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September 20, 2018

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

Attention: Mélanie Gervais, Planner

Re **Riverside South Elementary School, Ottawa-Carleton District School Board**
925 Ralph Hennessy Avenue, Ottawa
Site Servicing Report

Dear Mélanie:

We provide the following Site Servicing Report in accordance with the City of Ottawa Site Plan Control Application requirements for the Conseil des écoles catholiques du Centre-Est proposed Riverside South Elementary School at 925 Ralph Hennessy Avenue, Ottawa. The purpose of the report is to confirm that existing municipal and site services, including water, storm, and sanitary, can support the demand from the proposed new building.

Reference documents

- Site Servicing Plan – C1, Grading and Drainage, Erosion and Sediment Control Plan – C2by Jp2g Consultants Inc., September 20, 2018.
- Stormwater Management Report by Jp2g Consultants Inc., September 20, 2018.
- Topographical Survey by Annis, O'Sullivan, Vollebekk Ltd., April 11, 2018, Job No. 18720-18.
- Riverside South Development Corporation Phase 13 Site Servicing and Stormwater Management Report, September 20, 2017

Background

The proposed elementary school is to be located on an existing vacant property, at the intersection of Ralph Hennessy Avenue and Mount Nebo Way, in the Riverside South subdivision phase 13, east of Spratt Road and south of Earl Armstrong Road in Ottawa, Ontario. The total site area is approximately 2.003 ha. The proposed site development includes a new school building, a bus lay-by, a car lay-by, asphalt parking, hard surface walkways and play areas, landscaped areas, a sports field, an area for portables and a future expansion of the building.

Servicing

1.1 Storm Sewer and Stormwater Management

Uncontrolled site storm drainage for the sidewalk and boulevard areas west and north of the proposed school will be collected by the existing curb inlet catch basins along Ralph Hennessy Way and Mount Nebo Way.

Controlled site storm drainage for the roof, asphalt parking, hard surface walkways and play areas, landscaped areas, sports field, area for portables and future expansion of the building will be collected to the existing 1650 mm diameter municipal storm sewer flowing west on Mount Nebo Way with an existing 600 mm diameter storm sewer stub teeing in from the subject property, via the new 1200 mm diameter storm manhole MHST-01 with a new 525 mm diameter storm sewer service inlet connection. The site currently has an existing ditch inlet connected to the 1650 mm diameter storm sewer on Mount Nebo Way. The ditch inlet and associated pipe will be removed up to the property line and abandoned to accommodate the new development.

Stormwater quantity control will be achieved using flow restrictors for the parking area and school yard. Stormwater management calculations are included in the Stormwater Management Report prepared by Jp2g, dated June 29, 2018.

1.2 Sanitary Sewer

There is an existing 450 mm diameter sanitary sewer flowing north along Ralph Hennessy Way with an existing 200 mm diameter sanitary sewer stub teeing in from the subject property. As indicated in the Stantec Consulting Report, dated June 30, 2017, wastewater generated in Riverside South Subdivision Phase 13 will be conveyed to the existing 450 mm diameter sanitary sewer on Ralph Hennessy way and 525 mm diameter sanitary sewer on Portico Way, then northerly to the existing Rideau River crossing, and ultimately to the existing West River Collector.

A proposed 1200 mm diameter sanitary manhole MHSA-01, connected to the existing 200 mm sanitary sewer service outlet with a new 200 mm diameter sanitary sewer service inlet approximately 2.0m deep, will service the proposed building. The sanitary sewer will outlet the building at a slope of 1.0% and connect to the proposed 1200 mm diameter sanitary sewer manhole MHSA-01 which ultimately connects to existing municipal sanitary sewer as per City of Ottawa Standard Detail S11.1.

Based on the City of Ottawa Sewer Design Guidelines, the peak sanitary flow for the site was calculated to be 2.3 l/s (Refer to Appendix A - Sanitary Sewer Design Sheet). This is in accordance with the sanitary flows accounted for in the Riverside South Development Corporation Phase 13 Site Servicing and Stormwater Management Report Sanitary Sewer Design Sheet, Phase 8 Stub 5 (Ralph Hennessy Avenue), Area ID Number I23AA with a total flow of 2.3 l/s, included Appendix A. The proposed 200mm diameter sanitary service will have a full flow capacity of 32.8 l/s, which will be sufficient to handle the proposed development sanitary flows.

1.3 Water

There is an existing 300 mm diameter watermain located on the east side of Ralph Hennessy Way, with an existing 200 mm diameter watermain service teeing in complete with an existing service valve box up to the property line of the subject property. A proposed 200mm diameter watermain will service the proposed school, and connect to the municipal watermain, in the right-of-way. The water meter will be located inside the school's mechanical room and a remote water meter will be installed along the building exterior.

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 occupancy = 490 persons (staff and students)

Average Daily Demand: $\frac{70 \text{ l/student/day} \times 490 \text{ students}}{8 \text{ hrs/day} \times 3600 \text{ s/hr}} = 1.19 \text{ l/s}$

Maximum Daily Demand: 1.19 l/s x 1.5 = 1.79 l/s

Maximum Hour Demand: 1.19 l/s x 1.8 = 2.14 l/s

There is an existing fire hydrant on Ralph Hennessy Avenue located along the front of the school building which will provide fire protection to the site. The proposed building will be equipped with sprinklers and a siamese connection located at the front of the building at the southeast entrance within 20 metres of the municipal fire hydrant. Based on the Fire Underwriters Survey Method, the fire flow demand for the proposed school was calculated to be:

Fire Flow Demand: 116.7 l/s (Refer to Appendix B – Fire Flow Calculations).

The above water demand requirements were provided to the City of Ottawa for the hydraulic analysis of the boundary conditions at the proposed school location. The following Boundary Conditions, included in Appendix B, were returned:

Max. HGL = 147.8 m (head) / 78.9 psi (pressure)
PKHR = 145.6 m (head) / 75.8 psi (pressure)
MXDY+Fire = 143.9 m (head) / 73.4 psi (pressure)

According to the City of Ottawa Design Guidelines, the installation of a pressure reducing valve will be required inside the building.

End of Site Servicing Report

Please contact the undersigned should you require any clarification.

Yours truly,

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Roxanne Tubb, P.Eng.
Civil Engineer

Appendix A - Sanitary Sewer Design Sheet

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Appendix A - 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 = 350 L/p/day

2) Commercial/Institutional Flow = 50,000 L/ha/day

3) Maximum Residential Peak Factor = 4

4) Commercial/Institutional Peak Factor = 1.50

5) Extraneous Flow = 0.28L/s/ha

6) Minimum Velocity = 0.76 m/s

Designed PH

Checked RT

Dwg. Reference C1

Jp2g project No 18-1015A

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	MHSA-01	0.00	0	0	0.00	0	4.00	0.00	2.003	2.003	1.74	2.003	2.003	0.56	2.30	8.3	200	1.0	32.8	1.0	7.0
MHSA-01	Ex. 450mm San. Sewer	0.00	0	0	0.00	0	4.00	0.00	0.000	2.003	1.74	0.000	2.003	0.56	2.30	13.2	200	1.0	32.8	1.0	7.0

A.1.2 - Peak Flow Design Based on Design Population

Design Parameters*

1) Average Daily Sewage Flow for day school with cafetria or gym and showers = 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	490	1.79	2.003	2.003	0.56	2.35	8.3	200	1.0	32.8	1.5	7.2

* City of Ottawa Sewer Design Guidelines, Section 4 - Sanitary Sewer Systems

**Residential flow data from Half Moon Bay Subdivision, Phase 1, 2, 3, 5, 6, sanitary sewer calculation sheets by DSEL, dated August 2010.

***Calculated based on an 8-hour school day.

Stantec

SUBDIVISION:

Riverside South Development Corporation - Phase 13

DATE: April 6, 2017
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: AMP

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 1604-01260

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 L/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 L/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 L/ha/day	MANNINGS n	0.013
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 L/ha/day	BEDDING CLASS	B
PERSONS / SINGLE UNIT	3.2	INSTITUTIONAL	50,000 L/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.4	INFILTRATION	0.28 L/s/ha		
PERSONS / APARTMENT	1.9				

External Areas

Low Density	22 unit/ha*
Medium Density	38 unit/ha*
High Density	60 unit/ha

* As per the RSCISSU, populations for low and medium density residential are based on 70% of the total area

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (ha)	SINGLE	UNITS TOWN	APT.	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	FLOW (L/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (l/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Phase 8 Stub 7 (Portico Way)																																	
External 3D, 3E, 4A, R80B (External), R80A	80	79	107.75	1169	373	1062	6652	107.75	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	11.72	11.72	39.97	39.97	10.2	159.44	159.44	44.6	139.1	63.4	525	PVC	SDR 35	0.19	196.7	**70.71%**	0.88	0.84
R79A	79	78	0.11	0	0	0	0	107.86	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.11	159.55	44.7	139.1	41.1	525	PVC	SDR 35	0.19	195.1	**71.33%**	0.87	0.83
R78A	78	77	0.11	0	0	0	0	107.97	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.11	159.66	44.7	139.2	41.1	525	PVC	SDR 35	0.19	200.1	**69.53%**	0.90	0.84
R77AA	77A	77	7.75	0	0	0	0	7.75	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	7.75	7.75	2.2	2.2	13.0	200	PVC	SDR 35	1.00	33.4	**6.49%**	1.05	0.49
R77B, R77A	77	76	0.48	0	0	0	0	116.20	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.48	167.89	47.0	141.5	110.6	525	PVC	SDR 35	0.19	195.7	**72.30%**	0.88	0.84
R76A	76	75	0.07	0	0	0	0	116.27	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.07	167.96	47.0	141.5	26.4	525	PVC	SDR 35	0.19	197.2	**71.77%**	0.88	0.84
R75A	75	74	0.19	0	0	0	0	116.46	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.19	168.15	47.1	141.5	71.3	525	PVC	SDR 35	0.19	195.1	**72.56%**	0.87	0.83
R74A	74	73	0.08	0	0	0	0	116.54	6652	3.13	84.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.08	168.23	47.1	141.6	32.3	525	PVC	SDR 35	0.19	195.4	**72.47%**	0.87	0.84
R73AA	73A	73	6.00	0	0	0	684	6.00	684	3.90	10.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	6.00	6.00	1.7	12.5	13.0	200	PVC	SDR 35	1.00	33.4	**37.34%**	1.05	0.83
R73A	73	60E	0.20	0	0	0	0	122.74	7336	3.09	91.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.72	0.00	39.97	10.2	0.20	174.43	48.8	150.7	78.2	525 525	PVC	SDR 35	0.19	195.9	**76.95%**	0.88	0.85
Phase 8 Stub 6 (Pathfinder Way)																																	
R41A	41	40	0.45	4	0	0	13	0.45	13	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.45	0.45	0.1	0.3	77.1	200	PVC	SDR 35	0.65	27.1	**1.23%**	0.85	0.24
R40A	40	39	0.34	4	0	0	13	0.78	26	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34	0.78	0.2	0.6	76.4	200	PVC	SDR 35	0.32	18.9	**3.36%**	0.60	0.23
R39A	39	38	0.13	1	0	0	3	0.91	29	4.00	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.13	0.91	0.3	0.7	11.4	200	PVC	SDR 35	0.32	18.9	**3.82%**	0.60	0.24
R38A	38	37	0.52	9	0	0	29	1.44	58	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.52	1.44	0.4	1.3	77.0	200	PVC	SDR 35	0.32	18.9	**7.06%**	0.60	0.29
R37A	37	36	0.93	17	0	0	54	2.37	112	4.00	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.93	2.37	0.7	2.5	120.0	200	PVC	SDR 35	0.32	18.9	**13.10%**	0.60	0.34
R36A	36	35	0.05	0	0	0	0	2.42	112	4.00	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.05	2.42	0.7	2.5	33.8	200	PVC	SDR 35	0.32	18.9	**13.18%**	0.60	0.34
G72A, R72A	72	47	0.46	6	0	0	19	0.46	19	4.00	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71	1.71	0.0	2.18	2.18	0.6	0.9	100.1	200	PVC	SDR 35	0.65	27.0	**3.42%**	0.85	0.34
R58A	58	51	0.36	0	9	0	22	0.36	22	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.36	0.36	0.1	0.5	68.2	200	PVC	SDR 35	0.65	26.9	**1.68%**	0.85	0.26
R57A	57	53	0.36	0	10	0	24	0.36	24	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.36	0.36	0.1	0.5	71.6	200	PVC	SDR 35	0.32	18.9	**2.59%**	0.60	0.22
R67A	67	66	0.34	0	9	0	22	0.34	22	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34	0.34	0.1	0.4	61.4	200	PVC	SDR 35	0.65	27.0	**1.65%**	0.85	0.26
R66B (External), R66A	66	56	0.22	0	5	0	12	0.56	34	4.00	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	1.30	0.0	1.52	1.86	0.5	1.1	49.3	200	PVC	SDR 35	0.32	18.9	**5.63%**	0.60	0.27
R56A	56	55	0.32	0	8	0	19	0.88	53	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.32	2.18	0.6	1.5	61.5	200	PVC	SDR 35	0.32	18.9	**7.75%**	0.60	0.30
R55A	55	54	0.07	0	1	0	2	0.95	55	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.07	2.25	0.6	1.5	10.0	200	PVC	SDR 35	0.32	18.9	**8.06%**	0.60	0.30
R54A	54	53	0.39	0	10	0	24	1.34	79	4.00	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.39	2.64	0.7	2.0	82.1	200	PVC	SDR 35	0.32	18.9	**10.69%**	0.60	0.33
R53A	53	52	0.66	0	21	0	50	2.37	154	4.00	2.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.66	3.67	1.0	3.5	78.8	200	PVC	SDR 35	0.32	18.9	**18.58%**	0.60	0.38
R52A	52	51	0.12	0	4	0	10	2.48	163	4.00	2.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.12	3.78	1.1	3.7	18.0	200	PVC	SDR 35	0.32	18.9	**19.58%**	0.60	0.39
R51A	51	50	0.45	0	11	0	26	3.29	211	4.00	3.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.45	4.59	1.3	4.7	81.9	200	PVC	SDR 35	0.32	18.9	**24.89%**	0.60	0.41
R60A	60	59	0.37	4	6	0	27	0.37	27	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.37	0.37	0.1	0.5	41.8	200	PVC	SDR 35	0.32	18.9	**2.88%**	0.60	0.22
R59A	59	50	0.89	9	15	0	65	1.27	92	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.89	1.27	0.4	1.8	114.6	200	PVC	SDR 35	0.32	18.9	**9.76%**	0.60	0.31
R50A	50	49	0.07	0	0	0	0	4.63	303	4.00	4.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.07	5.93	1.7	6.6	49.0	200	PVC	SDR 35	0.32	18.9	**34.75%**	0.60	0.46
R65A	65	64	0.50	0	11	0	26	0.50	26	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.50	0.50	0.1	0.6	77.2	200	PVC	SDR 35	0.32	18.9	**3.00%**	0.60	0.23
R64A	64	63	0.58	0	16	0	38	1.08	65	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.58	1.08	0.3	1.4	58.5	200	PVC	SDR 35	0.32	18.9	**7.15%**	0.60	0.29
R63A	63	62	0.56	5	3	0	23	1.64	88	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.56	1.64	0.5	1.9	68.9	200	PVC	SDR 35	0.32	18.9	**9.97%**	0.60	0.32
R62A	62	61	0.29	2	0	0	6	1.93	94	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.29	1.93	0.5	2.1	9.0	200	PVC	SDR 35	0.32	18.9	**10.95%**	0.60	0.33
R61A	61	49	0.70	11	0	0	35	2.64	130	4.00	2.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.70	2.64	0.7	2.8	94.3	200	PVC	SDR 35	0.32	18.9	**15.00%**	0.60	0.35
R49A	49	48	0.26	4	0	0	13	7.53	446	4.00	7.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.26	8.83	2.5	9.7	53.8	200	PVC	SDR 35	0.32	18.9	**51.24%**	0.60	0.51
R48A	48	47	0.59	8	0	0	26	8.12	471	3.99	7.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.0	0.59	9.42	2.6	10.2	120.0	200	PVC	SDR 35	0.32	18.9	**54.19%**	0.60	0.52
R71A	71	70	0.88	13	0	0	42	0.88	42	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.88	0.88	0.2	0.9	100.1	200	PVC	SDR 35	0.32	18.9	**4.87%**	0.60	0.25

Stantec

SUBDIVISION:

Riverside South Development Corporation - Phase 13

DATE: April 6, 2017
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY: AMP

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 1604-01260

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350	L/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000	L/ha/day	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000	L/ha/day	MANNINGS n	0.013	
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000	L/ha/day	BEDDING CLASS	B	
PERSONS / SINGLE UNIT	3.2	INSTITUTIONAL	50,000	L/ha/day	MINIMUM COVER	2.50	m
PERSONS / TOWNHOME	2.4	INFILTRATION	0.28	L/s/ha			
PERSONS / APARTMENT	1.9						

External Areas

Low Density	22 unit/ha*
Medium Density	38 unit/ha*
High Density	60 unit/ha

* As per the RSCISSU, populations for low and medium density residential are based on 70% of the total area

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT.	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
R70A	70	69	0.20	2	0	0	6	1.08	48	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.20	1.08	0.3	1.1	8.6	200	PVC	SDR 35	0.32	18.9	**5.72%**	0.60	0.27
R69A	69	68	0.24	3	0	0	10	1.32	58	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.24	1.32	0.4	1.3	43.7	200	PVC	SDR 35	0.32	18.9	**6.89%**	0.60	0.29
R68A	68	47	0.17	2	0	0	6	1.49	64	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	1.49	0.4	1.5	36.8	200	PVC	SDR 35	0.32	18.9	**7.68%**	0.60	0.30
R47A	47	46	0.04	0	0	0	0	10.12	554	3.95	8.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.04	13.13	3.7	12.5	23.4	200	PVC	SDR 35	0.32	19.0	**66.21%**	0.60	0.55
R46A	46	45	0.10	0	0	0	0	10.22	554	3.95	8.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.10	13.23	3.7	12.6	62.1	200	PVC	SDR 35	0.32	18.9	**66.44%**	0.60	0.55
R45B, R45A	45	44	0.37	4	0	0	13	10.59	567	3.95	9.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.37	13.60	3.8	12.9	36.5	200	PVC	SDR 35	0.40	21.1	**60.90%**	0.67	0.60
R44A	44	43	0.23	4	0	0	13	10.81	580	3.94	9.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.23	13.83	3.9	13.1	23.4	250	PVC	SDR 35	0.25	30.2	**43.52%**	0.61	0.50
R43A	43	42	0.63	12	0	0	38	11.44	618	3.92	9.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.63	14.45	4.0	13.9	78.1	250	PVC	SDR 35	0.25	30.3	**45.78%**	0.61	0.51
R42A	42	35	0.20	3	0	0	10	11.64	628	3.92	10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.20	14.65	4.1	14.1	27.7	250	PVC	SDR 35	0.25	30.3	**46.44%**	0.61	0.51
R35A	35	34	0.21	3	0	0	10	14.27	750	3.88	11.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.21	17.28	4.8	16.6	24.6	250	PVC	SDR 35	0.25	30.3	**54.79%**	0.61	0.54
R34A	34	33	0.36	8	0	0	26	14.63	775	3.87	12.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.0	0.36	17.64	4.9	17.1	40.6	250 250	PVC	SDR 35	0.26	30.7	**55.65%**	0.62	0.55
Phase 8 Stub 1 (Taurus Place)																																			
R4A	4	3	0.35	6	0	0	19	0.35	19	4.00	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.35	0.35	0.1	0.4	90.4	200	PVC	SDR 35	0.65	27.0	**1.51%**	0.85	0.26
R3AA	3A	3	2.21	0	0	0	252	2.21	252	4.00	4.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	2.21	2.21	0.6	4.7	8.3	200	PVC	SDR 35	1.00	33.5	**14.05%**	1.05	0.61
R3A	3	2	0.10	2	0	0	6	2.65	278	4.00	4.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	2.65	0.7	5.2	13.9	200	PVC	SDR 35	0.65	27.0	**19.44%**	0.85	0.54
	2	1	0.00	0	0	0	0	2.65	278	4.00	4.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	2.65	0.7	5.2	2.2	200 200	PVC	SDR 35	0.34	19.4	**26.99%**	0.61	0.43
Phase 8 Stub 2 (Serenade Crescent)																																			
R4B	4	6	0.44	10	0	0	32	0.44	32	4.00	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.44	0.44	0.1	0.6	67.6	200	PVC	SDR 35	0.35	19.7	**3.26%**	0.62	0.23
R10A	10	9	1.00	19	0	0	61	1.00	61	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.00	1.00	0.3	1.3	120.0	200	PVC	SDR 35	0.60	25.9	**4.89%**	0.81	0.35
R9A	9	8	0.15	2	0	0	6	1.15	67	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	1.15	0.3	1.4	12.4	200	PVC	SDR 35	0.40	21.1	**6.67%**	0.67	0.31
R8A	8	7	0.61	12	0	0	38	1.76	106	4.00	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.61	1.76	0.5	2.2	79.4	200	PVC	SDR 35	0.40	21.1	**10.42%**	0.67	0.36
R7A	7	6	0.56	10	0	0	32	2.32	138	4.00	2.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.56	2.32	0.6	2.9	62.0	200	PVC	SDR 35	0.40	21.1	**13.61%**	0.67	0.39
	6	5	0.00	0	0	0	0	2.76	170	4.00	2.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	2.76	0.8	3.5	11.6	200 200	PVC	SDR 35	0.34	19.4	**18.13%**	0.61	0.38
Phase 8 Stub 3 (Dreamcatcher Place)																																			
R32A	32	31	0.60	8	0	0	26	0.60	26	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.60	0.60	0.2	0.6	59.5	200	PVC	SDR 35	0.65	27.0	**2.16%**	0.85	0.29
R31B	31	15	0.43	6	0	0	19	1.02	45	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.43	1.02	0.3	1.0	63.7	200	PVC	SDR 35	0.40	21.1	**4.79%**	0.67	0.28
R15A	15	14	0.17	2	0	0	6	1.19	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	1.19	0.3	1.2	17.1	200	PVC	SDR 35	0.40	21.2	**5.48%**	0.67	0.29
R14A	14	13	0.17	2	0	0	6	1.36	58	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	1.36	0.4	1.3	30.8	200	PVC	SDR 35	0.40	21.1	**6.21%**	0.67	0.31
R13A	13	12	0.48	7	0	0	22	1.83	80	4.00	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.48	1.83	0.5	1.8	61.5	200	PVC	SDR 35	0.40	21.1	**8.57%**	0.66	0.34
G19AA	19A	19	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.55	0.0	0.55	0.55	0.2	0.2	11.0	150	PVC	DR 28	1.00	15.3	**1.01%**	0.86	0.23
R19A	19	18	0.39	3	0	0	10	0.39	10	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.0	0.39	0.94	0.3	0.4	45.0	200	PVC	SDR 35	0.65	27.0	**1.56%**	0.85	0.26
R18A	18	17	0.21	2	0	0	6	0.61	16	4.00	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.0	0.21	1.16	0.3	0.6	12.7	200	PVC	SDR 35	0.65	27.0	**2.16%**	0.85	0.29
R17A	17	12	0.38	6	0	0	19	0.99	35	4.00	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.0	0.38	1.54	0.4	1.0	75.0	200	PVC	SDR 35	0.40	21.1	**4.73%**	0.67	0.28
R12A	12	11	0.07	1	0	0	3	2.89	118	4.00	1.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.0	0.07	3.44	1.0	2.9	13.9	200 200	PVC	SDR 35	0.34	19.5	**14.80%**	0.61	0.36
Phase 8 Stub 4 (Serenade Crescent)																																			
R10B	10	30	0.72	13	0	0	42	0.72	42	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.72	0.72	0.2	0.9	95.9	200	PVC	SDR 35	0.40	21.1	**4.15%**	0.66	0.27
R30A	30	29	0.46	4	0	0	13	1.17	54	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.46	1.17	0.3	1.2	10.5	200	PVC	SDR 35	0.40	21.1	**5.72%**	0.67	0.30
R29A	29	28	0.19	2	0	0	6	1.36	61	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.19	1.36	0.4	1.4	36.7	200	PVC	SDR 35	0.40	21.1	**6.46%**	0.67	0.31
R28A	28	27	0.78	13	0	0	42	2.14	102	4.00	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.78	2.14	0.6	2.3	101.9	200	PVC	SDR 35	0.40	21.2	**10.65%**	0.67	0.36
R27A	27	21	0.39	3	0	0	10	2.53	112	4.00	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.39	2.53	0.7	2.5	58.1	200	PVC	SDR 35	0.40	21.1	**11.93%**	0.67	0.37
R21A	21	20	0.71	10	0	0	32	3.24	144	4.00	2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.71	3.24	0.9	3.2	88.5	200 200	PVC	SDR 35	0.34	19.5	**16.64%**	0.61	0.38
Phase 8 Stub 5 (Ralph Hennessy Avenue)																																			
R26B (External), EXT3B	26A	26	60.37	663	460	0	3227	60.37	3227	3.42	44.6	3.43	3.43	0.00	0.00	0.00	0.00	0.00	0.00	9.27	9.27	3.0	73.07	73.07	20.5	68.1	3.4	450	PVC	SDR 35	0.17	124.1	**54.84%**	0.76	0.66
R26A	26	25	0.88	8	10	0	50	61.25	3276	3.41	45.3	0.00	3.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27	3.0	0.88	73.95	20.7	68.9	105.5	450	PVC	SDR 35	0.17	124.1	**55.53%**	0.76	0.67
R25A	25	24	0.67	10	0	0	32	61.92	3308	3.41	45.6	0.00	3.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27	3.0	0.67	74.62	20.9	69.5	120.0	450	PVC	SDR 35	0.17	122.7	**56.65%**	0.75	0.66
R24A	24	23	0.74	9	0	0	29	62.66	3337	3.40	46.0	0.00	3.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.27	3.0	0.74	75.36	21.1	70.1	120.0	450	PVC	SDR 35	0.17	122.7	**57.10%**	0.75	0.66
I23AA	23A	23	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	2.01	2.01	0.00	0.00	1.7	2.01	2.01	0.6	2.3	13.0	200	PVC	SDR 35	1.00	33.4	**6.89%**	1.05	0.51
R23A	23	22	0.25	3	0	0	10	62.91	3347	3.40	46.1	0.00	3.43	0.00	0.00	0.00	0.00	0.00	2.01	0.00	9.27	4.7	0.25	77.62	21.7	72.6	32.7	450	PVC	SDR 35	0.17	123.2	**58.89%**	0.75	0.68

Appendix B - Fire Flow Calculations

Appendix C - Fire Flow Demand Requirements (Fire Underwritters Survey (FUS Guidelines))

Riverside South Elementary School, 925 Ralph Hennessy Avenue, Ottawa, ON

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Appendix C - Water Demand

C.1.1 - Fire Flow Demand Requirements

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
$C_{1.0}$ = 1.0 for ordinary construction
$C_{0.8}$ = 0.8 for non-combustible construction
$C_{0.6}$ = 0.6 for fire-resistive construction
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.

Exposure Adjustment Calcualtion		
Separation Distance		32.0
Length*Height factor of exposed wall	=42m*2 storeys	84.0
Construction of exposed wall	Wood frame or non-combustible	5%

				Adjustments (increases or decreases)							
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)
	4,257.0	0.8	11,000.0	0.0	11,000.0	30%	3,300.0	5%	550.0	7,000.0	116.7

*Water Supply for Public Protection (Fire Underwriters Survey, 1999).
**The building is partially sprinklered, but not monitored.
***Including all stories

C.1.2 - Existing Water Boundary Conditions

Water Demands

Average Daily Demand:	1.00 l/s
Maximum Daily Demand:	1.50 l/s
Maximum Hour Demand:	1.80 l/s
Fire Flow Demand:	116.67 l/s
Maximum Daily + Fire Flow Demand:	118.17 l/s

Design Parameters

Pipe Diameter:	200 mm
Pipe Material:	PVC
Pipe Length	58.0 m
Finished Floor Elevation:	93.75
Pavement (R.O.W.) Elevation:	93.30

Boundary Conditions

Max. HGL:	147.8 m
Min HGL:	145.6 m
Max. Day + Fire:	143.9 m

Boundary Condition Check

Check water pressure at municipal connection:

Min. HGL - Pavement elevation = 52.30 m

= 74.37 psi*
= 512.76 kPa*

*Normal operating pressure ranges between 345 kPa (50 psi) and 552 kPa (80 psi) under a condition of maximum daily flow as per City of Ottawa Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at municipal connection OK

Check water pressure at building connection (at max. hour demand):

Min. HGL - Finished floor elevation - Friction Loss** = 51.84 m
= 73.72 psi***
= 508.28 kPa***

**Friction loss calculated using the Hazen-Williams Equation

***Under maximum hourly demand conditions the pressures shall not be less than 276 kPa (40 psi) as per City of Ottawa Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at building connection (at max. hour demand) OK

Check water pressure at building connection (at max. day + fire demand):

Min. HGL - Finished floor elevation - Friction Loss** = 47.02 m
= 66.86 psi****
= 461.00 kPa****

**Friction loss calculated using the Hazen-Williams Equation

****Under maximum day and fire flow demand conditions the residual pressure at any point in the system shall not be less than 140 kPa (20 psi) as per City of Ottawa Design Guidelines - Water Distribution (Section 4.2.2)

Pressure at municipal connection (at max. day + fire demand) OK