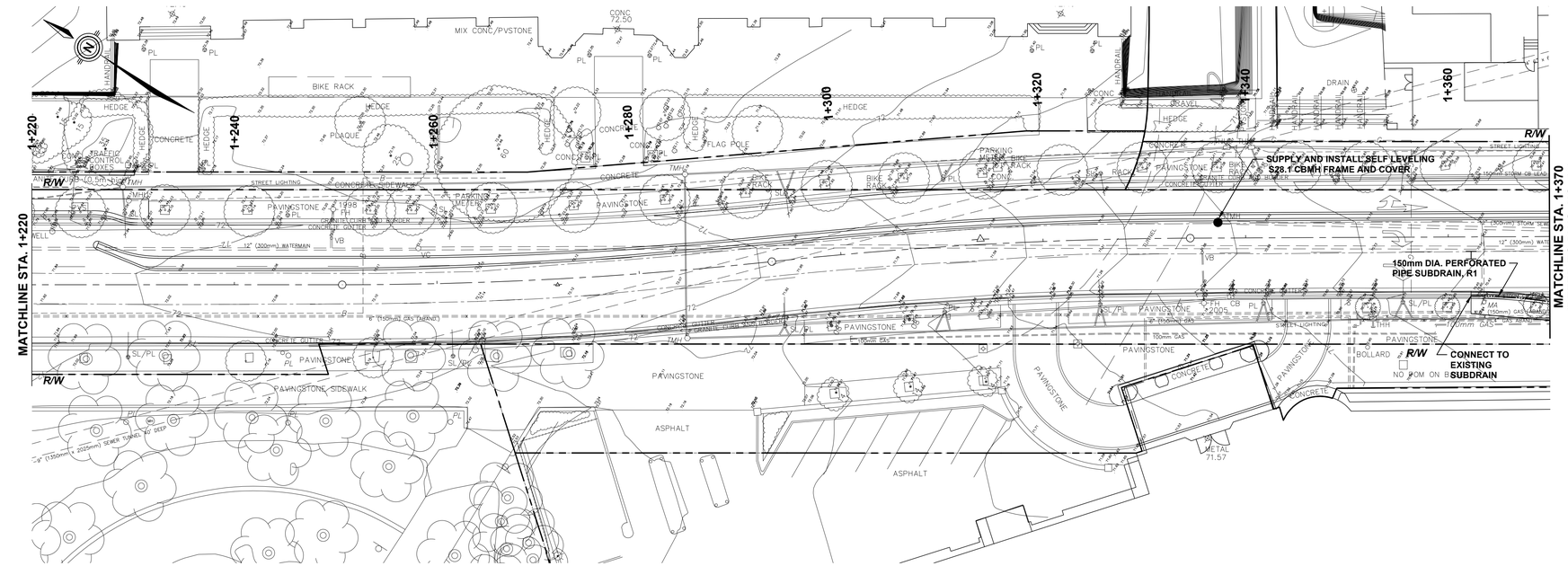
Drawing Number -

2016-04-04 1:43 PM w:\active\160601029\design\drawings\isd15-5168-015-grd2.dwg

MACKENZIE AVENUE



MACKENZIE AVENUE



NCC CCN Canada

MACKENZIE AVENUE CYCLING FACILITY AND RESURFACING PROJECT

GRADING AND DRAINAGE
MACKENZIE AVENUE
STA. 1+070 TO STA. 1+370

W. R. NEWELL, P. ENG.	J. MACDONALD, P. ENG.
General Manager	Senior Engineer
Infrastructure Services Department	Infrastructure Projects

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON Canada
K2C 3G4
Tel. 613.722.4420
www.stantec.com

LICENSED PROFESSIONAL ENGINEER
B. C. HARRIS
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J. BOULET
100161914
PROVINCE OF ONTARIO

Ottawa

Contract No.	Dwg. No.
ISD15-5168	015

Sheet 15 of 44

Des.	Chk'd.
J.B.	B.C.H.
Dwn.	Chk'd.
K.D.M.	J.B.

Asset No.

Asset Group

Utility Circ. No. | Index No.

Const. Inspector

Scale: HORIZONTAL 1:250
0m 2.5 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yyyy)
1	ISSUED FOR DESIGN CIRCULATION	B.C.H.	22/12/2015
2	ISSUED FOR MUNICIPAL CONSENT	B.C.H	11/02/2016
3	ISSUED FOR TENDER	B.C.H	16/02/2016
4	ISSUED FOR CONSTRUCTION	B.C.H	05/04/2016

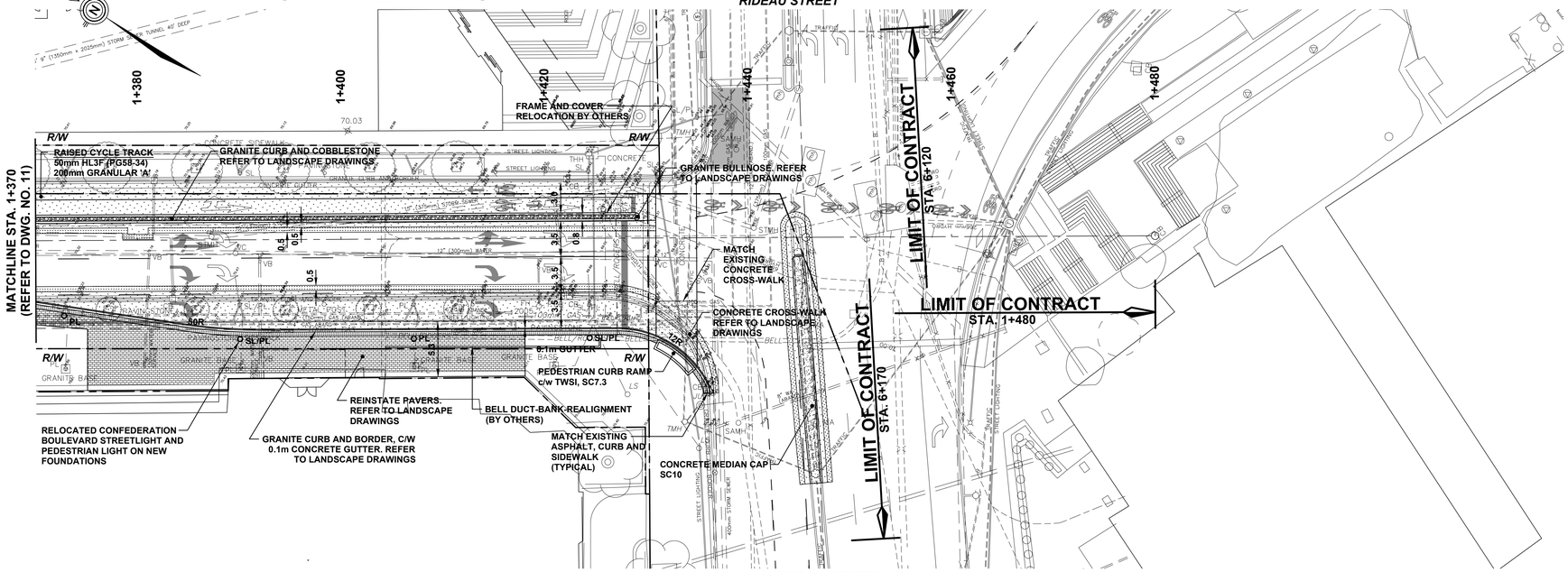
CATCHBASIN & MAINTENANCE HOLE DATA

NO.	STATION	OFFSET (m)	TYPE		ELEVATION	
			Structure	Cover	Grate	Low Inv.
CB3	1+106	1.4 LT	705.010	S19	68.815	67.31
CB4	1+155	1.4 LT	705.010	S19	70.314	68.81
CB5	1+180	1.4 LT	705.010	S19	71.004	69.50

SEWER DATA

NO. to NO. (high to low)		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
					Inlet	Outlet
CB3	SEWER	200	1.5	SDR 35	67.31	67.16
CB4	SEWER	200	1.5	SDR 35	68.81	68.66
CB5	SEWER	200	1.5	SDR 35	69.50	69.44

MACKENZIE AVENUE



NCC CCN Canada

MACKENZIE AVENUE CYCLING FACILITY AND RESURFACING PROJECT

GEOMETRY AND GENERAL LAYOUT

MACKENZIE AVENUE
STA. 1+370 TO STA. 1+462.5

W. R. NEWELL, P. ENG.
General Manager
Infrastructure Services Department

J. MACDONALD, P. ENG.
Senior Engineer
Infrastructure Projects

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON Canada
K2C 3G4
Tel. 613.722.4420
www.stantec.com

LICENSED PROFESSIONAL ENGINEER — B. C. HARRIS — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — J. BOULET 100161914 — PROVINCE OF ONTARIO

Ottawa

Contract No.	Dwg. No.
ISD15-5168	012

Sheet 12 of 44

Asset No.	
Asset Group	
Des. J.B.	Chk'd. B.C.H.
Dwn. K.D.M.	Chk'd. J.B.
Utility Circ. No.	Index No.
Const. Inspector	

Scale: HORIZONTAL 1:250
0m 2.5 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

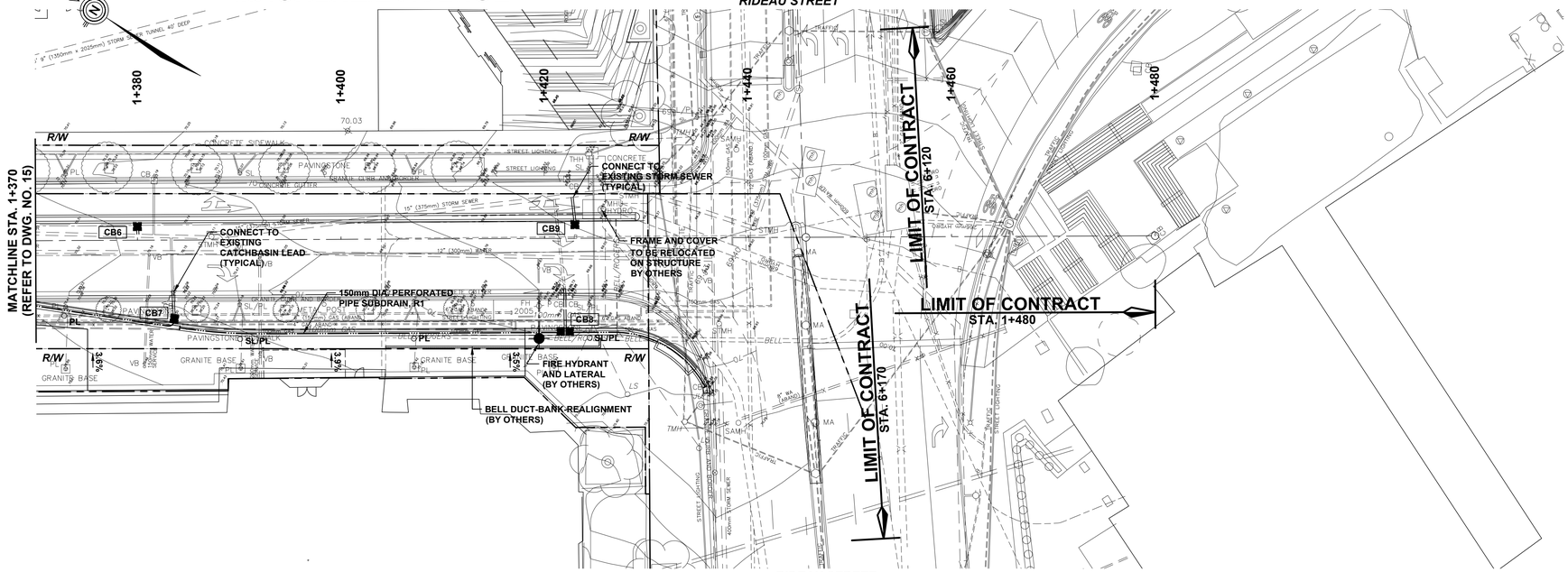
No.	Description	By	Date (dd/mm/yyyy)
1	ISSUED FOR DESIGN CIRCULATION	B.C.H.	22/12/2015
2	ISSUED FOR MUNICIPAL CONSENT	B.C.H	11/02/2016
3	ISSUED FOR TENDER	B.C.H	16/02/2016
4	ISSUED FOR CONSTRUCTION	B.C.H	05/04/2016

NOTES:

1. **ALL ROADWAY CO-ORDINATES AND RADII SHOWN ARE GIVEN AT EDGE OF PAVEMENT UNLESS OTHERWISE NOTED. WHERE SIDEWALKS INTERSECT CURBLINES, CO-ORDINATES ARE GIVEN AT EDGE OF PAVEMENT.**
2. **CO-ORDINATES FOR SIDEWALKS INTERSECTING CURBLINES ARE GIVEN AT FACE OF CURB.**

Drawing Number -

MACKENZIE AVENUE



NCC CCN Canada

MACKENZIE AVENUE CYCLING FACILITY AND RESURFACING PROJECT

GRADING AND DRAINAGE
MACKENZIE AVENUE
STA. 1+370 TO STA. 1+462.5

W. R. NEWELL, P. ENG.
General Manager
Infrastructure Services Department

J. MACDONALD, P. ENG.
Senior Engineer
Infrastructure Projects

Stantec
Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON Canada
K2C 3G4
Tel. 613.722.4420
www.stantec.com

LICENSED PROFESSIONAL ENGINEER — B. C. HARRIS — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — J. BOULET 100161914 — PROVINCE OF ONTARIO

Ottawa

Contract No.	Dwg. No.
ISD15-5168	016

Sheet 16 of 44

Asset No.

Asset Group

Des.	Chk'd.
J.B.	B.C.H.
Dwn.	Chk'd.
K.D.M.	J.B.

Utility Circ. No. | Index No.

Const. Inspector

Scale: HORIZONTAL 1:250
0m 2.5 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yyyy)
1	ISSUED FOR DESIGN CIRCULATION	B.C.H.	22/12/2015
2	ISSUED FOR MUNICIPAL CONSENT	B.C.H	11/02/2016
3	ISSUED FOR TENDER	B.C.H	16/02/2016
4	ISSUED FOR CONSTRUCTION	B.C.H	05/04/2016

CATCHBASIN & MAINTENANCE HOLE DATA

NO.	STATION	OFFSET (m)	TYPE		ELEVATION	
			Structure	Cover	Grate	Low Inv.
CB6	1+380	1.7 LT	705.010	S19	70.20	68.70
CB7	1+383.6	8.0 RT	705.010	S19	70.112	68.91
CB8	1+422	8.8 RT	705.020	S22/S23 (2)	69.813	68.62
CB9	1+423	1.7 LT	705.010	S19	69.473	67.97

SEWER DATA

NO. to NO. (high to low)		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
					Inlet	Outlet
CB6	SEWER	200	1.0	SDR 35	68.70	68.67
CB7	EXIST.	200	2.5	SDR 35	68.91	68.58±
CB8	EXIST.	200	4.0	SDR 35	68.62	68.31±
CB9	SEWER	200	3.0	SDR 35	67.97	67.72

□ DENOTES INVERT GIVEN AT TOP OF RISER

Drawing Number - 016

APPENDIX L

Checklist

4. Development Servicing Study Checklist

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

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

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☑ Date and revision number of the report.
- ☑ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☑ Plan showing the site and location of all existing services.
- ☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.
- ☑ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.
- ☑ Statement of objectives and servicing criteria.
- ☑ Identification of existing and proposed infrastructure available in the immediate area.

- ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).
- ☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.
- ☐ Proposed phasing of the development, if applicable.
- ☐ Reference to geotechnical studies and recommendations concerning servicing.
- ☑ All preliminary and formal site plan submissions should have the following information:
    - ☑ Metric scale
    - ☑ North arrow (including construction North)
    - ☑ Key plan
    - ☑ Name and contact information of applicant and property owner
    - ☑ Property limits including bearings and dimensions
    - ☑ Existing and proposed structures and parking areas
    - ☑ Easements, road widening and rights-of-way
    - ☑ Adjacent street names

4.2 Development Servicing Report: Water

- ☐ Confirm consistency with Master Servicing Study, if available
- ☑ Availability of public infrastructure to service proposed development
- ☐ Identification of system constraints
- ☑ Identify boundary conditions
- ☑ Confirmation of adequate domestic supply and pressure

- [x] 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.
- [x] Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.
- [ ] Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
- [ ] Address reliability requirements such as appropriate location of shut-off valves
- [ ] Check on the necessity of a pressure zone boundary modification.
- [ ] Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range
- [x] Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.
- [ ] Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.
- [x] Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- [x] Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- [x] Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).
- [ ] Confirm consistency with Master Servicing Study and/or justifications for deviations.

- ☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.
- ☑ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)
- ☑ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.
- ☑ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☑ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☑ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☐ Analysis of available capacity in existing public infrastructure.
- ☑ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

- [x] Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- [ ] Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- [x] Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- [ ] Set-back from private sewage disposal systems.
- [ ] Watercourse and hazard lands setbacks.
- [ ] Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- [ ] Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- [x] Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- [ ] Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- [x] Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- [ ] Any proposed diversion of drainage catchment areas from one outlet to another.
- [ ] Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- [ ] If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100 year return period storm event.
- [ ] Identification of potential impacts to receiving watercourses

- ☐ Identification of municipal drains and related approval requirements.
- ☑ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☑ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☑ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

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

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

4.6 Conclusion Checklist

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

Bridges, Dams, Culverts

Retaining Walls

Falsework, Formwork, Temporary Structures

Parking Garages, Parking Lots

Sewage and Storm Water Management

Piles, Platforms

Condominiums, Apartments Buildings, Office Buildings

PROFESSIONAL SERVICES PROVIDED WITH CARE,
COMPETENCE AND INTEGRITY THAT DELIVER
PRACTICAL SOLUTIONS TO COMPLEX PROBLEMS

REMISZ Consulting Engineers Ltd. 57 Auriga Drive, Suite 102 Ottawa, ON K2E 8B2