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MEMORANDUM

DATE: 2015-12-11 *EMAIL*

TO: **Ryan Hicks, B.E.D.S., LEED BD+C**
Lic. Tech. OAA
srm Architects Inc.

SUBJECT: **Functional Servicing and Stormwater Management Brief in support of Site Plan Amendment for 774 Bronson Avenue**

OUR FILE: DSEL Project No. 15-807

ATTACHMENTS:

- Previously approved Site Plan prepared by Marco Manini February 27, 2013
- Proposed Site Plan prepared by SRM Architects Inc., dated December 10, 2015
- Reduced Copy of approved Site Servicing Plan by DSEL, dated January 2014
- Previously approved Water Demand Calculation Sheet by DSEL, dated February 2013
- Water Demand Calculation Sheet by DSEL, Dated December 2015
- Updated Boundary Conditions from City of Ottawa, Dated November 2015
- Previously approved Wastewater Discharge Calculation Sheet by DSEL, dated June 2012
- Wastewater Discharge Calculation Sheet by DSEL, Dated December 2015
- Previously approved Stormwater Management Plan (SWM-1) prepared by DSEL, dated February 2013
- Previously approved Stormwater Management Calculation sheet, dated February 2013
- Stormwater Management Plan (SWM-1) prepared by DSEL, December 2015
- Stormwater Management Calculation Sheet by DSEL, Dated December 2015
- Ipex Tempest LMF Flow Curve, provided by Ipex
- Summary of Triton U/G Storage calculation, dated December 2015

DSEL has been retained by SRM Architects Inc. to provide a servicing memo in support of the Site Plan Amendment of a proposed development at 774 Bronson Avenue. DSEL had previously prepared a Functional Servicing and Stormwater Management Report prepared for the Site Plan Application (SPA) for 774 Bronson Avenue and 551 Cambridge Street, approved by the City of Ottawa in February 2013. Since the February 2013 approval, the subject property has been combined into a single parcel, 774 Bronson Avenue. The new proposed plan, dated December 2015, including a 12-storey student residence. See ***Appendix*** for proposed plan prepared by SRM Architects Inc.

Site Plan Approval (SPA) was obtained for the subject site based on the Functional Servicing Report (FSR) & Site Servicing Plan (SSP) prepared by DSEL, dated February 2013 & October 2013, respectively. A reduced copy of the approved SSP can be found in ***Appendix.***

The approved AES and FSR both show that the previously proposed development was supported by existing water, sanitary and stormwater services. The following serviceability study will confirm that the updated concept plan will continue to be sufficiently supported by existing services.

The approved FSR proposed ***193*** residential units and ***804m^2*** of commercial floorspace. The new application contemplates ***181*** student residence units and ***136m^2*** of commercial/amenity space.

1.0 Water Servicing

Water servicing is proposed to follow the approved FSR and SSP. As the contemplated development has a water demand greater than 50m^3/day a redundant water connection is required as per the *City of Ottawa Water Design Guidelines* (2010). Water servicing will continue to be achieved as per the approved SSP with a dual connection to the existing 200mm diameter watermain within Cambridge Street. ***Table 1*** summarizes the anticipated water demand for the proposed development. See ***Appendix*** for detailed calculations of water demand based on the December 2015 concept plan.

Table 1: Water Demand and Boundary Conditions

Design Parameter	Anticipated Demand (L/min)	Boundary Conditions[2] Bronson Avenue (m H_2O / kPa)	
Average Daily Demand	48.5	117.1	429.3
Max Day + Fire Flow	145.0 + 14,000 = 14,145.0	7500 L/min @ 140 kPa	
Peak Hour	217.6	106.1	321.4

1) Water demand calculation per ***Water Supply Guidelines***.
2) Water demand and boundary conditions from City of Ottawa, received October, 2015.

Fire demand is determined based on the FUS method in accordance with the City of Ottawa Guidelines. The FUS calculation resulted in approximately **14,000 L/min** of water demand required as shown in the attached calculation sheet. From ***Table 1***, the municipal system can provide a maximum fire flow of **7500L/min**. Fire flow for the proposed building will be confirmed by a fire suppression system specialist to ensure adequate fire protection is available.

It is our understanding that the city is undertaking off-site watermain improvements that may improve the service to the area.

2.0 Sanitary Servicing

The existing approved FSR proposed sanitary sewer connections to Cambridge and Bronson Avenue. It is proposed to discharge sanitary flow to the existing 250mm diameter combined sewer within Cambridge Street.

Table 2 below summarizes the design guidelines for wastewater sewer systems required by the City of Ottawa.

Table 2: Wastewater Design Criteria

Design Parameter	Value
Commercial Floor Space	5 L/m^2/d
Residential Average Apartment Demand	1.8 person/unit
Residential Daily Average	350 L/person/d
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Institutional Floor Space	5 L/m^2/d
Office Space	75 L/9.3m^2/d
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
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 2004.	

Table 3 below summarizes the sanitary discharge from the subject site from the approved FSR and from the proposed December 2015 Plan. See ***Appendix*** for detailed calculations of anticipated wastewater discharge.

Table 3: Total Anticipated Wastewater Discharge

	Wastewater Discharge (L/s)	
Design Parameter	**FSR February 2013**	**December 2015 Plan**
Estimated Average Dry Weather Flow	1.51	0.97
Estimated Peak Dry Weather Flow	5.79	3.70
Estimated Peak Wet Weather Flow	5.79	3.70

The approved FSR contemplated wastewater discharge to both Cambridge and Bronson Avenue combined sewers. The December 2015 Plan results in a decrease in total wastewater discharge when compared to what was contemplated in the FSR, however, results in an increase in sanitary discharge directed to the Cambridge Street combined sewer, as shown in ***Table 4***. The appropriate calculations have been attached.

Table 4: Anticipated Wastewater Discharge to Cambridge Street

	Wastewater Discharge (L/s)	
Design Parameter	**FSR February 2013**	**December 2015 Plan**
Estimated Average Dry Weather Flow	0.29	0.97
Estimated Peak Dry Weather Flow	1.15	3.70
Estimated Peak Wet Weather Flow	1.15	3.70

A single outlet to the Cambridge Street is a preferable to the dual connection in the approved FSR to eliminate a connection to the high traffic Bronson Avenue and take advantage of the deeper sewer within Cambridge Street.

The proposed increase in sanitary flow is accommodated by the anticipated decrease to stormwater flow to the combined sewer through rooftop and subsurface stormwater controls.

3.0 Stormwater Management

Stormwater servicing is contemplated to be achieved by a stormwater connection to the 250mm diameter combined sewer within Cambridge Street and connection to the combined sewer within Bronson Avenue. The approved FSR contemplated 2 outlets to the combined sewer within Cambridge Street and Bronson Avenue.

Consistent with the currently approved FSR, the allowable release rate has been split equally to each of the Cambridge and Bronson Avenue sewers, resulting in an allowable release of **11.0L/s** at each outlet. The total allowable release rate of **11.0L/s** directed to each outlet***,*** described in the approved FSR, was determined by the rational method based on following criteria provided by the City of Ottawa:

- Lesser of existing or 0.40 runoff coefficient
- Attenuate to the 2-year storm event, design capacity of the existing combined sewer
- Time of concentration of 20 minutes

Attenuation will be provided by a Tempest LMF 55 and Tempest LMF 60 inlet control devices located at ***STM103 & STM201,*** respectively. Stormwater storage is provided by an internal stormwater cistern controlling flow to Cambridge Street and an underground storage system controlling flow to Bronson Avenue. See attached for manufacturer information on the inlet control devices flow rates and proposed underground storage system used for sizing of the chamber footprint.

Table 5 summarizes the anticipated total release rates and storage requirements from the existing FSR. A calculation sheet of the existing approved plan is attached.

Table 5: Proposed Amendment SWM Summary

Design Parameter	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)
Cambridge Street	5.0	63.3	10.3	128.6
Bronson Avenue	5.1	12.6	10.7	26.7
Total	**10.1**	**75.4**	**21.0**	**154.4**

The contemplated stormwater servicing will be designed to meet the allowable release rate determined in the approved FSR of ***11.0L/s*** at each outlet, with a total release rate of ***21.0 L/s***. It is anticipated that ***154.4m³*** of total storage will be required to attenuate stormwater runoff.

4.0 Combined Sewer Servicing

It is contemplated to direct stormwater and sanitary discharge to the combined sewer within Cambridge Street. ***Table 6 & 7*** below summarizes the combined system flow contemplated in the approved FSR and December 2015 Plan to the Cambridge Street sewer.

Table 6: Combined Sewer Flow to Cambridge Street

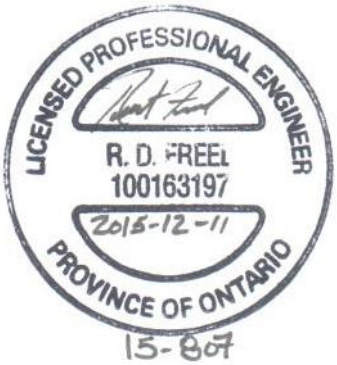
Flow Type	FSR February 2013		December 2015 Plan	
	Pre-Development (L/s)	Post-Development (L/s)	Pre-Development (L/s)	Post-Development (L/s)
Sanitary	0.27	1.15	0.27	3.70
Storm (2-year uncontrolled, 100-year controlled)	31.1	10.7	31.1	10.3
Combined Flow	**31.4**	**11.9**	**31.4**	**13.8**

Table 7: Combined Sewer Flow to Bronson Avenue

Flow Type	FSR February 2013		December 2015 Plan	
	Pre-Development (L/s)	Post-Development (L/s)	Pre-Development (L/s)	Post-Development (L/s)
Sanitary	0.27	4.64	0.27	0.00
Storm (2-year uncontrolled, 100-year controlled)	31.1	10.7	31.1	10.7
Combined Flow	**31.4**	**15.3**	**31.4**	**10.7**

The proposed sanitary and stormwater servicing contemplated in the December 2015 Plan, results in a net reduction of ***17.6 L/s*** and ***20.7 L/s*** of flow entering the combined sewer on Cambridge and Bronson, respectively. The increase in sanitary discharge to the Cambridge Street combined sewer is accommodated with the significant decrease in stormwater discharge.

Yours truly,
David Schaeffer Engineering Ltd.



Per: Robert D. Freel, P.Eng.

Yours truly,
David Schaeffer Engineering Ltd.

Per: Steven L. Merrick, EIT.

APPENDIX

TYPOLOGY BRONSON AVENUE (12 FLOORS)				
FLOOR	UNITS / FLOOR	QTY	TYPE	AREA
10 - 11 - 12	11	7	3 1/2	613-660 sq.ft.
		4	4 1/2	824-995 sq.ft.
5 - 6 - 7 - 8 - 9	13	5	Loft	430-580 sq.ft.
		6	3 1/2	613-650 sq.ft.
		2	4 1/2	825-865 sq.ft.
3 - 4	16	8	Loft	485-650 sq.ft.
		6	3 1/2	613-650 sq.ft.
		2	4 1/2	825-865 sq.ft.
2	8	6	3 1/2	613-650 sq.ft.
		2	4 1/2	825-865 sq.ft.
		1	COMMERCIAL SPACE	4,300 sq.ft.
RDC	8	6	3 1/2	613-650 sq.ft.
		2	4 1/2	825-865 sq.ft.
		2	COMMERCIAL SPACE	3 067 sq.ft.
TOTAL	146 UNITS + (2 COMMERCIAL SPACES)			

TYPOLOGY CAMBRIDGE STREET (6 FLOORS)				
FLOOR	UNITS / FLOOR	QTY	TYPE	AREA
6	4	4	3 1/2	585-690 sq.ft.
5	7	2	5 1/2 / 2 niveau	1325-1420 sq.ft.
		1	4 1/2 / 2 niveau	1050 sq.ft.
		4	3 1/2	585-690 sq.ft.
2 - 3 - 4	7	2	4 1/2	1005-1080 sq.ft.
		5	3 1/2	585-780 sq.ft.
RDC	7	1	4 1/2	1000 sq.ft.
		6	3 1/2	585-780 sq.ft.
TOTAL	39 UNITS			

TOTAL	185 + (2 COMMERCIAL SPACES)
PARKING	154 INTERIOR + 2 EXTERIOR
RATIO	0.84 : 1

PROJECT INFORMATION

Site Area (PHASE 1) 1 513 sq m.
Site Area (PHASE 2) 2 115 sq m.

Site Area (TOTAL) 3 628 sq m.

Density 14 723 sq m - 15%
12 515 / 3 628 = **3.45**

CAR PARKING

REQUIRED		
RESIDENTIAL	0.5 / UNIT (185 UNITS)	92
VISITOR	0.2 / UNIT (185 UNITS)	37
COMMERCIAL	2.5 / 100 sq m of GFA	7
TOTAL		136
PROVIDED		
TOTAL		156

BICYCLE PARKING

REQUIRED		
RESIDENTIAL	0.5 / UNIT	92
COMMERCIAL	2.5 / 100 sq m of GFA	7
TOTAL		99
PROVIDED		
Underground (wall mounted rack at end of parking space)		99

PHASE 1

PROJECT STATISTICS

Building height 20.5 m

GROSS BUILDING AREAS

Parking level 1	1 263 sq m	
Parking level 2	1 263 sq m	
Ground Floor		583 sq m
Level 2,3,4	3 x 590 sq m	1 770 sq m
Level 5,6	2 x 500 sq m	1 000 sq m
Total area		3 353 sq m

Note: Does not include parking level and amenity level

UNIT STATISTICS

1 Bedroom unit	29
2 Bedroom unit	10
Total	39

PHASE 2

PROJECT STATISTICS

Building height 38 m
Amenity space height 5 m

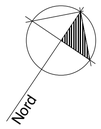
GROSS BUILDING AREAS

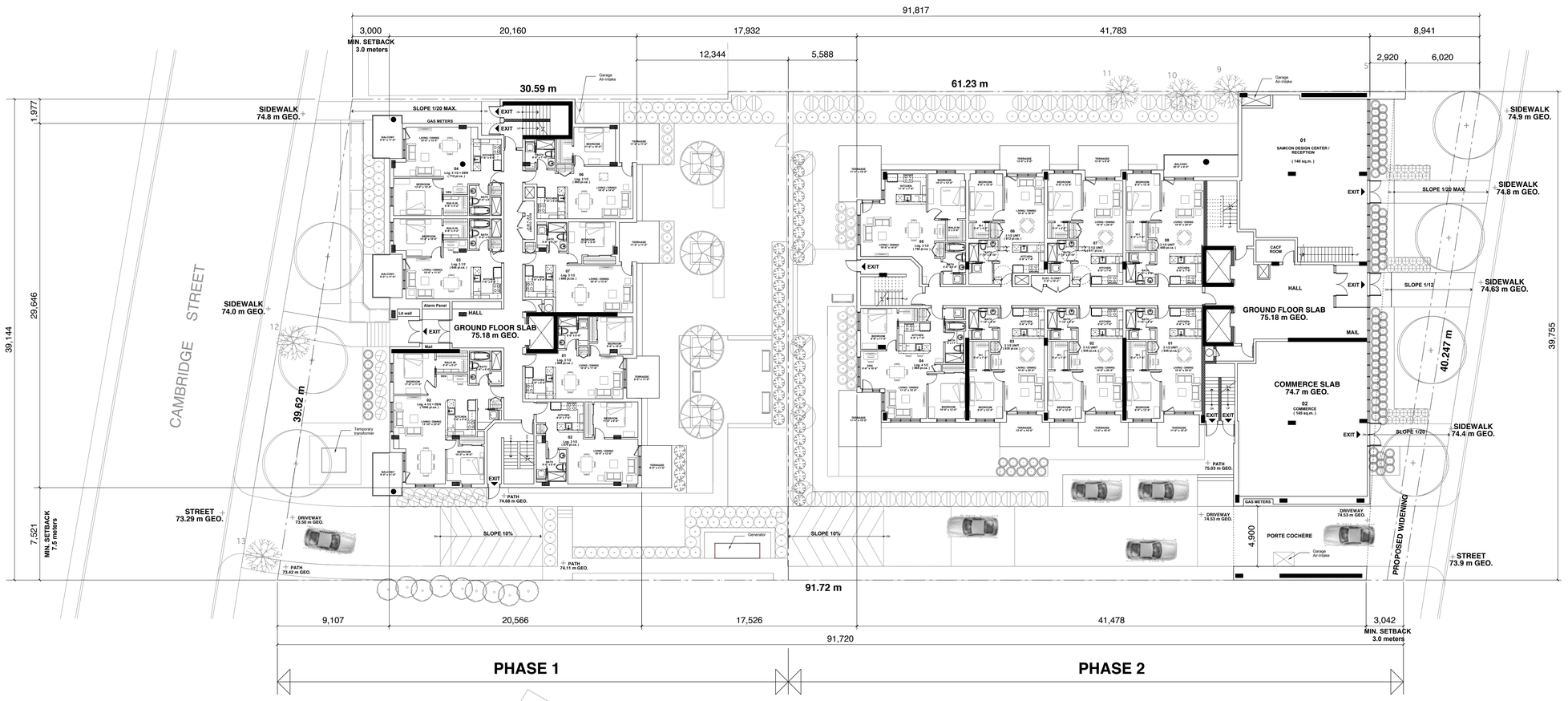
Parking level 1	1 851 sq m	
Parking level 2	1 851 sq m	
Ground Floor		980 sq m
Level 2,3,4	3 X 1 075 sq m	3 225 sq m
Level 5,6,7,8,9	5 x 863 sq m	4 315 sq m
Level 10,11,12	3 x 860 sq m	2 580 sq m
Amenity Level		270 sq m
Total area		11 370 sq m

Note: Does not include parking level

UNIT STATISTICS

Studio	41
1 Bedroom unit	75
2 Bedroom unit	30
Total	146
Commercial	685 sq m





1 / A10-03 **GROUND FLOOR PLAN**
SCALE : 1:200

FOR INFORMATION ONLY / DO NOT USE FOR CONSTRUCTION

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STAMP

ONTARIO ASSOCIATION OF ARCHITECTS
MARCO MANINI
LICENCE 7115

REVISIONS	
DATE	DESCRIPTION
27/02/2013	SITE PLAN CONTROL

ENGINEERS

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2611 Queensview Drive,
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PROMOTER

Samcon
URBAN REDEVELOPMENT
815 Boul. René Lévesque Est
Montréal, Québec H2L 4V5
Tél: 514-844-7300
Fax: 514-844-5625

DRAWING TITLE

GROUND FLOOR PLAN
SUBMISSION
SITE PLAN CONTROL

PROJECT NO. 11170

PROJECT NAME

774 BRONSON AVE. /
551 CAMBRIDGE STREET
OTTAWA, ONTARIO
RESIDENTIAL DEVELOPMENT

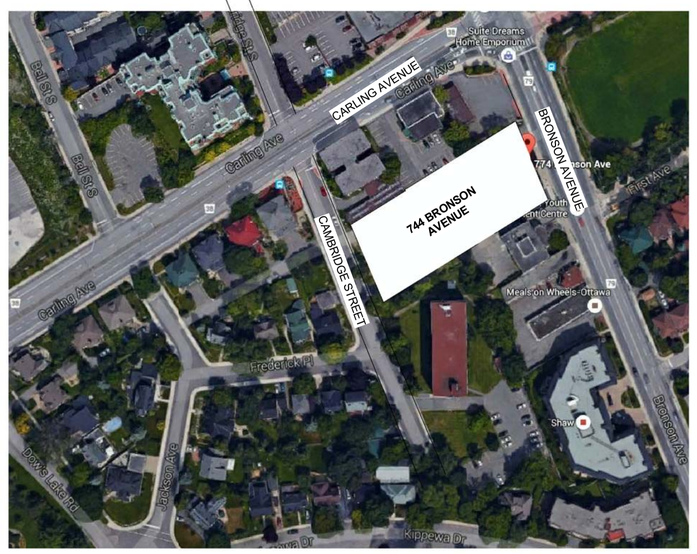
SHEET NO. A10-03

STANDARD ZONING MECHANISM - AMI

PROVISION	REQUIREMENT	PROPOSED
MINIMUM LOT WIDTH	No Minimum	39.14 m
MINIMUM LOT AREA	No Minimum	3628 m^2
MINIMUM FRONT YARD SETBACK	No Minimum	5.50 m
MINIMUM INTERIOR SIDE YARD SETBACKS	No minimum unless abutting a residential zone (7.5 m)	4.24 m
MINIMUM REAR YARD SETBACK	3 m	3 m
MAXIMUM BUILDING HEIGHT*	Ranges from 11 to 25 m	39.25 m
MAXIMUM FLOOR SPACE INDEX*	3.5 (if 80% of parking is below grade), 2 (otherwise)	3.02
MINIMUM WIDTH OF LANDSCAPED AREA (abutting a residential zone)*	3 m	4.24 m
MINIMUM RESIDENT PARKING RATE	0.5 spaces per dwelling unit (91 spaces)	
MINIMUM VISITOR PARKING RATE*	0.2 spaces per dwelling unit, first 12 units exempt (34 spaces)	31 spaces
MINIMUM BICYCLE PARKING RATE	0.5 spaces per dwelling unit (91 spaces)	95 spaces
PARKING SPACE SIZE PROVISION	2.6 m (width) by 5.2 m (length)	2.6 m by 5.2 m
PARKING AISLE AND DRIVEWAY SIZE PROVISION	6.7 m minimum width for double traffic lane	6.7 m minimum
BICYCLE PARKING SPACE SIZE PROVISION	0.6 m by 1.8 m	0.6 m by 1.8 m
MINIMUM AMENITY AREA	6m^2 per dwelling unit, 50% minimum communal amenity area (1,086m^2)	720.14 m^2 (interior) + 599.92 m^2 (exterior) = 1,320.06 m^2

SITE DATA CHART

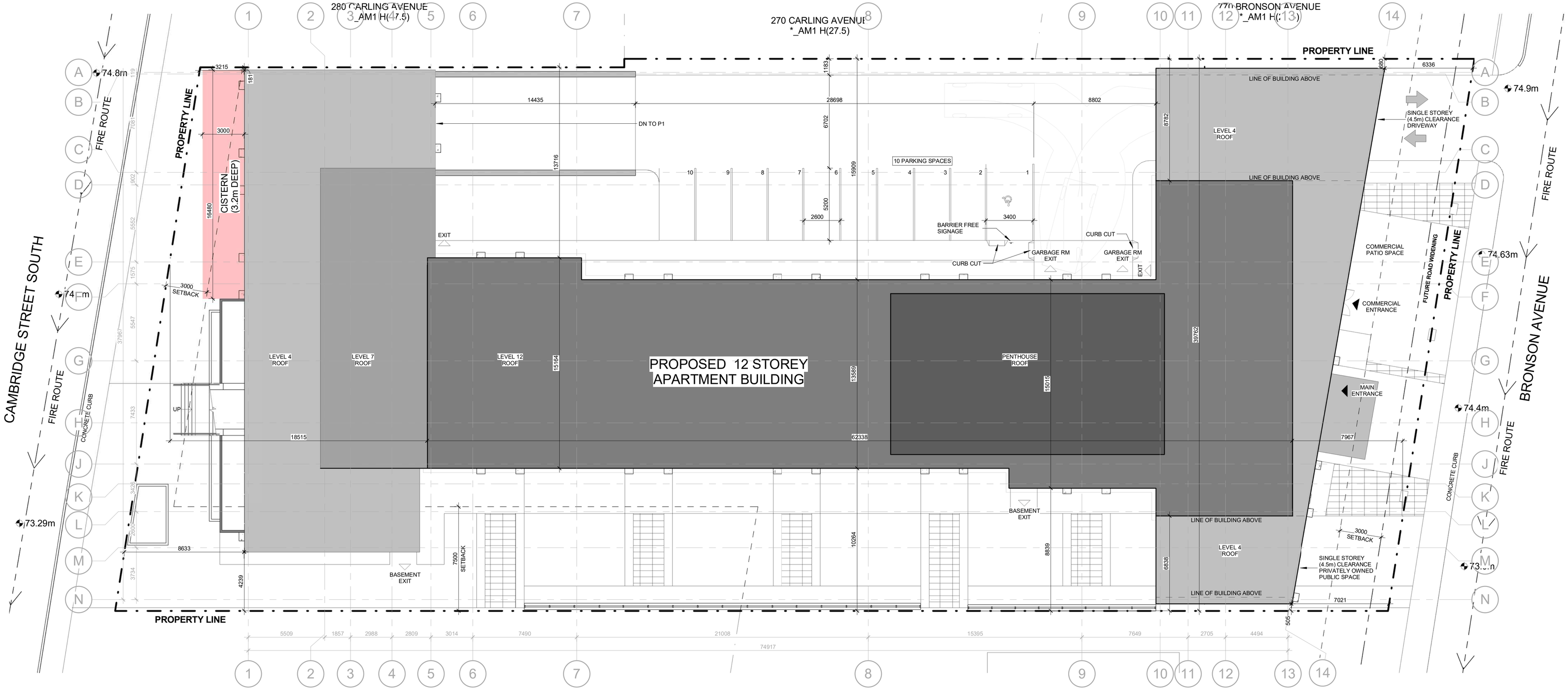
DATA		REQUIREMENT	PROPOSED
ZONING		Arterial Main Street - AM1 zone	
LOT AREA		3,628.09 m^2	
TOTAL DENSITY			181 units (341 beds)
GROSS FLOOR AREA (m^2)			10,965.52 m^2
NUMBER OF STOREYS			12
BUILDING HEIGHT (m)		maximum 41.5 m	39.25 m
COMMERCIAL / RETAIL AREA (m)			135.62 m^2
AMENITY AREA		minimum 6m^2 / unit	1,320.06 m^2
LANDSCAPE AREA (%)			1,088 m^2 ÷ 3,628 m^2 = 29.9%
LANDSCAPE AREA (m^2)			1,088 m^2
PARKING	RESIDENTIAL	0.5 / unit = 91	31
	VISITOR (first 12 units exempt)	0.2 / unit = 34	
	TOTAL	125	
	BARRIER FREE SPACES		1 (incl.)
BICYCLE PARKING	RESIDENTIAL	0.5 / unit = 91	95
	COMMERCIAL	2.5 / 100 m^2 = 4	
	TOTAL	95	



2 KEY PLAN
1 : 2000

Project North

True North



1 SITE PLAN
1 : 150

No.	Date	Revision

srm ARCHITECTS INC.

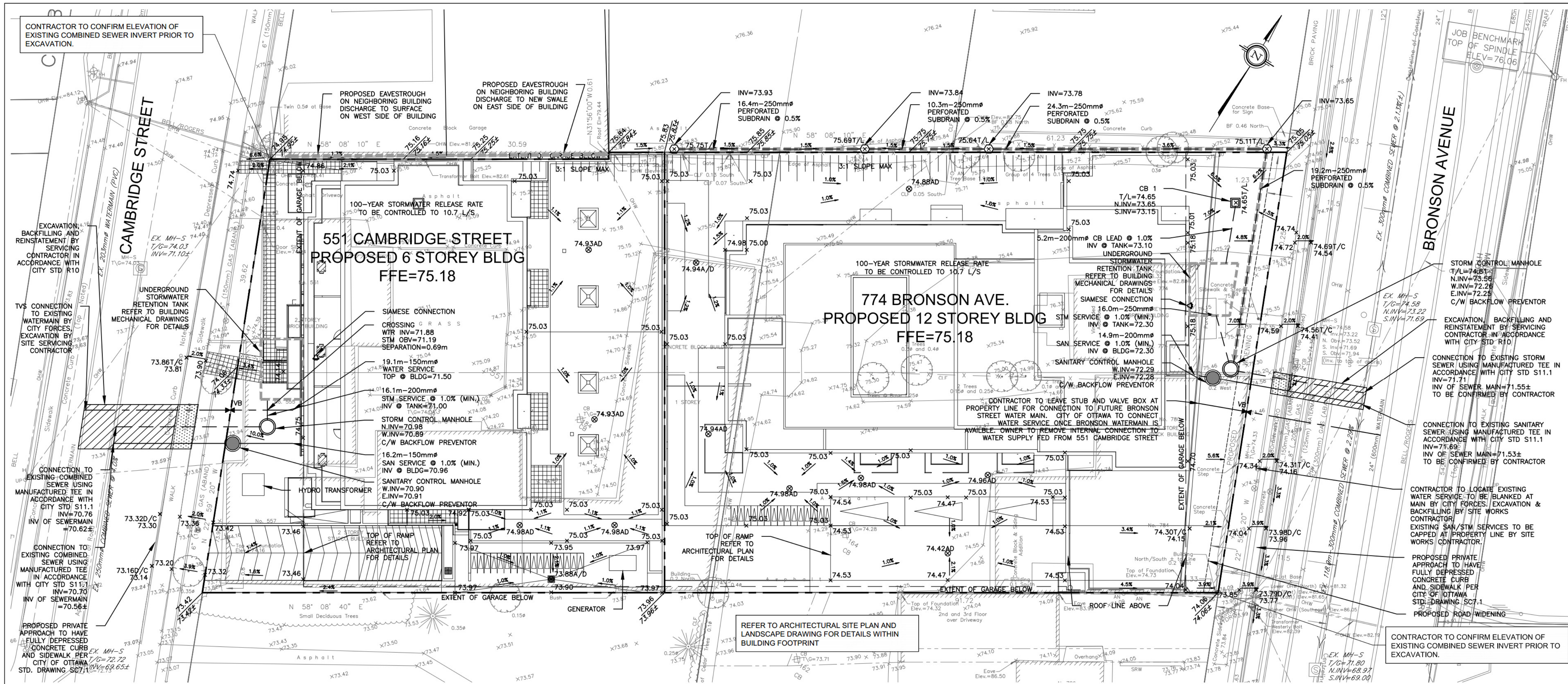
Project No	15076
Issue Date	
Drawn by	MS
Checked by	RH
Plot Date / Time	12/8/2015 2:00:33 PM

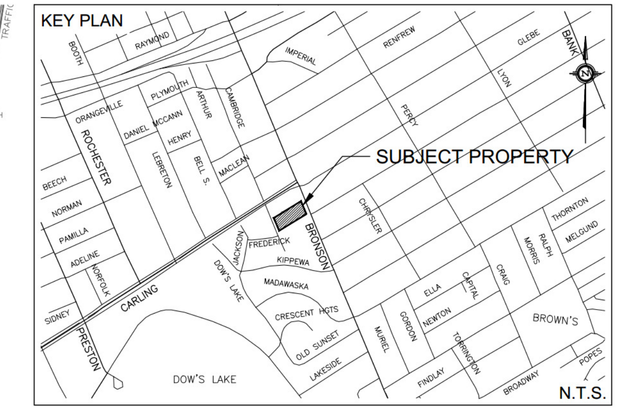
774 BRONSON AVENUE, OTTAWA

SITE PLAN

PRELIMINARY

Drawing Scale	As indicated
Status	
Drawing No.	Revision No.
A1.1	





LEGEND

x100.00	PROPOSED SPOT ELEVATION		PROPOSED HEAVY DUTY ASPHALT
x100.00T/C	PROPOSED TOP OF CURB ELEVATION		PROPERTY LINE
x100.00B/W	PROPOSED BOTTOM OF WALL ELEVATION		PROPOSED WATERMAIN
x100.00T/W	PROPOSED TOP OF WALL ELEVATION		PROPOSED SANITARY SEWER
x100.00T/L	PROPOSED TOP OF LID ELEVATION		PROPOSED STORM SEWER
1.0%	PROPOSED GRADE AND DIRECTION		PROPOSED VALVE BOX
	TOP OF GARAGE ELEVATION SPECIFIED BY OTHERS		PROPOSED FIRE HYDRANT
	PROPOSED GRADE DIRECTION BY OTHERS		PROPOSED SIAMESE CONNECTION
100.00 / 100.00	PROPOSED/EXISTING SPOT ELEVATION		PROPOSED REMOTE WATER METER
			PROPOSED WATER METER

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 THE FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

CONTRACTOR TO CONFIRM ELEVATIONS AND LOCATIONS OF EXISTING UNDERGROUND SERVICES AND UTILITIES WITHIN CAMBRIDGE STREET AND BRONSON AVENUE RIGHTS OF WAY PRIOR TO INSTALLATION OF SITE SERVICING INFRASTRUCTURE.

NOT FOR CONSTRUCTION

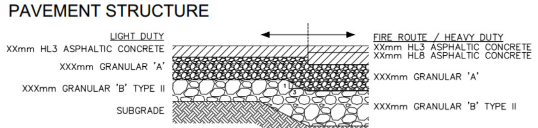
GENERAL NOTES

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISION OF THE STANDARDS AND SPECIFICATIONS FOR THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
4. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
5. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR DIRECTED BY THE ENGINEER AT THE EXPENSE OF THE DEVELOPER.
6. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 'OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.' THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE 'CONSTRUCTOR' AS DEFINED IN THE ACT.
7. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE MINISTRY OF TRANSPORTATION OF ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES PER LATEST AMENDMENT.
8. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES TO PREVENT CONFLICTS.
9. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
10. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS RECEIVED FROM THE ENGINEER.
11. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
12. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE REFER TO THE SITE SERVICING AND STORMWATER MANAGEMENT REPORT.
13. ALL SEWERS CONSTRUCTED WITH GRADES LESS THAN 1.0% SHALL BE INSTALLED USING LASER ALIGNMENT AND CHECKED WITH LEVEL INSTRUMENT PRIOR TO BACKFILLING.
14. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF THE SAME.
15. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL BEDDING, OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH AS SPECIFIED BY OPSD IS EXCEEDED.
16. ALL PIPE / CULVERT SECTION SIZES REFER TO INSIDE DIMENSIONS.
17. SHOULD DEEPLY BURIED ARCHAEOLOGICAL REMAINS BE FOUND ON THE PROPERTY DURING CONSTRUCTION ACTIVITIES, THE HERITAGE OPERATIONS UNIT OF THE ONTARIO MINISTRY OF CULTURE MUST BE NOTIFIED IMMEDIATELY.
18. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO ANY TREE CUTTING / REMOVAL.
19. DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE ARCHITECTURAL SITE PLAN.
20. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER ONE SET OF AS CONSTRUCTED SITE SERVICING AND GRADING DRAWINGS.
21. BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION DEPICTED ON THIS PLAN.

SITE GRADING NOTES

1. PRIOR TO THE COMMENCEMENT OF THE SITE GRADING WORKS, ALL SILTATION CONTROL DEVICES SHALL BE INSTALLED AND OPERATIONAL PER EROSION CONTROL PLAN.
2. ALL GRANULAR AND PAVEMENT FOR ROADS/PARKING AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
3. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD AND PARKING AREAS ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
4. CONCRETE CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.1. PROVISION SHALL BE MADE FOR CURB DEPRESSIONS AS INDICATED ON ARCHITECTURAL SITE PLAN. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD SC1.4. ALL CURBS, CONCRETE ISLANDS, AND SIDEWALKS SHOWN ON THIS DRAWING ARE TO BE PRICED IN THE SITEWORKS PORTION OF THE CONTRACT.
5. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. R10 AND OPSD 509.010, AND OPSS 310.
6. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 300mm LIFTS.
8. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR TO BACKFILLING.
9. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
10. ALL PAVEMENT MARKING FEATURES AND SITE SIGNAGE SHALL BE PLACED PER ARCHITECTURAL SITE PLAN. LINE PAINTING AND DIRECTIONAL SYMOBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT PAINT.
11. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
12. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
13. SIDEWALKS TO BE 20mm BELOW THE FINISHED FLOOR SLAB ELEVATION AT ENTRANCES UNLESS OTHERWISE NOTED.
14. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWS FOR RETAINING WALL (INCLUDE RAILINGS IF APPLICABLE) TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY STRUCTURAL AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTRED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

PAVEMENT STRUCTURE



EROSION AND SEDIMENT CONTROL NOTES

GENERAL

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM THEIR CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN A MANNER THAT STRICTLY MEETS THE REQUIREMENTS OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT THEIR OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVE FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES ARRANGED IN SUCH A MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCES, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR BERMS, OR OTHER RECOGNIZED TECHNOLOGIES AND METHODS AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF OPSS 577 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY. AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIMES WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT A MOMENT'S NOTICE.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP). THE ESCP WILL CONSIST OF A WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTORS, IN THE WORKING AREA ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO ANY SEWER OR WATERCOURSE AND AVOIDS DAMAGE TO THE CONTROL MEASURE. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BREACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL.

WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR AT ALL, THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

SPILL CONTROL NOTES

1. ALL CONSTRUCTION EQUIPMENT SHALL BE RE-FUELED, MAINTAINED, AND STORED NO LESS THAN 30 METRES FROM WATERCOURSES, STREAMS, CREEKS, WOODLOTS, AND ANY ENVIRONMENTALLY SENSITIVE AREAS, OR AS OTHERWISE SPECIFIED.
2. THE CONTRACTOR MUST IMPLEMENT ALL NECESSARY MEASURES IN ORDER TO PREVENT LEAKS, DISCHARGES OR SPILLS OF POLLUTANTS, DELETERIOUS MATERIALS, OR OTHER SUCH MATERIALS OR SUBSTANCES WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT.
3. IN THE EVENT OF A LEAK, DISCHARGE OR SPILL OF A POLLUTANT, DELETERIOUS MATERIAL OR OTHER SUCH MATERIAL OR SUBSTANCE WITH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT, THE CONTRACTOR SHALL:
   - 3.1. IMMEDIATELY NOTIFY THE APPROPRIATE FEDERAL, PROVINCIAL, AND LOCAL GOVERNMENT MINISTRIES, DEPARTMENTS, AGENCIES, AND AUTHORITIES OF THE INCIDENT IN ACCORDANCE WITH ALL CURRENT LAWS, LEGISLATION, ACTS, BY-LAWS, PERMITS, APPROVALS, ETC.
   - 3.2. TAKE IMMEDIATE MEASURES TO CONTAIN THE MATERIAL OR SUBSTANCE, AND TO TAKE SUCH MEASURES TO MITIGATE AGAINST ADVERSE IMPACTS TO THE NATURAL ENVIRONMENT.
   - 3.3. RESTORE THE AFFECTED AREA TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION.

SANITARY AND STORM SEWER NOTES

GENERAL

1. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
2. CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5m LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUB-BEDDING, AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPACTABLE BROWN SILTY CLAY PLACED IN MAXIMUM 225mm LIFTS AND COMPACTED TO A MINIMUM OF 95% SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT 60m INTERVALS IN THE SERVICE TRENCHES.
3. SERVICES TO BUILDINGS TO BE TERMINATED 1.0m FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
4. ALL MAINTENANCE STRUCTURE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY, A MINIMUM OF 300mm AROUND STRUCTURES.
5. "MODULOC" OR APPROVED PRE-CAST MAINTENANCE STRUCTURE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
6. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
7. DROP STRUCTURES SHALL BE IN ACCORDANCE WITH OPSD 1003.01 AND 1003.02, IF APPLICABLE.
8. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO RECORDINGS IN A FORMAT ACCEPTABLE TO THE ENGINEER. ALL SEWERS ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS AND NECESSARY REPAIRS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE ENGINEER.
9. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF WEAR COURSE ASPHALT.

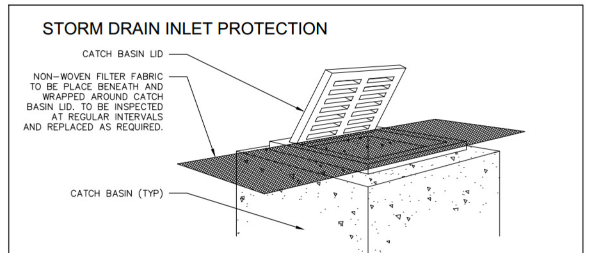
SANITARY

10. ALL SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
11. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
12. EXISTING MAINTENANCE STRUCTURES TO BE RE-BECHNED WHERE A NEW CONNECTION IS MADE.
13. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
14. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
15. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.

STORM

16. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
17. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
18. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
19. CATCH BASINS SHALL BE IN ACCORDANCE WITH OPSD 705.010.
20. CATCH BASIN LEADS SHALL BE 200MM DIA. AT 1% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
21. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
22. ALL CATCH BASIN LEAD INVERTS TO BE 1.5m BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
23. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR IS REQUIRED TO PROVIDE AND SHALL BE BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
24. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
25. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30, AND S31, WHERE APPLICABLE.
26. RIP-RAP TREATMENT FOR SEWER AND CULVERT OUTLETS PER OPSD 810.010.
27. ALL STORM SEWERS / CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE.

STORM DRAIN INLET PROTECTION



NOT TO SCALE

WATERMAIN NOTES

1. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
3. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17. UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY THE PROJECT GEOTECHNICAL ENGINEER.
4. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W.36.
5. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD. W40 AND W42.
6. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
7. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
8. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25,3 AND W25.4.
9. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
10. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25. RESPECTIVELY.
11. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4m.
12. THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER / UTILITY IS 0.50m PER MOE GUIDELINES. FOR CROSSING UNDER SEWERS, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTRED AT THE POINT OF CROSSING TO ENSURE THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
13. ALL WATERMAINS SHALL HAVE A MINIMUM COVER OR 2.4m, OTHERWISE THERMAL INSULATION IS REQUIRED AS PER STD DWG W22.
14. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20
15. FIRE HYDRANT INSTALLATION AS PER STD DWG W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10m ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W18.
16. BUILDING SERVICE TO BE CAPPED 1.0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12m BACK FROM STUB.
17. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
18. ALL WATERMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT THE ENVIRONMENT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
19. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50mm BLOW OFF UNLESS OTHERWISE NOTED.

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
PROJ. NO. 12483-11 SAMCON LTS 3,4,37&38 PI 28 T D3
DATED JUNE 2012

SITE PLAN INFORMATION

SITE PLAN PROVIDED BY MARCO MANINI ARCHITECTE
PROJ. NO. 1170
DATE DECEMBER 12, 2013

GEOTECHNICAL STUDY

GEOTECHNICAL RECOMMENDATIONS PROVIDED BY GENIVAR
PROJ. NO. 111-26060-00
DATED DECEMBER 2011

SITE SERVICING AND STORMWATER MANAGEMENT STUDY

SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 12-557
DATED FEBRUARY 2013

BENCH MARK

TOP OF SPINDLE LOCATED
ELEV=76.06

No.	BY	YY.MM.DD	DESCRIPTION
6	A.D.F.	13.10.21	REVISED PER SITE PLAN (ADDED PARKING SPACE SOUTH OF BRONSON PHASE)
5	A.D.F.	13.10.21	REVISED PER MUNICIPAL COMMENTS
4	A.D.F.	13.10.03	ISSUED FOR MUNICIPAL REVIEW
3	B.N.C.	13.07.08	ISSUED FOR CONSTRUCTION PERMIT
2	B.N.C.	13.02.26	1st SITE PLAN CONTROL SUBMISSION
1	B.N.C.	13.02.21	ISSUED FOR CONSULTANT COORDINATION

PROJECT No. 12-557

SITE SERVICING & GRADING PLAN
774 BRONSON/551 CAMBRIDGE

SAMCON REDEVELOPPEMENT URBAIN
815 Boul. Rene Levesque Est
Montreal, Quebec H2L-4V5

DSEL
david schaeffer engineering ltd
120 Iber Road Unit 203
Stittsville, Ontario, K2S 1E9
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Fax. (613) 836-7183
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DRAWN BY:	B.N.C.	CHECKED BY:	R.M.W.	DRAWING NO.	SHEET NO.
DESIGNED BY:	R.M.W.	CHECKED BY:		SSGP-1	1 of 1
SCALE:	1:200	DATE:	JUNE 2013		

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Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8	193	348

	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	348	121.8	84.6	365.4	253.8	548.1	380.6

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 $L/m^2/d$	804	2.01	1.4	3.0	2.1	5.4	3.8
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	2.0	1.4	3.0	2.1	5.4	3.8
		Total Demand	**123.8**	**86.0**	**368.4**	**255.8**	**553.5**	**384.4**

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0
Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1	341	341

	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	341	68.2	47.4	204.6	142.1	306.9	213.1

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 $L/m^2/d$	136	0.34	0.2	0.5	0.4	0.9	0.6
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	0.3	0.2	0.5	0.4	0.9	0.6
		Total Demand	**68.5**	**47.6**	**205.1**	**142.4**	**307.8**	**213.8**

* Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines
** Comprises all proposed commercial and amenity space

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	10965.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	18429.6	L/min	
	18000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Non-Combustible	-25%	
Fire Flow	**13500.0**	**L/min**

3. Reduction for Sprinkler Protection

Sprinklered	-50%	
Reduction	**-6750**	**L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	3.1m-10m	20%	
E	>45m	0%	
W	20.1m-30m	10%	
	% Increase	**50%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**6750.0**	**L/min**

Total Fire Flow

Fire Flow	13500.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	14000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by SRM Architects Inc.
-Calculations based on Fire Underwriters Survey - Part II

Steve Merrick

To: Steve Merrick
Subject: RE: 774 Bronson Ave - Water Boundary Conditions

From: White, Joshua [mailto:Joshua.White@ottawa.ca]
Sent: November-12-15 3:41 PM
To: 'Steve Merrick' <smerrick@dsel.ca>
Subject: RE: 774 Bronson Ave - Water Boundary Conditions

Hello Steve,

Please find the Boundary Conditions for the proposal at 774 Bronson. If you have any questions please let me know.

Josh

The following are boundary conditions, HGL, for hydraulic analysis at 774 Bronson (zone 1W) assumed to be connected to the 203mm on Cambridge (see attached PDF for location).

Minimum HGL = 106.1m

Maximum HGL = 117.1m

Available Flow = 125 L/s, assuming a residual of 20 psi and a ground elevation of 73.9m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: Monday, November 09, 2015 5:03 PM
To: White, Joshua
Cc: Wu, John
Subject: RE: 774 Bronson Ave - Water Boundary Conditions

Thanks Josh,

You are correct, a bit of a miscommunication between Adam and I on the proposed connections to the municipal system. Let me know if you get any updating timing for the new watermain within Bronson Ave. In the meantime, can we proceed with the boundary conditions request assuming a dual connection to the Cambridge Street watermain as per the approved servicing plan?

Thanks,

Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

From: White, Joshua [mailto:Joshua.White@ottawa.ca]
Sent: November-09-15 2:55 PM
To: 'Steve Merrick' <smerrick@dsel.ca>
Cc: Wu, John <John.Wu@ottawa.ca>
Subject: RE: 774 Bronson Ave - Water Boundary Conditions

Hey Steve,

I will go through my email and check and see if we heard back from public works. It should be noted that the previous approval did not contemplate a connection into the 600 mm water main on Bronson as it is a back bone water main. In the previous approval the site would be serviced off of Cambridge entirely with a new connection into Bronson when the new local water main is installed during the future reconstruction of Bronson.

Josh

Joshua White, P.Eng.
Project Manager, Infrastructure Approvals
Development Review, Urban Services, City of Ottawa
Please consider the environment before printing this e-mail.

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 15843
Email: joshua.white@ottawa.ca
ottawa.ca/planning / ottawa.ca/urbanisme

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: Monday, November 09, 2015 1:14 PM
To: White, Joshua; Wu, John
Subject: RE: 774 Bronson Ave - Water Boundary Conditions

Hi John & Josh,

I don't believe we received boundary conditions based on the correspondence below. There have been updates to the site plan that have led to a decrease in total demand as shown below:

	L/min	L/s
Avg. Daily	48.6	0.81
Max Day	145.4	2.42
Peak Hour	218.2	3.64

Please use the above demands and the connection points and assumptions as discussed below to provide boundary conditions for the subject site.

Thanks,

Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

From: Steve Merrick [mailto:smerrick@dsel.ca]
Sent: August-26-15 2:29 PM
To: White, Joshua (Joshua.White@ottawa.ca) <Joshua.White@ottawa.ca>; 'Wu, John' <John.Wu@ottawa.ca>
Subject: 774 Bronson Ave - Water Boundary Conditions

Hi John,

This job has been previously submitted and approved by Josh White back in October 2013. The lands have since changed hands and the site plan has been modified since our last submission. We are starting by preparing a serviceability letter for the client and hope that in Josh's absence you could forward on a boundary condition request

for this site. We are hoping to provide the client with the serviceability letter by the end of the week and hope you can forward this on to the water resources group as soon as possible for their analysis.

The approved plans contemplated a looped water connection to the existing 600mm watermain within Bronson Avenue and the existing 200mm watermain on Cambridge Street. The proposed water service will be achieved by the same way, see attached sketch

I have summarized the development water demands below:

	L/min	L/s
Avg. Daily	55.0	0.92
Max Day	163.6	2.73
Peak Hour	245.8	4.10

As the plan is still in the preliminary concept phase, we don't have a calculated FUS and will require available fire flow @ 20 psi.

Thanks in advance!

Steve Merrick, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561

fax: (613) 836-7183
email: smerrick@DSEL.ca

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Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 0.18 **ha**

Extraneous Flow Allowances

Infiltration / Inflow* **0.00 L/s**

*Additional flow due to infiltration is taken into account in stormwater calculations

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8	154	278

Total Pop **278**

Average Domestic Flow **1.13 L/s**

Peaking Factor **4.00**

Peak Domestic Flow **4.50 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate		No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5	$L/m^2/d$	804	0.09
Institutional	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow **0.09**

Peak Institutional / Commercial Flow 0.14
Peak Industrial Flow** 0.00
Peak I/C/I Flow **0.14**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**1.22 L/s**
Total Estimated Peak Dry Weather Flow Rate	**4.64 L/s**
Total Estimated Peak Wet Weather Flow Rate	**4.64 L/s**

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 0.19 **ha**

Extraneous Flow Allowances

Infiltration / Inflow* **0.00 L/s**

*Additional flow due to infiltration is taken into account in stormwater calculations

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8	39	71

Total Pop **71**

Average Domestic Flow **0.29 L/s**

Peaking Factor **4.00**

Peak Domestic Flow **1.15 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate		No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5	$L/m^2/d$		0.00
Institutional	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow **0.00**

Peak Institutional / Commercial Flow 0.00
Peak Industrial Flow** 0.00
Peak I/C/I Flow **0.00**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**0.29 L/s**
Total Estimated Peak Dry Weather Flow Rate	**1.15 L/s**
Total Estimated Peak Wet Weather Flow Rate	**1.15 L/s**

SRM Architects Inc.
Proposed Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area 0.37 **ha**

Extraneous Flow Allowances

Infiltration / Inflow* **0.00 L/s**

*Additional flow due to infiltration is taken into account in stormwater calculations

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0
Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1	341	341

Total Pop **341**

Average Domestic Flow **0.79 L/s**

Peaking Factor **4.00**

Peak Domestic Flow **3.16 L/s**

Institutional / Commercial / Industrial Contributions

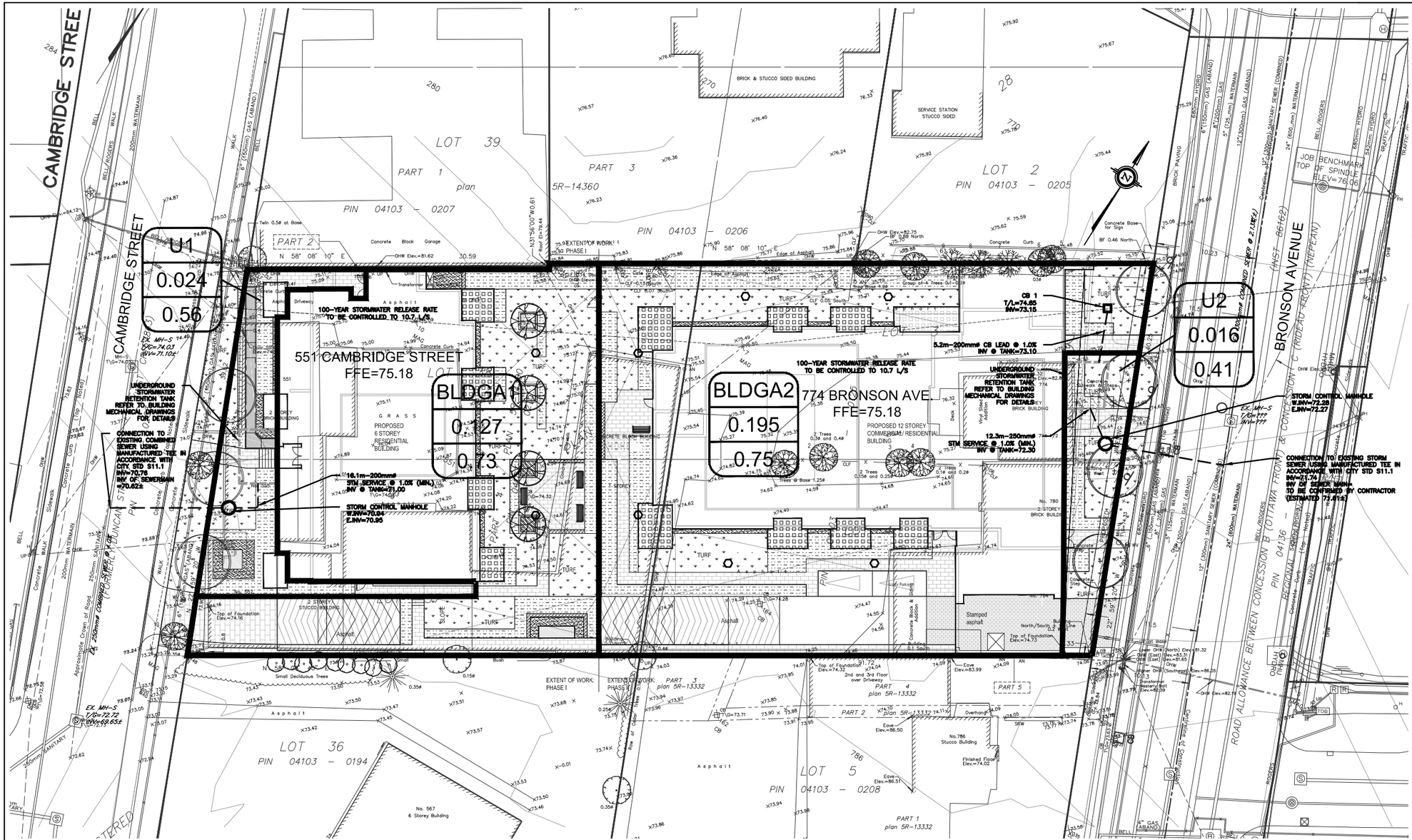
Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space**	5	$L/m^2/d$	136	0.02
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow **0.02**

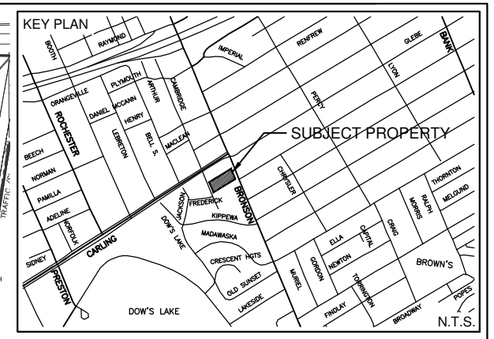
Peak Institutional / Commercial Flow 0.02
Peak Industrial Flow** 0.00
Peak I/C/I Flow **0.02**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**0.81 L/s**
Total Estimated Peak Dry Weather Flow Rate	**3.18 L/s**
Total Estimated Peak Wet Weather Flow Rate	**3.18 L/s**



KEY PLAN



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER
- DRAINAGE DIVIDE
- MAJOR SYSTEM FLOW ROUTE
- EX6 — DRAINAGE AREA ID
- 4.010 — AREA IN Ha
- 0.19 — RATIONAL METHOD RUNOFF COEFFICIENT

NOT FOR CONSTRUCTION

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
PROJ. NO. 12483-11 SAMCON LTS 3,4,37&38 PI 28 T D3
DATED JUNE 2012

SITE PLAN INFORMATION
SITE PLAN PROVIDED BY MARCO MANNI ARCHITECTE
PROJ. NO. 1170
DATED FEBRUARY 22, 2013

GEOTECHNICAL STUDY
GEOTECHNICAL RECOMMENDATIONS PROVIDED BY
PROJ. NO.
DATED

SITE SERVICING AND STORMWATER MANAGEMENT STUDY
SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 12-557
DATED

BENCH MARK
TOP OF SPINDLE LOCATED
ELEV=76.06

No.	BY	YY.MM.DD	DESCRIPTION
1	B.N.C.	13.02.26	1st SITE PLAN CONTROL SUBMISSION
1	B.N.C.	13.02.21	ISSUED FOR CONSULTANT COORDINATION

PROJECT No. 12-557

STORMWATER MANAGEMENT PLAN
774 BRONSON/551 CAMBRIDGE

SAMCON REDEVELOPPEMENT URBAIN
815 Boul. Rene Levesque Est
Montreal, Quebec H2L-4V5

DSEL
david schaeffer engineering ltd
120 Iber Road Unit 203
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY:	B.N.C.	CHECKED BY:	R.M.W.	DRAWING NO.	SHEET NO.
DESIGNED BY:	R.D.F.	CHECKED BY:		SWM-1	1 of 1
SCALE:	N.T.S.	DATE:	FEBRUARY 2013		

z:\projects\12-557_samcon_bronson-cambridge\b_design\b2_drawings\b2-2_main (dsel)\2013-01-10_spa\cad\2013-02-25_spa.dwg

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2004

Target Flow Rate

Area 0.19 ha
C 0.40 Rational Method runoff coefficient
t_c 20.0 min

2-year
i 52.0 mm/hr
Q 10.7 L/s

Estimated Post Development Peak Flow from Unattenuated Areas
Area ID: U2

Total Area 0.02 ha
C 0.41 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	1.9	1.9	0.0	0.0	178.6	4.1	4.1	0.0	0.0

Estimated Post Development Peak Flow from Attenuated Areas
Area ID: A2

Total Area 0.20 ha
C 0.75 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	42.3	3.1	39.2	23.5	178.6	90.7	6.7	84.0	50.4
15	83.6	33.9	3.1	30.8	27.7	142.9	72.6	6.7	65.9	59.3
20	70.3	28.5	3.1	25.4	30.5	120.0	60.9	6.7	54.2	65.1
25	60.9	24.7	3.1	21.6	32.4	103.8	52.7	6.7	46.1	69.1
30	53.9	21.9	3.1	18.8	33.8	91.9	46.7	6.7	40.0	72.0
35	48.5	19.7	3.1	16.6	34.8	82.6	41.9	6.7	35.3	74.1
40	44.2	17.9	3.1	14.8	35.6	75.1	38.2	6.7	31.5	75.6
45	40.6	16.5	3.1	13.4	36.1	69.1	35.1	6.7	28.4	76.7
50	37.7	15.3	3.1	12.2	36.5	64.0	32.5	6.7	25.8	77.4
55	35.1	14.3	3.1	11.1	36.7	59.6	30.3	6.7	23.6	77.9
60	32.9	13.4	3.1	10.2	36.9	55.9	28.4	6.7	21.7	78.2
65	31.0	12.6	3.1	9.5	36.9	52.6	26.7	6.7	20.1	78.3
70	29.4	11.9	3.1	8.8	36.9	49.8	25.3	6.7	18.6	78.2
75	27.9	11.3	3.1	8.2	36.8	47.3	24.0	6.7	17.3	78.0
80	26.6	10.8	3.1	7.6	36.7	45.0	22.8	6.7	16.2	77.7
85	25.4	10.3	3.2	7.2	36.5	43.0	21.8	6.7	15.1	77.2
90	24.3	9.9	3.2	6.7	36.3	41.1	20.9	6.7	14.2	76.7
95	23.3	9.5	3.2	6.3	36.0	39.4	20.0	6.7	13.4	76.1
100	22.4	9.1	3.2	5.9	35.7	37.9	19.2	6.7	12.6	75.5
105	21.6	8.8	3.2	5.6	35.4	36.5	18.5	6.7	11.9	74.8
110	20.8	8.5	3.2	5.3	35.0	35.2	17.9	6.7	11.2	74.0

5-year $Q_{attenuated}$ **3.15 L/s** **100-year $Q_{attenuated}$** **6.67 L/s**
5-year Max. Storage Required **36.9 m^3** **100-year Max. Storage Required** **78.3 m^3**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Storage (m^3)	100-Year Release Rate (L/s)	100-Year Storage (m^3)
Unattenuated Areas	1.9	0.0	4.1	0.0
Attenutated Areas	3.1	36.9	6.7	78.3
Total	**5.0**	**36.9**	**10.7**	**78.3**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2004

Target Flow Rate

Area	0.19	ha
C	0.40	Rational Method runoff coefficient
t_c	20.0	min

2-year

i	52.0	mm/hr
Q	10.7	L/s

Estimated Post Development Peak Flow from Unattenuated Areas
Area ID: U1

Total Area	0.02	ha
C	0.56	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	3.6	3.6	0.0	0.0	178.6	7.6	7.6	0.0	0.0

Estimated Post Development Peak Flow from Attenuated Areas
Area ID: A1

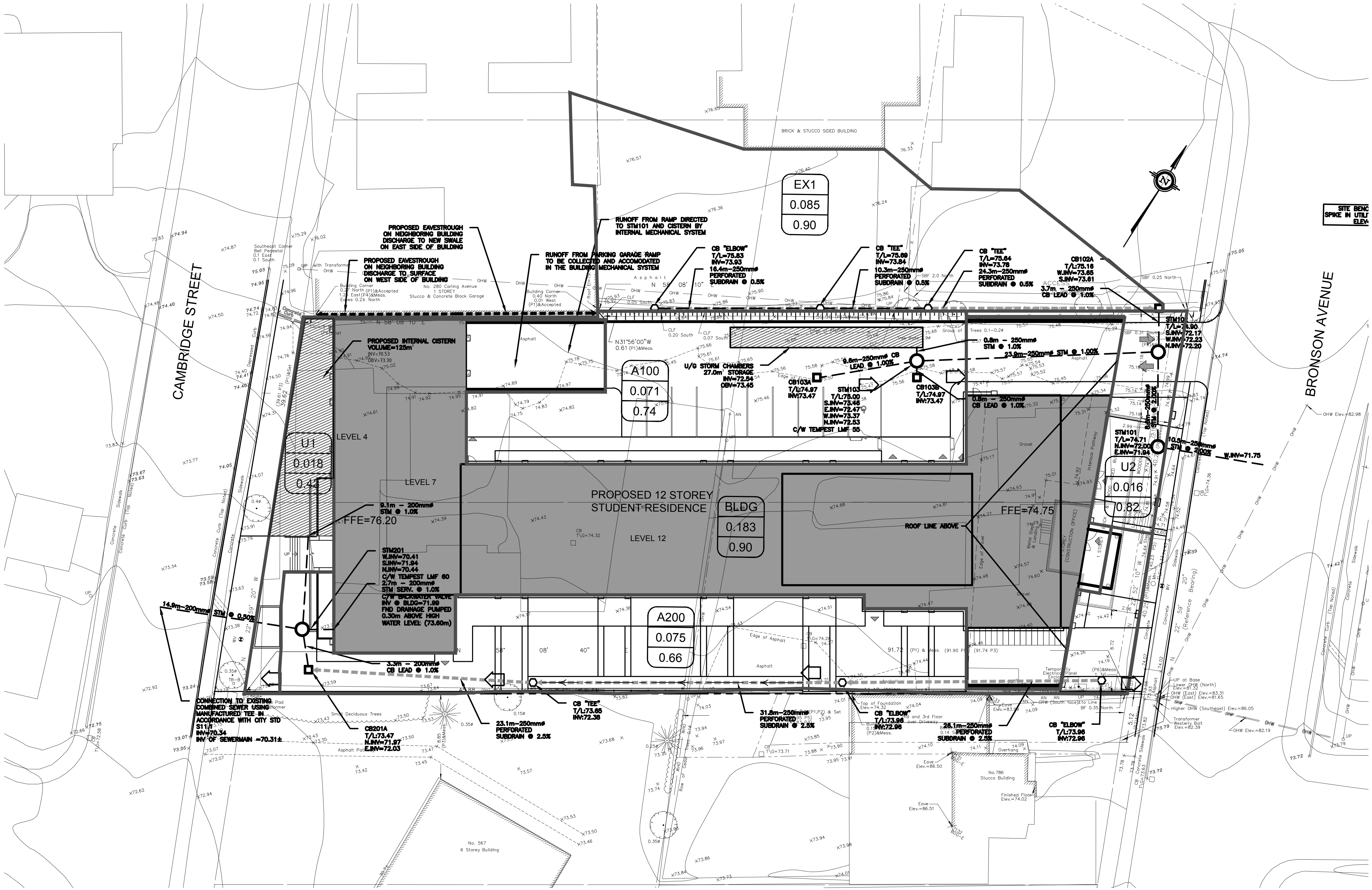
Total Area	0.13	ha
C	0.73	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	26.8	1.4	25.4	15.2	178.6	57.5	3.1	54.4	32.6
15	83.6	21.5	1.4	20.1	18.1	142.9	46.0	3.1	42.9	38.6
20	70.3	18.1	1.4	16.6	20.0	120.0	38.6	3.1	35.5	42.6
25	60.9	15.7	1.4	14.2	21.4	103.8	33.4	3.1	30.3	45.5
30	53.9	13.9	1.4	12.4	22.4	91.9	29.6	3.1	26.5	47.7
35	48.5	12.5	1.4	11.0	23.2	82.6	26.6	3.1	23.5	49.4
40	44.2	11.4	1.4	9.9	23.8	75.1	24.2	3.1	21.1	50.7
45	40.6	10.5	1.4	9.0	24.3	69.1	22.2	3.1	19.1	51.7
50	37.7	9.7	1.5	8.2	24.7	64.0	20.6	3.1	17.5	52.5
55	35.1	9.0	1.5	7.6	25.1	59.6	19.2	3.1	16.1	53.2
60	32.9	8.5	1.5	7.0	25.3	55.9	18.0	3.1	14.9	53.7
65	31.0	8.0	1.5	6.5	25.5	52.6	16.9	3.1	13.9	54.1
70	29.4	7.6	1.5	6.1	25.7	49.8	16.0	3.1	12.9	54.4
75	27.9	7.2	1.5	5.7	25.8	47.3	15.2	3.1	12.1	54.6
80	26.6	6.8	1.5	5.4	25.9	45.0	14.5	3.1	11.4	54.7
85	25.4	6.5	1.5	5.1	25.9	43.0	13.8	3.1	10.7	54.8
90	24.3	6.3	1.5	4.8	25.9	41.1	13.2	3.1	10.2	54.8
95	23.3	6.0	1.5	4.5	25.9	39.4	12.7	3.1	9.6	54.8
100	22.4	5.8	1.5	4.3	25.9	37.9	12.2	3.1	9.1	54.7
105	21.6	5.6	1.5	4.1	25.8	36.5	11.7	3.1	8.7	54.6
110	20.8	5.4	1.5	3.9	25.8	35.2	11.3	3.1	8.3	54.5

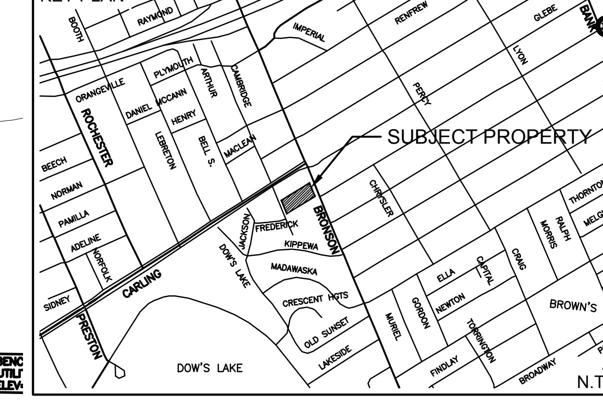
5-year $Q_{attenuated}$	**1.46 L/s**	**100-year $Q_{attenuated}$**	**3.08 L/s**
5-year Max. Storage Required	**25.9 m^3**	**100-year Max. Storage Required**	**54.8 m^3**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Storage (m^3)	100-Year Release Rate (L/s)	100-Year Storage (m^3)
Unattenuated Areas	3.6	0.0	7.6	0.0
Attenutated Areas	1.5	25.9	3.1	54.8
Total	**5.0**	**25.9**	**10.7**	**54.8**



KEY PLAN



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER
- DRAINAGE DIVIDE
- PROPOSED SWALE
- PROPOSED PERFORATED SUBDRAIN
- MAJOR SYSTEM FLOW ROUTE
- EX6 — DRAINAGE AREA ID
- 4.010 — AREA IN Ha
- 0.19 — RATIONAL METHOD RUNOFF COEFFICIENT
- SURFACE PONDING AREA (MAX PONDING / INTERMEDIATE PONDING)
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED CB 'T'

NOT FOR CONSTRUCTION

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
PROJ. NO. 16040-15
DATED NOVEMBER 19, 2015

SITE PLAN INFORMATION
SITE PLAN PROVIDED BY SRM ARCHITECTS INC.
PROJ. NO. 15076
DATED DECEMBER 10, 2015

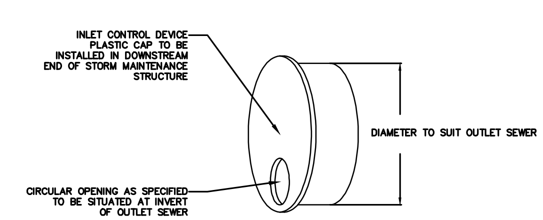
GEOTECHNICAL STUDY
GEOTECHNICAL RECOMMENDATIONS PROVIDED BY GENIVAR
PROJ. NO. 111-26060-00
DATED DECEMBER 2011

SITE SERVICING AND STORMWATER MANAGEMENT STUDY
SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 15-807
DATED DECEMBER 2015

BENCH MARK
LOCATED TOP OF SPINDLE OF HYDRANT ON BRONSON AVENUE
ELEV=76.06

No.	BY	YY.MM.DD	DESCRIPTION
1	SLM	15.12.11	ISSUED FOR MUNICIPAL REVIEW

INLET CONTROL DEVICE (ICD) DETAIL
PLASTIC "PLUG" STYLE



NOT TO SCALE

R. D. FREEL
100163197
2015-12-11
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

PROJECT No. 15-807

STORMWATER MANAGEMENT PLAN
774 BRONSON AVENUE

© DSEL

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DRAWN BY:	S.L.M.	CHECKED BY:	R.D.F.	DRAWING NO.	SHEET NO.
DESIGNED BY:	S.L.M.	CHECKED BY:	R.D.F.	SWM-1	1 of 1
SCALE:	1:200	DATE:	DECEMBER 2015		

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Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area 0.1900 ha
C 0.40 Rational Method runoff coefficient
t_c 20.0 min

2 year
i 52.0 mm/hr
Q 11.0 L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area 0.02 ha
C 0.82 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	3.8	3.8	0.0	0.0	178.6	7.9	7.9	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Contributions to Building Cistern

Total Area 0.071 ha
C 0.74 Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	15.2	1.3	13.9	8.3	178.6	32.6	2.8	29.8	17.9
20	70.3	10.3	1.3	8.9	10.7	120.0	21.9	2.8	19.1	22.9
30	53.9	7.9	1.3	6.6	11.8	91.9	16.8	2.8	14.0	25.2
40	44.2	6.4	1.3	5.1	12.3	75.1	13.7	2.8	10.9	26.3
50	37.7	5.5	1.3	4.2	12.6	64.0	11.7	2.8	8.9	26.7
60	32.9	4.8	1.3	3.5	12.6	55.9	10.2	2.8	7.4	26.7
70	29.4	4.3	1.3	3.0	12.5	49.8	9.1	2.8	6.3	26.5
80	26.6	3.9	1.3	2.6	12.3	45.0	8.2	2.8	5.4	26.1
90	24.3	3.5	1.3	2.2	12.1	41.1	7.5	2.8	4.7	25.5
100	22.4	3.3	1.3	2.0	11.8	37.9	6.9	2.8	4.1	24.9
110	20.8	3.0	1.3	1.7	11.4	35.2	6.4	2.8	3.7	24.1
120	19.5	2.8	1.3	1.5	11.1	32.9	6.0	2.8	3.2	23.3
130	18.3	2.7	1.3	1.4	10.6	30.9	5.6	2.8	2.9	22.4
140	17.3	2.5	1.3	1.2	10.2	29.2	5.3	2.8	2.5	21.4
150	16.4	2.4	1.3	1.1	9.7	27.6	5.0	2.8	2.3	20.4
160	15.6	2.3	1.3	1.0	9.3	26.2	4.8	2.8	2.0	19.4
170	14.8	2.2	1.3	0.9	8.8	25.0	4.6	2.8	1.8	18.3
180	14.2	2.1	1.3	0.8	8.3	23.9	4.4	2.8	1.6	17.2
190	13.6	2.0	1.3	0.7	7.7	22.9	4.2	2.8	1.4	16.1
200	13.0	1.9	1.3	0.6	7.2	22.0	4.0	2.8	1.2	14.9
210	12.6	1.8	1.3	0.5	6.6	21.1	3.9	2.8	1.1	13.7

5-year $Q_{attenuated}$ **1.3 L/s** | **100-year $Q_{attenuated}$** **2.8 L/s**
5-year Max. Storage Required **12.6 m^3** | **00-year Max. Storage Required** **26.7 m^3**
Storage Elevation **72.94 m** | **Storage Elevation** **73.44 m**

Total Available Storage

	Stage (m)	A (m^2)	h_o (m)	delta d (m)	V (m^3)	V_{acc} (m^3)	$Q_{release}$ (L/s)
	72.49	0.00	0.00	0.00	0.00	0.0	0.0
T/L	73.45	0.00	0.96	0.96	27.00	27.0	2.8

Orifice Lo STM103 LMF 55

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Storage (m^3)	100-Year Release Rate (L/s)	100-Year Storage (m^3)
Unattenuated Areas	3.8	0.0	7.9	0.0
Attenutated Areas	1.3	12.6	2.8	26.7
Total	**5.1**	**12.6**	**10.7**	**26.7**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	0.1900	ha
C	0.40	Rational Method runoff coefficient
t_c	20.0	min
	2 year	
i	52.0	mm/hr
Q	11.0	L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	0.02	ha
C	0.43	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	2.2	2.2	0.0	0.0	178.6	4.8	4.8	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas
Area ID: A200

Total Area	0.072
C	0.66

Area ID: BLDG

Total Area	0.184
C	0.90

Total Area	0.256	ha
C	0.83	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	61.7	2.7	59.0	35.4	178.6	127.0	5.5	121.4	72.9
20	70.3	41.6	2.7	38.9	46.6	120.0	85.3	5.5	79.8	95.7
30	53.9	31.9	2.7	29.2	52.6	91.9	65.3	5.5	59.8	107.6
40	44.2	26.2	2.7	23.4	56.2	75.1	53.4	5.5	47.9	114.9
50	37.7	22.3	2.7	19.6	58.7	64.0	45.5	5.5	39.9	119.8
60	32.9	19.5	2.7	16.8	60.4	55.9	39.7	5.5	34.2	123.1
70	29.4	17.4	2.7	14.7	61.6	49.8	35.4	5.5	29.9	125.4
80	26.6	15.7	2.7	13.0	62.4	45.0	32.0	5.5	26.5	127.0
90	24.3	14.4	2.7	11.6	62.9	41.1	29.2	5.5	23.7	127.9
100	22.4	13.3	2.7	10.5	63.2	37.9	27.0	5.5	21.4	128.5
110	20.8	12.3	2.7	9.6	63.3	35.2	25.0	5.5	19.5	128.6
120	19.5	11.5	2.7	8.8	63.3	32.9	23.4	5.5	17.9	128.5
130	18.3	10.8	2.7	8.1	63.2	30.9	22.0	5.5	16.4	128.2
140	17.3	10.2	2.7	7.5	62.9	29.2	20.7	5.5	15.2	127.6
150	16.4	9.7	2.7	7.0	62.6	27.6	19.6	5.5	14.1	126.8
160	15.6	9.2	2.7	6.5	62.2	26.2	18.7	5.5	13.1	125.9
170	14.8	8.8	2.7	6.1	61.7	25.0	17.8	5.5	12.2	124.9
180	14.2	8.4	2.7	5.7	61.2	23.9	17.0	5.5	11.5	123.7
190	13.6	8.0	2.7	5.3	60.6	22.9	16.3	5.5	10.7	122.5
200	13.0	7.7	2.7	5.0	60.0	22.0	15.6	5.5	10.1	121.1
210	12.6	7.4	2.7	4.7	59.3	21.1	15.0	5.5	9.5	119.6

5-year $Q_{attenuated}$	**2.7 L/s**	**100-year $Q_{attenuated}$**	**5.5 L/s**
5-year Max. Storage Required	**63.3 m^3**	**00-year Max. Storage Required**	**128.6 m^3**
Storage Elevation	**71.82 m**	**Storage Elevation**	**73.27 m**

Total Available Storage

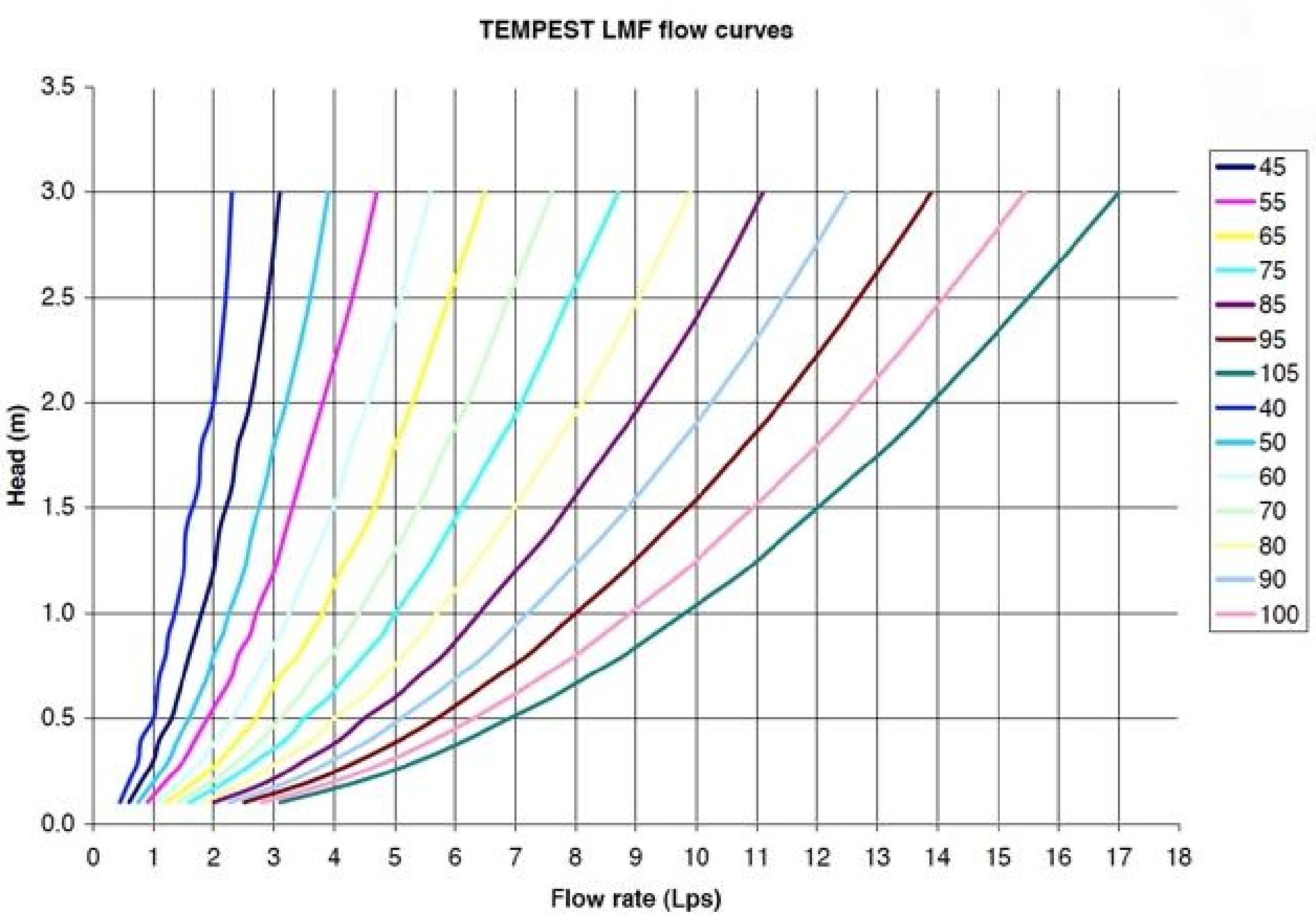
	Stage (m)	A (m^2)	h_o (m)	delta d (m)	V (m^3)	V_{acc} (m^3)	$Q_{release}$ (L/s)
	70.41	0.00	0.00	0.00	0.00	0.0	0.0
T/L	73.30	0.00	2.89	2.89	130.00	130.0	5.6

Orifice Location STM201 LMF 60

Summary of Release Rates and Storage Volumes

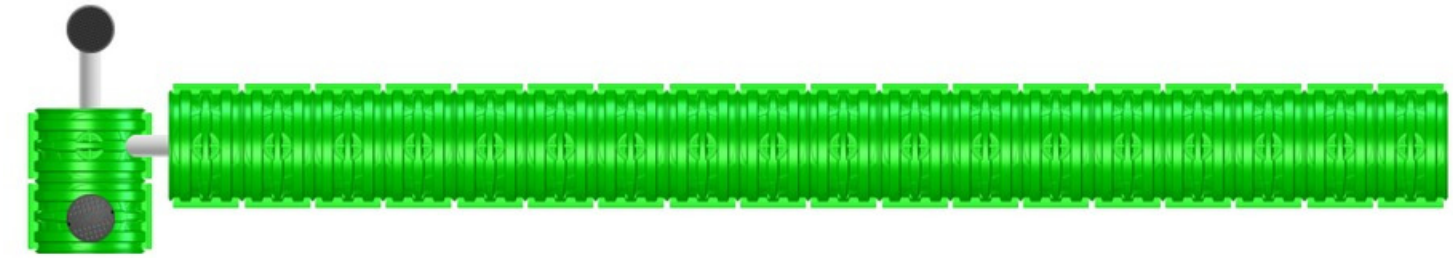
Control Area	5-Year Release Rate (L/s)	5-Year Storage (m^3)	100-Year Release Rate (L/s)	100-Year Storage (m^3)
Unattenuated Areas	2.2	0.0	4.8	0.0
Attenutated Areas	2.7	63.3	5.5	128.6
Total	**5.0**	**63.3**	**10.3**	**128.6**

										Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C**	**I**	**Q**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
			(ha)	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
TO BRONSON AVE																		
A100	STM103	STM102	0.071	0.74	0.05	0.05	10.0	104.2	15.2	250	1.00	23.9	0.049	0.063	1.21	59.5	0.3	0.26
EX1	CB102A	STM102	0.085	0.90	0.08	0.13	10.0	104.2	37.3	250	1.00	3.7	0.049	0.063	1.21	59.5	0.1	0.63
	STM102	STM101	0.000	0.00	0.00	0.18	10.3	102.5	51.7	250	2.00	8.6	0.049	0.063	1.71	84.1	0.1	0.61
	STM101	EX. CMBMH	0.000	0.00	0.00	0.18	10.4	102.1	51.5	250	2.00	10.5	0.049	0.063	1.71	84.1	0.1	0.61


TEMPEST LMF flow curves
Head (m)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Flow rate (Lps)
45
55
65
75
85
95
105
40
50
60
70
80
90
100

# of Chambers long:	18
# of rows:	1
Actual Trench Length:	17.597 M
Actual Trench Width:	2.108 M

Field Diagram

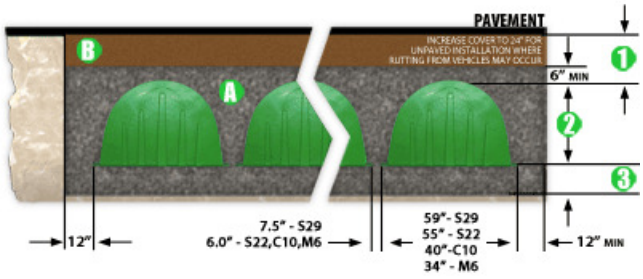


WIRE DIAGRAM

Chamber Type

Dimensions 59" x 36" x 35" (WxHxL)
1498.6mm x 914.4mm x 889mm
Weight 32 lbs / 14.5 kg
Bare Chamber Storage 29 ft³ / 0.82 m³

Project Results



- 1 Total Cover Over Chambers: 45.72 cm
- 2 Height of Chamber: 91.44 cm
- 3 Embedment Stone Under Chambers: 15.24 cm
- A Volume of Embedment Stone Required: 29 Cu. M
- B Volume of Fill Material Required: 11 Cu. M

Total Storage Provided:	27.4 Cu. M
Type of Distribution Chambers:	S-29
# of Distribution Chambers Required:	18
# of end caps required:	4
Type of header row chambers required:	S-29
# of header row chambers required:	2

Floors:	0
Bins:	0
Dumpsters:	0
Required Bed Size:	37.1 Sq. M
Volume of Embedment Stone Required:	29.65 Cu. M
Volume of Fill Material Required:	11.31 Cu. M
Volume of Excavation:	56.54 Cu. M
Area of Filter Fabric:	85.15 Sq. M
# of Chambers long:	18
# of rows:	1
Actual Trench Length:	17.597 M
Actual Trench Width:	2.108 M

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