Jp2g Consultants Inc.
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February 18th, 2020

City of Ottawa
Development Review - Urban Services Branch
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON, K1P 1J1

Attention: Cornette Gorni, Planner

Re **Fernbank Elementary School, 480 Cope Drive**
At Cope Drive and Rouncey Road, Ottawa
Site Servicing Report Brief – Revised as per City Comments on January 17th 2020
Revision 1

Dear Ms. Gorni:

We provide the following Site Servicing Report Brief in accordance with the City of Ottawa Site Plan Control Application requirements for the Ottawa-Carleton District School Board's proposed Elementary. The current report outlines the site servicing criteria pertaining to the servicing of the 3889 square metre proposed elementary school on Cope Drive between Continental Avenue and Rouncey Road. The site is located within the Fernbank Community Development near Stittsville.

Reference documents

- Site Servicing, Grading and Drainage by Jp2g Consultants Inc., February 18th 2020.
- Stormwater Management Report by Jp2g Consultants Inc., February 18th 2020.
- Topographical Survey by Farley, Smith & Denis Ltd, September 23, 2014, File No. 481-19.
- Servicing and Stormwater Management Report – Blackstone Community Phase 4-8 by Stantec, April 11, 2019.

Background

The proposed elementary school and daycare is to be located within the Phase 4-8 of the Blackstone Community which was developed by Mattamy Ltd. Stantec provided engineering design services based on the Fernbank Community Master Servicing plan – 2009, by Novatech and the Stormwater management Report by IBI group 2012. Relevant excerpts from the Servicing and Stormwater Report by Stantec, dated April 11, 2019 are provided in Appendix B of this report.

The current 2.84 ha property is vacant and was previously agricultural land. Water, sanitary and storm sewer stubs have been provided from the Rouncey Road right-of-way. The proposed site development includes the construction of a two-storey school building including a 360 m2, one-storey daycare, a bus loop, parking, walkways, play areas, a sports field, and landscaped areas.

A pre-consultation meeting was held on August 23rd with representatives of the City of Ottawa, the Ottawa-Carleton District School Board and the consultant design team (Refer to Appendix A).

Servicing

1.1 Water

An existing 200mm watermain is located on the east side of the school property off of the existing 300mm watermain on Rouncey Road. The new elementary school will be protected by a supervised fire protection sprinkler system. Two new private fire hydrants will be added to the school site. The first hydrant is located within 45m of the siamese connection; located at the rear of the building; while the second hydrant is located to

the west, in vicinity of the future portable classrooms. The water meter will be located inside the school's mechanical room and a remote water meter will be installed along the building exterior. No changes to the existing City water distribution system is required.

Boundary conditions were provided by the City of Ottawa during the design of the Residential Development to Stantec. The Stantec hydraulic modelling indicated the hydraulic pressures for different scenario conditions are shown below, based on fire flows and domestic demands estimated for the proposed lands (Refer to Appendix B – Background – Water Distribution System). A fire flow of 167 L/s (10,000 L/s) was estimated for the school institutional block; which correlates to the calculated fire flow.

Table 1 – Stantec Hydraulic Modelling Results @ Cope Drive and Rouncey Road

Scenario	Hydraulic Pressure (psi)	Head (m)
Average Day (Max HGL)	86.30	161.2
Peak Hour (Min HGL)	78.65	155.8
Max Day + Flow	74.53	152.9

Ground Elevation= 100.50

A request was made for updated boundary conditions following comments from the City. We are awaiting the information.

Water Demand

The water demand for the proposed school was calculated based on Table 4.2 from the City of Ottawa Design Guidelines for Water Distribution. The calculations are based on the following criteria:

- Average daily demand for schools = 70 l/student/day
- School day = 8 hours
- Maximum school and daycare occupancy = 1000 persons (staff and students)

Average Daily Demand: $\frac{70 \text{ l/student/day} \times 1000 \text{ students}}{8 \text{ hrs/day} \times 3600 \text{ s/hr}} = 2.43 \text{ l/s}$

Maximum Daily Demand: 2.43 l/s x 1.5 = 3.64 l/s

Maximum Hour Demand: 2.43 l/s x 1.8 = 4.37 l/s

These water demands based on population are higher than the rates used by Stantec Report for the Residential Development which were based on institutional rate per hectare.

Table 2 – Water Demands comparison to Stantec Report

Scenario	Calculated demands (L/s)	Stantec Area demands (L/s)
Average Day (Max HGL)	2.43	0.92
Peak Hour (Min HGL)	3.64	1.38
Max Day + Flow	4.37	2.49

Fire Flows

The required fire flow rate for the new elementary school was calculated using the Fire Underwriters Survey Method, which takes into consideration the type of building, occupancy, use of sprinklers and exposure to adjacent building structures. Based on a non-combustible construction protected by sprinkler system with minimum exposure (future portables 25m to the south and townhomes 40 m to the north), the fire flow demand for the proposed school was calculated to be 167 L/s. Refer to Appendix B – Fire Flow Calculations.

Fire flow analysis from the hydraulic modelling by Stantec confirms available fire flows between 980 L/s to 1,314 L/s at nodes adjoining the proposed school on Rouncey Road as well as available fire flows of 578 L/s in front of the proposed building along Cope Drive.

Maximum and Minimum Pressure check

Based on the modelling results, the minimum pressure during peak hour is anticipated to be approximately 78 psi which is well above the minimum pressure of 40 psi.

Maximum pressure is anticipated to be approximately 86.3 psi which exceeds the maximum operating pressure of 80 psi.

Based on the above values, and according to the City of Ottawa Design Guidelines, the installation of a pressure reducing valve will be required inside the building. The need for pressure reducing valve is consistent with the Stantec Servicing Report for the Blackstone Community.

1.2 Sanitary Sewer

Proposed sanitary flows will be collected by a proposed storm sewer system, which will outlet from the site to the existing 200mm diameter municipal storm sewer along the east property line on Rouncey Road. The proposed sanitary sewer will outlet the building at a slope of 0.40% and be connected to the existing municipal sewer by connecting into an installed manhole at the property line. The existing sanitary sewer, in the right-of-way, is approximately 4.4m deep while the sanitary sewer at the property line is approximately 3.8m deep.

Based on the City of Ottawa Sewer Design Guidelines, the peak sanitary flows for the site were calculated to be 2.32 L/s (Refer to Appendix C - Sanitary Sewer Design Sheet). The proposed 200mm diameter sanitary sewer service will have a full flow capacity of 20.7 l/s, which will be sufficient to handle the proposed development.

1.3 Storm sewer and Stormwater Management

Proposed site storm drainage from the overall roof, school yard, parking area, bus loop, and sports field, will be collected by a proposed storm sewer system, which will outlet from the site to the existing 1200mm diameter municipal storm sewer via an existing 825mm diameter storm sewer stub which is connected to the existing 1500mm ϕ municipal storm manhole STM 2049 along the east property line on Rouncey Road. The manhole will be replaced with an 1800mm ϕ diameter structure to accommodate the pipe layout.

The site is limited to an allowable release rate of 575.7 L/s as established by the subdivision development brief by Stantec. Storm flows greater than the allowable release rate up to the 100-year event will be retained on site. Stormwater quantity control will be achieved using flow restriction and surface storage.

Stormwater quality control will be provided by the downstream pond 6, no onsite quality control is required.

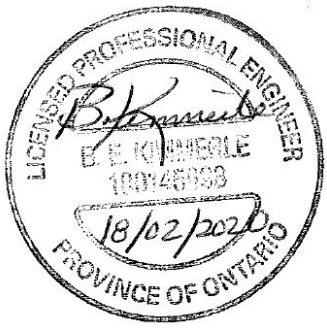
Stormwater management calculations are included in the Stormwater Management Report updated by Jp2g, February 18th, 2020.

End of Site Servicing Report

Please contact the undersigned should you require any clarification.

Yours truly,

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS



Barbra Kimmerle, P.Eng.
Civil Engineer

Appendix A
Pre-Consultation Meeting

File Number: PC2019-0217
August 23, 2019

480 Cope Drive (Fernbank Elementary School)
Pre-application Consultation Meeting Notes

Location: Room 4103E, City Hall
Date: August 14, 2019 at 1:00 PM

Attendees:	Colette Gorni, Planner, City of Ottawa Kathy Rygus, Planner, City of Ottawa Eric Surprenant, Project Manager (Infrastructure), City of Ottawa Rosanna Baggs, Project Manager (Transportation), City of Ottawa Matthew Ippersiel, Planner (Urban Design), City of Ottawa Vladimir Popovic, Architect, N45 Architecture Inc. Jennifer Luong, Engineer (Transportation), Novatech Barbra Kimmerle, Engineer, Jp2g Consultants Inc. Daniel Bradley, Manager of Facilities, OCDSB David Lacelle, Supervisor (Design & Construction Services), OCDSB Jean Voth, Project Leader (Design & Construction Services), OCDSB
Regrets:	Mark Richardson, Forester, City of Ottawa Matthew Hayley, Planner (Environment), City of Ottawa Eric Lalande, Planner, RVCA

Comments from the Applicant

1. The Ottawa-Carleton District School Board is proposing the construction of a new 2-storey, 75,000 square foot elementary school, which is intended to serve approximately 650 students.
2. On-site daycare facilities are proposed within the main school building. A separate child drop-off and pick-up zone is provided for the daycare within the parking lot, which is accessible from Continental Avenue.
3. It is anticipated that 12 portables will be required in the future, as the school population grows. The future portables are to be located at the rear of the property, within the fenced school yard.
4. Three lay-bys are proposed to minimize disruptions in vehicular movement around the school during peak child drop-off and pick-up times. The lay-bys are to be along portions of Continental Avenue, Cope Drive, and Rouncey Road. It is preferred to by the applicant to have as much lay-by space available as possible.

Planning Comments

1. This is a formal pre-application consultation meeting for a Site Plan Control Application - Complex. Application form, timeline and fees can be found here.

2. Please ensure that plans submitted as part of a formal application show the roundabout to be constructed at the intersection of Cope Drive and Rouncey Road.
3. Please note that the municipal address for the site it 480 Cope Drive.
4. Please refer to '[Section 110 – Landscaping Provisions for Parking Lots]' of the Zoning By-law when designing the parking lot.
5. Please reach out to the applicable Ward Councillor and set up a meeting to present plans for the site.

Urban Design Comments

1. Reduce the depth of the Cope Drive bus drop-off and shift the building footprint closer to the street edge. This may also require a reconfiguration of the parking lot. Explore the feasibility of following options (in order of preference):
    a. Eliminate the bus loop and create a bus lay-by in the public right-of-way along Cope Drive.
    b. Eliminating some of the layers such as the fire route, parking spaces, and the lay-by and tighten-up the bus loop so that it is as shallow and efficient as possible.
    c. Explore the possibility of a shallow and efficient bus loop on Rouncey drive.
2. Please consider aligning the parking lot entrance on Continental Avenue with Brittanic Road.
3. Please create a pedestrian connection from Continental Avenue to the Daycare entrance. For example, a sidewalk along the daycare drop-off zone.
4. Ensure that Rouncey Drive and Continental Avenue are also lined with street trees.

Transportation Comments

1. Follow Traffic Impact Assessment Guidelines
    - Traffic Impact Assessment will be required; screening form submitted.
    - Start this process asap.
    - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
2. ROW protection on Cope is 24m even.

3. Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required:

    - Local Road to Collector Road: 5 metre x 5 metres
    - Collector Road to Collector Road: 5 metre x 5 metres

4. Noise Impact Studies required for the following:

    - Road
    - Stationary (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)

5. Ensure accesses are far enough away from the intersections as per TAC guidelines. It is encouraged to have the accesses as far away from the intersections as possible.

6. It is encouraged to align the parking lot access on Continental with the Birittanic

7. AODA legislation is in full effect. Refer to attached checklist for guidance.

8. On site plan:

    - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions). Provide on a separate drawing.
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    - Show lane/aisle widths.
    - Sidewalk is to be continuous across access as per City Specification 7.1.
    - Grey out any area that will not be impacted by this application.
    - Show design for full length of frontage on Continental,

9. Cope and Rouncey will be constructed as a round about. Ensure this design is integrated into your site plan to ensure that your proposed infrastructure does not conflict with it. Contact Parsons to coordinate.

    - Splitter Islands

- MUP connections; drops approximately 40m from the circle.
- OC Transpo Bus stop locations; there is one planned on the south side of Cope west of Rouncey.

10. Ensure the that Geometric Road Design Drawings for Cope and Rouncey are the latest versions and integrate them into the site plan.
    - Sidewalk on Continental Ave is against the curb.
11. It would be encouraged to bring the building closer to Cope to eliminate the need for the fire route. As per BBSS, lay-bys would be the preferred option for bus and parent drop off. This will also eliminate the number of conflict points between children being dropped off and vehicles and buses.
12. Lay-bys are to be constructed with asphalt and grade with the road towards the curb. Maintenance agreement will be required for snow removal.

Engineering Comments

1. Please ensure that all servicing is extended to the property line.
2. Please integrate the Cope cross-section into the site plan design.
3. Please run FUS calculation for the site.

Forestry Comments

No comment.

Environmental Comments

1. No EIS required.
2. Please consider the policies outlined in Section 4.9 – Energy Conservation Through Design of the Official Plan in the design of your site. The southern exposure of the building has a large amount of asphalt and limited trees in the yard, which creates concerns regarding shade and a localized heat island effect.
3. The integration of solar energy

File Number: PC2019-0217
August 23, 2019

RVCA

1. Please ensure that the site is providing 80% TSS removal, either on-site or through a downstream SWM facility. It would appear to outlet to the downstream SWM, confirmation of this should be included as part of their Site Servicing report. Confirm whether this will be achieved through the pond to the north.

Sincerely,

Colette Gorni
Planner I
Development Review - West

Appendix B
WATER
Background excerpts – Water Distribution System - Fire Flow Calculations

Blackstone South - Domestic Water Demand Estimates

Building ID	Area (ha)	# of Units	PPU	Population	Daily Rate of Demand (L/day)	Avg Day Demand [2,3]		Max Day Demand [2,3]		Peak Hour Demand [2,3]	
						(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
High School	7.50	-	-	-	28000	145.8	2.43	218.8	3.65	393.8	6.56
Elem. School	2.84	-	-	-	28000	55.2	0.92	82.8	1.38	149.1	2.49
Condo 1	-	192	2.3	441.6	350	107.3	1.79	268.3	4.47	590.3	9.84
Singles	-	349	3.4	1186.6	350	288.4	4.81	721.0	12.02	1586.3	26.44
Towns	-	382	2.7	1031.4	350	250.7	4.18	626.7	10.45	1378.8	22.98
B2B	-	92	2.3	211.6	350	51.4	0.86	128.6	2.14	282.9	4.71
Total Site :						**898.9**	**15.0**	**2046.2**	**34.1**	**4381.1**	**73.0**

1 For the purpose of this study it is predicted that commercial facilities will be operated 12 hours per day.

2 Water demand criteria used to estimate peak demand rates for commercial areas are as follows:

maximum day demand rate = 1.5 x average day demand rate

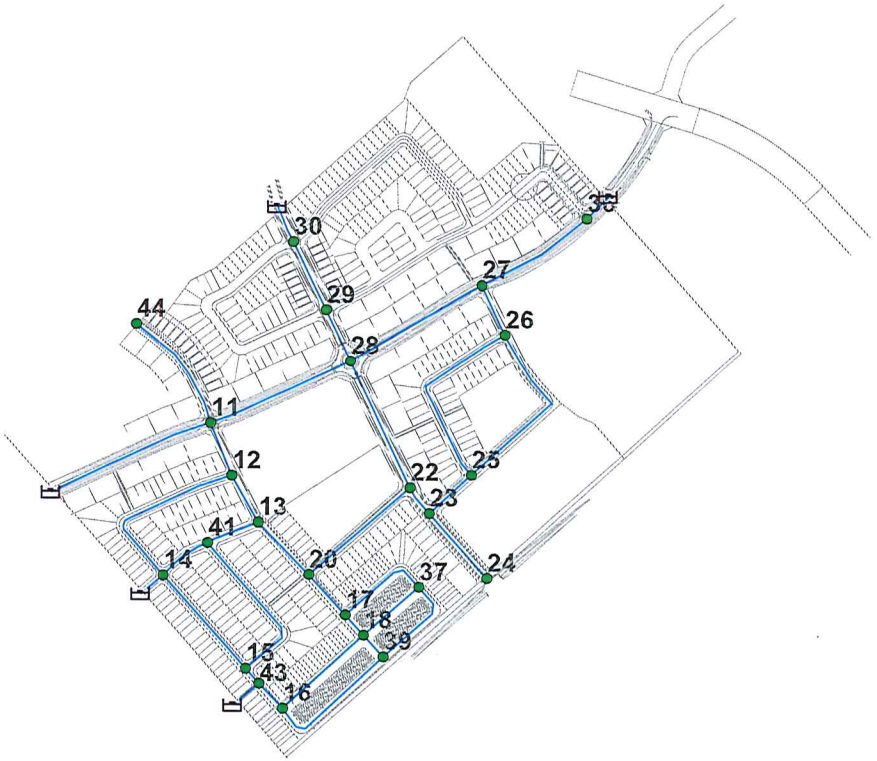
maximum hour demand rate = 1.8 x maximum day demand rate

3 Water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate

maximum hour demand rate = 2.2 x maximum day demand rate

160401130-SOUTH OF COPE DRIVE - JUNCTION ID



JUNCTION (VALUE)
- less than 2.23
- greater than 2.23

TANK (VALUE)
- less than 0.00
- greater than 0.00
- less than 0.00
- greater than 0.00

PIPE (VALUE)
- Less than 205
- Greater than 205

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

ACAD-Hydraulic Analysis.dxf

ANNO2

Prepared By:

Date: Friday, July 27, 2018

Hydraulic Model Results - Average Day Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
11	0.54	101.05	161.50	85.94	592.54
12	0.33	101.16	161.50	85.78	591.44
13	0.00	101.53	161.50	85.25	587.78
14	0.72	102.34	161.50	84.10	579.85
15	0.00	102.49	161.50	83.89	578.40
16	0.75	102.75	161.50	83.52	575.85
17	0.00	101.74	161.50	84.95	585.71
18	0.81	101.80	161.50	84.87	585.16
20	0.54	101.65	161.50	85.08	586.61
22	0.00	101.36	161.50	85.50	589.51
23	0.45	101.35	161.51	85.52	589.64
24	1.79	101.39	161.50	85.45	589.16
25	0.61	100.58	161.51	86.62	597.23
26	0.00	99.31	161.52	88.44	609.78
27	0.84	99.00	161.54	88.90	612.95
28	1.20	100.80	161.51	86.30	595.02
29	1.26	100.43	161.50	86.82	598.61
30	1.12	100.21	161.50	87.13	600.74
36	2.90	98.28	161.58	89.99	620.46
37	0.00	101.97	161.50	84.63	583.51
39	0.00	101.85	161.50	84.80	584.68
41	0.59	101.94	161.50	84.67	583.78
43	0.00	102.44	161.50	83.96	578.89
44	0.39	100.74	161.50	86.38	595.57

Pipe Results

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	(mm)		(L/s)	(m/s)
1	6	36	48.36	297	120	18.43	0.27
10	28	11	232.94	204	110	1.56	0.05
11	11	3	263.74	204	110	0.35	0.01
13	11	12	86.45	204	110	0.28	0.01
14	12	13	81.22	204	110	-0.34	0.01
15	12	14	281.63	204	110	0.29	0.01
16	22	23	49.12	204	110	-0.98	0.03
17	23	24	135.60	204	110	1.79	0.05
2	36	27	190.42	297	120	15.53	0.22
21	37	39	149.48	204	110	0.15	0.00
22	17	20	83.29	204	110	-1.04	0.03
23	37	18	112.17	204	110	0.17	0.01
24	18	17	41.45	204	110	-0.72	0.02
29	15	43	30.23	204	110	0.27	0.01
3	27	28	231.49	297	120	10.86	0.16
30	15	14	189.32	204	110	-0.09	0.00
32	27	26	84.15	204	110	3.83	0.12
33	26	25	297.30	204	110	1.90	0.06
36	26	25	291.17	204	110	1.93	0.06
37	25	23	86.62	204	110	3.22	0.10
38	5	30	58.89	297	120	-3.10	0.04
39	30	29	115.52	297	120	-4.22	0.06
4	28	22	213.20	297	120	2.62	0.04
40	29	28	86.54	297	120	-5.48	0.08
55	39	16	209.96	204	110	0.11	0.00
56	18	16	165.72	204	110	0.12	0.00
57	37	17	148.85	204	110	-0.32	0.01
59	41	14	84.47	297	120	0.91	0.01
6	20	22	203.30	297	120	-3.60	0.05
61	41	15	259.87	204	110	0.19	0.01
63	39	18	44.32	204	110	0.04	0.00
65	43	16	52.16	204	110	0.52	0.02
7	20	13	110.50	297	120	2.02	0.03
71	7	43	51.03	204	110	0.25	0.01
72	44	11	193.50	204	110	-0.39	0.01
8	13	41	82.99	297	120	1.68	0.02
9	14	2	44.02	297	120	0.39	0.01

Hydraulic Model Results -Peak Hour Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
11	2.95	101.05	156.11	78.27	539.66
12	1.82	101.16	156.12	78.13	538.69
13	0.00	101.53	156.12	77.61	535.11
14	3.94	102.34	156.16	76.51	527.52
15	0.00	102.49	156.12	76.24	525.66
16	4.11	102.75	156.10	75.84	522.90
17	0.00	101.74	156.10	77.28	532.83
18	4.47	101.80	156.10	77.19	532.21
20	2.95	101.65	156.11	77.42	533.80
22	0.00	101.36	156.11	77.83	536.62
23	2.50	101.35	156.07	77.79	536.35
24	9.84	101.39	155.97	77.59	534.97
25	3.33	100.58	156.08	78.90	544.00
26	0.00	99.31	156.10	80.74	556.69
27	4.63	99.00	156.13	81.22	560.00
28	4.30	100.80	156.13	78.65	542.28
29	6.92	100.43	156.13	79.19	546.00
30	6.14	100.21	156.17	79.55	548.48
36	9.10	98.28	156.17	82.30	567.44
37	0.00	101.97	156.10	76.95	530.55
39	0.00	101.85	156.10	77.12	531.73
41	3.26	101.94	156.14	77.05	531.24
43	0.00	102.44	156.11	76.29	526.00
44	2.13	100.74	156.10	78.70	542.62

Pipe Results

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	(mm)		(L/s)	(m/s)
1	6	36	48.36	297	120	23.87	0.34
10	28	11	232.94	204	110	2.72	0.08
11	11	3	263.74	204	110	1.73	0.05
13	11	12	86.45	204	110	-4.08	0.12
14	12	13	81.22	204	110	-1.94	0.06
15	12	14	281.63	204	110	-3.96	0.12
16	22	23	49.12	204	110	9.75	0.30
17	23	24	135.60	204	110	9.84	0.30
2	36	27	190.42	297	120	14.77	0.21
21	37	39	149.48	204	110	0.56	0.02
22	17	20	83.29	204	110	-4.25	0.13
23	37	18	112.17	204	110	0.74	0.02
24	18	17	41.45	204	110	-2.95	0.09
29	15	43	30.23	204	110	7.58	0.23
3	27	28	231.49	297	120	4.22	0.06
30	15	14	189.32	204	110	-5.02	0.15
32	27	26	84.15	204	110	5.92	0.18
33	26	25	297.30	204	110	2.94	0.09
36	26	25	291.17	204	110	2.98	0.09
37	25	23	86.62	204	110	2.59	0.08
38	5	30	58.89	297	120	23.22	0.34
39	30	29	115.52	297	120	17.08	0.25
4	28	22	213.20	297	120	7.36	0.11
40	29	28	86.54	297	120	10.16	0.15
55	39	16	209.96	204	110	0.04	0.00
56	18	16	165.72	204	110	-0.25	0.01
57	37	17	148.85	204	110	-1.30	0.04
59	41	14	84.47	297	120	-17.35	0.25
6	20	22	203.30	297	120	2.39	0.03
61	41	15	259.87	204	110	2.56	0.08
63	39	18	44.32	204	110	0.52	0.02
65	43	16	52.16	204	110	4.33	0.13
7	20	13	110.50	297	120	-9.59	0.14
71	7	43	51.03	204	110	-3.25	0.10
72	44	11	193.50	204	110	-2.13	0.07
8	13	41	82.99	297	120	-11.54	0.17
9	14	2	44.02	297	120	-30.28	0.44

Hydraulic Model Results -Fire Flow Analysis (167 L/s)

ID	Static Demand	Static Pressure		Static Head	Fire-Flow Demand	Residual Pressure		Available Flow at Hydrant	Available Flow Pressure	
	(L/s)	(psi)	(Kpa)	(m)	(L/s)	(psi)	(Kpa)	(L/s)	(psi)	(Kpa)
11	1.34	74.89	516.35	153.73	167	69.20	477.12	578.60	20	137.90
12	0.83	74.74	515.32	153.74	167	70.36	485.12	659.60	20	137.90
13	0.00	74.27	512.08	153.77	167	72.83	502.15	1,200.77	20	137.90
14	1.79	73.04	503.60	153.72	167	72.43	499.39	1,873.74	20	137.90
15	0.00	72.83	502.15	153.72	167	69.22	477.26	711.82	20	137.90
16	1.87	72.49	499.80	153.74	167	66.12	455.88	528.62	20	137.90
17	0.00	73.99	510.15	153.79	167	66.92	461.40	505.24	20	137.90
18	2.03	73.88	509.39	153.77	167	66.39	457.75	491.57	20	137.90
20	1.34	74.22	511.73	153.86	167	72.39	499.11	1,061.22	20	137.90
22	0.00	75.03	517.32	154.14	167	72.65	500.91	980.93	20	137.90
23	1.14	75.06	517.52	154.15	167	67.66	466.50	512.89	20	137.90
24	4.47	74.96	516.83	154.12	167	37.62	259.38	211.39	20	137.90
25	1.52	76.25	525.73	154.22	167	65.87	454.16	427.16	20	137.90
26	0.00	78.18	539.04	154.30	167	69.17	476.91	468.70	20	137.90
27	2.11	78.74	542.90	154.39	167	76.56	527.87	1,096.55	20	137.90
28	2.20	76.17	525.18	154.38	167	74.53	513.87	1,314.92	20	137.90
29	3.15	76.96	530.62	154.56	167	75.05	517.45	1,210.45	20	137.90
30	2.79	77.67	535.52	154.84	167	76.20	525.38	1,577.48	20	137.90
36	4.80	79.88	550.76	154.47	167	78.79	543.24	1,675.67	20	137.90
37	0.00	73.64	507.73	153.77	167	63.24	436.03	407.11	20	137.90
39	0.00	73.81	508.91	153.77	167	64.74	446.37	439.94	20	137.90
41	1.48	73.64	507.73	153.74	167	72.42	499.32	1,299.69	20	137.90
43	0.00	72.90	502.63	153.72	167	70.22	484.15	840.77	20	137.90
44	0.97	75.32	519.32	153.73	167	28.46	196.23	183.76	20.00	137.90

Hydraulic Model Results -Fire Flow Analysis (267 L/s)

ID	Static Demand	Static Pressure		Static Head	Fire-Flow Demand	Residual Pressure		Available Flow at Hydrant	Available Flow Pressure	
	(L/s)	(psi)	(Kpa)	(m)	(L/s)	(psi)	(Kpa)	(L/s)	(psi)	(Kpa)
16	1.87	62.68	432.17	146.84	267	47.70	328.88	472.99	20	137.90
18	2.03	64.15	442.30	146.93	267	46.53	320.82	441.56	20	137.90

Fernbank Elementary School, Cope Drive and Rouncey Road, Ottawa, ON

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Appendix B - Water Demand

Fire Flow Demand Requirements (Fire Underwritters Survey (FUS Guidelines))

Design Parameters*

Estimated Fire Flow Formula: $F=220*C*A^{1/2}$(L/min)

F = Required fire flow (L/min)
C = Coefficient related to the type of construction
$C_{1.5}$ = 1.5 for wood frame construction (structure essentially all combustible)
$C_{1.0}$ = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
$C_{0.8}$ = 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
$C_{0.6}$ = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = Total floor area in square metres

Adjustments to the calculated fire flow are based on: reduction for low fire hazard occupancy (school), reduction for automatic sprinkler protection, and an increase for exposures for residences within 45 metres on two sides of the school.
The table below summarizes the adjustments made to the basic fire flow.

Building Construction	Floor Area	C	1	2		3		4		Final Adjusted Fire Flow	Final Adjusted Fire Flow
			Fire Flow (F)	Occupancy		Sprinkler		Exposure			
non-combustible construction	(m^2)		(L/min)	%	Adjusted Fire Flow(s) (L/min)	%	Adjusted Fire Flow(s) (L/min)		Adjusted Fire Flow(s) (L/min)	(L/min)	(L/s)
Main Building	6,353.0	0.8	14,028.2	-15.0	11,924.0	-30.0	-3,577.2	15.0	1788.6	10,135.4	168.9

*Water Supply for Pubic Protection (Fire Underwriters Survey, 1999).

Final Fire Flow adjusted to the nearest 1,000 L/min = 10,000 L/min = 167 L/sec

C.1.2 - Water Boundary Conditions

Water Demands

Average Daily Demand:	2.43 l/s
Maximum Daily Demand:	3.64 l/s
Maximum Hour Demand:	4.37 l/s
Fire Flow Demand:	167.0 l/s

Design Parameters

Pipe Diameter:	200 mm
Pipe Material:	PVC
Pipe Length	95.0 m
Finished Floor Elevati	101.25
Pavement Elevation:	100.50

Boundary Conditions

Max. HGL:	161.18 m
Min HGL:	155.80 m
Max. Day + Fire:	152.9 m

Appendix C - SANITARY
Sanitary Sewer Design Sheet

Appendix C - Sanitary Sewer Design Sheet

A.1.1 - Peak Flow Design Based on Site Area

Definitions
Manning's Coefficient (n) = 0.013

Manning's Formula
$Q = A*R^{2/3}*S^{1/2}/n$ (l/s), where
A = Areas in Hectares (ha)
R = Hydraulic Radius (m)
S = Slope

Design Parameters*
1) Average Daily Flow = 280 L/p/day
2) Commercial/Institutional Flow = 28,000 L/ha/day
3) Maximum Residential Peak Factor = 4.0
4) Commercial/Institutional Peak Factor = 1.50
5) Extraneous Flow = 0.33L/s/ha
6) Minimum Velocity = 0.60 m/s

Location		Residential Flow**							Institutional Flow			Infiltration Flow			Total Flow	Sewer Data					
					Cumulative		Peak Factor	Peak Flow	Area (ha)		Peak Flow	Area (ha)		Inf. Flow		Length	Dia.	Slope	Capacity	Velocity	Utilization
From	To	Area (ha)	Units	Population	Area	Population		(l/s)	Individual	Cumulative	(l/s)	Individual	Cumulative	(l/s)	(l/s)	(m)	(mm)	(%)	(full) (l/s)	(full) (m/s)	(%)
School	SANMH1	0.00	0	0	0.00	0	4.00	0.00	2.840	2.840	1.38	2.840	2.840	0.94	2.32	34.0	200	0.4	20.7	0.66	11.2
SANMH1	SANMH2	0.00	0	0	0.00	0	4.00	0.00	0.000	2.840	1.38	0.000	2.840	0.94	2.32	20.0	200	0.4	20.7	0.66	11.2
SANMH2	SANMH3	0.00	0	0	0.00	0	4.00	0.00	0.000	2.840	1.38	0.000	2.840	0.94	2.32	23.5	200	0.4	20.7	0.66	11.2
SANMH3	EXSANMH	0.00	0	0	0.00	0	4.00	0.00	0.000	2.840	1.38	0.000	2.840	0.94	2.32	17.9	200	0.4	20.7	0.66	11.2

A.1.2 - Peak Flow Design Based on Design Population

Design Parameters*
1) Average daily water demand for schools = 70 L/person/day
2) Institutional Peak Factor = 1.50

Type of Establishment	Population	Average Daily Flow	Infiltration Flow			Total Flow	Sewer Data					
			Area (ha)		Inf. Flow		Length	Dia.	Slope	Capacity	Velocity	Utilization
		(l/s)	Individual	Cumulative	(l/s)	(l/s)	(m)	(mm)	(%)	(full) (l/s)	(full) (m/s)	(%)
School	1000***	1.22	2.840	2.840	0.80	2.01	5.0	200	2.0	46.4	1.5	4.3

Appendix D - Development Servicing Study Checklist

4. Development Servicing Study Checklist

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

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

4.1 General Content

N/A ☐ Executive Summary (for larger reports only).

☑ Date and revision number of the report.

C3&C4 ☑ Location map and plan showing municipal address, boundary, and layout of proposed development.

C3&C4 ☑ Plan showing the site and location of all existing services.

N/A ☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

☑ Summary of Pre-consultation Meetings with City and other approval agencies.

☑ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

☑ Statement of objectives and servicing criteria.

☑ Identification of existing and proposed infrastructure available in the immediate area.

N/A ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

C3&C4 ☑ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

N/A ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

N/A ☐ Proposed phasing of the development, if applicable.

☑ Reference to geotechnical studies and recommendations concerning servicing.

C3&C4 ☑ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☑ Confirm consistency with Master Servicing Study, if available

☑ Availability of public infrastructure to service proposed development

☑ Identification of system constraints

☑ Identify boundary conditions

☑ Confirmation of adequate domestic supply and pressure

☑ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

☑ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

N/A ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☑ Address reliability requirements such as appropriate location of shut-off valves

N/A ☐ Check on the necessity of a pressure zone boundary modification.

☑ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

☑ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

N/A ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

☑ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

N/A ☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☑ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

☑ Confirm consistency with Master Servicing Study and/or justifications for deviations.

N/A ☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

☑ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

☑ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

☑ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.

☑ Description of proposed sewer network including sewers, pumping stations, and forcemains.

N/A ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).

N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

N/A ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

N/A ☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

☑ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

☑ Analysis of available capacity in existing public infrastructure.

C3&C4 ☑ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

☑ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

☑ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

☑ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

N/A ☐ Set-back from private sewage disposal systems.

N/A ☐ Watercourse and hazard lands setbacks.

TBC ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

☑ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

- [x] Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- N/A [ ] Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- [x] Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
- N/A [ ] Any proposed diversion of drainage catchment areas from one outlet to another.
- [x] Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- N/A [ ] If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.
- N/A [ ] Identification of potential impacts to receiving watercourses
- N/A [ ] Identification of municipal drains and related approval requirements.
- [x] Descriptions of how the conveyance and storage capacity will be achieved for the development.
- [x] 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
- N/A [ ] Inclusion of hydraulic analysis including hydraulic grade line elevations.
- [x] Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- N/A [ ] Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
- N/A [ ] Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

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

N/A ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

N/A ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

N/A ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☑ Clearly stated conclusions and recommendations

☑ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

☑ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario