



80 KING STREET SOUTH AND 87 REGINA STREET SOUTH

Functional Servicing and Stormwater Management Report

Project Location:

80 King Street South and 87 Regina Street South
Waterloo, Ontario

Prepared for:

The Torgan Group
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1.0 INTRODUCTION

MTE Consultants Inc. was retained by The Torgan Group to complete a Functional Servicing and Stormwater Management Report in support of the Zoning By-Law Amendment Application for the redevelopment of 80 King Street South and 87 Regina Street South in the City of Waterloo (herein referred to as 'the Site').

The Site is located southeast of the King Street South and Willis Way intersection. The property is bounded to the west by King Street South, to the north by Willis Way, to the east by Regina Street South, and to the south by commercial developments that include the Region of Waterloo Public Health and Emergency Services building. The Site consists of two properties separated by Hughes Lane: 80 King Street South and 87 Regina Street South. For the exact location of the Site refer to Figure 1.0.

The proposed redevelopment of the Site consists of the addition of two new commercial storeys over the existing 80 King Street South two-storey commercial building and the construction of a new 25-storey mixed-use building with associated indoor, above-ground parking garage at 87 Regina Street South. The proposed 25-storey mixed-use building will consist of one floor for commercial use, five floors for indoor parking, and the remainder for residential use.

80 King Street South and 87 Regina Street South are currently zoned Commercial Eight (C8-25) in City of Waterloo Zoning By-law 1108. A number of site-specific By-laws also apply to one or both of the properties. Zoning By-law Amendments are proposed for both 80 King Street South and 87 Regina Street South that will establish site-specific regulations to implement the relevant policy framework of the City of Waterloo Official Plan and establish appropriate zone standards to achieve the development proposal.

The purpose of this report is to document the opportunities and constraints for the Site with respect to servicing, grading, and stormwater management in support of the Zoning By-Law Amendment Application. Pending approval of the Zoning By-Law Amendment application, detailed design of the Site will commence and be submitted to the City in support of the Site Plan Approval.

2.0 EXISTING CONDITIONS

The Site encompasses an area of 0.346ha and is currently occupied by an existing two-storey commercial building at 80 King Street South and an outdoor parking lot at 87 Regina Street South. They are separated by Hughes Lane, which is a municipal right-of-way.

2.1 Existing Topography

In the existing condition, surface runoff for the 87 Regina Street South parking lot flows from north to south, towards the existing catchbasin located at the south side of the Site. There is an elevation difference of approximately 0.72 metres between the north property line and the catchbasin top of grate.

Surface runoff from Hughes Lane flows from north to south, towards the existing catchbasin near the southern property line. There is an elevation difference of approximately 0.58 metres between the north property line and the catchbasin located near the south property line.

The existing building at 80 King Street South extends to the north, south, and west property lines, and is situated immediately to the west of Hughes Lane. As such, all runoff is captured on the flat roof, and is conveyed to the municipal storm sewer via the building's existing storm connection.

2.2 Existing Servicing

2.2.1 Water

Existing watermains run along all roads fronting the two properties. Regina Street South has an existing 400 mm diameter watermain. Willis Way has an existing 200 mm diameter watermain. Hughes Lane has an existing 100 mm diameter watermain.

The 80 King Street South building is currently serviced by four existing water service connections: three off the King Street South 300mm diameter municipal watermain and one off the Hughes Lane 100mm diameter municipal watermain. The existing water service sizes are unknown. There is an existing municipal hydrant located adjacent to the middle of the northern property line, along Willis Way. There is a second municipal hydrant on the other side of the Regina Street South and Willis Way intersection, northeast of the Site.

2.2.1 Sanitary

There is a 750mm diameter municipal sanitary sewer that runs along Regina Street South. Two existing sanitary manholes on this line are located at the Regina Street South and Willis Way intersection; they are approximately 3.71 metres and 3.55 metres deep, respectively. There is also an existing 250mm diameter pipe that runs along Hughes Lane. There is a manhole on this line located along the southern property line; it is approximately 1.45 metres deep.



FIGURE 1.0

Date: APR.28/17
Scale: NTS

SITE LOCATION PLAN



The existing 80 King Street South building is serviced by a 250mm diameter sanitary sewer which connects to the existing sanitary manhole at the Willis Way and Hughes Lane intersection. The sewer transitions to a 375mm diameter municipal sanitary sewer at the next downstream manhole on Willis Way. The two sanitary manholes are approximately 2.22 metres and 2.45 metres deep, respectively.

2.2.2 Storm

The Site is included in the City of Waterloo Catchment 320, which ultimately drains to Laurel Creek per the City of Waterloo's Master Drainage Study (2005). King Street South, Regina Street South, Willis Way, and Hughes Lane all contain existing municipal storm sewers and structures across the frontages of the Site. There is a 300mm and a 750mm diameter storm sewer on the east and west sides, respectively, of King Street South. There is a 750mm diameter storm sewer on the eastern side of Regina Street South. There is a 450mm diameter storm sewer on Willis Way, and a 375mm diameter storm sewer on Hughes Lane.

There is an existing private catchbasin located at the southwest side of the 87 Regina Street South parking lot. A 300mm diameter storm sewer connects the Site's catchbasin to the Hughes Lane catchbasin and associated 375mm diameter storm.

The location and size of the 80 King Street South building's storm connection is unknown at the time of publication of this report.

2.3 Existing Soils Information

Five (5) boreholes were advanced by Chung & Vander Doelen Engineering Ltd. as part of the Draft Geotechnical Investigation Report (G17384), published March 27, 2017, in order to determine the underlying soil conditions on the Site. The subsurface stratigraphy is generally comprised of pavement underlain by loose fill; loose fluvial deposits containing organics; compact silty sand and gravel; compact fine granular soils; and, very stiff silty clay till.

Groundwater was contacted in all five (5) boreholes at approximately 2.45 to 9.05 metres below grade, or 312.50 to 319.13 metres elevation. For additional details, refer to the afore-mentioned Draft Geotechnical Investigation Report by Chung & Vander Doelen.

2.4 Reviewing Agencies

In support of the Zoning By-Law Amendment and Site Plan Approval, the City of Waterloo, the Grand River Conservation Authority (GRCA), and the Region of Waterloo will be responsible for the review of the proposed re-zoning, site plans, site servicing, grading, storm water management, lighting and landscape design.

3.0 PROPOSED GRADING AND SERVICING STRATEGY

The preliminary grading and servicing strategies for the proposed development have been prepared based on available plan and profile information, the conceptual Site Plan prepared by Quadrangle Architects Limited received on February 16, 2016, and the Topographical Survey prepared by MTE, dated March 6, 2017. Based on the conceptual Site Plan, the buildings and laneway occupy 100% of the site. The existing Hughes Lane between the proposed new building and proposed redeveloped building will continue to act as a municipal roadway connecting Willis Way and William Street East. A new driveway connection to Hughes Lane will come in from Regina Street South along the south side of the development.

3.1 Proposed Grading

The proposed development consists of two buildings: a new 27-storey building at 87 Regina Street South; and, the addition of two commercial storeys to the existing building at 80 King Street South. The main pedestrian accesses to the buildings will be off of Regina Street South, and King Street South, respectively. The proposed grading strategy will respect the existing grades along all property lines and provide barrier-free access from King Street South and Regina Street South to their respective principal building entrances.

3.2 Proposed Servicing

Refer to Figure 2.0 for an illustration of the surrounding services, infrastructure, and proposed service connection locations.

3.2.1 Water

At this time, the sizes of the existing water service connections to 80 King Street South are unknown. Given the number of existing connections, and the amount of proposed commercial space, it is likely that a new water service is not needed. During detailed design, an investigation will be undertaken to establish the size of the existing water services from the King Street South right-of-way 300mm diameter municipal watermain in order to determine if they will be of sufficient size to service the proposed additional two commercial storeys at the 80 King Street South building or if a new connection will be required.

Based on the size of the proposed building at 87 Regina Street South, it is anticipated that a new 200mm diameter water service off of the Regina Street South 400mm diameter municipal watermain will be required. It should be noted that an internal booster pump will likely be specified in the building to achieve appropriate flow and pressure on the upper floors given the proposed height of the building. The existing municipal fire hydrant located adjacent to the middle of the northern property line, along Willis Way, will likely provide sufficient fire protection for both buildings.

A flow test was ordered to confirm available pressure in the municipal system. Refer to Appendix B for the hydrant flow test results. Assuming the use of the municipal fire hydrant located near the Willis Way and Hughes Lane intersection, and by extrapolating the data to the allowable 140 kPa (20psi) pressure, a water supply flow rate of approximately 9700 L/min was obtained. This exceeds the minimum required water supply flow rate of 9000 L/s and is therefore acceptable. It should be noted that a second flow test may be required along the Regina Street South watermain, where the proposed water connection for 87 Regina Street South will be located. This second flow test would be required to determine pressure in the main along Regina Street South, as the Willis Way and Regina Street South watermains are not connected.

3.2.2 Sanitary

A sanitary flow design sheet was prepared to determine the anticipated flows to be generated by the proposed development for both 80 King Street South and 87 Regina Street South. Under the proposed Zoning By-law Amendments and with the proposed development, the maximum anticipated peak sanitary flow rates for 80 King Street South and 87 Regina Street South are calculated to be 0.79 L/s and 19.98 L/s, respectively. Refer to Appendix A for the sanitary flow rate calculations.

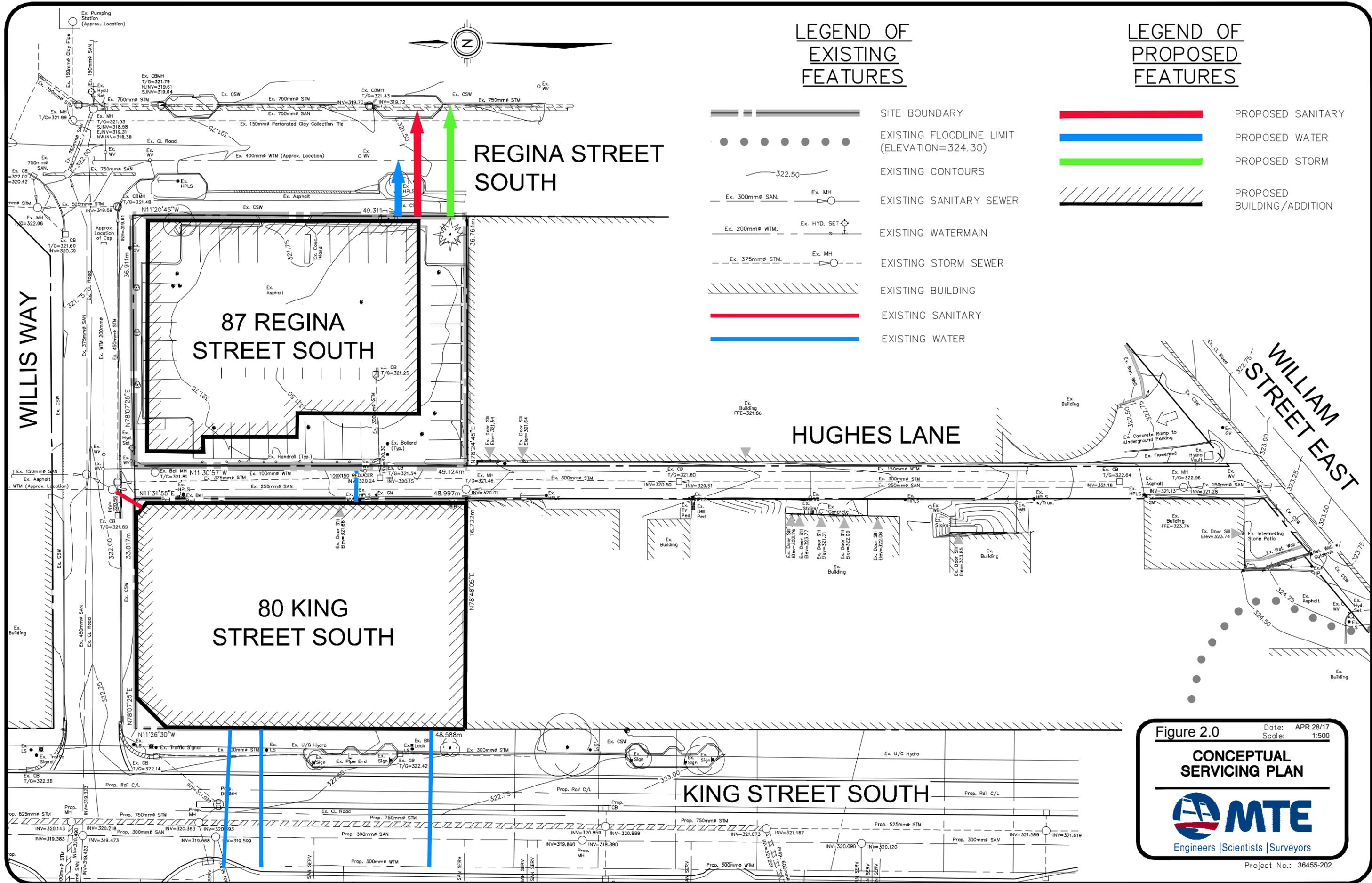
The existing 250mm diameter sanitary sewer that services the existing building at 80 King Street South has an unknown slope. Assuming a minimum slope of 0.5%, the capacity of the existing service may be 42.03 L/s. The anticipated peak sanitary flow for the proposed addition and existing building will be 0.79 L/s, which falls well below the capacity of the existing service. Therefore, the 80 King Street South building can continue to be serviced by the existing 250mm diameter sanitary service.

The proposed building at 87 Regina Street South will have an anticipated peak sanitary flow rate of 19.98 L/s. A 200mm diameter pipe at a slope of 0.5% provides a capacity of 23.18 L/s, which would accommodate the proposed development.

3.2.3 Storm

The size and location of the storm connection from the 80 King Street South building to the municipal system is currently unknown. Given the current configuration of the existing building with a flat roof, it is concluded that a storm service exists. Since the building footprint will remain the same, storm runoff rates will remain the same; therefore, the existing storm connection will remain adequate.

A new storm connection will be provided to the 87 Regina Street South property from the 750mm diameter municipal storm pipe in the Regina Street South right-of-way complete with new manhole. An on-site storm sewer system will be installed to collect runoff from the roof as well as part of the proposed driveway at the south side of the Site.



LEGEND OF EXISTING FEATURES

-  SITE BOUNDARY
-  EXISTING FLOODLINE LIMIT (ELEVATION=324.30)
-  EXISTING CONTOURS
-  EXISTING SANITARY SEWER
-  EXISTING WATERMAIN
-  EXISTING STORM SEWER
-  EXISTING BUILDING
-  EXISTING SANITARY
-  EXISTING WATER

LEGEND OF PROPOSED FEATURES

-  PROPOSED SANITARY
-  PROPOSED WATER
-  PROPOSED STORM
-  PROPOSED BUILDING/ADDITION

Figure 2.0 Date: APR.28/17 Scale: 1:500

CONCEPTUAL SERVICING PLAN



Engineers | Scientists | Surveyors

Project No.: 36455-202

4.0 CONCEPTUAL STORM WATER MANAGEMENT DESIGN

4.1 Stormwater Management Criteria

The Site is located within Catchment 320 of the City of Waterloo's Special Policy Area, per the City of Waterloo's Master Drainage Study (2005). Catchment 320 drains directly to Laurel Creek. In terms of water quantity control, sites within this catchment area are required to control post- to pre-development stormwater runoff up to the 5-year storm event. Storms greater than the 5-year event are to be directed to the municipal storm sewer system.

The residential component of the proposed development requires a pedestrian route which meets the GRCA safe access requirements during a regional storm event. The regional storm is a storm with the equivalent magnitude of Hurricane Hazel (1954). During a storm event of this magnitude, residents require a passage out of their building, through floodwaters that are no deeper than 0.8 metres below the Regional Flood Elevation, with little or no velocity. The GRCA is currently in the process of updating the floodline mapping for the Uptown Waterloo area which includes this Site. Refer to the Safe Access Report prepared by MTE dated April 28, 2017 for further analysis and details.

4.2 Water Quantity Control

In the existing condition, the Site is 92% impervious. Under the proposed condition, the Site will become approximately 100% impervious. As the proposed flat roof will capture part of the runoff, flow-control roof drains will be proposed during the detailed design stage, which will attenuate the flow rate from the roof system into the onsite storm system and subsequent municipal storm system to the existing (pre-development) flow rates.

All storm drainage will be directed to the right of ways.

4.3 Water Quality Control

The proposed development will improve the water quality of runoff exiting the Site since the majority of the storm outflow will be roof runoff which is considered clean, as opposed to the existing parking lot runoff. Therefore, no on-site quality controls are proposed.

4.4 Erosion & Sediment Control

In order to minimize the effects of erosion during the grading of the site, sediment control fencing will be installed around the perimeter of the site on construction fencing and around any stockpiles and catchbasins during construction. Any sediment that is tracked onto the road way during the course of construction will be cleaned by the contractor. These measures will be shown on the detailed design drawings.

5.0 CONCLUSIONS

Based on the foregoing analysis and the information available at the time this report was published, it is concluded that:

- i) Existing municipal infrastructure for water, sanitary and storm is available for the development along King Street South, Willis Way, Regina Street South, and Hughes Lane.
- ii) The existing water services are sufficient to service the proposed additional storeys to the 80 King Street South building. It is expected that a new 200mm diameter water service will be sufficient to service the proposed building at 87 Regina Street South.
- iii) The existing 200mm diameter sanitary service is sufficient to service the 80 King Street building. A new 200mm diameter sanitary service will be required to service the new 87 Regina Street South building.
- iv) The existing storm service for the 80 King Street South building is likely sufficient for the proposed development condition. It is expected that a 300mm diameter storm connection to Regina Street South will be required to service the proposed 87 Regina Street South development.
- v) Additional grading, servicing and storm water management details will be provided during detailed design, through the Site Plan Approval process.

All of which is respectfully submitted,

MTE CONSULTANTS INC.

Andr ea McKay, E.I.T.
Designer

AXM:rla



Rebecca Kerr, P.Eng.
Design Engineer



APPENDIX A

SANITARY SEWER DESIGN SHEET

80 King Street South
Sanitary Flow Rate Analysis
Waterloo, Ontario

Project #: 36455-202
 Date: March 27, 2017
 Date Printed: 3/27/2017
 By: AXM



Sanitary Flow Rate with Proposed Occupancy (C8)			
Development Information			Sanitary Flow Calculations
Maximum Density	Site Area	Allowable Gross Building Area	Average Flow
<i>p/unit</i>	<i>ha</i>	<i>ha</i>	<i>L/s</i>
1.77	0.17	0.66	0.77
TOTALS FOR SITE			0.79

*including infiltration

Assumptions:

1	Structure Type	PPU
	Apartment	1.77

Taken From Waterloo 2014 Water and Wastewater Monitoring Report (Region of Waterloo, June 2014)

2 Sanitary peak Flow (residential) 0.004 L/s/p

Taken from Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (Region of Waterloo, Feb 2016)

3 Sanitary peak Flow (commercial - core) 1.16 L/s/ha

Taken from Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (Region of Waterloo, Feb2016)

4 Residential Harmon Peaking Factor Formula

$F=1+(14/(4+P^{0.5}))$ Where P = population (in thousands)

5	Zoning Category	Floor Area Ratio
	C8	4.00

Taken from City of Waterloo Zoning By-Law 1108 As Amended Document, August 2012

"Floor Area Ratio means the building floor area (gross building area) of all buildings on a lot divided by the lot area"

6 Infiltration Rate (included unpeaked in all final flows) 0.15 L/s/ha

Taken from Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (Region of Waterloo, Feb 2012)

**87 Regina Street South
Sanitary Flow Rate Analysis**

Waterloo, Ontario

Project #: 36455-202
Date: March 27, 2017
Date Printed: 3/27/2017
By: AXM



Sanitary Flow Rate with Proposed Occupancy								
	Development Information			Sanitary Flow Calculations				
Residential	Site Area	Maximum Density	# of units	Population	Average Flow	Peaking Factor	Peak Flow	
	ha	p/unit	unit	# of people	L/s		L/s	
	0.18	1.77	750.00	1328	5.31	3.7	19.74	
Commercial	Site Area	Maximum Density	No. of storeys for this use	Commercial Area	Average Flow	Peaking Factor	Peak Flow	
	ha	p/unit	building	ha	L/s		L/s	
	0.18	1.77	1.00	0.181	0.21	N/A	0.21	
TOTAL FOR SITE							19.98	*including infiltration

Assumptions:

1	Structure Type	PPU
	Apartment	1.77

Taken From Waterloo 2014 Water and Wastewater Monitoring Report (Region of Waterloo, June 2014)

2 Sanitary peak Flow (residential) 0.004 L/s/p
Taken from Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (Region of Waterloo, Feb 2016)

3 Sanitary peak Flow (commercial - core) 1.16 L/s/ha
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6 Infiltration Rate (included unpeaked in all final flows) 0.15 L/s/ha
Taken from Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS) (Region of Waterloo, Feb 2012)



HYDRANT FLOW TEST

Hydrant Flow Test - 80 KING STREET S. WATERLOO 6" MAIN

FLOW HYDRANT @ WILLIS WAY BETWEEN REGINA & KING ST. WATERLOO

RESIDUAL HYDRANT @ HUGHES LANE, WATERLOO

Static Pressure (Psi)	80
Residual Pressure 1 (Psi)	64
Residual Pressure 2 (Psi)	50
Residual Pressure 3 (Psi)	

Pitot Reading 1	58
Outlet Size 1	2.5
Pitot Reading 2	26
Outlet Size 2	2.5
Pitot Reading 3	
Outlet Size 3	
Flow 1 Calculated	1277.88
Flow 2 Calculated	1711.17
Flow 3 Calculated	0.00

# of Outlets Flowed 1	1
# of Outlets Flowed 2	2
# of Outlets Flowed 3	0
Graph Data: MARCH 28, 2017	
Pressure Values (y-axis)	Flow Values (x-axis)
80	0
64	1278
50	1711
Time of Test :	
28-Mar-17	10:00 AM
Performed by:	
	K.S. & T.H.

Co efficient value	0.9
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Water Graph

