544 North Service Road Residential Development

Preliminary Functional Servicing & Stormwater Management Brief

Project Location:

544 North Service Road, Grimsby Ontario

Prepared for:

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MTE File No.: 53651-100

Engineers, Scientists, Surveyors.

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1.0 INTRODUCTION

1.1 Overview

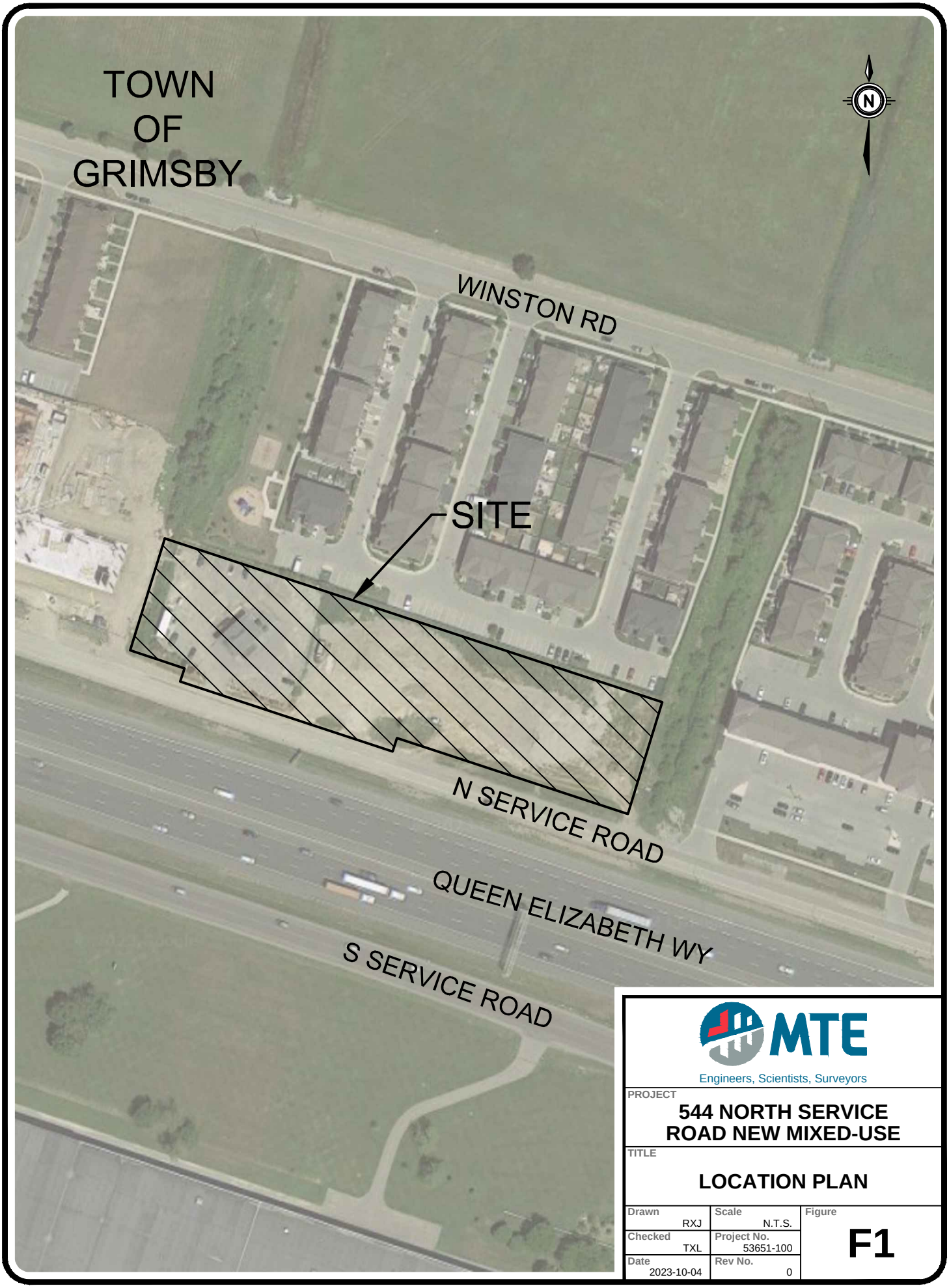
MTE Consultants Inc. were retained by LJM Developments to complete the site grading, servicing, and stormwater management design for the proposed development located at 540-544 North Service Road in the Town of Grimsby (see Figure 1 for Location Plan). This report will outline a functional servicing and stormwater management strategy for the proposed development.

The site is located on a parcel of land bounded by North Service Rd. to the south, a small shopping plaza to the east, residential properties to the north, and an apartment building to the west. The property is predominantly undeveloped land with a small showroom/sales building located on the west side of the property. The proponent plans to construct two residential towers with shared underground parking. An existing municipal sanitary sewer located west of the site within the North Service Road right-of-way will need to be extended to service the property. There is existing watermain and hydrants along North Service Road, fronting the site. There is no municipal storm sewer along North Service Road; drainage from the site will be conveyed to two (2) existing watercourses along the east and west property limits and ultimately outlet to Lake Ontario.

1.2 Background Information

The following documents were referenced in the preparation of this report:

- Ref. 1: *MOE Stormwater Management Practices Planning and Design Manual (Ministry of Environment, March 2003).*
- Ref. 2: *Erosion & Sediment Control Guideline for Urban Construction (December 2006).*
- Ref. 3: *Design Guidelines for Drinking-Water Systems, Ministry of the Environment and Climate Change (2008).*
- Ref. 4: *Design Guidelines for Sewage Works, Ministry of the Environment and Climate Change (2008).*
- Ref. 5: Ontario Building Code (2012).
- Ref. 6: *Water Supply for Public Fire Protection, Fire Underwriters Survey (2020).*
- Ref. 7: Water and Wastewater Master Servicing Plan *(Region of Niagara, June 2023).*
- Ref. 8: Niagara Region Water-Wastewater Project Design Manual *(Region of Niagara, July 2023).*



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MTE
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PROJECT
544 NORTH SERVICE ROAD NEW MIXED-USE

TITLE
LOCATION PLAN

Drawn	Scale	Figure
RXJ	N.T.S.	**F1**
Checked	Project No.	
TXL	53651-100	
Date	Rev No.	
2023-10-04	0	

2.0 STORMWATER MANAGEMENT

2.1 Stormwater Management Criteria

Based on the pre-consultation comments and municipal standards, the following stormwater management (SWM) criteria will be applied to the site:

2.1.1 Quality Control

An Enhanced (Level 1) water quality treatment (80% TSS Removal) is required for all impacted surface runoff prior to discharging to the receiving system.

2.1.2 Quantity Control

No quantity controls will be required for the proposed development due to the proximity to Lake Ontario. This matches the design of the recently approved and constructed adjacent development (560 North Service Road - Waterview Condominiums).

2.2 Existing Conditions

Under existing conditions, much of the site is undeveloped and is occupied by a small free-standing building and parking lot. Currently the site drains north into Lake Ontario via the following outlets:

- Two (2) water courses located on the west and east property limits.
- Existing catchbasins and storm sewers within the northern property. The site servicing design for the northern property has accounted for drainage from the subject site under existing conditions.

There are no known existing stormwater management quantity or quality controls on site.

2.3 Proposed Conditions

Under proposed conditions, the proponent plans to construct two residential towers with shared underground parking and landscaped areas. Stormwater for the site will be captured and conveyed to the existing watercourses via an on-site storm sewer and swale network. Headwalls and erosion protection will be installed at the sewer outlets. No quantity controls are required for the site due to the proximity to Lake Ontario. This matches the design of the recently approved and constructed adjacent development (560 North Service Road - Waterview Condominiums).

2.3.1 Water Quality Control

Water quality control for the proposed development will be provided by Stormceptor oil/grit separators (OGS) units (or approved equivalent) that will be installed at the downstream end of the on-site storm sewers. The majority of runoff generated from the site will be inherently clean because the site will predominantly be the building roof and landscaped areas (sod, plantings, and walkways). As such further water quality measures are not required beyond the OGS units.

2.4 Sediment and Erosion Control

Sediment and erosion control measures will be implemented on site during construction and will include:

- Installation of silt control fencing at strategic locations around the perimeter of the site where feasible.
- Preventing silt or sediment laden water from entering inlets (catch basins / catch basin manholes) by wrapping their tops with filter fabric or installing silt sacks.
- Construction of a mud mat at the entrance/exit to and from the site at North Service Road to mitigate the transportation of sediments to the surrounding roads.
- Maintaining sediment and erosion control structures in good repair (including periodic cleaning as required) until such time that the Engineer or municipality approves their removal. Erosion control measures to be inspected daily and after any rainfall event.

3.0 SANITARY SEWER SERVICING

3.1 Existing Conditions

There is an existing 250mm diameter sanitary sewer flowing west within the North Service Road right-of-way beyond the west limits of the site. The sewer terminates in front of 560 North Service Road. This sewer has a full flow capacity of approximately 35 L/s.

3.2 Sanitary Demands

The anticipated sanitary discharge from the proposed development was estimated using Niagara Region design criteria, and parameters used by adjacent developments of a similar use. Table 3.1 provides an estimate of the residential population and the number of units in each type of building.

Table 3.1 - Population Estimate

Building	Total Number of Units	People per unit [A]	Population (people) [B]
West Residential Tower	326	1.65	538
East Residential Tower	222	1.65	366
Total	**548**		**904**

[A] Referenced from as-constructed sanitary drainage area plan of adjacent development (Bravo by the Lake, Urbantech, 2023). Population density referenced is for apartment use.
[B] Population calculated as (Total # of Units) X (Persons per Unit)

The sanitary sewer discharge rate from the development was calculated using the Niagara Region Water and Wastewater Master Servicing Plan design parameters and is summarized in Table 3.2. Detailed calculations are found in Appendix A.

Table 3.2 - Sanitary Sewer Discharge from Site

Land Use	Population (people)	Average Flow (L/s)	Peak Flow (L/s)
Proposed Residential Buildings	904[A]	2.669[B]	10.215[C]
		Total Peak Sanitary Demand for Site	10.215[D]
		Total Infiltration Allowance	0.225[E]
		Total Peak Sanitary Demand for Site (with infiltration allowance)	**10.439**[F]

[A] Population Estimate: see Table 3.1
[B] Average flow based on 255 L/ca/day.
[C] Peak flow = Average Flow*PF, where Harmon Peaking Factor (PF) = 1+14/(4+√(P)) where P = population in thousands, Max 4 and Min 2.
[D] Total Peak flow = Peak flow from Apartments
[E] Where infiltration is based on 0.286 L/s/ha.
[F] Total Peak flow with infiltration = Total Peak flow + infiltration allowance

3.3 Proposed Sanitary Servicing Plan

There are no existing sanitary sewer fronting the site within the North Service Road right-of-way. As such, an extension of the existing sanitary sewer will be required. The proposed buildings will connect to this extension of the municipal sanitary sewer via a site service connection. Approximately 120m of new municipal sanitary sewer will be required to be installed within North Service Road to service the proposed development.

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

4.1 Existing Conditions

There is an existing 200mm diameter municipal watermain fronting the site. There are also two (2) fire hydrants fronting the property which will provide fire hydrant coverage.

4.2 Domestic Water Demands

The expected domestic water demands for the proposed development were estimated using Niagara Region design criteria and the Niagara Region Water and Wastewater Master Servicing Plan. Table 4.1 summarizes the domestic water demand requirements for the Average Day, Maximum Day, and Peak Hour demand scenarios. Detailed calculations are provided in Appendix B.

Table 4.1 - Domestic Water Demands

Residential Demands		
Population:	904 people (see Table 3.1)	
Average Day Demand:	240 L/c/d x 904 people =	2.512 L/s
Maximum Day Demand [A]:	1.66 x 2.512 L/s =	4.169 L/s
Peak Hour Demand [A]:	4.0 x 2.512 L/s =	10.047 L/s
[A] Peak factors referenced in accordance with Region of Niagara Water and Wastewater Master Servicing Plan (June 2023).		

4.3 Fire Flow Demands

Fire flow demands for the proposed development were determined using the methodology outlined in Water Supply for Public Fire Protection (Fire Underwriters Survey (FUS), 2020). The fire demands are summarized in Table 4.3 and detailed calculations are provided in Appendix B.

Table 4.2 - FUS Fire Flow Requirements

Building	Fire Underwriters Survey (FUS) Flow Rate	Max Day + Fire Flow
West Tower	150.00 L/s (9,000 L/min)	154.17 L/s (9,250 L/min)
East Tower	133.33 L/s (8000 L/min)	137.50 L/s (8,250 L/min)

4.4 Proposed Water Servicing Plan and Analysis

Water servicing for the site will include the installation of a 150mm diameter water service teed off the existing 200mm diameter watermain on North Service Road to service the proposed building. The 150mm proposed water service will then be split into a 150mm diameter fire service and 100mm domestic service. Hydrant coverage will be provided by the existing municipal hydrants located along North Service Road. All building's fire department connections will be within 45m of one of the two fire hydrants. Please refer to Drawing C2.2 for further details.

It is recommended that a fire hydrant pressure test be completed during detailed design to evaluate the existing system pressures.

5.0 CONCLUSIONS

Based on the information provided herein, it is concluded that the development can be serviced to meet the requirements of the Town of Grimsby and Niagara Region as described below:

i. OGS units be installed to achieve the required 80% TSS removal.

ii. No stormwater quantity controls are required due to the proximity to Lake Ontario.

iii. A municipal sanitary sewer extension within North Service Road will be required.

iv. Water servicing for the development can be provided via a connection to the existing watermain on North Service Road. Hydrant coverage will be provided via existing municipal hydrants.

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

All of which is respectfully submitted,

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Appendix A

Sanitary

544 North Service Road

Grimsby, Ont
MTE Project #: 53651-100
Date: October 2023
By: TJL

Sanitary Demand Calculations

Land Use	Residential					Total	
	Units [1]	Population Density [2]	Population (persons)	Demand (L/s)	Floor Area (ha)	Total Peaked Demand (L/s)	Total Peaked Demand + Infiltration (L/s)
WEST TOWER	326	1.65	538	1.588			
EAST TOWER	222	1.65	366	1.081			
Total	**548**		**904**	**2.669**		**10.215**	**10.439**

Sanitary Demand		
Domestic Daily Demands [3]	255	L/cap/d
	0.0030	L/cap/s
Harmon Peaking Factor (Residential) [4]	3.83	
Site Area	0.785	ha
Infiltration Allowance [5]	0.286	L/s/ha
	0.225	L/s

Note 1: Room/Unit count breakdown provided by architect

Note 2: Design population based on previously approved development to the easternly adjoining property

Note 3: Domestic daily demands provided by Niagara Region Water and Wastewater Master Servicng Plan 2023 Volume 4 (Section 2.4)

Note 4: Harmon Peaking Factor PF = 1+14/(4+v(P)) where P = population in thousands, Max 4 and Min 2

Note 5: Infiltration allowance provided by Niagara Region Water and Wastewater Master Servicng Plan 2023 Volume 4 (Section 2.4)

Appendix B

Water

544 North Service Road

Grimsby, Ont
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Residential Peaking Factors[2]:	
Avg. Day	1.0
Max. Day	1.66
Peak Hour	4.00

Water Demand Calculations

	Residential					Final (Residential + Commercial + Hotel) Demand	
Location	Units[1] (ea)	Population Density (persons/unit)[3]	Population (persons)	Demand (L/s)	Avg Day Demand Qavg (L/s)	Max Day Demand Qmax.day (L/s)	Peak Hour Demand Qpeak (L/s)
Proposed Residential Development							
WEST TOWER	326	1.65	538	1.494	1.494	2.480	5.977
EAST TOWER	222	1.65	366	1.018	1.018	1.689	4.070
Total	**770**		904	2.512	***2.512***	***4.169***	***10.047***

Water Demand		
Average Residential Daily Demands [4]	240	L/day/person
	0.0028	L/s/person

Max Day + Fire Flow Demand		
Qmax.day+ Fire Flow West Tower	154.17	L/s
Qmax.day+ Fire Flow East Tower	137.50	L/s
Qmax.day+ Fire Flow [6]	**154.17**	**L/s**

Fire Flow[5]		
Fire Flow West Tower	150	L/s
Fire Flow East Tower	133	L/s

Note 1: From project site statistics.
Note 2: Peaking factors for residential based on Niagara Region Water and Wastewater Master Servicng Plan 2017 & 2023 Volume 3
Note 3: Design population based on recently constructed development of similar use.
Note 4: Residential demands based on Niagara Region Water and Wastewater Master Servicng Plan 2023 Volume 3 (Section 2.4.1 Updated Per Capita Demand Criteria)
Note 5: Fire flows calculated using FUS (2020) guidelines - See attached worksheet
Note 6: Qmax.day and fire flow taken from the larger of the two towers.

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FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$RFF = 220C\sqrt{A}$$

where:

RFF = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for **Type V** Wood Frame Construction
= 0.8 for **Type IV-A** Mass Timber Construction
= 0.9 for **Type IV-B** Mass Timber Construction
= 1.0 for **Type IV-C** Mass Timber Construction
= 1.5 for **Type IV-D** Mass Timber Construction
= 1.0 for **Type III** Ordinary Construction
= 0.8 for **Type II** Noncombustible Construction
= 0.6 for **Type I** Fire Resistive Construction
A = Total floor area in square meters from Site Plan
(for Type III Combustible Construction, A = 100% of all Floor Areas)
A = 100% of all Floor Areas

	West Tower	**East Tower**
Floor	Bldg Footprint (m^2)	Bldg Footprint (m^2)
Level 1	974	347
Level 2	1543	1477
Level 3	1330	1223
Level 4	1275	1158
Levels 5-6	2406	2236
Level 7	675	690
Levels 8-17	9180	
Levels 18 to 22	4530	
Levels 8-12		3885
Levels 13 to 16		3084
TOTAL	**21913.0**	**14100.0**

Adjustments to the calculated fire flow can be made based on occupancy, sprinkler protection and exposure to other structures. The table below summarizes the adjustments made to the basic fire flow demand.

			(1)		(2)		(3)		(4)		**Final Adjusted**		
Building	Area "A" (m^2)	C (Type III)	Fire Flow "RFF" (l/min)	(l/s)	Occupancy %	Adjusted Fire Flow (L/min)	Sprinkler %	Adjustment (L/min)	Exposure %	Adjustment (L/min)	**Fire Flow (L/min)**	**Rounded(L/min)**	**(L/s)**
West Tower	6,887.0	0.8	15,000	250.0	-15	12,750	-40	-5,100	10	1,275	8,925	9,000	**150.0**
East Tower	6,381.0	0.8	14,000	233.3	-15	11,900	-40	-4,760	10	1,190	8,330	8,000	**133.3**

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

-30% - Automatic sprinkler protection designed and installed in accordance with NFPA 13
-10% - Water supply is standard for both the system and Fire Department hose line
-10% - Fully supervised system

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
>30	0%	exceed 75%

West Tower	**Direction**	**Distance**	**%**
	N	>45m	0
	E	Sprinklered	0
	S	22m	10
	W	Sprinkered	0
		Total	**10**

East Tower	**Direction**	**Distance**	**%**
	N	22m	10
	E	11m	0
	S	>45m	0
	W	Sprinklered	0
		Total	**10**