Ottawa Trainyards Inc.

Type of Document:
Serviceability Report - 1st Submission

Project Name
Trainyards – 564 Industrial Avenue

Project Number
OTT-00251800-A0

Prepared By:
exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6
Canada

Date Submitted
March 18, 2019

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Date Submitted:
March 18, 2019

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1 Introduction

EXP Services Inc. (EXP) was retained by Ottawa Trainyards Inc. to prepare a serviceability report in support of a rezoning application for the property located at 564 Industrial Avenue. The subject site is approximately 0.59 hectares in area and is located on the south side of Industrial Avenue, opposite to Trainyards drive in the City of Ottawa. This site is currently zoned General Industrial IG3 and the owner is applying to rezone the site to a Mixed-Use Centre Zone MC7 designation. Figure 1 is a key plan that shows the location of the subject property.

2 Studies and Resources

The following Studies, Guidelines and Resources were used in the preparation of this report:

- Ottawa Sewer Design Guidelines, City of Ottawa, Oct. 2012 and Technical Bulletin PIEDTB-2016-01
- Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2 and ISDTB-2014-02
- Fire Underwriter's Survey, 1997

3 Water Servicing

3.1 Existing Water Service

The development will be serviced off the existing 300mm diameter municipal watermain located along Industrial Avenue.

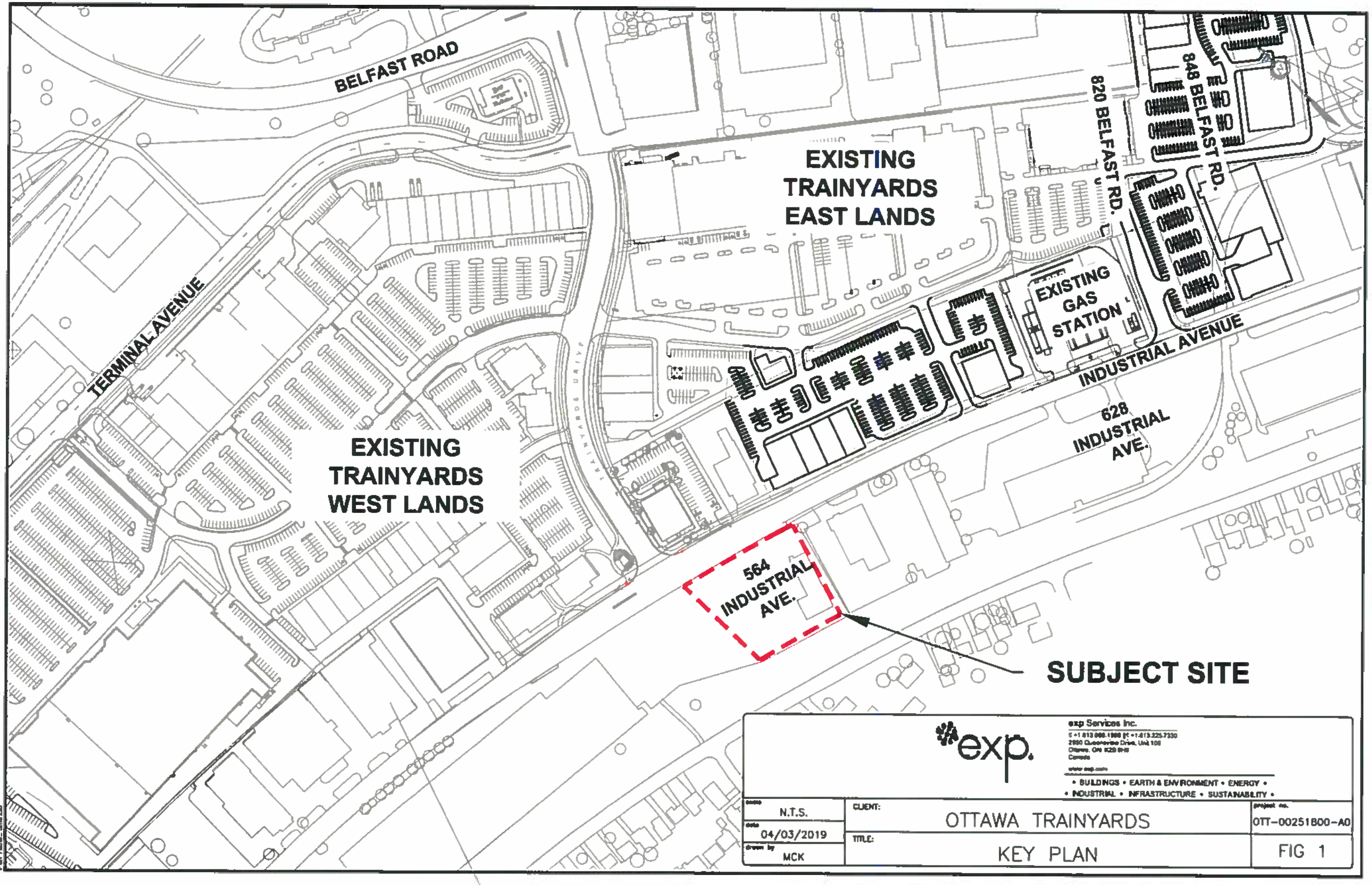
Boundary conditions have been provided by the city of Ottawa at the location of the proposed service connection to the proposed building. This data indicates a minimum pressure of 59.0 psi and a maximum pressure of 72 psi. During periods of maximum day and fire flow demand the residual pressure is 60.9 psi, which is greater than the required 20 psi per section 4.2.2.3 of the water distribution guideline.

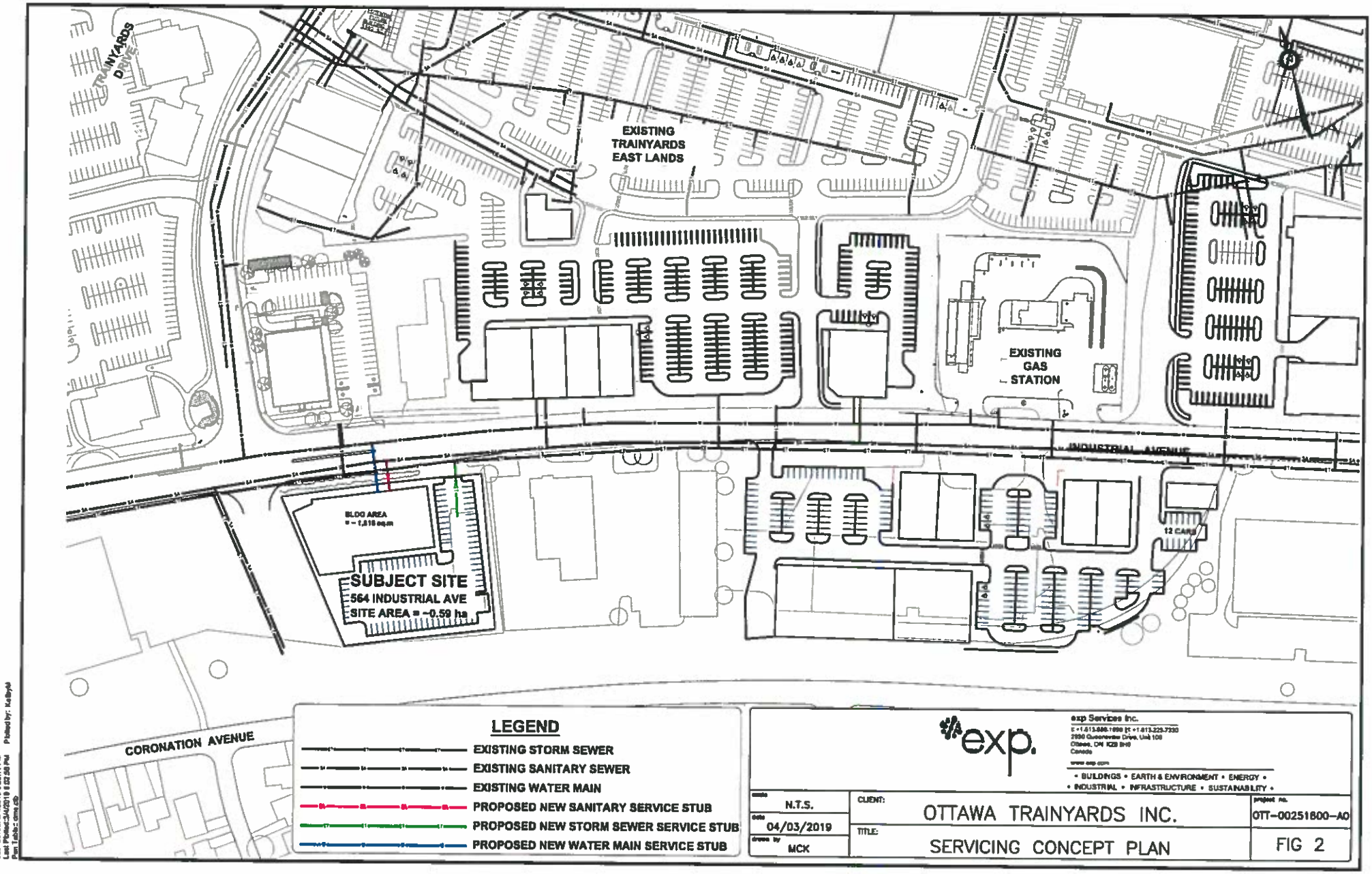
3.2 Proposed Water Service

The proposed watermain servicing scheme is to service the new building by a 150mm water service connected to the existing 300 mm diameter municipal watermain along Industrial Avenue. Refer to Figure 2 for the proposed servicing layout.

The proposed building is a one storey commercial building with a gross floor area of approximately 1,840 m^2. Refer to Figure 3 for draft site plan. The domestic water demands are estimated below, utilizing parameters from the City of Ottawa Water Distribution Design Guidelines. The following summarizes the parameters used.

- Average daily water consumption = 28,000 L/gross ha/d (Table 4.2)
- Gross site area = 0.59 ha
- Maximum Day Factor = 1.5 x Avg. Day
- Maximum Hour factor = 1.8 x Max Day


BELFAST ROAD
TERMINAL AVENUE
EXISTING TRAINYARDS EAST LANDS
820 BELFAST RD.
848 BELFAST RD.
EXISTING GAS STATION
INDUSTRIAL AVENUE
628 INDUSTRIAL AVE.
EXISTING TRAINYARDS WEST LANDS
564 INDUSTRIAL AVE.
SUBJECT SITE
exp.
exp Services Inc.
• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •
N.T.S.
04/03/2019
MCK
CLIENT:
OTTAWA TRAINYARDS
TITLE:
KEY PLAN
OTT-00251800-A0
FIG 1



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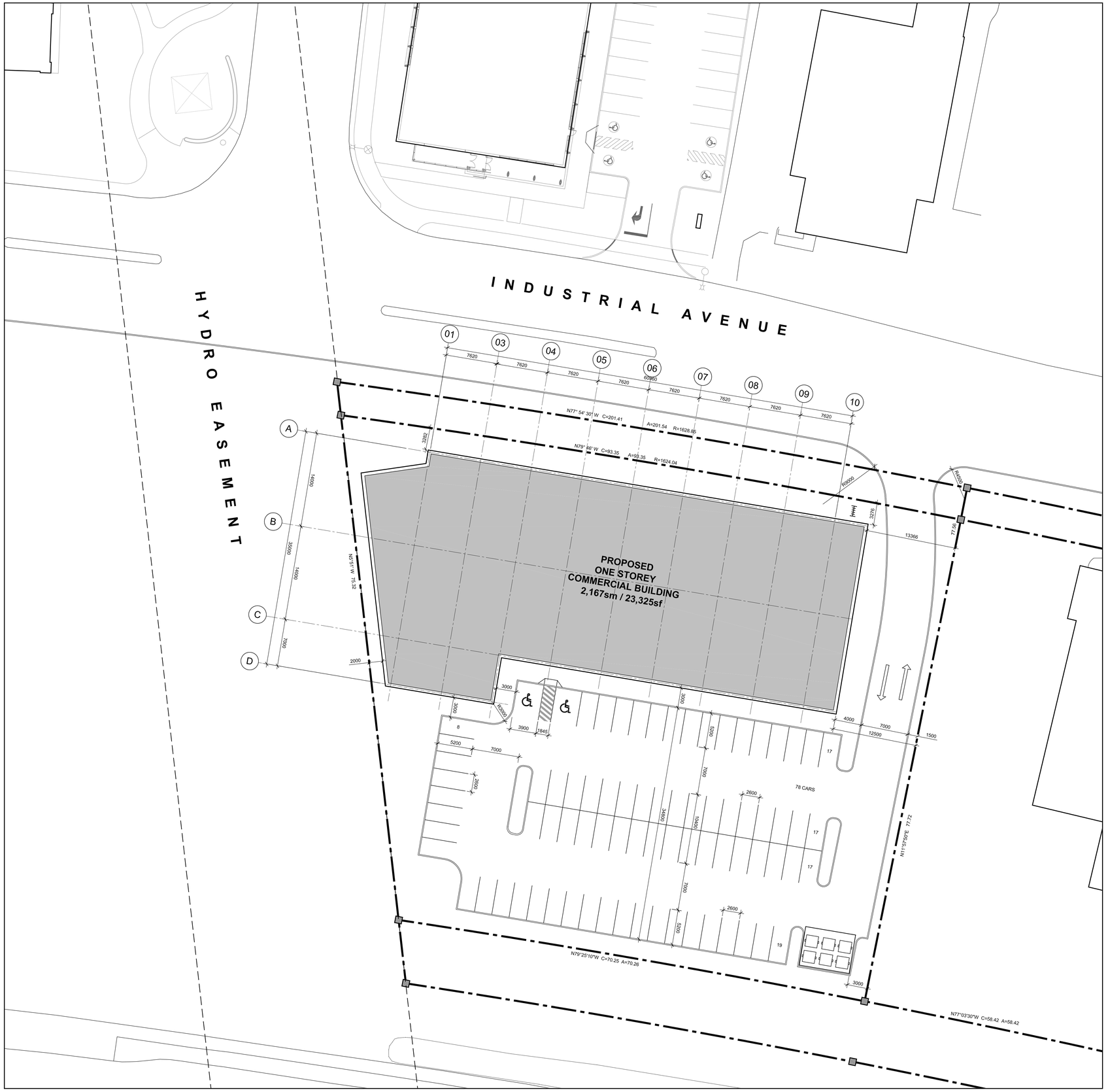
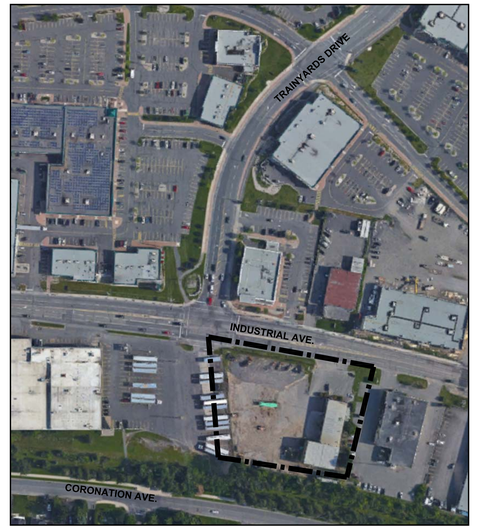
Last Plotted:3/4/2019 5:22:58 PM Plotted by: Kai Beyk
Pen Table: cmns.ctb



01 SITE PLAN
SP-A01 SCALE: 1:250



02 LOCATION PLAN
SP-A01 SCALE: NTS

SITE INFORMATION

SITE AREA: 5942 m²

BUILDING DATA:

AREA CALCULATIONS:

Gross Area (by Ontario Building Code definition):
The total area of all floors above grade measured between the outside surfaces of exterior walls is:

Ground Floor: 2167 m²

Gross Floor Area (City of Ottawa Zoning Bylaw definition for the purpose of determining maximum building area and parking requirements):
The total floor area measured from the interior of outside walls excluding mechanical/electrical service rooms, stairwells, elevator shafts, parking/loading facilities, washrooms and storage areas:

Ground Floor: 2167 m²

DESIGNATION: GM - GENERAL MIXED USE

PERMITTED NON RESIDENTIAL USES:

Section 199:

- Amusement Center
- Amusement Park
- Animal Care Establishment
- Animal Hospital
- Artist Studio
- Automobile Dealership
- Automobile Rental Establishment
- Automobile Service Station
- Bank
- Bank Machine
- Bar
- Broadcasting Studio
- Car Wash
- Catering Establishment
- Cinema
- Click and Collect Facility
- Community Center
- Community Health and Resource Center
- Convenience Store
- Day Care
- Diplomatic Mission
- Drive-Through Facility
- Emergency Service
- Funeral Home
- Gas Bar
- Hotel
- Instructional Facility
- Library
- Medical Facility
- Municipal Service Center
- Museum
- Nightclub
- Office
- Park
- Parking garage
- Payday Loan Establishment
- Personal Service Business
- Place of Assembly
- Place of Worship
- Post Office
- Production Studio
- Recreational and Athletic Facility
- Research and Development Center
- Residential Care Facility
- Restaurant
- Retail Food Store
- Retail Store
- School
- Service and Repair Shop
- Small Batch Brewery
- Sports Arena
- Storefront Industry
- Technology Industry
- Theatre
- Training Center
- Urban Agriculture

MAXIMUM FSI:
Table 187: 2 times coverage

Permitted: 11,884 m²

SETBACKS:
Table 187: Front & Corner Yard: 3.0m
Interior Side Yard: 3.0m
Rear Side Yard: 3.0m

MAXIMUM BUILDING HEIGHT:
Table 187: 18m

MINIMUM WIDTH OF LANDSCAPED AREA:
Table 187: Abutting at Street: 3.0m
Abutting and Residential Zone: 3.0m

PARKING (Section 101 and Exception 2071)
Minimum Required: 55 (2.5/100m² of GLA)
Maximum Permitted: 125 (5.75/100m² of GLA)
Provided: 78

BARRIER-FREE PARKING (Bylay 2017-301):
Part C, Sect. 111: 2 spaces required

BICYCLE PARKING:
Section 111: 1 per 250m² of GFA

Required: 8 spaces
Provided: 12 spaces

LOADING FACILITIES:
Section 113: Not Required

03 SITE DATA AND ZONING INFORMATION
SP-A01 SCALE: 1:100

MCROBIE
ARCHITECTS + INTERIOR DESIGNERS

OTTAWA TRAIN YARDS

North

BAR SCALE
0 1 5 10 15 20

Revisions

No.	By	Description	Date
01	HAZ	ISSUED FOR REVIEW	2018-12-18
02	HAZ	REVISED FOR REVIEW	2019-01-31
03	HAZ	REVISED FOR REVIEW	2019-03-12

Figure 3

Project
OTTAWA TRAINYARDS RETAIL DEVELOPMENT

564 INDUSTRIAL AVENUE

Drawing
SITE PLAN - OPTION 6

Scale: AS SHOWN
Drawn: HAZ
Checked: JAS
Stamp

Project No.: 18 - 231
Date: SEP 17, 2018
Drawing No.: SP-A01

28 X 40 – PLOT ISO B1

The average, maximum day and peak hour domestic demands for the building are as follows:

- Average Day = 28,000 x 0.59 / 86,400 = **0.19 l/s**
- Maximum Day = 1.5 x 0.19 = **0.29 l/s**
- Peak Hour = 1.8 x 0.29 = **0.52 l/s**

Fire flow calculations have been completed to establish the expected fire flow demand. The calculations based on the Fire Underwriters Survey are provided in Appendix 1. The proposed building is assumed to be sprinklered for fire protection. Based on the Fire Underwriters Survey, the required fire flow for this building is 83 L/sec, based on a building of non-combustible construction and combustible contents. The fire flow demand can be accommodated by a connection to the existing municipal watermain on Industrial Avenue.

4 Sanitary Sewer Servicing

The existing building on the site is serviced by a connection to the 600 mm sanitary main located on the south side of Industrial Avenue. The 600 mm sanitary sewer drains westward towards the Rideau River collector sewer.

The peak design flow for the subject site under the current zoning designation IG3 is calculated below using the City of Ottawa Sewer Design Guidelines.

- Average Wastewater Flow = 35,000L/ha/d (Figure 4.3)
- Peak Factor = 7.3 (See appendix 2)
- Peak Domestic Flow = 7.3 x 35,000*0.59/86,400 = **1.74 l/s**
- Infiltration Flow = 0.33 L/sec/ha = 0.33 x 0.59 = **0.19 l/s**
- Peak Flow = 1.74 L/sec + 0.19 l/s = **1.93 l/s**

The peak sanitary flows for the proposed zoning MC7 is calculated below.

- Average Wastewater Flow = 28,000L/ha/d (Figure 4.3)
- Peak Factor = 1.5 x Avg. Flow
- Peak Domestic Flow = 1.5 x 28,000*0.59/86,400 = **0.29 l/s**
- Infiltration Flow = 0.33 l/s/ha = 0.33 x 0.59 = **0.19 l/s**
- Peak Flow = 0.29 l/s + 0.19 l/s = **0.48 l/s**

The estimated peak sanitary flow for the subject site following re-zoning will be 0.48 l/s.

The proposed change in zoning from IG3 to MC7 will result in net reduction in peak sanitary design flow from 1.93 l/s to 0.48 l/s to the industrial Avenue sewer. Therefore, since there will be no increase in sanitary flows the existing municipal sanitary sewer should be able to convey the sanitary flows from the proposed development following the re-zoning.

5 Storm Sewer Servicing/Stormwater Management

5.1 Design Criteria

The storm management system will be designed using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from MacDonald Cartier Airport, collected 1966 to 1977.

The run off coefficient C will be based pre-development C value or 0.5 whichever is less.

A minimum of 10 minutes time of concentration T_c will be used if the calculated T_c is less than 10 minutes.

Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, will be detained on site.

5.2 Existing and Proposed Servicing

The existing development on the subject site drains to the existing City 750mm diameter storm sewer which runs along the southern edge of the Industrial Avenue right-of-way and drains west to the Rideau River. The proposed development will continue to drain to this sewer. Major overland flows will be directed to the Industrial Avenue municipal Right of Way.

5.3 Runoff Coefficients

Runoff coefficients used for post development conditions were based on actual areas measured in CAD. Runoff coefficients for impervious surfaces (roofs, asphalt, concrete) were taken as 0.90, and pervious surfaces (grass/landscaping) were taken as 0.20.

The average runoff coefficient for the overall site area under pre and post-development conditions were calculated as 0.88 and 0.84 respectively.

5.4 Time of Concentration

The time of concentration was determined using the Bransby-Williams equation below.

$T_c = 0.057L / (S_w^{0.2} \times A^{0.1})$ (min)

Where: .....L = Length of Overland Sheet Flow (m)

.....S_w = Average slope of Watershed (%)

.....A = Catchment Area (ha)

$T_c = 0.057*50 / (0.02^{0.2} \times 0.59^{0.1})$

T_c = 6.6 min

Since calculated T_c is less than 10 minutes, T_c of 10 minutes will be used.

5.5 Quantity Control

Quantity control of stormwater is required as per City standards. The pre-development runoff will be calculated using the following design parameters; a 5 year design storm, a runoff coefficient of 0.5, and a calculated time of concentration of 10 minutes. The allowable release rate is calculated as follows:

Allowable Runoff Coefficient:	C = 0.5
Rainfall Intensity:	$i_{(5\text{-year, 10 min})}$ = 104.40 mm/hr
Allowable Release Rate per ha:	Q = 2.78CiA = 2.78*(0.5)*104.40
	Q = 145.1 l/s/ha
Approximate Area of Site:	A = 0.59 hectares
Allowable release rate:	Q = 0.59 ha x 145.1 l/s/ha
	Q = 85.6 l/s

Runoff from the site will be controlled using either simple, plug-type orifices (where the orifice diameter is 75mm or greater) or Hydrovex models. To attenuate the post-development flows on site, a combination of surface storage in the parking lots and rooftops, underground pipe and structure storage will be used. Ponding depths in parking lots will be limited to 150 mm for the 5-year storm and 350 mm for the 100-year event. Approximately 34.8 m^3 and 95.6 m^3 of storage is required for the 5 year and 100 year design storms, respectively.

5.6 Quality Control

It is anticipated that a quality control target of 80% removal of total suspended solids (TSS) will be required by the Rideau Valley Conservation Authority. Quality control of runoff from the Industrial Avenue properties will be provided through the installation of a hydrodynamic separation unit.

6 Conclusion

The servicing strategy can be summarized as follows:

- Adequate fire flow protection and domestic supply can be provided from the existing 305mm watermain located in Industrial Avenue.
- The estimated peak sanitary flow for the proposed building is 0.48 L/s.
- Sanitary design flows under the proposed zoning are lower than the existing design flows to the municipal sanitary sewer within Industrial Avenue. The existing peak sanitary flow will be decreased from 1.93 l/s to 0.48 l/s.
- Stormwater can be attenuated on-site to meet the release rate criteria established by the City. Control will be achieved through the use of orifice controls in the outlet MHs. Storage will be provided through rooftop storage, pipe and structure storage, and above ground parking lot ponding in larger events.
- Quality control of stormwater of 80% TSS removal will be achieve using a Stormceptor (or similar) hydrodynamic separation unit.

- Flows in excess of the 100 year event will be directed overland to the Industrial Avenue Right of Way.

This report has shown that there is adequate capacity available in the existing public and private infrastructure to support the re-zoning of the property located at 564 Industrial Avenue.

Appendix 1

Boundary Conditions
Fire Flow Demand Calculations
Pressure Calculations

Matthew Kelley

From: Sharif, Sharif <sharif.sharif@ottawa.ca>
Sent: Wednesday, March 6, 2019 4:08 PM
To: Matthew Kelley
Subject: RE: File No. PC2018-0345 - 564 Industrial Avenue Rezoning application - Boundary Conditions Request
Attachments: 564 Indutrial Feb 2019.pdf

Hello Mathew,

Please see the boundary condition information below:

The following are boundary conditions, HGL, for hydraulic analysis at 564 Industrial (zone 1E) assumed to be connected to the 305mm on Industrial (see attached PDF for location).

Minimum HGL = 109.5m

Maximum HGL =118.6m

MaxDay + FireFlow (83L/s) = 110.8m

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

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

If you need any further information, please let me know. Thanks.

Sharif

From: Matthew Kelley <Matthew.Kelley@exp.com>
Sent: Thursday, February 28, 2019 5:40 PM
To: Sharif, Sharif <sharif.sharif@ottawa.ca>
Subject: File No. PC2018-0345 - 564 Industrial Avenue Rezoning application - Boundary Conditions Request

Good Evening Sharif,

I am currently working on the Serviceability report in support of the rezoning application at 564 Industrial Avenue. I am hoping to obtain boundary conditions at the location of the proposed water connection. I have attached a plan showing the location of the service as well as approximate hydrant spacing. Please find water demands below:

Commercial Development
Average Day Demand: **0.19 L/sec**
Maximum Day: **0.29L/sec**

Peak Hour: **0.52 L/sec**
FF Requirement (FUS): **83 L/sec**

I hope this is sufficient information to request boundary conditions. If you require anything else please don't hesitate to contact me.

Best Regards,

Matthew Kelley, P. Eng
EXP | Project Engineer
t : +1.613.688.1899 | m : +1.613.218.0925 | e : matthew.kelley@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

exp.com | legal disclaimer
keep it green, read from the screen


Boundary Condition for 564 Industrial
N
203mm
152mm
203mm
165
500
505
203mm
102mm
305mm
TRAINYARDS DR
55
55
565
152mm
INDUSTRIAL AVE
605
203mm
152mm
152mm
203mm
400
540
564
568
580
631
102mm
152mm
655
628
CORONATION AVE
655
CROMLEY CRES
530
1462
531
1470
532
1484
542
1465
1469
1473
1477
1481
1699
552
1500
1496
1492
1488
1484
1480
1474
578
582
586
590
600
1490
1494
1489
152mm
305mm
684
Legend
Pipe Ownership
Ownership
Private
Public

TABLE 1: FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999

564 Industrial Avenue

Building No: 564 Industrial

An estimate of the Fire Flow required for a given fire area may be estimated by:

$$F = 220 * C * SQRT(A)$$

where:
F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input	Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction	0.8	
	Ordinary Construction	1			
	Non-combustible Construction	0.8			
	Fire Resistive Construction	0.6			
Input Building Floor Areas (A)	Floor 3		0	1840.0 m²	
	Floor 2		0		
	Floor 1		1840		
	Basement (At least 50% below grade, not included)		0		
Fire Flow (F)	F = 220 * C * SQRT(A)				7,550
Fire Flow (F)	Rounded to nearest 1,000				8,000

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Combustible	0%	0	8,000
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	Adequate Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-2,400	5,600
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-800	4,800
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	4,800
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Lenth-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	86	6	> 45.1	Type B	72	1	72	6	0%	5%	400	5,200
	Side 2	53	6	> 45.1	Type B	10	1	10	6	0%			
	Front	36	5	30.1 to 45	Type B	34	1	34	5B	5%			
	Back	96	6	> 45.1	Type B	59	1	59	6	0%			
Obtain Required Fire Flow											Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =		5,000
											Total Required Fire Flow, L/s =		83

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

Ottawa Train Yards
564 Industrial Avenue
Client: Controlex
exp Project: OTT-00251800-A0
Date: March 2019

Pressure check at service connection for 564 for Max Day + Fireflow

Max day (0.29L/s) + FireFlow(83L/s) HGL= **110.8 m** **Tie-In Location**

Min HGL = **109.5 m** **Tie-In Location**

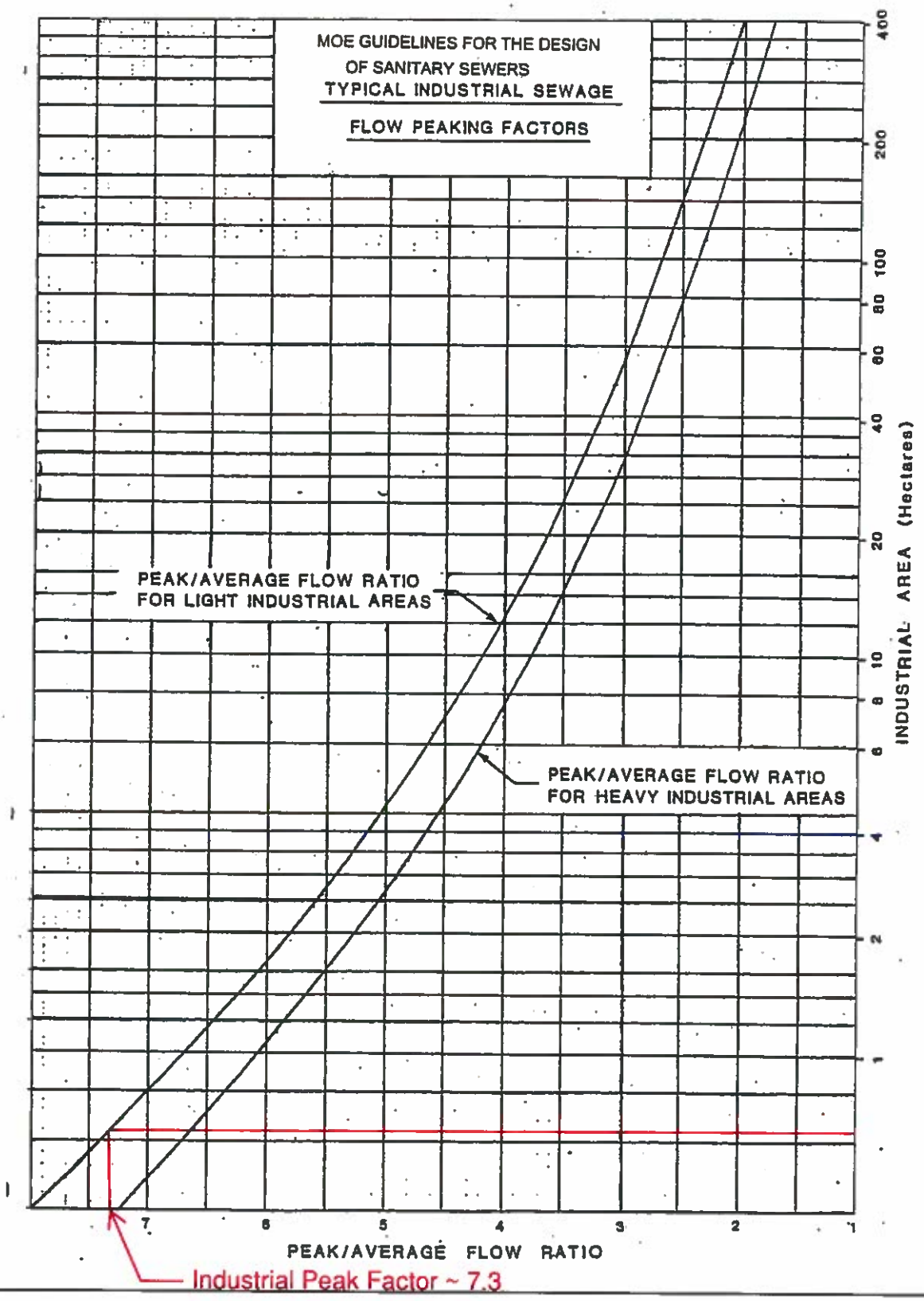
Max HGL= **118.6 m** **Tie-In Location**

Description	From	Start Ground Elev(m)	Pressure at Tie-In kPa	(psi)
Max Day + Fire Flow	Main Industrial Avenue	68.00	419.7	(60.9)
Minimum	Main Industrial Avenue	68.00	407.0	(59.0)
Maximum	Main Industrial Avenue	68.00	496.2	(72.0)

Appendix 2 – Industrial Peaking Factors

APPENDIX 4-B

PEAKING FACTOR FOR INDUSTRIAL AREAS



Appendix 3

Pre-development Runoff Coefficient
Stormwater On-Site Storage Calculations

564 Industrial Avenue
Client: Controlex/Ottawa Trainyards Inc.
EXP Project: OTT-00251800-A0
Date: Mar, 2019

TABLE 1 - Pre-Development C

Pre-Dev run-off Coefficient "C"

			5 Year Event	
Area	Surface	Ha	"C"	C_{avg}
Total	Asphalt	0.50	0.90	0.88
0.59	Roof	0.07	0.90	
	Grass	0.02	0.20	

*Areas are approximate based on existing mapping

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$

564 Industrial Avenue
Client: Controlex/Ottawa Trainyards Inc.
EXP Project: OTT-00251800-A0
Date: Mar, 2019

TABLE 2 - Storage Required

Allowable Release Rate:
85.6 l/s

Post Dev run-off Coefficient "C"

			5 Year Event	
Area	Surface	Ha	"C"	C_{avg}
Total	Asphalt	0.36	0.90	0.84
0.59	Roof	0.18	0.90	
	Grass	0.05	0.20	

*Areas are approximate based on draft site plan

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$

QUANTITY STORAGE REQUIREMENTS - 5 Year

0.59 = Area(ha)
0.84 = C
85.60 l/s = max allowable release rate

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3
	10	104.19	143.6	85.6	58.0	34.8
	15	83.56	115.1	85.6	29.5	26.6
	25	60.90	83.9	85.6	-1.7	-2.5
5 YEAR	35	48.52	66.8	85.6	-18.8	-39.4
	45	40.63	56.0	85.6	-29.6	-80.0
	55	35.12	48.4	85.6	-37.2	-122.8

QUANTITY STORAGE REQUIREMENTS - 100 Year

0.59 = Area(ha)
0.84 = °C
85.60 l/s = max allowable release rate

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Controlled Runoff (L/s)	Net Runoff To Be Stored (L/s)	Storage Req'd m^3
	10	178.56	246.0	85.6	160.4	96.2
	15	142.89	196.9	85.6	111.3	100.1
100 YEAR	20	119.95	165.3	85.6	79.7	95.6
	25	103.85	143.1	85.6	57.5	86.2
	30	91.87	126.6	85.6	41.0	73.8

Equations:

Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area