

New Apartment Dwelling-Low Rise Building

178 Carruthers Avenue

Ottawa, Ontario

Servicing Brief Report

By

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Seal and Signature of Engineer: _____

Date: 9 March 2015

1. Introduction of Servicing Brief

A new residential building consists of apartment units above ground is located at 178 Carruthers Avenue Ottawa, Ontario, intersection of Carruther and Scott Avenue. The location of the site is shown in Figure-1 below.



Figure 1: Location of site

Refer to drawing C1 and C2 (prepared by Kamco Technique Ltee for the proposed building and servicing connections between street main and building.

There is an existing fire hydrant (FH) in the municipal right-of-way on the near side of the street north side of Carruthers Avenue approximately less than 45m of the proposed development. It's approximately 43m from the Siamese connection of the building.

A fire flow requirement of 12,000 L/min (200 l/sec) is required, as calculated as per the fire Underwriter Survey "Water Supply for Fire Protection".

The boundary conditions, based on the City of Ottawa computer simulation of the water distribution system in this area, is required to determine if an adequate water supply for the firefighting should be available.

This servicing brief report will:

- Calculate the anticipated sanitary contribution from this development;
- Evaluate the existing municipal sanitary infrastructure for capacity;
- Calculate the anticipated municipal water demand;
- Evaluate the existing municipal water supply for capacity;
- Demonstrate compliance of the proposed building with accepted engineering practices and criteria from the governing approval agencies and in support the subsequent application for rezoning

2. Water Supply for fire-fighting calculations

The existing 300 diameter watermain infrastructure is located adjacent to the proposed subject property along western side of Carruthers Avenue. The proposed domestic and fire line water service will be connect to the existing municipal watermain in Carruthers Avenue as shown on proposed site servicing drawing C2.

The recommended fire flow for the building was calculated using the criteria indicated in the Water Supply for Public Fire Protection Manual, 1999, by the Fire Underwriter survey. The fire flow calculated as follow:

$$F = 220.C. (A)^{1/2}$$

F = the required fire flow in liters per minute

C = Coefficient related to the type of construction

= 1.5 wood frame (combustible construction)

= 1.0 ordinary construction (masonry wall, combustible floor and interior)

= 0.8 non-combustible construction (unprotected structural components)

= 0.6 non-combustible construction (protected structural components, floor and roof)

A = total floor area (all storeys excluding basement at least 50% below grade)

Main floor area: 244 m²

Second floor area: 244 m²

Third floor area: 244 m²

Fourth floor area: 195 m²

Mezzanine floor area: 195 m²

Total area: 1122 m²

$$F = 220 \times 1.0 (1122)^{1/2}$$

$$= 7369 \text{ L/min}$$

F = 7000 L/min (rounded off to the nearest 1,000 L/min)

75% total increase for exposure (maximum 75%)

Therefore, $F = 7000 \times 1.75 = 12250 \text{ L/min}$ (rounded off to the nearest 1,000 L/min)

$$F = 12,000 \text{ L/min (200 L/sec)}$$

3. Water Demand calculations

The recommended max-daily domestic flow for the building was calculated using the current City of Ottawa design criteria with a conservative usage:

DAILY AVERAGE	350 liters / person / day 2.1 l/min, 0.04 l/sec, 0.6 Usgpm
MAXIMUM DAILY DEMAND	9.5 (Peaking Factor for a equivalent population of < 9): Table 3-3 MOE Design Guidelines for Drinking Water Systems) 20.3 l/min, 0.34 l/sec, 5.4 Usgpm
MAXIMUM HOURLY DEMAND	13.3 (Peaking Factor for an equivalent population of < 9): Table 3-3 MOE Design Guidelines for Drinking Water Systems) 30.6 l/min, 0.51 l/sec, 8.1 Usgpm

TOTAL PEAK DEMAND “D”

$D = \text{Daily.usage.demand} \times \text{persons} \times \text{peaking factor}$

Usage = 51 persons

$D = (350 \text{ l / cap / day} \times 51 \text{ persons} \times 9.5) / 86400 = 1.96 \text{ l/sec}$

117 l/min, 31 Usgpm, 1.96 l/sec

MINIMUM NOMINAL DOMESTIC PIPE SIZE

1.5 in, 5.7 ft/sec

38 mm, 1.7 m/sec

Use minimum 75mm (3 in Domestic water supply to the Building)

There will be proposed 70 mm diameter domestic service connection as well as 150 mm diameter fire flow supply connection to existing watermain on 178 Carruthers Avenue. Pipe materials shall be PVC with copper trace wire and ductile iron fittings.

The domestic water service connection will be made to a water meter in the mechanical room as shown on mechanical drawings. Confirmation of these water service sizes will be given by the mechanical consultant at the detailed internal building design stage. In addition, a fire siamese connection shall be installed along the face of the building, fronting 178 Carruthers Avenue as

shown on C1 drawing. An existing fire hydrant is present at the south north of the site on 178 Carruthers Avenue lactated within less than 45m from the proposed siamese connection.

Applying the above fire and max-day domestic flows to the Hazen-William formula, the resulting pressure head loss at the proposed building face is calculated to be ; as follows:

$$Q = 0.278.C. D^{2.63} .(Hf/L)^{0.54}$$

$$0.0617 = 0.278 \times 100 \times 0.15m^{2.63} (Hf/9m)^{0.54}$$

$$Hf = 1.67 \text{ psi}$$

For Ottawa City a typical order of 55 - 62 psi is recommended to use in the vicinity of the site.

In summary, we are requesting the boundary condition on Carruthers Avenue in the area of the subject property based on the following:

Average daily demand: 0.04 l/s.
 Maximum daily demand: 0.34 l/s.
 Maximum hourly daily demand: 0.51 l/s.
 Fire flow demand: 200 l/s (12,000 l/min)

4. Sanitary Drainage

The proposed development will have 315m² floor areas of residential units typical for four floor. Based on the City of Ottawa's Design Criteria for sewers and watermain, the equivalent populations is 50 people and equivalent retail population of 15 people for a total development population of 65 people.

Sanitary sewage flows are calculated from the following parameters: average daily flow per capita, contributing population, peaking factor of the domestic flows plus an infiltration allowance.

Design flow = average daily dry weather flow x peaking factor + infiltration allowance

Where:

Residential peaking factor = 4
 Usage = 51 persons
 51 person shall be used to calculate sanitary flow same as water supply calculations
 Residential = 350 L / capita / day
 Commercial = 50,00 L / ha / day
 Institutional = 50,00 L / ha / day
 Light Industrial = 35,00 L / ha / day
 Heavy Industrial = 55,00 L / ha / day
 n = 0.013 Manning factor

Residential (Harmon Equation): P.F. = $1 + 14 / (4 + P^{0.5})$

Infiltration allowance: 0.28 L / s / ha

Sanitary Flow Velocity: $V = Q / A$

Where:

V = flow velocity (m/sec)

Q = Design flow (l/sec)

A = cross sectional area of flow (m^2)

The post-development sanitary sewer flow for the proposed commercial development is calculated using a domestic sewage flow based on 350 Lcpd and the proposed development population using the City of Ottawa design criteria of 51 persons.

Design Flow:

$$Q_{\text{san.}} = (350 \text{ Lcpd} \times 51 \text{ persons} \times 4 \text{ peaking factor}) / 86400 \text{ s/day} + 0.28 \times 0.0551 \text{ ha} \\ = 0.83 \text{ l/s.}$$

$$V = 0.87 \text{ m/s}$$

Using a design flow of 0.83 l/s for this development, it is proposed that a new connection be made to the existing sanitary street mains.

A 150 mm diameter, length 11m sanitary PVC DR-35 pipe at 1% slope as indicated on site servicing drawing C2 will be adequate to carry the sanitary flow capacity for the development. This connection size can easily handle the post-development flow sanitary sewer design.

Pre-development sanitary flow assumed to be negligible as the existing site has a small building in which to be demolished complete with existing serviced to be abandoned. Therefore the post-development sanitary sewer flow is taken as 0.83 l/s is very small additional flow to the existing trunk sewers in comparison with exiting neighborhood residual capacities in the downstream pipe segments, which is therefore deemed acceptable.

In conclusion, this development can be served with sanitary connections which can be designed and constructed to comply with the applicable sanitary sewer criteria and standards of the City of Ottawa.

5. Fire Protection

There is a minimum of existing one fire hydrant located within 90m of the development to provide fire coverage. Existing FH located in the municipal right-of-way on the near side of the street north side of Carruthers Avenue approximately less than 40m of the proposed development. Further, the proposed Siamese connection shall be installed along the face of the building, fronting Carruthers Avenue as shown on drawing C1 in which within 45m of the existing fire hydrant to the north.

6. Conclusions

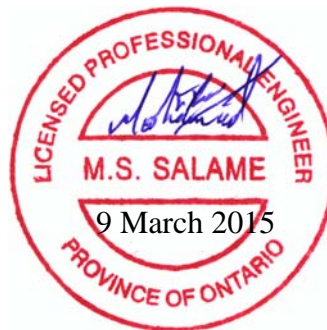
1. Boundary conditions are required to determine if there is an adequate water supply for the fire.
2. We require the boundary conditions to determine if the existing water pressure is adequate for the proposed development
3. The proposed water service connection is adequately sized to serve the residential development.
4. The proposed sanitary service connection is adequately sized to serve the residential development.
5. The expected sanitary sewage flow will be adequately handled by the proposed sanitary sewer service connection.
6. The increase in sanitary flows contributing to the existing municipal sanitary sewer is expected to have a negligible impact.
7. The installation of sewers connection to be inspected by local authorized civil engineer and certified to facilities, City of Ottawa.

All of which is respectfully submitted,

Kamco Technique Ltee



Mohamad Salame, M.A.Sc., P. Eng.,
Project Manager



Appendices

BY: MS
DATE: 17/02/2015

<u>SEWER DESIGN:</u>	PIPE ROUGHNESS:	0.013 FOR MANNING'S EQUATION
	PIPE SIZES:	1.016 IMPERIAL EQUIVALENT FACTOR
	PERCENT FULL:	TOTAL PEAK FLOW / CAPACITY

STORM SEWER DESIGN SHEET

[illegible]

City of Ottawa Servicing Study Checklist

General Content

Executive Summary (for large reports only): not applicable

Date and revision number of the report: see page 1 of Servicing Brief

Location map and plan showing municipal address, boundary, and layout of proposed development: see drawings SG-1

Plan showing the site and location of all existing services: see drawings SG-1

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: not applicable

Summary of Pre-consultation Meetings with City and other approval agencies: not available

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 defensible design criteria: not applicable

Statement of objectives and servicing criteria: see page 1 of Servicing Brief

Identification of existing and proposed infrastructure available in the immediate area: see drawings SG-1

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). not applicable

Concept level master grading plan to confirm existing and proposed grades in the development 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: not applicable

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: not applicable

Proposed phasing of the development, if applicable: not applicable

Reference to geotechnical studies and recommendations concerning servicing: not available

All preliminary and formal site plan submissions should have the following information:

- **Metric scale:** included
- **North arrow:** included
 - **(including construction North):** not included
- **Key Plan:** included
- **Name and contact information of applicant and property owner:** not available
- **Property limits:** included
 - **including bearings and dimensions:** not included
- **Existing and proposed structures and parking areas:** included
- **Easements, road widening and rights-of-way:** included
- **Adjacent street names:** included

Development Servicing Report: Water

Confirm consistency with Master Servicing Study, if available: not applicable

Availability of public infrastructure to service proposed development: see page 2 of Servicing Brief

Identification of system constraints: see page 2 of Servicing Brief

Confirmation of adequate domestic supply and pressure: see page 2 of Servicing Brief

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 locations throughout the development: see page 2 & 4 of Servicing Brief

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: see page 2 of Servicing Brief

Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design: not applicable

Address reliability requirements such as appropriate location of shut-off valves: not applicable

Check on the necessity of a pressure zone boundary modification: not applicable

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: not applicable

Description of the proposed water distribution network, including locations of proposed connections to the existing systems, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions: not applicable

Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation: not applicable

Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines: see page 2 & 5 of Servicing Brief

Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference: not applicable

Development Servicing Report: Wastewater

Summary of proposed design criteria: see page 2 & 3 of Servicing Brief

(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): not applicable

Confirm consistency with Master Servicing Study and /or justification for deviations: not applicable

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 conditions of sewers: not applicable

Descriptions of existing sanitary sewer available for discharge of wastewater from proposed development: see page 2 & 3 of Servicing Brief

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): not applicable

Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix C) format. see page 6 of Servicing Brief

Description of proposed sewer network including sewers, pumping stations, and forcemains: see page 3 of Servicing Brief

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): not applicable

Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development: not applicable

Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity: not applicable

Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding: not applicable

Special considerations such as contamination, corrosive environment etc: not applicable

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): see page 3 of Servicing Brief

Analysis of available capacity in existing public infrastructure. not applicable

A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern: see drawing SG-1

Water quality 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: see Stormwater Management Report

Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements: see Stormwater Management Report

Descriptions of the references and supporting information.

Set-back from private sewage disposal systems. not applicable

Watercourse and hazard lands setbacks: not applicable

Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed: not applicable

Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists: not applicable

Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period). see drawing SG-1 and Stormwater Management Report

Identification of watercourses within the proposed development and how watercourses will be protected, or , if necessary, altered by the proposed development with applicable approvals. see drawing SG-1 & SG-2 and Stormwater Management Report

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: see Stormwater Management Report

Any proposed diversion of drainage catchment areas from one outlet to another. : not applicable

Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities. : not applicable

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: not applicable

Identification of potential impacts to receiving watercourses: see Stormwater Management Report

Identification of municipal drains and related approval requirements. : not applicable

Descriptions of how the conveyance and storage capacity will be achieved for the development: see page 3 of Servicing Brief

100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading:

Inclusion of hydraulic analysis including hydraulic grade line elevations. : not applicable

Description of approach to erosion and sediment control during construction for the protection of receiving watercourses of drainage corridors: see notes 2.1 to 2.3 on drawing SG-1

Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplains elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current: not applicable

Identification of fill constraints related to floodplain and geotechnical investigation. : not applicable

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:

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 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: not available

Application for Certificate of Approval (CofA) under the Ontario Water Resources Act:

Changes to Municipal Drains. : not applicable

Other permits (National Capital commission, Parks Canada, public Works and Government Services Canada, Ministry of transportation etc.) : not applicable

Conclusion Checklist

Clearly stated conclusions and recommendations: see page 3 of Servicing Brief

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: included