
SERVICING CAPACITY REPORT

WILFRID LAURIER UNIVERSITY

**SERVICING CAPACITY CHECK FOR KING/REGINA/LODGE
RESIDENTIAL BLOCK**

Project No.: 2023-0805-10

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WALTERFEDY

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ISSUANCE AND REVISION RECORD					
REV	DATE	WRITTEN BY	QA BY	SEALED BY	ISSUED FOR
1	2024.03.07	D Romero	R Khakharia	R Khakharia	Client Review
2	2024.05.13	D Romero	R Khakharia	R Khakharia	Client Review
3	2024.06.24	D Romero	A Whaley	R Khakharia	Final Submission



Rushin Khakharia, P.Eng.
Design Engineer

Site Development Practice Lead, Civil
Partner
rkhakharia@walterfedy.com
519.576.2150, Ext. 469

A handwritten signature in black ink, appearing to read 'Diego Romero'.

Diego Romero, EIT
Designer,
Civil Engineering

dromero@walterfedy.com
519.576.2150, Ext. 330

EXECUTIVE SUMMARY

Wilfrid Laurier University (WLU) is seeking to lift a holding provision that is applicable to a portion of the block bound by King Street, Regina Street, and Lodge Street. The site is currently home to a mixed use of student residence housing and university academic offices, including the multi-story King Street Residence building and the Cooperative and Career Education (CCE) building. The updated redevelopment for the overall block has not been prepared as of this writing; however, the intent is to redevelop the block with a new student residence building fronting Lodge Street or Regina Street and may include connections to the existing building along King Street. For the purposes of lifting the servicing capacity holding on this block, calculations will apply the maximum-allowed density provision within the UC zoning.

The zoning allows for a maximum total of 952 bedrooms within the King/Regina/Lodge block. The existing King Street residence building contains 324 bedrooms. The proposed new residential building will accommodate a maximum of 628 bedrooms, supporting an equal mix of single and double residence units. The total population on the site will be approximately 1428 persons. A portion of the site will also be used for ancillary academic-related uses; for calculation purposes, it is assumed a maximum of 25% of the new building floor area is to be used for ancillary purposes.

Sanitary servicing for the site can be accommodated within the sanitary sewers along Regina Street. Existing infrastructure within the site outlets to the municipal 250 mm sanitary sewer system along Regina Street. This existing sanitary system has a utilization of approximately 25%; the proposed redevelopment will increase the utilization to approximately 44%, with a projected total flow of 23.181 L/s into the sanitary trunk system at University Avenue. The City of Waterloo Sanitary Master Plan has not identified any downstream concern in the University Trunk. Therefore, the local system has adequate capacity to convey the proposed flows.

Water servicing for the site can be accommodated through the service connection at King Street. Infrastructure along King Street was recently upgraded and a 400-mm-diameter watermain currently services the King Street Residence building through a 200-mm-diameter water service. The domestic and firewater demands have been calculated to assess the adequacy of the proposed watermain system and follows the Region of Waterloo, The City of Waterloo, and Ontario Building Code (OBC) standards. A total required flow of 172.37 L/s was calculated, which falls below the available flow of 198 L/s. Therefore, the existing water service has sufficient capacity to provide adequate servicing, and it is assumed that a connection to the existing 200 mm water service within the property will accommodate any future development within the site.

Stormwater and storm servicing are provided through an internal storm sewer system which collects runoff and provides stormwater management (SWM) prior to discharging to the municipal storm sewer at Regina Street. The storm sewer at Regina Street ranges from 250 mm to 750 mm in diameter. It is also assumed surrounding developments have SWM controls limiting the flow into the municipal storm sewer system. The proposed student residence will also include SWM controls and relocated internal drainage systems to limit the proposed discharge flows to those in existing conditions or less.

The proposed development included in the Laurel Creek Subwatershed Study; best water practices should be implemented, and water quality will depend on the ultimate design for the proposed development. A water balance assessment should also be completed as part of any future planning application, and Geotechnical and Hydrological studies will support the infiltration measures as part of the detailed design.

Erosion control measures will be implemented during the construction period to ensure sediment from the site does not migrate downstream to the regulated water feature and elsewhere offsite.

WILFRID LAURIER UNIVERSITY SERVICING CAPACITY

SERVICING CAPACITY REPORT

King/Regina/Lodge Residential Block

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1.0 INTRODUCTION

WalterFedy Inc. has been retained by Wilfrid Laurier University to provide civil engineering consulting services to support the lifting of a holding provision applying to 195, 205, and 209 Regina Street within the King/Regina/Lodge block of land.

The subject property, collectively with 12, 14, 16, 18, and 20 Lodge Street and 201 Regina Street, form seven parcels of land within the King/Regina/Lodge university block that this report will evaluate as a whole and assess the servicing sewer capacity and how future developments will be serviced, including water, sanitary, and storm connections to the municipal infrastructure. The report will discuss boundary servicing conditions and the availability in the municipal system to accommodate future development. Preliminary stormwater management design has been included, demonstrating consistency with the City of Waterloo and Region of Waterloo design criteria.

1.1 Background

The Wilfrid Laurier University King/Regina/Lodge residential block site is approximately 1.25 hectares in size. The site is located in Waterloo, Ontario, and is bound to the west by King Street North, Lodge Street to the south, Regina Street to the east, and the King North Commercial Plaza to the north. Access to the site is through King Street, Lodge Street, and Regina Street. The site has a holding provision applying to 195, 205, and 209 Regina Street within the King/Regina/Lodge block of land.

The site is zoned as “University College (UC)”, and a “Holding (H)” provision for a servicing capacity study only applies to 195, 205, and 209 Regina Street; the holding provision for the properties fronting King Street has been previously lifted. Exceptions (H-UC-81) (C170) (C176) apply to 195, 205, and 209 Regina St.

The subject site is home to a mix of student housing including the existing multi-story King Street residence building and university offices. The site has been utilized mostly as student housing, with the King Street residence building constructed between 2003-2004 and the CCE building constructed in 2008. Other student housing includes a mix of residential houses converted to student housing and low-rise apartments occupying the areas fronting Lodge Street and Regina Street.

The updated redevelopment concept for the site has not been yet prepared; the intent is to develop a new university residence building oriented to the Lodge and Regina Street frontages, which may include connections to the existing student residential building and/or the CCE. Renovations to the CCE may also be undertaken. The new residence building is envisioned to accommodate other academic-related uses and potential for a mixed-use component; however, a program for the new building has not yet been initiated. The intent for the redevelopment is to maximize the density permissions afforded to the block as a whole in the City of Waterloo Official Plan, accommodate academic-related uses in the building, and provide for ancillary uses on the ground floor as permitted in the UC-81 zone category. For calculation purposes, the new student residential building will support approximately 628 bedrooms, providing an equal mix of single and double residence units. The proposed location, building footprint, and space program of this new student housing building have not been identified at the time of this report.

1.2 Reference Reports and Drawings

In the preparation of this Servicing Capacity Report, the following reports/drawings were referenced:

1. Plan & Profile, Storm, Sanitary and Watermain Information from the City of Waterloo and Region of Waterloo for Lodge Street, Regina Street North, King Street North, and University Avenue East.
2. WLU Infrastructure Drawings, Existing Services Plan drawing dated September 2008.
3. City of Waterloo Sanitary Master Plan Volume 1, by Stantec Consulting Ltd., dated August 2015.

4. City of Waterloo Water Distribution Master Plan, by GM Blue Plan., dated April 2017.
5. Development Charges Background Study for The City of Waterloo, by Hemson Consulting Ltd., dated January 2020.
6. City of Waterloo Comprehensive Engineering and Landscape Manual, by the City of Waterloo, dated February 2024
7. Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), by Region of Waterloo, dated February 2024.

2.0 EXISTING INFORMATION

2.1 Topography and Land Use

The subject lands have historically been used for student residential purposes and academic administration to support WLU's growing student population. The construction of the multi-story King Street residence building and the CCE building brought more university uses to the parcel of land, and more asphalt parking was added to support these buildings. A survey by MTE Consultants was completed prior to the construction of the King Street Residence building, and subsequent site grading for the King Street Residence and CCE buildings showed that the site green areas have largely been replaced with asphalt parking.

The centerline of Lodge Street ranges in elevation from 329.55 m at the King Street intersection to 327.50 m at the Regina Street intersection. The Regina Street centerline elevations range from 327.50 m at Lodge Street to 320.85 m at the lowest point of the road at 230 Regina Street. The centerline elevation of Regina Street increases from the low point to 321.55 m at the intersection of University Avenue East. The King Street centerline elevation ranges from 323.85 m at the intersection with University Avenue increasing to 329.55 m at the intersection with Lodge Street.

The CCE building site sits at an elevation around 329.95 m. The site is accessed off Lodge Street with grading directed towards Lodge Street. Storm drainage is collected within a catchbasin in the asphalt parking lot and directed towards the northeast of the site, and then discharged along with the storm flows from the King Street residence to the municipal system along Lodge Street. The King Street residence building main floor elevation is approximately 327.5 m. The underground parking for the King Street residence building elevation is approximately 323.60 m and the grading slopes to Regina Street over the asphalt parking lot used by the Regina Street low-rise student housing. Existing student housing facing Lodge Street mostly drains from front-to-back to the northeastern side of the property along Lodge Street. The existing residences facing Lodge Street contain a large portion of the green area of the overall site. Student low-rise apartments facing Regina Street drain back-to-front and the overland grading follows the road grading along Regina Street.

The overall catchment for the storm sewer along Regina Street captures the WLU King/Lodge/Regina residence block, drainage from the apartment building along Lodge Street, residence houses fronting Regina Street, the commercial plaza between the residence block and University Avenue, and the industrial block fronting Regina Street between Lodge Street and University Avenue. The drainage from this larger catchment is directed to a 450-mm-diameter storm sewer through a servicing easement between the industrial buildings at 210 and 203 Regina Street.

2.2 Servicing and Utilities

Services on and around the site were identified as part of a topographic survey conducted by MTE and supplemented with City of Waterloo GIS open data. Where data was not available, it was obtained from as-built

plan and profile drawings of Lodge Street and Regina Street. King Street was recently reconstructed, and Plan and profiles drawings were used to complement the GIS data.

Utility information collected from various sources is provided in Appendix A.

2.2.1 Water Servicing

The King Street residence building is being serviced by a 200-mm-diameter watermain connected to the municipal 300-mm-diameter PVC watermain along King Street. The CCE building and the single-unit residential houses along Lodge Street are being serviced by a 150 mm watermain connected to the municipal 200-mm-diameter PVC watermain along Lodge Street. Low-rise buildings along Regina Street are being serviced by the municipal 150-mm-diameter cast iron watermain.

Internal to the site, every individual building has its own water service connected to the municipal watermain; no internal watermain has been installed within the property.



Figure 1: Existing Water Servicing

2.2.2 Sanitary Servicing

Sanitary servicing for the residence building and the CCE building is through an internal sanitary sewer network that discharges to the municipal 250-mm-diameter sanitary sewer along Regina Street. Sanitary service for residences fronting Lodge Street are via a 200-mm-diameter municipal sanitary sewer. Low-rise student housing along Regina Street is being serviced by the municipal 250-mm-diameter sanitary sewer. The sanitary sewer along Regina Street flows towards University Avenue, which is then carried by the 600-mm-diameter trunk main towards the Waterloo Wastewater Treatment plant.

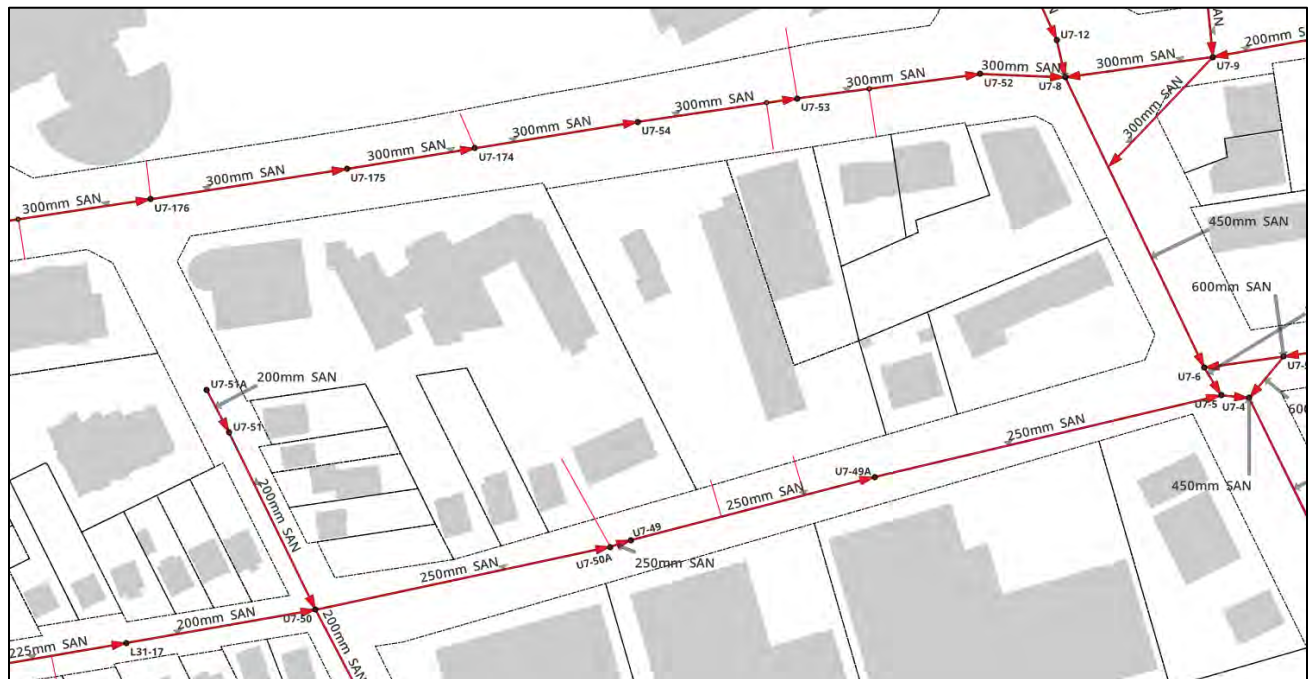


Figure 2: Existing Sanitary Servicing

2.2.3 Storm Servicing

Storm servicing for the residence building and the CCE building is through an internal storm sewer network that discharges to the municipal 250-mm-diameter storm sewer along Regina Street. With the exception of the low-rise buildings along Lodge Street and King Street, some level of stormwater management appears to exist within the site. Evidence of an oil/grit separator (OGS), cistern, and other stormwater controls were evident from the background drawings.



Figure 3: Existing Storm Servicing

2.2.4 Gas Servicing (Enbridge Gas)

Based on provided WLU servicing drawings, a gas service connection is located at the northeastern corner of the site and is connected to the gas main along Regina Street. A 200-mm-diameter gas main and a 50-mm-diameter gas main are located within the King Street right-of-way; however, it is not known if there is a connection to the site.

2.2.5 Communications (Bell Canada/Rogers Communications)

Communication servicing is provided to the site via two 100-mm-diameter buried conduits on the northeastern corner of the site. This communication conduits cross Regina Street and connect to the WLU Administration Building at 202 Regina St.

2.2.6 Power (Enova)

Power is provided to the King Street residence building through a buried service connection along King Street. The CCE building appears to connect to Lodge Street independently from the King Street residence building. Each individual residence along Lodge Street and Regina Street appears to have its own connection to the overhead hydro poles located on Lodge Street and Regina Street.

3.0 REVIEW AGENCIES

3.1 City of Waterloo

The City of Waterloo will be responsible for the review and approval of this servicing capacity assessment in support of lifting the holding provision. Future development on this site will require Site Plan Approval from the City.

3.2 Region of Waterloo

As the property abuts King Street, a Region of Waterloo owned road allowance, future development on the site will require grading and stormwater management clearance by the Region. Additionally, the Region's Corridor Management division will be involved in infrastructure planning and approval decisions as it relates to servicing within the King Street municipal right-of-way.

The Region will also review and comment on source water protection as it relates to the subject development.

4.0 FUTURE DEVELOPMENT

At present, a concrete development plan has not been determined; however, it is anticipated that the future development will maximize the potential for the site based on the permitted zoning "University College (UC)", and removal of the "Holding (H)" provision for the servicing capacity study which only applies to 195, 205, and 209 Regina Street; the holding provision for the properties fronting King Street has been previously lifted. Exceptions (H-UC-81) (C170) (C176) apply to 195, 205, and 209 Regina Street. It is also understood that the existing King Street residence building at 200 King Street West will remain as part of the site. It is also anticipated that the multiple legal properties will be consolidated into single ownership. The proposed future condition of the site is further described below:

Residential/Student Housing:

The site's zoning allows for a total of 952 bedrooms on the entire King Street block based on density permissions in the City of Waterloo Official Plan and Zoning By-Law 2018-050. The King Street student residence contains 324 bedrooms and 328 beds (i.e., mostly single rooms). The proposed development is, therefore, expected to contain the permitted maximum of 628 bedrooms. For the purposes of this report, a future student residence building is assumed with a total population on the site of 1.5 students per room, equating to 1428 persons.

Academic and Ancillary Uses:

The proposed development is envisioned to also contain academic and ancillary uses. The site is permitted a maximum of 25% of the building floor area to be used for ancillary uses, which will be located on the first storey of the proposed building as per the UC-81 zone category. For the purposes of calculations, the ancillary uses would cover 25% of the total site area at ground level.

5.0 SOURCE WATER PROTECTION

According to the Province of Ontario's *Source Protection Information Atlas*, the Site is located within a Wellhead Protection Area D, with a vulnerability score of 6. The site is also contained within an Issue Contributing Area for Sodium Chloride and Trichloroethylene.

Table 1 provides the source protection details for the Site.

Table 1: Source Protection Details

Source Protection Area	Grand River
Water Quality	
Wellhead Protection Area	D; score of 6
Wellhead Protection Area E (GUDI):	No
Intake Protection Zone:	No
Issue Contributing Area:	Yes; Sodium Chloride and Trichloroethylene
Significant Groundwater Recharge Area:	No
Highly Vulnerable Aquifer:	No
Event Based Area:	No
Water Quantity	
Wellhead Protection Area Q1:	Yes; low stress
Wellhead Protection Area Q2:	Yes; low stress
Intake Protection Zone Q:	No

Figure 4 provides the mapping for the subject site as exported from the Source Protection Information Atlas.

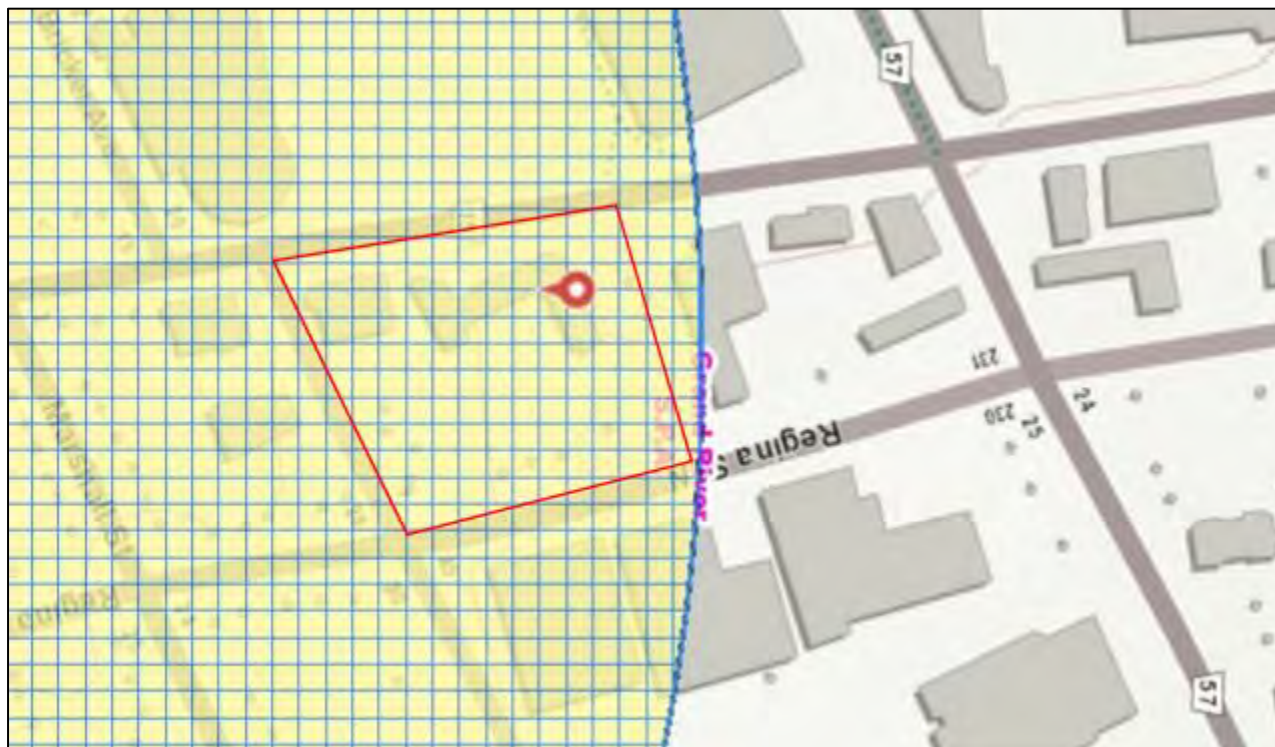


Figure 4: Source Protection Mapping

Based on a review of applicable Source Protection Policies for the Region of Waterloo under the Grand River Source Protection Plan and a review of 2017-2018 Table of Drinking Water Threats, winter deicing activities are considered a significant drinking water threat and will require controls and management. A Salt Management Plan and, potentially, a risk management plan may be required as part of future site plan approval.

To ensure that infrastructure proposed as part of this development does not contribute to drinking water threats in the future, it should be designed in accordance with Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works 2008 and the Region of Waterloo's DGSSMS. The design of infrastructure to this standard is done to maximize expected life and reduce the incidence of failure.

6.0 SANITARY SERVICING

6.1 Proposed Sanitary Servicing

In accordance with the City of Waterloo Engineering Standards and the DGSSMS, the sanitary flows from the subject development were calculated based on the split in land uses between residential and ancillary uses.

Sanitary flows for the residential component were calculated using an average daily flow of 275 L/c/day, peaked using the Harmon Formula for a design population of 1.5 persons/bedroom.

The total sanitary flow from the King/Regina/Lodge block, including the existing and proposed uses, is presented in Table 2.

Table 2: King/Regina/Lodge Development Sanitary Flow

Relevant Total Site Area	1.25 ha
Number of Bedrooms	952 rooms
Design Population (1.5p/bedroom)	1428 persons
Average Residential Daily Flow	275 L/c/d
Average Sanitary Flow	4.5451 L/s
Residential Peaking Factor – Harmon Formula	3.6949
Total Residential Sanitary Peak Flow	16.7938L/s
Commercial Area	0.3125 ha
General Commercial Average Daily Flow	0.5 L/s/ha
Peaking Factor	2.5
Total Commercial Peak Flow	0.391 L/s
Extraneous Flow Allowance	0.25 L/s/ha
Total Proposed Extraneous Flow	0.313 L/s
Total Sanitary Flow	17.4978 L/s

6.2 Local Sanitary Capacity Assessment

The sanitary flow from the proposed site is directed along Regina Street using a 250-mm-diameter sanitary sewer. The local municipal sanitary system is comprised of a 200-mm-diameter to 250-mm-diameter sewer along Lodge Street and Regina Street. The sanitary system discharges to a 600-mm-diameter municipal sanitary trunk main at the intersection of University Avenue and Regina Street.

The City of Waterloo's GIS mapping was utilized to obtain information about the sewers around the site; Appendix B provides a capacity assessment of the municipal infrastructure in existing and proposed conditions.

Based on the assessment, the local sanitary sewer system is utilized at approximately 25%. The redevelopment of the site, including the new residence building and the removal of the low-rise student housing, will increase the utilization to 44%. A projected total flow into the sanitary trunk sewer at University Avenue is approximately 23.181 L/s. As such, the local system has adequate capacity to convey the proposed flows.

Stantec's Master Plan has not identified downstream concerns in the University trunk, including the future growth scenarios and future wet weather conditions. We note that the City of Waterloo is undertaking an update to the plan and, as of this writing, a Notice of Public Consultation Centre #2 for the Master Plan Addendum was posted online and available for review; no new constraints were noted within the University trunk sewer. Given the above, sanitary sewer constraints are not anticipated downstream of this proposed development.

7.0 WATER SERVICING

The proposed redevelopment of the King/Regina/Lodge block will maintain the existing King Street residence building and redevelop the residence housing along Lodge Street and Regina Street with a new multi-story residence building, which will also include academic-related and potential ancillary uses as permitted in the UC Zoning category. This assessment aims to confirm that adequate service capacity is available in the municipal system to support future development, and the final layout/configuration of the distribution network will be developed as part of the future planning application.

7.1 Design Criteria

The Region of Waterloo requires that watermain distribution systems be able to convey the larger of maximum daily demand and fire flow or the peak hourly demand. Additionally, the Region of Waterloo DGSSMS recommends that the average daily flow from any development be conveyed with a resulting pressure within the range of 350 kPa (50 psi) to 550 kPa (80 psi).

The Region also stipulates that the minimum resultant pressure under any non-fire demand scenario shall not be less than 275 kPa (40 psi). With the inclusion of fire flows, the minimum residual pressure in the distribution system shall not be less than 140 kPa (20 psi) and shall not cause velocities in the system to be greater than 5 m/s.

Should static pressures in the system exceed 550 kPa (80 psi), the Region requires the use of individual pressure-reducing valves for new developments. The distribution system is also required to be designed to ensure that pressures do not exceed 700 kPa (100 psi) at any point in the system.

7.2 Domestic Demand

Calculations of the water demand for the proposed development have been performed using the DGSSMS and MECP Drinking-Water Guidelines.

In accordance with the DGSSMS, the average residential demand for the proposed development was estimated using a demand of 225 L/c/day. A peaking factor of 1.42 was used to convert the average daily demand into a maximum day demand. This peaking factor is in accordance with the Tri-City Water Masterplan.

Demand for commercial uses was determined using the MECP Drinking Water Guidelines.

Table 3: Maximum Day Domestic Demand

Relevant Total Site Area	1.25 ha
Number of Bedrooms	952 rooms
Design Population (1.5p/bedroom)	1428 persons
Average Daily Flow	225 L/c/d
Average Domestic Demand	3.7187 L/s
Maximum Day Demand Factor	1.42
Total Residential Maximum Day Demand	5.2805 L/s
Commercial Area	0.3125 ha
General Commercial Average Daily Flow	0.5 L/s/ha
Peaking Factor	1.42
Total Commercial Maximum Day Demand	0.222 L/s
Total Maximum Day Demand	5.50 L/s

7.3 Fire Flow Demand

In addition to the daily domestic demand for the proposed development, fire flow demands were calculated to assess the adequacy of the proposed watermain system. The Region of Waterloo specifies that all fire flow requirements shall be determined in accordance with the current issue of Water Supply for Public Fire Protection published by the Fire Underwriters Survey (FUS).

A fire and life safety report were not available for review at the time of writing; however, based on our experience, such buildings are typically classified as non-combustible construction in accordance with OBC 3.1.5. Such a building also typically has:

- Floors constructed as fire separations with a resistance rating of 2 hours.
- Roofs intended for occupancy, such as roofs having exterior amenity or terrace space, will be constructed as fire separations equal to the floor assembly (i.e. 2 hr).
- Load-bearing walls, columns, and arches will have a fire-resistance rating not less than that required for the supported assembly.

The *Fire Protection Water Supply Guidelines for Part 3 in the Ontario Building Code* (October 1999) require that the buildings shall be provided with a supply of water not less than the total volume of the building, multiplied by the water supply coefficient from Table 1 of the technical bulletin, and the spatial coefficient values obtained from Figure 1 of the technical bulletin. Regardless of the size of the building, the maximum fire flow resulting from this methodology is 9,000 L/min, or 150 L/s.

The FUS methodology is likely to result in fire flows in the range of 133 L/s – 167 L/s. While full details on the adjacencies and exposures, and floor areas for the new development was not available, a required fire flow of 167 L/s was estimated based on past experience and utilized to complete updated water modelling for the Site.

7.4 System Capacity

The system capacity was determined using a hydrant flow test completed on the private hydrant located at 200 King Street. A static pressure of 72 PSI was noted and the data for the flowing conditions was used to establish the rated capacity of the system at 20 PSI, determined to be 3150 US gpm (198 L/s). The flow test results are provided in Appendix B and are graphically represented on an N1.85 graph below.

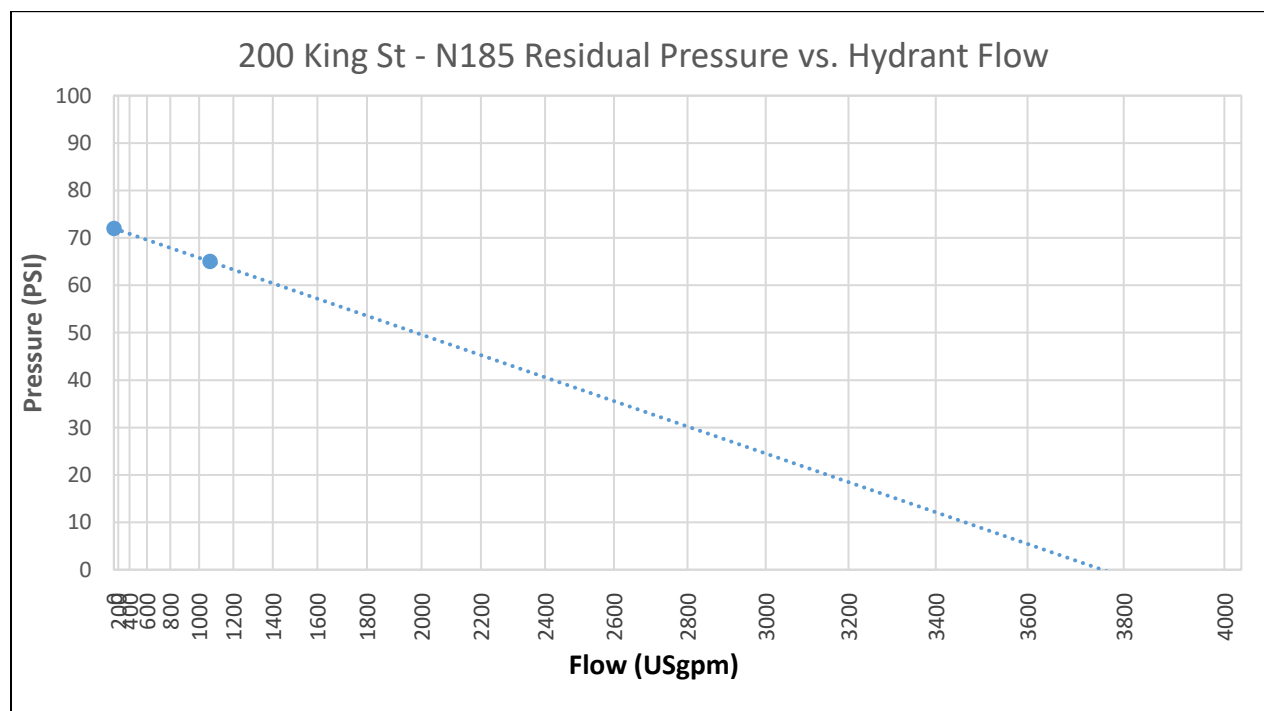


Figure 5: Watermain System Capacity

Based on a total required flow of 172.37 L/s (comprising 5.37 L/s in Maximum Day Domestic Demand and 167 L/s in Fire Flow Demand), and an available flow of 198 L/s, it is concluded that sufficient capacity is available in the municipal water supply to provide adequate servicing to this development.

In accordance with OBC clause 3.2.9.4(4), “if a building is 84 m or more high, measured between grade and the ceiling level of the top storey, the building shall be served by no fewer than two sources of water supply from a public water system”. The existing maximum permitted height under Zoning category UC-81 is 81 m. At this time there is no intent to exceed this maximum with the new student residence building; should the future development exceed 84 m in height, a secondary redundant fire supply would be required for the development.

8.0 STORM SERVICING

8.1 Storm Servicing and Drainage

In current conditions, storm servicing is provided through an internal storm sewer system. Drainage is directed to the municipal storm system at Regina Street, with SWM being provided within the site for the existing King Street residence building and the CCE building. Drainage from the lots fronting Lodge Street and Regina Street appear to have front yards draining to the respective streets without any controls. Ultimately, all runoff is directed towards the Regina Street storm sewer system.

It is anticipated that the internal drainage systems within the site will be reconfigured as necessary to provide adequate service connection to the new development. The new development will be required to limit proposed discharge flows to existing conditions or less. SWM within the site is discussed further in Section 9.0.

8.2 Local Servicing

The proposed development will contain an internal storm sewer system to collect runoff and provide SWM within the site prior to discharge to the municipal storm system. The City of Waterloo’s Design Criteria notes that municipal storm sewers shall be designed to convey the runoff from a 5-year design storm event, without surcharging.

The storm sewer system on Regina Street is a series of pipes, ranging from 250 mm in diameter to 750 mm in diameter, collecting drainage from the surrounding developed properties. A storm sewer capacity assessment was completed utilizing an existing composite runoff coefficient (C) of 0.8. In this scenario, it was determined that the local sewer does not have sufficient capacity to accommodate the flows from overall catchment. With a composite runoff coefficient of 0.3, the anticipated flows are more in line with the capacity of the local storm network. As such, it is assumed that the surrounding developed properties within the contributing catchment do have stormwater controls limiting inflow into the storm sewer system.

As previously noted, evidence of stormwater controls was visible on the King/Regina/Lodge block.

8.3 Major Overland Flow

Major overland flow from the site is to be directed to the northeastern corner of the site and discharge to Regina Street. This overland flow will ultimately be discharged through the storm easement and follow existing drainage patterns. The peak discharge of the redevelopment will be limited to the peak discharge of existing conditions.

9.0 STORMWATER MANAGEMENT

9.1 Stormwater Management Design

In accordance with the City of Waterloo's Comprehensive Engineering and Landscape Manual, an effective SWM design must address the following:

- Water Quantity: post development peak flows controlled to pre-development levels.
- Water Quality: in accordance with the requirements of the Laurel Creek Watershed Study (GRCA, 1993) and a minimum of average, long-term total suspended solids reduction of 80% or greater in accordance with the Municipal Class EA Integrated Stormwater Management Master Plan (SWM-MP) (Aquafor Beech, 2021).
- Water Balance: to ensure groundwater protection and recharge.
- Volume Control: the site is subject to a volume control target of 12.5mm across the entire site in accordance with the SWM-MP.

The site is part of the Lower Laurel Creek subwatershed as delineated within the City's integrated stormwater management master plan. The subwatershed has a relatively poor health and, as part of the redevelopment, opportunities to improve conditions through the design of the SWM systems will have to be explored.

9.2 Existing Conditions

The subject site has an area of 1.25 ha. Drainage from the site is directed towards Regina Street, and it is assumed that stormwater controls limit the discharge to pre-development conditions, with a composite runoff coefficient of 0.3, regardless of the site's imperviousness.

Utilizing a time of concentration of 10 minutes, the runoff from the site is estimated to be 0.084 m³/s.

9.3 Peak Flow Control

The proposed development is expected to comprise the entire site being largely impervious, with a total imperviousness of 90%, or a composite runoff coefficient of approximately 0.85. On-site storage will be required to limit peak discharge from the site to existing conditions. This can be achieved through:

- Control flow roof drains on the proposed building(s),
- Incorporation of green or blue roof systems and/or
- Detention in the form of underground chambers, cisterns or superpipes with outlet controls.

The uncontrolled flow from the development is likely to be in the order of 0.584 m³/s and approximately 492 m³ of storage is required to limit discharge to 0.084 m³/s. Based on previous experience, flow-control roof drains are generally sufficient to control the 100-year flow from the building rooftops to their pre-development levels and, should they be implemented, only controls for the parking areas would be necessary.

9.4 Water Quality Control

The City of Waterloo's guidelines stipulate that a minimum Enhanced Level of Protection be provided, as defined by the MECP design guidelines. This corresponds to 80% long-term removal of total suspended solids (TSS).

A Stormceptor EFO6 OGS unit can provide 82% TSS removal for greater than 90% of runoff capture, utilizing the MECP Fine Particle Distribution as an end-of-pipe system. Sizing for the OGS is provided in Appendix C.

Should quality control be required to meet the MECP particle size distribution, an equivalent Jellyfish Filter can provide the required treatment.

As part of the Laurel Creek Subwatershed Study (1993), new developments are assigned additional water quality targets to be achieved through best management practices. The targets from the 1993 study include:

- May 1 – October 31 instream temperature: <29 deg. C.
- June 1 – August 1 instream temperature: <26 deg. C
- Instream E. coli: <200 counts/100 mL
- Instream DO: > 6 mg/L
- Instream phosphorus: 0.05-0.08 mg/L
- BMPs to remove 90% phosphorus
- Storage discharge: <25 mg/L suspended solids (event mean concentrations and flow proportional sampling)

Given the nature of the development, potential sources for phosphorus in runoff include plant and leaf litter, road salt, and fertilizer applied to lawns and/or landscaped areas. The presence of phosphorus contributes to eutrophication (which is a reduction in dissolved oxygen in water); however, this is typically associated with dissolved phosphorus and not commonly particulate phosphorus (which is attached to sediment). Similarly, potential sources for E. coli in stormwater include wildlife waste, decomposing matter, or through malfunctioning sewage collection systems that may leech bacteria into storm water collection system.

In addition to the OGS unit described above (which addresses the TSS parameter), the development should incorporate the following pollution prevention control measures to address the water quality, specifically E. Coli control, phosphorus control, and instream dissolved oxygen:

- Minimize or eliminate dry water flows. In urban environments, dry weather flows are typically a result of sanitary sewer leaks that are intercepted by storm drain system. The sanitary sewer system for the project shall be constructed and tested (low-pressure air test, per OPSS 410) to be completely watertight to prevent infiltration of groundwater into the sanitary sewer system. Such construction is intended to prevent sewage leaks from entering the sanitary sewer.
- Non-stormwater discharges in dry weather will be limited to routine cleaning and maintenance and irrigation overspray. Irrigation systems will be designed by qualified professionals to minimize overspray.
- Implementation of proper waste management to minimize naturally occurring and human-attracted urban wildlife. The project should strive to not include any open/outdoor waste storage areas that will attract wildlife.
- Litter control measures shall be encouraged and incorporated during detailed design to ensure that litter is properly disposed of in a timely manner.
- Limit use of fertilizers in landscaped areas and consider incorporation of sorbent additives to growing medium substrates to limit the total phosphorus in runoff. Instead, maintain healthy lawns in organic-rich soil to prevent soil erosion and filter stormwater contaminants.
- Incorporate native landscaping to reduce turf areas and reduce the need for irrigation and watering. Over-watering lawns can be a significant source of bacteria.
- Sweeping of parking lots to reduce surface contaminants that may drain to stormwater systems.
- Leaf collection and composting to prevent growth of bacteria and decomposition of the leaf piles.
- Storm sewer cleaning and catchbasin cleaning to remove accumulated debris and sediment.

- Maintenance of sanitary sewer systems, including regular inspection and flushing to ensure any leaks are identified and repaired.

Depending on the ultimate design for the proposed development, the following best management practices for capture of stormwater runoff may also be incorporated:

- Infiltration and retention measures to collect runoff from landscape and rooftop areas, with a total volume exceeding 25 mm for these surfaces. As the site is within an Issue Contributing Area for Sodium Chloride, parking lot runoff should not be infiltrated. Bacteria and phosphorus removal is considered to be 100% for infiltration measures as no runoff is anticipated for the water quality event.
- OGS, as described above, for sediment removal, which will also remove particulate phosphorus and bacteria bound to the sediment. The feasibility of infiltration measures should be revisited when more details about the final building configuration and soil/groundwater are known.

9.5 Volume Control and Water Balance

The site is largely impervious and, without infiltration measures, would not contribute to baseflow to Laurel Creek. A site-specific water balance assessment should be completed as part of future planning applications to ensure that the volume of discharge on an average annual basis is not significantly exceeded. Volume control can be provided via:

- Natural retention within the landscape areas and/or enhanced infiltration via bioretention measures
- Extensive green roof systems
- Infiltration measures

Geotechnical and hydrogeological studies to support the infiltration measures will be required as part of the detailed design.

10.0 SITE GRADING

The grading of the site should respect the existing grades along all property lines. Proposed grading will conform with slopes outlined as part of the Accessibility for Ontarians with Disabilities Act (AODA) and City of Waterloo Development Engineering Guidelines.

The proposed grading also allows for conveyance of major overland flow towards the northeastern corner of the site, ultimately draining to Regina Street.

10.1 Compliance with On-Site and Excess Soil Management Provincial Regulations

The MECP has introduced a new regulation, O.Reg. 406/19 “On-Site and Excess Soil Management”, under the Environmental Protection Act. The excavation of excess material, and subsequent off-site disposal of excess soils from this Site, will require compliance with this new regulation should it be in force during construction of the blocks.

A Qualified Person, as defined within the Regulation, should be retained to provide site-specific guidance related to the Excess Soil Regulation.

11.0 ADDITIONAL CONSTRUCTION CONSIDERATIONS FOR SERVICING

11.1 Short-Term Construction Dewatering

The construction of underground parking structures may require dewatering of perched groundwater under the surficial layers of the site. Should shallow perched groundwater be encountered, depending on the quantity to be dewatered, the dewatering activity could be considered a water taking requiring additional permits and approvals from the MECP.

In the short term, the dewatering can replace inflow to the storm sewer network from the relevant pre-development catchment area, as the contributing catchment is expected to be replaced with a large excavation. The groundwater will require treatment and sediment removal to provincial standards, and to comply with the City of Waterloo sewer use bylaw for discharge to storm sewers. Such a treatment system may require an Environmental Compliance Approval (ECA) from the MECP.

Further details of construction dewatering (if required) shall be made available at the Site Plan Approval stage for the various phases of the development.

11.2 Long-Term Dewatering

It is noted that neither the City of Waterloo nor Region of Waterloo permit buildings that rely on active dewatering systems for waterproofing. As such, should construction of underground levels encounter groundwater, mitigation measures such as a caisson cut-off wall or “tanking” of the underground level to create a watertight system should be pursued.

12.0 EROSION AND SEDIMENT CONTROL

Sediment and erosion controls to be implemented during construction will include stabilized construction entrances, a perimeter silt fence, and sediment interceptor swales with installation of coir log check dams.

Prior to the start of any construction, all erosion and sediment control measures installed will be inspected by the Consultant. The controls will be maintained, and accumulated sediments removed once their capture capacity has been decreased by one-third. The measures will also be periodically inspected and upgraded/alterd as Site conditions change. Periodic inspections will consist of visual observation of the effectiveness of the control measures and sediment migration offsite.

Any sediment tracked onto the roadway during the course of construction will be cleaned by the Contractor. To minimize the amount of mud tracked onto the roadway, a mud-mat will be installed at all construction exits and the Contractor will be required to ensure that vehicles leave through the exits. The mud-mat will be periodically inspected and cleaned/maintained as required to ensure it is functioning as intended.

To prevent sediment runoff from the Site, light-duty silt fencing (in accordance with OPSD 219.110) will be installed along the perimeter of the Site and at the base of all stockpiles. Stockpiles are to be visually monitored after rainfall events and will be hydraulically seeded if the stockpiles are to remain undisturbed for extended periods of time.

The outlets from the Site will be inspected for evidence of sediment migration offsite. In the event that sediments have migrated offsite, additional sediment controls shall be implemented as necessary to ensure that no additional sediment escapes from the Site. Any sediment that has migrated offsite shall be removed and the area restored to pre-construction conditions.

As the servicing phase of the construction proceeds, each inlet structure will have an insert installed and/or filter fabric will be wrapped around the lids of all manholes to prevent intrusion of sediment into the storm sewer

network. The inserts will be cleaned once they reach one-third their sediment accumulation capacity or as per the manufacturer's recommendations.

All erosion and sediment control measures will be removed at the end of construction.

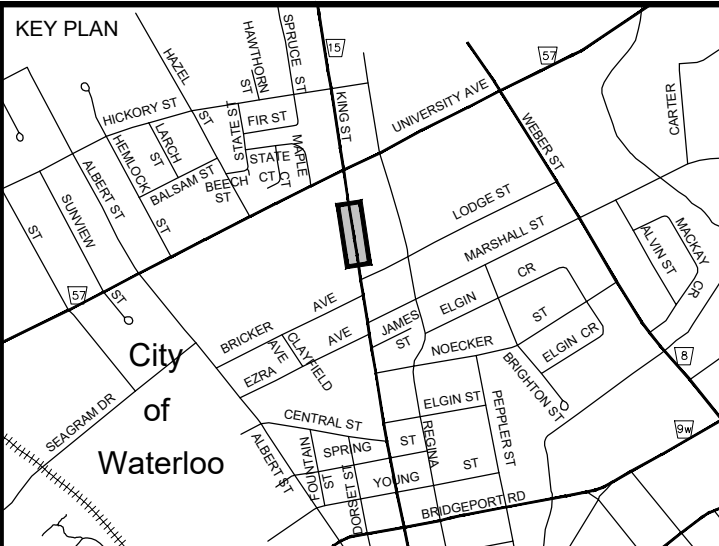
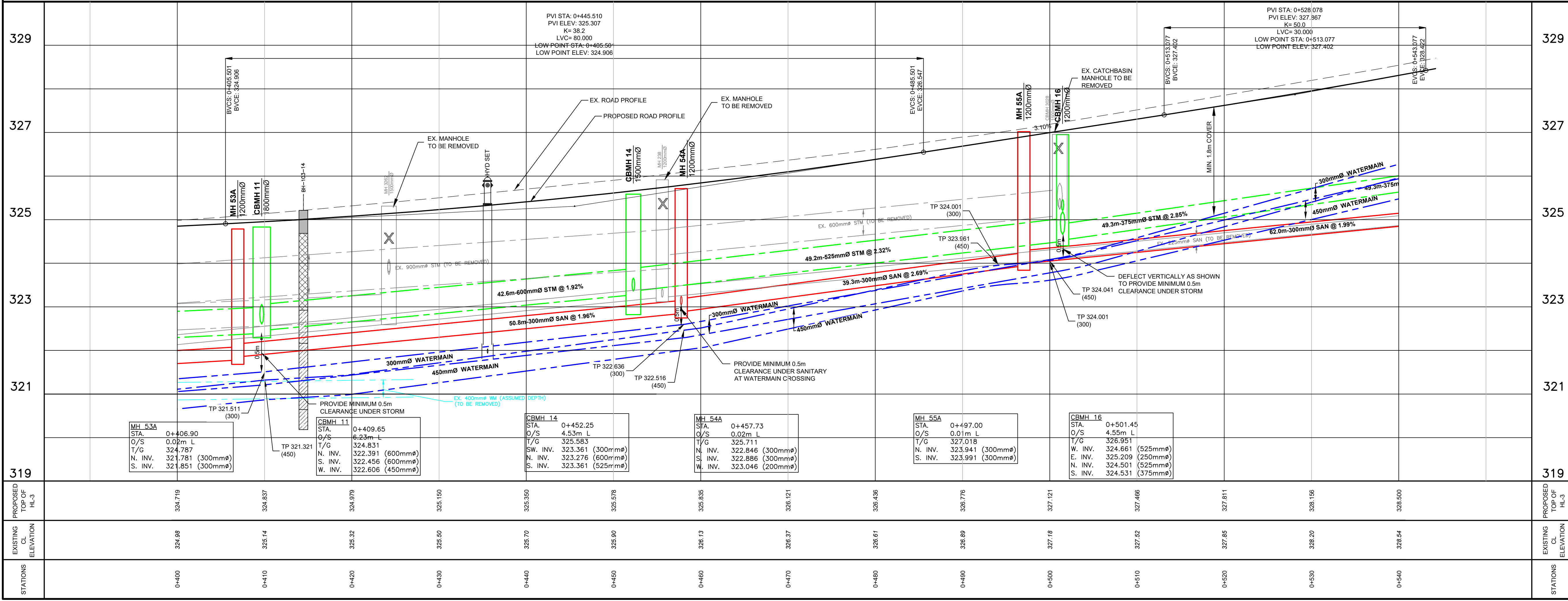
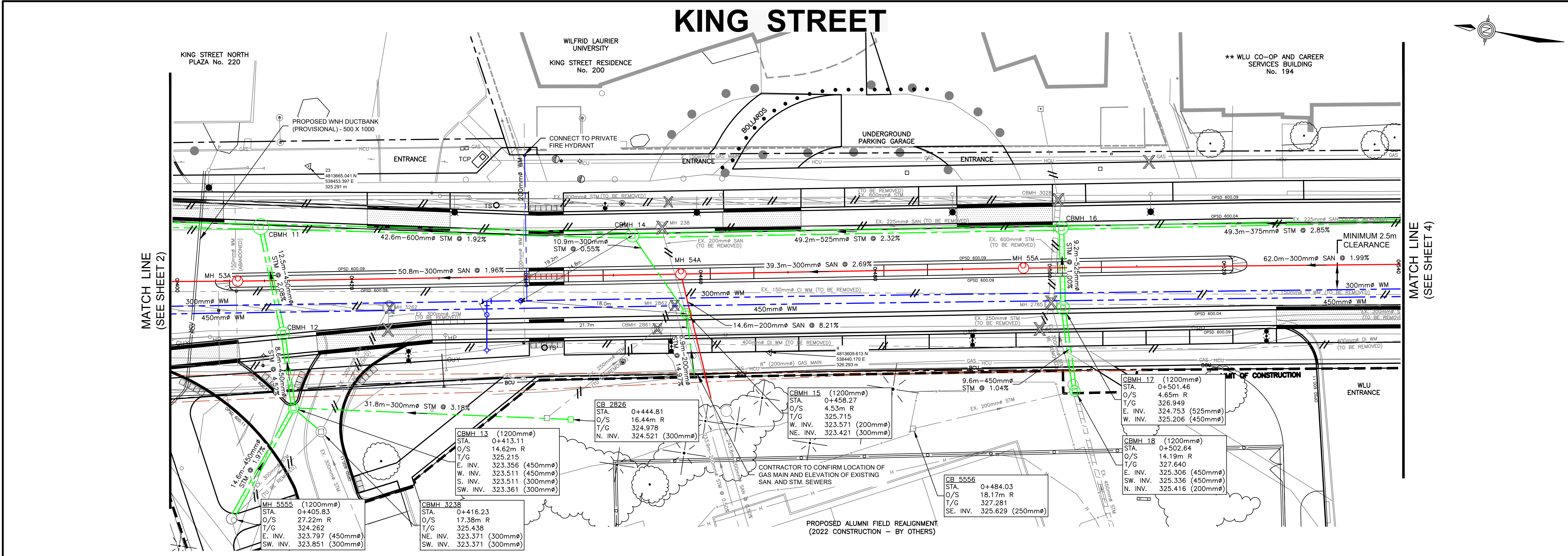
13.0 CONCLUSIONS

Based on the analysis presented in this report it is concluded that:

- The future student residence building will comply with existing Zoning and City of Waterloo Bylaws. The whole site will accommodate a maximum of 952 bedrooms with a maximum 25% of the area of the new building being directed for ancillary uses.
- The Site is within an Issue Contributing Area and the application of de-icing salts is a Significant Drinking Water Threat. A Salt Management Plan and potentially a risk management plan may be required as part of future site plan approval.
- The existing municipal sanitary sewer network is sufficient to accommodate the additional flows from the proposed student residential and academic related ancillary uses.
- The existing municipal water distribution network is sufficient to accommodate the proposed student residential and academic-related ancillary uses within the pressure and velocity ranges stipulated by the DGSSMS.
- The proposed development will require SWM controls to reduce peak discharge to that of existing conditions. It is assumed that the existing site already has stormwater controls limiting peak discharge to assumed undeveloped conditions.
- It is assumed that properties discharging stormwater to Regina Street have existing stormwater controls, and the storm sewer on Regina Street has capacity to accept the controlled drainage from the post-development conditions.
- Quality controls can be achieved through a Stormceptor EF06 OGS or equivalent.
- Best management practices should be implemented to incorporate the requirements of the Laurel Creek Subwatershed Study.
- Perimeter silt fence, silt fence at the base of all stockpiles, filter fabric over storm and sanitary structures, and construction entrance mud mats can provide erosion and sediment control. These will be designed during detailed design.

APPENDIX A – Existing Utility Information

- Region of Waterloo Plan and Profiles
- City of Waterloo Plan and Profiles
- Existing Sanitary System
- Existing Water Network System
- Existing Storm System



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

- NOTES:
- FOR CATCHBASIN, AND CATCHBASIN MANHOLES, OFFSETS ARE GIVEN TO THE EDGE OF PAVEMENT. GRATE ELEVATIONS ARE THE FINISHED PAVEMENT ELEVATIONS. FOR MANHOLES, AND OTHER STRUCTURES, OFFSETS ARE GIVEN TO THE CENTER OF THE STRUCTURE AND ELEVATIONS ARE THE FINISHED PAVEMENT ELEVATIONS.
 - PAVEMENT DEPTHS:
 - 50mm SP 12.5 FC CATEGORY 'D' SURFACE ASPHALT
 - 180mm SP 19 CATEGORY 'D' BASE ASPHALT (3x60mm LIFTS)
 - 400mm GRANULAR 'A'
 - REFER TO STREETScape AND LANDSCAPE PLANS FOR LIMIT OF RESTORATION WORK, TYPE OF SURFACE TREATMENT AND LOCATION OF DEPRESSED CURBING AT PEDESTRIAN / VEHICULAR CROSSINGS.
 - ALL CATCHBASINS AND CATCHBASIN MANHOLES HAVE A 0.600m SUMP.
 - SANITARY AND STORM MANHOLES HAVE SELF-LEVELING FRAME AND COVERS.
 - CATCHBASIN FRAME & COVERS ARE AS PER OPSD 400.10.

- LEGEND:
- OPSD 600.040 CONCRETE CURB
 - DROPPED OPSD 600.040 CONCRETE CURB
 - OPSD 600.010 TERMINATION OF CONCRETE CURB AND GUTTER
 - OPSD 600.090 SEMI-MOUNTABLE CONCRETE CURB WITH NARROW GUTTER
 - OPSD 600.110 CONCRETE BARRIER CURB
 - OPSD 600.110 DROPPED CONCRETE BARRIER CURB
 - PROPOSED LIMIT OF GRADING / TOPSOIL & SOD RESTORATION
 - TRUNCATED DOME DETECTABLE WARNING PLATES AS PER RMW SD 224
 - GROOVED DIRECTIONAL LINES AS PER RMW SD 228
 - REMOVALS
 - HYDROVAC EXPOSURE NEEDED
 - ** CONTRACTOR TO CONFIRM SERVICES

THE BASE TOPOGRAPHIC SURVEY IN THIS DRAWING WAS COMPLETED IN UTM COORDINATES USING GLOBAL POSITIONING EQUIPMENT USING THE NAD 83 ZONE 17 GRID. CONTACT THE REGION OF WATERLOO, DESIGN AND CONSTRUCTION DIVISION, SURVEY GROUP FOR DESCRIPTIONS, COORDINATES AND ELEVATIONS OF CONTROL POINTS.

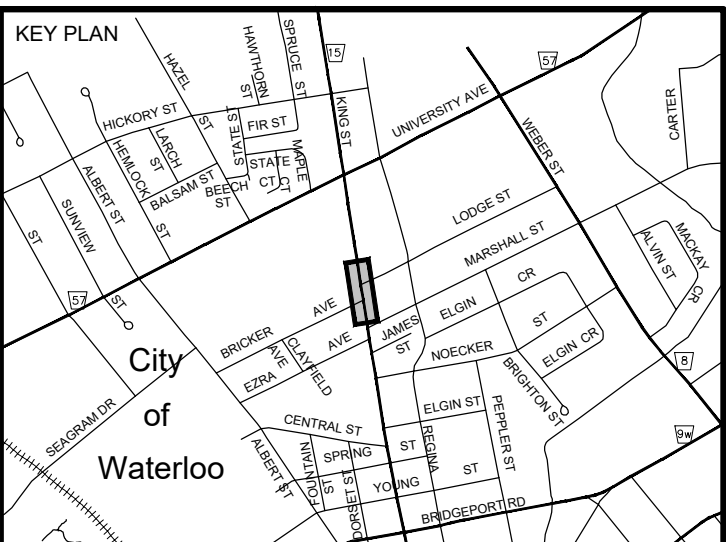
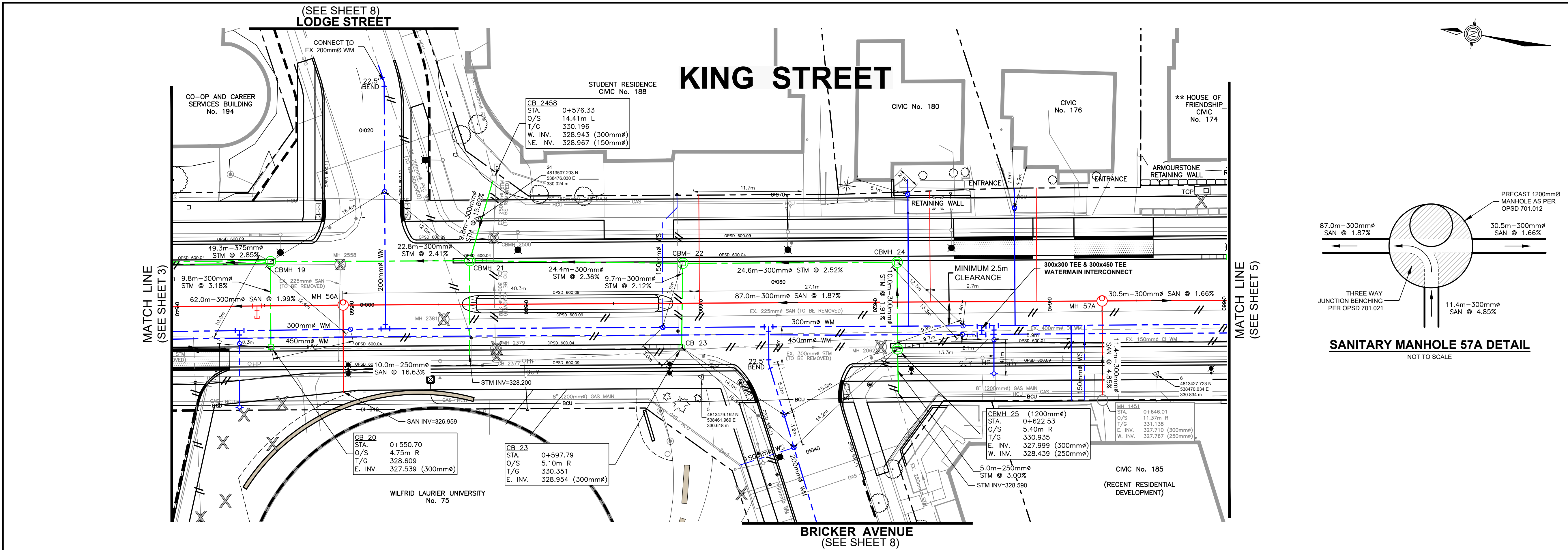
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3	ISSUED FOR ECA	E.S.	MAY 5, 2021
2	ISSUED FOR TENDER	E.S.	APR 2 2021
1	ISSUED FOR 90% PRE-QUALIFICATION	E.S.	FEB. 24 2021
No.	ISSUE/REVISION	BY	DATE

REGIONAL ROAD #15
(KING STREET NORTH)
CENTRAL STREET TO
UNIVERSITY AVENUE)

KING STREET
PLAN & PROFILE
0+400 TO 0+540



DRAWN BY:	K.S.M.	CONTRACT No.	2021-111
CHECKED BY:	E.S.	FILE No.	5494
DATE:	FEB. 24, 2021	DRAWING No.	
SCALE	HOR. 1:250 VERT. 1:50	SHEET No.	03 OF 65
LAYOUT NAME:	PP03		



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 - CATCHBASIN FRAME & COVERS ARE AS PER OPSD 400.10.

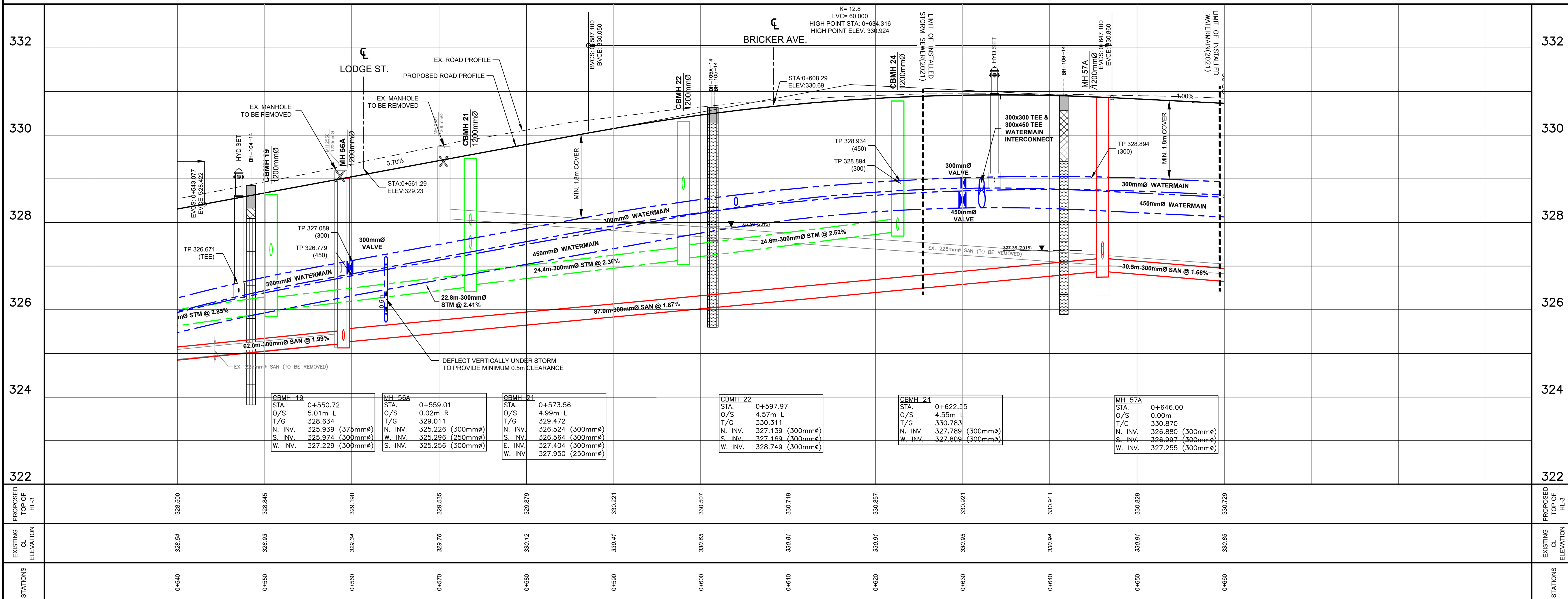
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- CONTROL POINT
 - OPSD 600.040 CONCRETE CURB
 - DROPPED OPSD 600.040 CONCRETE CURB
 - OPSD 608.010 TERMINATION OF CONCRETE CURB AND GUTTER
 - OPSD 600.090 SEMI-MOUNTABLE CONCRETE CURB WITH NARROW GUTTER
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 - PROPOSED LIMIT OF GRADING / TOPSOIL & SOD RESTORATION
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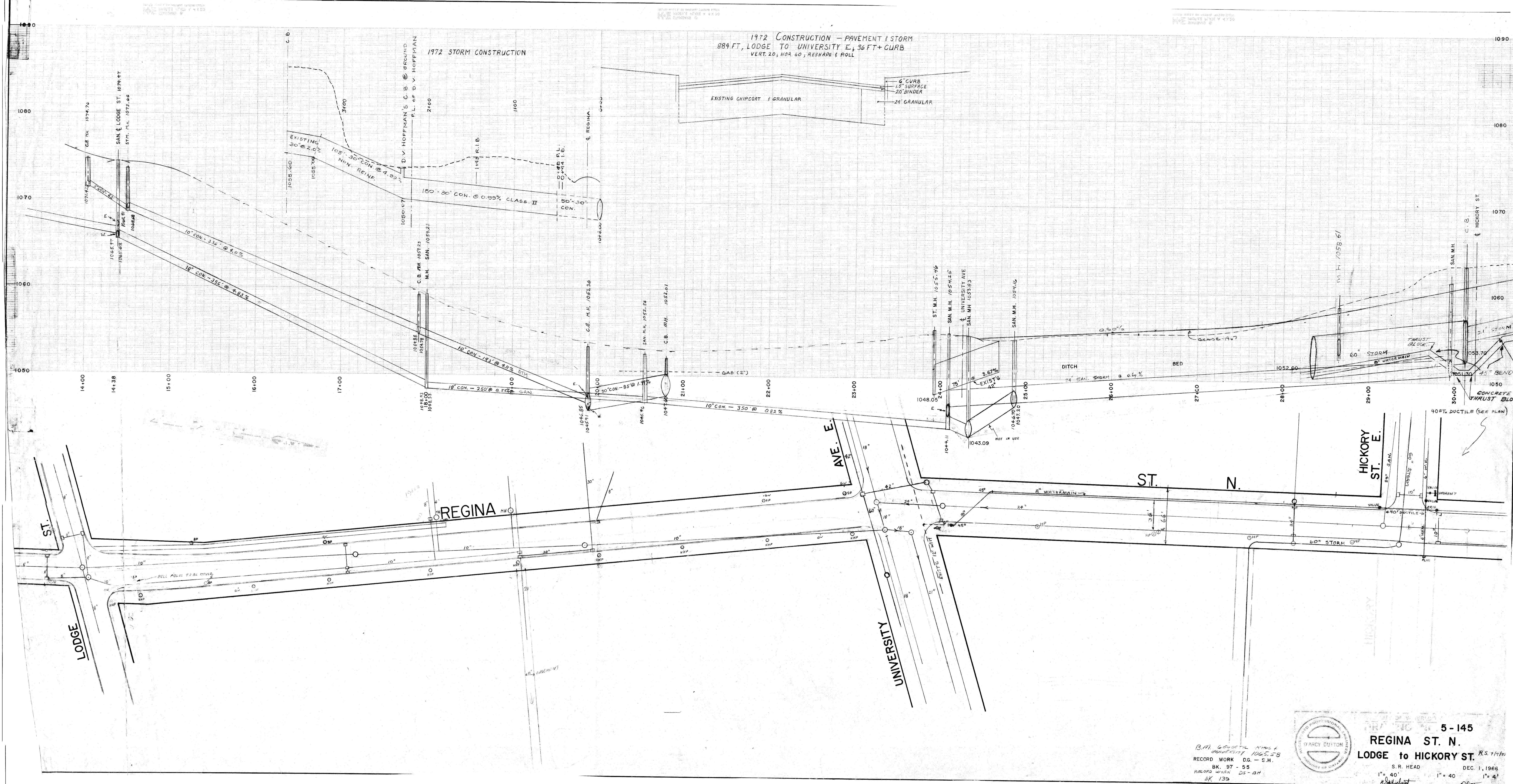
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No.	ISSUE/REVISION	BY	DATE

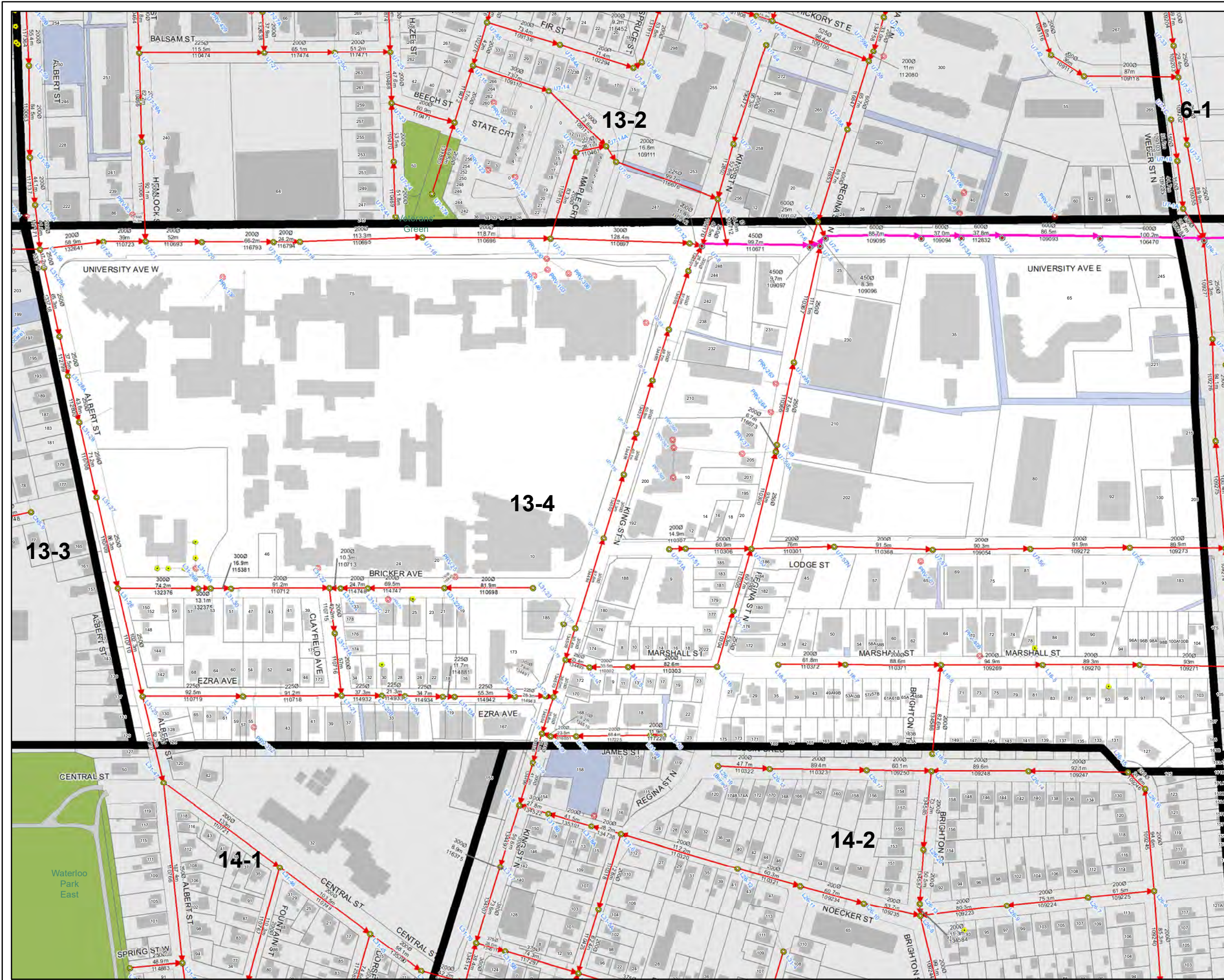
REGIONAL ROAD #15
(KING STREET NORTH)
CENTRAL STREET TO
UNIVERSITY AVENUE)

KING STREET
PLAN & PROFILE
0+540 TO 0+660



DRAWN BY:	K.S.M.	CONTRACT No.	2021-111
CHECKED BY:	E.S.	FILE No.	5494
DATE:	FEB. 24, 2021	DRAWING No.	
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LAYOUT NAME:	PP04		





SANITARY LAYOUT

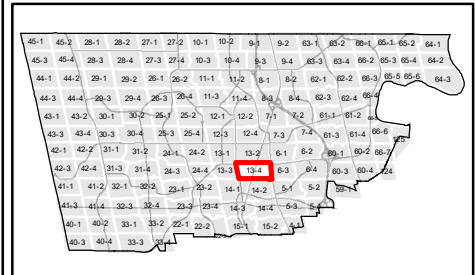
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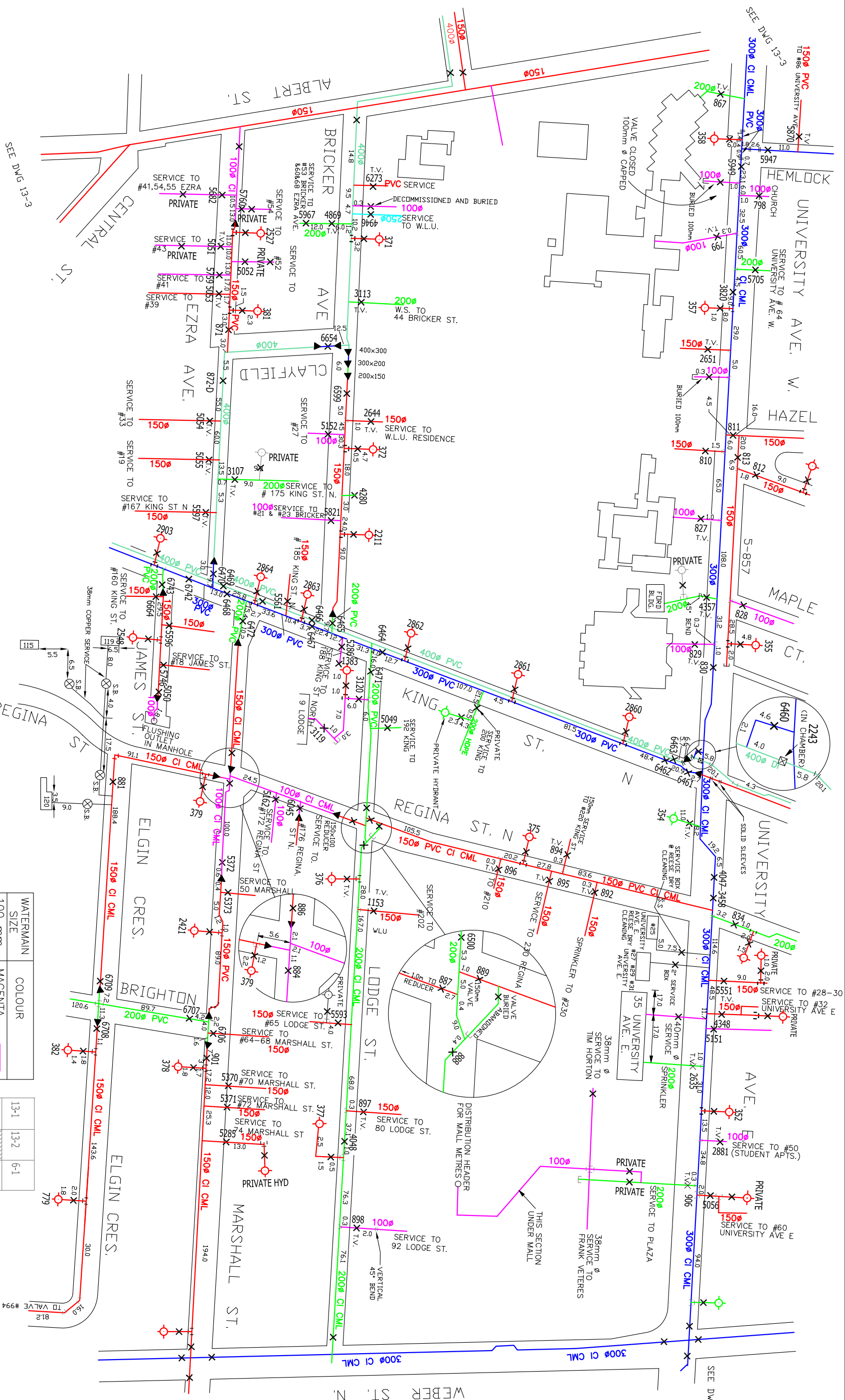
Date: 12 June, 2023

- Trunk Manhole
- Local Manhole
- Local Manhole (Private)
- Local Manhole (Region of W.)
- Local Manhole (Kitchener)
- Local Manhole (UoW)
- Local Manhole (Proposed)

- Trunk Main
- Trunk Main (Kitchener)
- Local Main
- Local Main (Private)
- Local Main (Region of W.)
- Local Main (Kitchener)
- Local Main (UoW)
- Forcemain
- Local Main (Proposed)

- Fitting
- Valve
- Chamber
- Clean Out
- Discharge Structure
- Meter Chamber
- Pumping Station
- Treatment Plant
- Storage Basin
- Easement





LEGEND

HYDRANT
VALVE
1000

WATERMAIN SIZE	COLOUR
100 mm	MAGENTA
150 mm	RED
200 mm	GREEN
250 mm	CYAN
300 mm	BLUE
350 mm	9
400 mm	113
450 mm	220
600 mm	112
750 mm	140
900 mm	243

13-1	13-2	6-1
13-3	13-4	6-3
14-1	14-2	5-1

NOTE: ALL MEASUREMENTS SHOWN
ARE IN METRIC UNLESS
OTHERWISE SPECIFIED

THE ACCURACY OF INFORMATION SHOWN ON THIS DRAWING IS NOT GUARANTEED TO ENSURE ITS ACCURACY, IT SHOULD BE VERIFIED IN THE FIELD.

NOTE

100x VALVE

4 26 2023	B.P.	VARIOUS ADDITIONS	
98 04 21	M.M.	VARIOUS CHANGES	
DATE	INT	REVISION	DRAWN BY:IRENN
CAD STATION	DATE	4 26 2023	SCALE N.T.S.

WATERMAIN LAYOUT

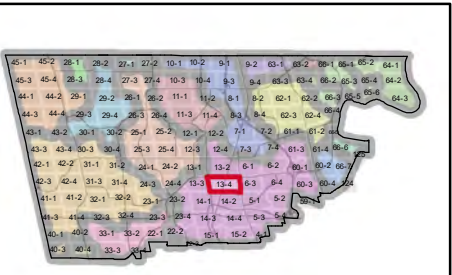
G.C.T. NO. 13-4

STORM LAYOUT

G.C.T. NO: 13-4

Date: 28 June, 2023

- Single Catchbasin
- Single Catchbasin (Private)
- Single Catchbasin, (Region of W.)
- Single Catchbasin, (Kitchener)
- Double Catchbasin
- Double Catchbasin (Private)
- Double Catchbasin, (Region of W.)
- Double Catchbasin, (Kitchener)
- Inlet
- Single Ditch Inlet Catchbasin
- Single Ditch Inlet Catchbasin (Prv)
- OGS
- OGS (others)
- Manhole
- Manhole, (Private)
- Manhole, (Region of W.)
- Manhole, (Kitchener)
- CWC Manhole
- Catchbasin Manhole
- Catchbasin Manhole (Private)
- Catchbasin Manhole, (Region of W.)
- Double Catchbasin Manhole
- Double Catchbasin Manhole (Prv)
- Double Catchbasin Manhole, (Region of W.)
- Ditch Inlet Catchbasin Manhole
- Ditch Inlet Catchbasin Manhole (Prv)
- Ditch Inlet Catchbasin Manhole, (Region of W.)
- Collector
- Collector (Private)
- Collector, (Region of W.)
- Collector, (Kitchener)
- Culvert
- Ditch
- Infiltration Pipe
- Infiltration/Infra Facility
- Infiltration Gallery
- Soakaway Pit
- Chamber
- Cleanout
- Discharge Structure
- Underground Storage
- SWM Pond
- Easement

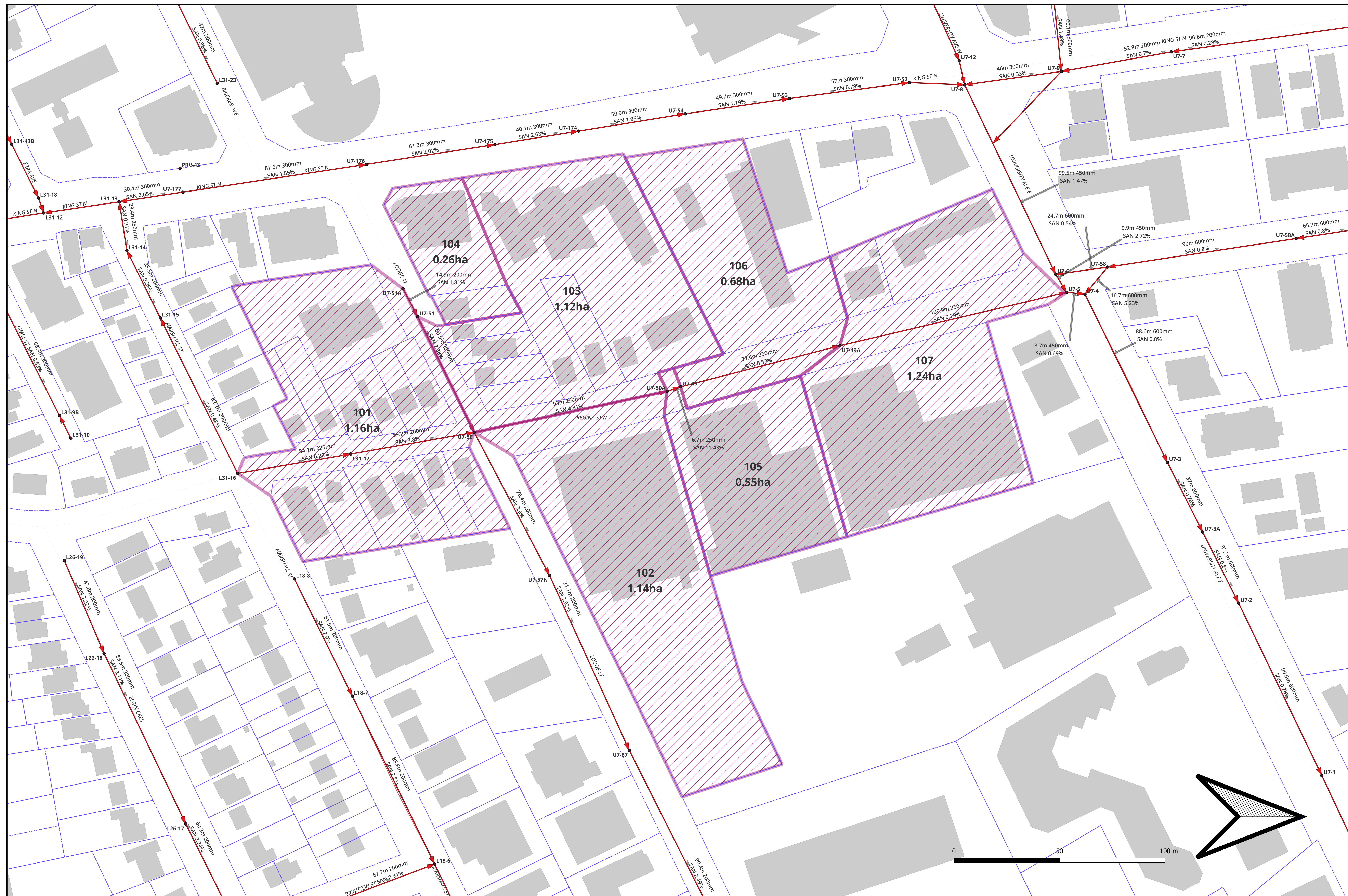


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Revision Date: 23 March 2018
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Imagery: May 2014
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APPENDIX B - Sanitary and Storm Calculations

- Sanitary Sewer Design Sheet
- Sanitary Flow Network and Catchment Areas
- Storm Sewer Design Sheet
- Storm Flow Network and Catchment Areas



Project:		WLU - King Regina Lodge -Servicing Capacity				Design Data			SANITARY SEWER DESIGN CALCULATIONS																														
Project No:		2023-0805-01				Min. Velocity		0.8		m/s																													
Date:		2024-03-07				Max. Velocity		3.0		m/s																													
Designed By:		DR		Checked By:		RK		Manning's 'n'		0.013																													
						Infiltration		0.25		l/s/ha		Peaking Factor		Harmon		Peaking Factor		2		Peaking Factor		2.5																	
												Avg. Daily Flow		275		L/c/d		Avg. Daily Flow		0.5		L/s/ha		Avg. Daily Flow		0.4		L/s/ha											
Pipe Data				Residential				Cumulative			Commercial			Industrial			Infiltration		Total Flow	Design Data																			
From		To		Length	Area	Units	Density	Population	Area	Population	Peak Factor	Area	Total Area		Area	Total Area		Area	Total Area		Area	Total Area		Diameter	Slope	Q _{FULL}	V _{FULL}	Q/Q _{FULL}											
				(m)	(ha)		(ppu)	(people)	(ha)	(people)		(ha)	(ha)		(ha)	(ha)		(ha)	(ha)		(L/s)	(mm)	(%)	(L/s)	(m/s)														
Existing Conditions																																							
101 102 Lodge St 14-16-18 Regina St 195 201 205 209 King Res SITE (103) 104 (Coop)		U7-50	U7-50A	93	1.16	0	0	208	1.16	208	4.14	0.00	0.00		0.00	0.00		1.16	1.16		3.032	250	4.8100	130.42	2.66	0.02													
		U7-50A	U7-49	6.7	0	0	0	0	0	0	4.50	1.14	1.14		0.00	0.00		1.14	2.30		1.715	250	11.4300	201.05	4.10	0.01													
					0	3	4.31	13	0	13																													
					0	3	2.22	7	0	20																													
					0	3	2.22	7	0	27																													
					0	3	2.22	7	0	34																													
					0	12	2.22	27	0	61																													
					0	328	1	328	0	389	4.03																												
		U7-50	U7-49	6.7	1.12	0	0	389	2.28	597	3.93	0.00	0.00		0.00	0.00		1.12	2.28		8.044	250	11.4300	201.05	4.10	0.04													
		U7-50	U7-49	6.7	0	0	0	0	0	0	4.50	0.26	0.26		0.00	0.00		0.26	1.42		0.615	250	11.4300	201.05	4.10	0.00													
105 106 107		U7-49	U7-49A	77.6	0	0	0	0	2.28	597	3.93	0.00	1.40		0.55	0.55		0.55	6.00		10.924	250	0.5300	43.29	0.88	0.25													
		U7-49A	U7-5	109.9	0	0	0	0	2.28	597	3.93	0.68	2.08		0.00	0.55		0.68	6.68		11.774	250	0.7900	52.86	1.08	0.22													
		U7-49A	U7-5	109.9	0	0	0	0	2.28	597	3.93	1.24	3.32		0.00	0.55		1.24	7.92		13.324	250	0.7900	52.86	1.08	0.25													
Proposed Conditions																																							
101 102 New Res BLDG Ex King Res BLDG SITE (103) 104 (Coop) 105 106 107		U7-50	U7-50A	93	1.16	0	0	208	1.16	208	4.14	0.00	0.00		0.00	0.00		1.16	1.16		3.032	250	4.8100	130.42	2.66	0.02													
		U7-50A	U7-49	6.7	0	0	0	0	0	4.50	1.14	1.14		0.00	0.00		1.14	2.30		1.715	250	11.4300	201.05	4.10	0.01														
						628	1.5	942	0	942																													
						328	1	328	0	1270	3.73																												
		U7-50	U7-49	6.7	1.12	0	0	1270	2.28	1478	3.68	0.00	0.00		0.00	0.00		1.12	2.28		17.901	250	11.4300	201.05	4.10	0.09													
		U7-50	U7-49	6.7	0	0	0	0	0	0	4.50	0.26	0.26		0.00	0.00		0.26	1.42		0.615	250	11.4300	201.05	4.10	0.00													
		U7-49	U7-49A	77.6	0	0	0	0	2.28	1478	3.68	0.00	1.40		0.55	0.55		0.55	6.00		20.781	250	0.5300	43.29	0.88	0.48													
		U7-49A	U7-5	109.9	0	0	0	0	2.28	1478	3.68	0.68	2.08		0.00	0.55		0.68	6.68		21.631	250	0.7900	52.86	1.08	0.41													
		U7-49A	U7-5	109.9	0	0	0	0	2.28	1478	3.68	1.24	3.32		0.00	0.55		1.24	7.92		23.181	250	0.7900	52.86	1.08	0.44													



WALTERFEDY

[illegible]