TATHAM ENGINEERING

Enhancing our communities

16728 Highway 12

FUNCTIONAL SERVICING REPORT

U-Haul Co. Canada Ltd.

File 324816 | September 25, 2024

Document Control

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324816
PROVINCE OF ONTARIO

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Issue	Date	Description
1	September 25, 2024	First Submission

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1 Introduction

Tatham Engineering Limited (Tatham) has been retained by U-Haul Co. Canada Ltd. to prepare a Functional Servicing Report (FSR) in support of a proposed development located at 16728 Highway 12 in the Town of Midland. A preliminary Stormwater Management (SWM) Report, Traffic Impact Brief (TIB) and Hydrogeological Assessment (Hydro-G) Report have been prepared by Tatham and are submitted under separate cover.

1.1 EXISITING SITE CONDITIONS

The overall development site is approximately 2.35 hectares in size and is located at 16728 Highway 12 within the Town of Midland. The property is bound by Prospect Boulevard to the south, an existing commercial hotel to the east, Highway 12 to the north, and an existing commercial automotive dealership to the west.

The property is located in the Wye River watershed which is within the jurisdiction of the Severn Sound Environmental Association (SSEA). The site location is illustrated on Figure 1 enclosed at the rear of this report for reference.

1.2 PROPOSED DEVELOPMENT

The proposed development includes two buildings consisting of the following:

- Building 'A' – a 3-storey, 3,348 m^2, mixed use building including self-storage, office and retail spaces; and
- Building 'B' – a 1-storey, 1,186 m^2 logistics building with the interior configured as one large open space 3-storeys in height.

In addition to the self-storage building, the site also includes an external storage unit area configured as four distinct groupings of storage units separated by access laneways. These storage units will be configured to allow surface drainage to flow beneath them without affecting their contents.

Building 'A' will reside along the west side of the property near the northern property limit while Building 'B' will also reside on the west side of the parcel, approximately 10.0 m south of the self-storage building. The external storage units will be located near the south-east corner of the property along with snow storage and a dry pond. The site plan also includes guest parking along the flanks of the buildings with truck share parking along the north and south lot limits, all of which will be accessed through a new site entrance to Prospect Boulevard. The existing site access to Highway 12 is to be removed.

1.3 BACKGROUND INFORMATION

The following design guidelines and manuals were referenced to prepare the servicing design for the site:

- Water supply for Public Fire Protection (Fire Underwriters Survey, 2020)
- Design Criteria for Sewage Works, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approvals (MECP, 2022);
- Design Guidelines for Drinking-Water Systems (MECP, 2008);
- Fire Hydrants: Installation, Field Testing and Maintenance, 5th edition, AWWA;
- Engineering Development Design Standards (Town of Midland, 2024); and
- 2012 Building Code as amended (OBC).

2 Water Supply and Distribution

2.1 EXISTING WATER SYSTEM

The Town maintains an existing 300 mm diameter PVC watermain along Prospect Boulevard. The watermain is located within pressure zone 2.

Two hydrants are located along Prospect Boulevard, one located at the southwest corner of the development, and the other directly in front of the development. There is currently no flow data available for the hydrant directly in front of the development however, flow data from the testing completed at the intersection of Jones Road and Prospect Boulevard in 2018 is summarized in Table 1.

Table 1: Fire Hydrant Flow Data Summary

HYD. NO	LOCATION	STATIC PRESSURE KPA (PSI)	FLOW PRESSURE KPA (PSI)	FLOW RATE L/S (GPM)	
				MEASURED	ESTIMATED AT 20 PSI
H30	Corner of Jones Rd. and Prospect Blvd.	297 (43)	214 (31)	58 (919)	82 (1306)
H115	Central to frontage of property	N/A	N/A	N/A	N/A

Available flows within the existing watermain under fire flow demands have been calculated as 82 L/s at a residual pressure of 138 kPa (20 psi). Calculations are available in Appendix A.

2.2 PROPOSED WATER SYSTEM

The proposed development will be serviced with a 200 mm diameter water service supplying water for both fire protection and domestic demand. The water service will connect directly to Building 'B' where a backflow prevention device and water meter will be installed. Plumbing for separate 25 mm diameter domestic and 150 mm diameter fire protection services will be provided internal to Building 'B'.

A separate 200 mm diameter watermain will extend from Building 'B' to service Building 'A' with 25 mm diameter domestic and 150 mm diameter fire protection services.

The new watermain will connect to the existing 300 mm diameter PVC watermain on Prospect Boulevard via live tap or by cutting in a new 300x300x200 mm tee. The 200 mm diameter pipe is proposed for servicing the site to minimize friction losses during firefighting demands,

recognizing the low supply pressure in the municipal watermain. The watermain is also illustrated on drawing GS.1 found in Appendix C.

2.3 PROPOSED DESIGN FLOWS

Water demands for the site have been estimated by applying typical daily flows expressed in Table 8.2.1.3.B of the Ontario Building Code (OBC) which apply to this development. These flows are summarized below:

- 950 L/day per water closet;
- 150 L/day per loading bay door in a warehouse building;
- 5.0 L/day per square meter of floor space in a retail use.

A maximum daily demand peaking factor of 2.0 and peak hour demand peaking factor of 4.0 were considered in accordance with MECP guidelines. The calculated water demands are summarized below with supporting calculations in Appendix A:

- Average Daily Demand (ADD): 0.07 L/s;
- Maximum Daily Demand (MDD): 0.14 L/s; and
- Peak Hour Demand (PHD): 0.29 L/s.

Presuming the 297 kPa (43 psi) system pressure, as identified by the hydrant flow testing, is available at the property frontage pressure losses on the site have been calculated based on the peak hour demand. Presuming domestic supply is provided to the finished floor of the proposed buildings, pressures of 299 kPa and 290 kPa are anticipated for Building 'A' and Building 'B' respectively. Therefore, the proposed servicing will be sufficient for domestic demands on the ground floor however, internal pumps may be necessary to maintain minimum pressure of 276 kPa (40 psi) on the 2nd and third storey of the building. Supporting calculations are provided in Appendix A.

2.4 FIRE PROTECTION

The fire flow demands of the site were calculated using the Fire Underwriters Survey Fire Flow Calculations. Assuming fire resistive construction, with associated exposure charge reductions, and an automatic sprinkler protection system designed and installed in accordance with NFPA 13, the fire flow required for both Building 'A' and Building 'B' is 83 L/s. Since the available flows from the existing hydrant are 82 L/s and finished grade at the hydrant is approximately 3.0 m higher than the proposed point of connection, the water supply for firefighting is considered to be sufficient to meet the proposed demand.

A private fire hydrant is proposed between the two buildings for fire department connections and improved access to building entrances. The location of the hydrant also ensures a minimum separation of 45 m between the hydrant and the fire fighting connections proposed on the two buildings.

An alternative to fire resistive construction may include vertical fire walls rated for 2-hours to compartmentalize the buildings and reduce the fire protection demand. While this may allow non-combustible construction materials to be used while meeting demand requirements, it may be difficult to implement in Building 'B' while maintaining its intended internal configuration.

Fire protection calculations are included in Appendix A. Construction materials and details for fire protection may be modified during detailed design of the development.

3 Sanitary System

3.1 EXISTING SANITARY SYSTEM

Under existing conditions, sewage flows from Prospect Boulevard are conveyed across King Street towards Cranston Crescent. Prospect Boulevard is serviced with a 200 mm diameter sanitary sewer. Existing peak flows within Prospect Boulevard between MH 957 and MH 956 are unknown, however the conveyance capacity of the system at this location is approximately 63.6 L/s based on as-built drawings showing a 200 mm diameter sewer at 3.45% grade and preliminary Manning's flow capacity calculations.

3.2 PROPOSED SANITARY SYSTEM

A new 200 mm diameter communal sanitary sewer is proposed to service this site. Building 'B' will discharge to the sanitary sewer via a 150 mm diameter service lateral. Building 'A' will discharge to the sanitary sewer via two 150 mm diameter service laterals servicing each of the internal restroom areas directly. Connection to the existing Prospect Boulevard sewer is proposed via prefabricated saddle tee with a maintenance hole at the property line for access.

The calculated average daily flow from the development is 6,230 L/day (0.07 L/s). Applying a peaking factor of 4.0 and infiltration rate per the Midland Engineering Design Standards results in a peak sewage flow of 0.83 L/s. This represents approximately 3.6% of the capacity of the existing sanitary system located on Prospect Boulevard. Sanitary sewer calculations are provided in Appendix B while the proposed alignment is illustrated on drawing GS.1 in Appendix C.

4 Erosion Control and Grading

Siltation and erosion controls will be implemented for all construction activities, including removals, earthwork operations, service construction, building construction, paving and grading works. Details of the siltation and erosion controls are shown on the Erosion & Siltation Control Plan drawing (ESC-1). A number of standard practices which will be implemented are summarized as follows:

- The disturbance area and activities will be minimized where possible;
- The smallest possible land area will be exposed for the shortest amount of time;
- Heavy duty silt control fences will be erected coincident with the property boundary prior to commencement of grading operations to control sediment movement;
- A stone mud mat will be implemented at the construction entrance;
- Catch basins on-site and downstream of the site will have grates wrapped in permeable geotextile to prevent migration of sediment into the storm sewers;
- Straw bale check dams will be installed in existing ditches and drainage features downstream of anticipated disturbance;
- Regular inspection of control measures shall be instituted and repairs made as necessary; and
- Promptly re-vegetating disturbed areas following completion of construction works within the site.

5 Utilities

There are existing overhead and underground utilities within Prospect Boulevard right-of-way. Detailed design for servicing will be completed in conjunction with service providers during the detailed design process, including designing internal work and any external upgrades where they may be required once building design loads have been established.

6 Summary

6.1 WATER SUPPLY AND DISTRIBUTION

A new 200 mm diameter watermain will be extended into the property and Building 'B' for backflow prevention and metering and extended to Building 'A' for servicing. Building 'A' will be serviced with a 25 mm diameter domestic service lateral connected to the main while Building 'B' will be serviced with a 25 mm diameter service internally. Fire protection will be provided by the existing fire hydrant on the frontage of the property, a proposed private hydrant within the site, and 150 mm diameter fire protection services extended to Building 'A' and an internal 150 mm diameter fire protection service within Building 'B'.

6.2 SANITARY SEWER COLLECTION

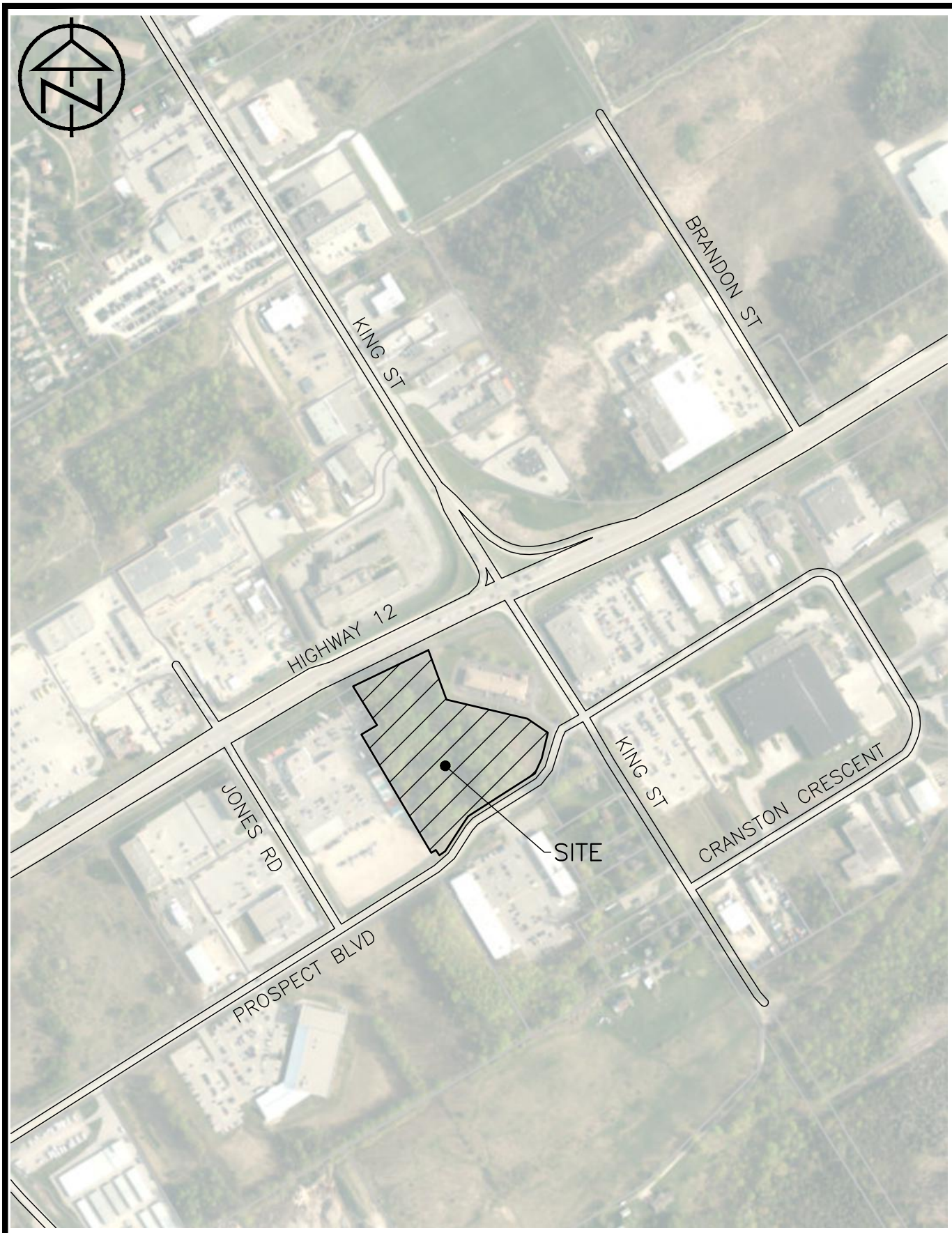
The site will be serviced by a 200 mm diameter sanitary sewer and 150 mm diameter sanitary service laterals: a single lateral to the single-storey building, and two laterals to the three-storey warehouse. A maintenance hole will be provided at the property line to serve as maintenance access.

6.3 EROSION CONTROL AND GRADING

Erosion control devices will be installed around the perimeter of the site, inspected, and maintained regularly during construction. Proposed grading will match existing grades along the perimeter of the development.

6.4 UTILITIES

Utilities will be coordinated to service the development during the detailed design phase.



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U-HAUL
16728 HIGHWAY 12
TOWN OF MIDLAND

DWG. No.
FIG. 1

SCALE: NTS	DATE: AUG. 2024	JOB NO. 324816

Drawing Name: 324816 – FIG–1.dwg, Plotted: Sep 17, 2024

Appendix A:
Water Demand Calculations

WATER FLOW TEST DATA

NAME OF RISK: Prospect Area			
ADDRESS: Prospect Drive		OPERATOR: AP/RH	DATE: 26/11/2018
CITY: Midla\nd	PROVINCE: Ontario		

SYSTEM DATA	SIZE OF MAIN:	DEAD END ☐	TWO WAYS X	LOOP ☐
	SOURCE RELIABLE			
TEST DATA	LOCATION OF TEST HYDRANTS: RESIDUAL:31psi FLOW:30 psi			
	STATIC PRESSURE: 43 psi TIME: 9:30 am			

Test No.	No. OF OUTLETS	ORIFICE SIZE (in.)	PITOT READING	EQUIVALENT FLOW gpm (U.S.)	TOTAL FLOW (U.S.)	RESIDUAL PRESSURE (psi)	COMMENTS
1	1	2.5	30	919	1306	31	

SKETCH AREA:

NOTE:

Pitot Pressure: The pressure reading obtained on the Pitot gauge during a flow test.

Residual Pressure: The pressure that exists in the distribution system, measured at the residual hydrant at the time the flow readings are taken at the flow hydrant.

Static Pressure: The pressure that exists at a given point under normal distribution-system flow conditions.

PROJECT	16728 HWY 12, Midland	FILE	324816	
		DATE	3/5/2024	
SUBJECT	Available Fire Flow from Hydrant Test	NAME	MF	CHKD
		PAGE	1	OF 1

DESIGN EQUATION

The following equation provided by the *AWWA M17 Fire Hydrants: Installation, Field Testing, and Maintenance* calculates the available fire flow at a desired residual pressure, given observed hydrant test results of static pressure, hydrant flow and residual pressure.

$$Q_r = Q_f \left(\frac{h_r}{h_f}\right)^{0.54}$$

Where: Q_r is the flow at a desired residual pressure (U.S. GPM)

Q_f is the observed flow (U.S. GPM)

h_r is the difference between the static pressure and the desired residual pressure (psi)

h_f is the observed drop in pressure from static pressure to residual pressure (psi)

CALCULATION

Enter values in the cells highlighted in blue

Hydrant Test Description	Observed			Calculated		Target		
	Static Pressure (psi)	Residual Pressure (psi)	Hydrant Flow (U.S. GPM) Q_f	h_r	h_f	Residual Pressure (psi)	Hydrant Flow Q_r (GPM)	(L/s)
H30 Corner of Jones Rd and Prospect Blvd	43	31	919	23	12	20	1,306	82

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PROJECT	16728 Highway 12 Building 'A'	FILE	324816
		DATE	September 16, 2024
SUBJECT	Non-Residential Occupancies Design Flow Calculations	NAME	JN
		PAGE	1 of 1

For non-residential occupancies, the total daily design sanitary sewage flow shall also be in accordance with OBC Table 8.2.1.3.B.

Sewage flow allocations according to OBC Table 8.2.1.3.B.

Occupancy	Flow/Unit	Occupant Load		Sewage Flow Allocation	
22. Stores (Note 3)					
a) Per 1.0 m2 of floor area, or	5 L	276	of 1.0 m2 floor space	1,380	L/d
26. Warehouse					
a) Per water closet, and	950 L	3	Water Closets	2,850	L/d
b) Per loading bay	150 L	5	Loading Bays	750	L/d
Total Industrial, Commercial and Institutional Occupancy Sewage Design Flow				**4,980**	**L/d**

TATHAM ENGINEERING

PROJECT	16728 Highway 12 Building 'B'	FILE	324816
		DATE	September 16, 2024
SUBJECT	Non-Residential Occupancies Design Flow Calculations	NAME	JN
		PAGE	1 of 1

For non-residential occupancies, the total daily design sanitary sewage flow shall also be in accordance with OBC Table 8.2.1.3.B.

Sewage flow allocations according to OBC Table 8.2.1.3.B.

Occupancy	Flow/Unit	Occupant Load		Sewage Flow Allocation	
26. Warehouse					
a) Per water closet, and	950 L	1	Water Closets	950	L/d
b) Per loading bay	150 L	2	Loading Bays	300	L/d
Total Industrial, Commercial and Institutional Occupancy Sewage Design Flow				**1,250**	**L/d**

TATHAM ENGINEERING	Project: 16728 HWY 12, Midland	Date:	September 19, 2024
	File No.: 324816	Designed:	MF/JH
	Subject: Fire Flow Demand - Building 'A' Fire Resistive Construction	Checked	
	Revisions:		

Fire Underwriters Survey Fire Flow Calculations

Calculation Based on 2020 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)	
1	Frame Use for Construction of Unit	**Framing Material**							
		Coefficient related to type of construction (C)	Type V - Wood Frame Construction	1.5	Fire Resistive Construction	**0.6**	%	N/A	
			Type IVA - Mass Timber Construction	0.8					
			Type IVB - Mass Timber Construction	0.9					
			Type IVC - Mass Timber Construction	1.0					
			Type IVD - Mass Timber Construction	1.5					
			Ordinary Construction	1.0					
			Non-combustible Construction	0.8					
			Fire Resistive Construction	0.6					
2	Total Effective Area	Largest Floor Area				**3348**	m^2	N/A	
		Percentage of the Total Area of the Other Floors for Coefficient 1.0 to 1.5			**100%**				
		Percentage of the Total Area of the Other Floors for Coefficient below 1.0:							
		a) If any vertical opening in the building are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight, **or**			**50%**				
		b) If all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.			**25%**	**1674**			
		Total Effective Area				**5022**			
3	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (RFF= 220 x C x $A^{0.5}$)							9,000
4	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**							
4.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	%	(1,350)	7,650
			Limited combustible	-0.15					
			Combustible	0.00					
			Free burning	0.15					
			Rapid burning	0.25					
4.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	For a fully supervised system the conditions a), b) and c) below must be met.			-0.4	%	(3,060)	4,590
			a) Automatic sprinkler protection designed and installed in accordance with NFPA 13	-0.3	Yes				
			b) Water supply is standard for both the system and the Fire Department hose lines	-0.1	Yes				
			c) Fully supervised system	-0.1	No				
			None	0.0	No				
4.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	Greater than 30.0 m	0.00	0.08	%	612	5,202
			East Side	Greater than 30.0 m	0.00				
			South Side	10.1 to 20.0 m	0.08				
			West Side	Greater than 30.0 m	0.00				
4.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	5,202
			Low risk of fire spread	2000					
			Moderate risk of fire spread	3000					
			High risk of fire spread	4000					
		Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:							5,000
5	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:							83
		Required Duration of Fire Flow of 5,000 L/min (hrs):							1.75
		Required volume for Fire Flow of 5,000 L/min (m^3):							525

TATHAM ENGINEERING	Project: 16728 HWY 12, Midland	Date:	September 19, 2024
	File No.: 324816	Designed:	JH
	Subject: Fire Flow Demand - Building 'B' Fire Resistive Construction	Checked	
	Revisions:		

Fire Underwriters Survey Fire Flow Calculations

Calculation Based on 2020 Publication "Water Supply for Public Fire Protection" by Fire Underwriters Survey (FUS).

Step	Description	Term	Options	Multiplier Associated with Option	Choose	Value used	Unit	Total Fire Flow (L/min)	
		Framing Material							
1	Frame Use for Construction of Unit	Coefficient related to type of construction (C)	Type V - Wood Frame Construction	1.5	Fire Resistive Construction	**0.6**	%	N/A	
			Type IVA - Mass Timber Construction	0.8					
			Type IVB - Mass Timber Construction	0.9					
			Type IVC - Mass Timber Construction	1.0					
			Type IVD - Mass Timber Construction	1.5					
			Ordinary Construction	1.0					
			Non-combustible Construction	0.8					
			Fire Resistive Construction	0.6					
2	Total Effective Area	Largest Floor Area				**1186**	m^2	N/A	
		Percentage of the Total Area of the Other Floors for Coefficient 1.0 to 1.5			**100%**				
		Percentage of the Total Area of the Other Floors for Coefficient below 1.0:							
		a) If any vertical opening in the building are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight, **or**			**50%**	**1779**			
		b) If all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.			**25%**				
		Total Effective Area				**2965**			
3	Required Fire Flow without Reductions or Increases	Required Fire Flows without Reductions or Increases per FUS): (RFF= 220 x C x $A^{0.5}$)						7,000	
4	Factors Affecting Burning	**Reductions / Increases Due to Factors Affecting Burning**							
4.1	Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0	%	-	7,000
			Limited combustible	-0.15					
			Combustible	0.00					
			Free burning	0.15					
			Rapid burning	0.25					
4.2	Reduction Due to Presence of Sprinklers	Sprinkler reduction	For a fully supervised system the conditions a), b) and c) below must be met.			-0.4	%	(2,800)	4,200
			a) Automatic sprinkler protection designed and installed in accordance with NFPA 13	-0.3	Yes				
			b) Water supply is standard for both the system and the Fire Department hose lines	-0.1	Yes				
			c) Fully supervised system	-0.1	No				
			None	0.0	No				
4.3	Separation Distance Between Units (Use 10% for 2 hour Fire Separation between adjacent units)	Exposure distance between units	North Side	10.1 to 20.0 m	0.08	0.08	%	560	4,760
			East Side	Greater than 30.0 m	0.00				
			South Side	Greater than 30.0 m	0.00				
			West Side	Greater than 30.0 m	0.00				
4.4	Combustibility of Wood Shingle or Shake Roof Material	Surcharge for potential to spread fire	Non-combustible roofing material	0	Non-combustible roofing material	0	L/min	0	4,760
			Low risk of fire spread	2000					
			Moderate risk of fire spread	3000					
			High risk of fire spread	4000					
		Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:							5,000
5	Required Fire Flow, Duration and Volume	Total Required Fire Flow (above) in L/s:							83
		Required Duration of Fire Flow of 5,000 L/min (hrs):							1.75
		Required volume for Fire Flow of 5,000 L/min (m^3):							525

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PROJECT	16728 HWY 12, Midland	FILE	324816
		DATE	19-Sep-2024
SUBJECT	Water Supply Calculations Commercial Development	NAME	JH CHECK JN
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SITE DESCRIPTION

Proposed 3-storey retail/ self-storage building (Building 'A') and 1-storey logistics building with 3-storey high interior (Building 'B').

DAILY DEMAND DESIGN PARAMATERS - PER OBC Table 8.2.1.3.B

Description	Domestic		Fire	
Building 'A'	4,980	L/d	83	L/s
Building 'B'	1,250	L/d	83	L/s
		L/d		L/s
		L/d		L/s

Max Day Factor	2
Peak Hour Factor	4

Q = PxDxPF, where:
P = Population
D = Per Capita Demand
PF = Peaking Factor

Design Demand	ADD		MDD	PHF
	L/day	L/s	L/s	L/s
Building 'A'	4,980	0.06	0.12	0.23
Building 'B'	1,250	0.01	0.03	0.06
	0	0.00	0.00	0.00
	0	0.00	0.00	0.00
Total	**6,230**	**0.07**	**0.14**	**0.29**

WATERMAIN SERVICE SIZING AND FRICTION LOSS

Domestic Peak Demand	D (mm)	Q (L/s)	A (m^2)	V (m/s)	C	L (m)	Friction Loss (m)	psi	kPa
Building 'A'	25	0.23	0.0005	0.47	100	7.4	0.183	0.261	1.80
Building 'B'	25	0.06	0.0005	0.12	100	0.0	0.000	0.000	0.00
Pvt. Watermain	200	0.29	0.0315	0.01	110	145.9	0.000	0.001	0.01
Fire Fighting									
Building 'A'	150	83.00	0.0177	4.69	100	7.4	1.607	2.286	15.77
Building 'B'	200	83.00	0.0315	2.64	110	0.0	0.000	0.000	0.00
Pvt. Watermain	200	83.14	0.0315	2.64	110	145.9	6.564	9.334	64.36

D - Pipe Diameter
Q - Demand Flow
A - Pipe Flow Area
V - Flow Velocity
C - Pipe Coefficient
L - Pipe Length

A = (πD2)/4
V = Q/A

$$h_f = L\left(\frac{Q}{0.278CD^{2.63}}\right)^{1/0.54}$$

TATHAM ENGINEERING

PROJECT	16728 HWY 12, Midland	FILE	324816
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SUBJECT	Water Supply Calculations Commercial Development	NAME	JH CHECK JN
		PAGE	2 OF 2

STATIC HEAD LOSS - Presuming 43 psi Static Pressure at Property Frontage

Static Head Loss	Road C/L Elev (m)	Depth to W/M (m)	Finished Floor (m)	Building Height (m)	Total Head Loss		
					(m)	(psi)	(kPa)
Building 'A'	221.27	1.70	219.14		-0.43	-0.612	-4.22
Building 'B'	221.27	1.70	220.18		0.61	0.868	5.99

TOTAL LOSSES - To Building Finished Floor

Domestic Service	Static Pressure		Static Loss	W/M Loss	Service Loss	Total Loss	Service Pressure	
	(psi)	(kPa)	(kPa)	(kPa)	(kPa)	(kPa)	(kPa)	(psi)
Building 'A'	43	296.48	-4.22	0.01	1.80	-2.41	298.89	43.36
Building 'B'	43	296.48	5.99	0.01	0.00	6.00	290.48	42.14
Fire Fighting								
Service Type	Static Pressure		Static Loss	W/M Loss	Service Loss	Total Loss	Service Pressure	
	(psi)	(kPa)	(kPa)	(kPa)	(kPa)	(kPa)	(kPa)	(psi)
Building 'A'	43	296.48	-4.22	64.36	15.77	75.91	220.57	32
Building 'B'	43	296.48	5.99	64.36	0.00	70.35	226.13	32.8

Appendix B:
Sanitary Flow Calculations

TATHAM ENGINEERING

PROJECT	16728 HWY 12, Midland	FILE	324816
		DATE	3/5/2024
SUBJECT	Sanitary Servicing	NAME	MF
		PAGE	1 OF 1

Sanitary Flow Calculation per Section 8 of the OBC with Inflow/Infiltration per Town Standards:

Design Flow (Commercial)	0.5203	L/day/m2
Site Area	2.35	Ha
Building Area	11974	m2
Commercial Flow	6230	L/day
	0.07	L/s
Peaking Factor:	4.00	*
Peak Flow:	0.29	l/s

Infiltration Flow per Midland Engineering Design Standardsl: (rate of 0.23 l/s/ha)

Infiltration Flow:	0.541	l/s
Total Sanitary Flow:	0.831	l/s

Service Capacity

pipe diameter	150	mm
pipe slope (assumed)	2	%
Pipe roughness (n)	0.013	

Manning's Equation

$$Q = \frac{A*Rh^{2/3}*S^{1/2}}{n}$$

= 0.022 m3/s

= 21.5 L/s

Main Capacity

pipe diameter	200	mm
pipe slope (as-built)	0.5	%
Pipe roughness (n)	0.013	

Manning's Equation

$$Q = \frac{A*Rh^{2/3}*S^{1/2}}{n}$$

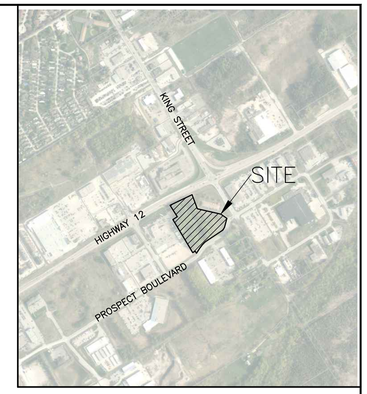
= 0.023 m3/s

= 23.2 L/s

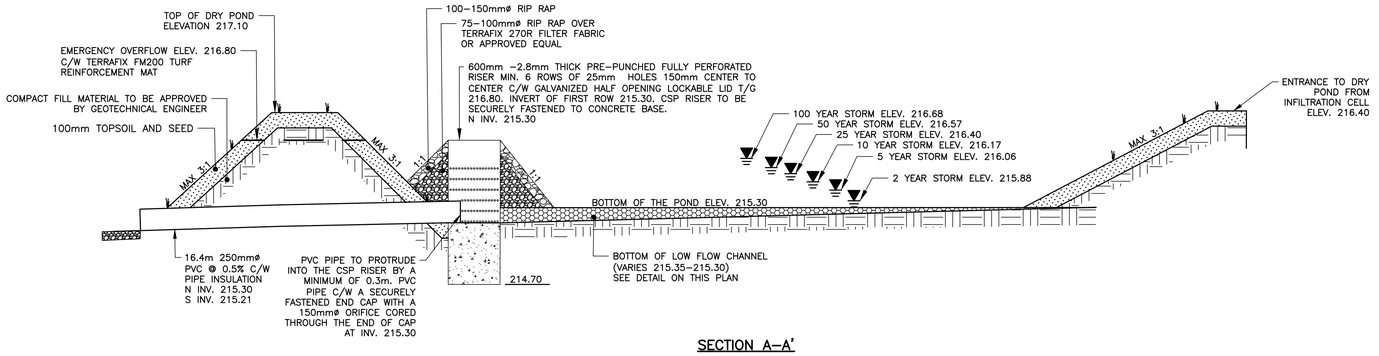
3.6 %

Flows from site represent 3.6% of the capacity of the main

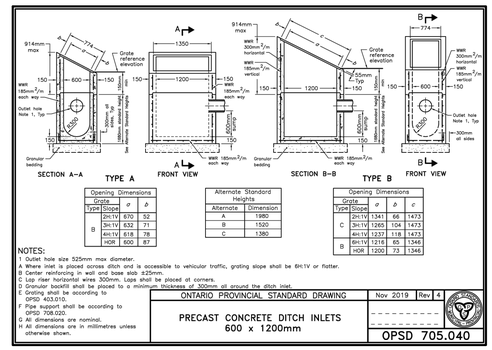
Appendix C:
Design Drawing



KEY PLAN



SECTION A–A'
NTS



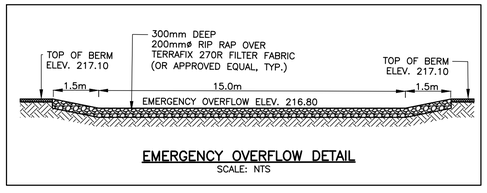
Opening Dimensions				
Grate Type	Slope	a	b	
B	2H:1V	670	52	
	3H:1V	632	71	
	4H:1V	618	78	
	HOR	600	87	

Alternate Standard Heights	
Alternate	Dimension
A	1980
B	1520
C	1380

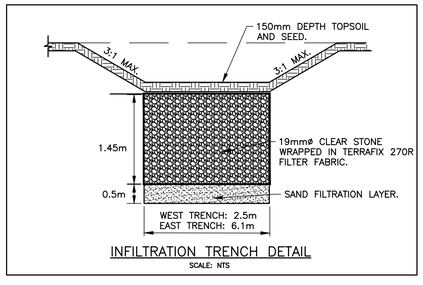
Opening Dimensions				
Grate Type	Slope	a	b	c
C	2H:1V	1341	66	1473
	3H:1V	1265	104	1473
	4H:1V	1237	118	1473
B	6H:1V	1216	65	1346
	HOR	1200	73	1346

NOTES:
A Outlet hole size 525mm max diameter.
A Where inlet is placed across ditch and is accessible to vehicular traffic, grating slope shall be 6H:1V or flatter.
B Center reinforcing in wall and base slab ø25mm.
C Lap riser horizontal wires 300mm. Laps shall be placed at corners.
D Granular backfill shall be placed to a minimum thickness of 300mm all around the ditch inlet.
E Grating shall be according to OPSD 403.010.
F Pipe support shall be according to OPSD 708.020.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

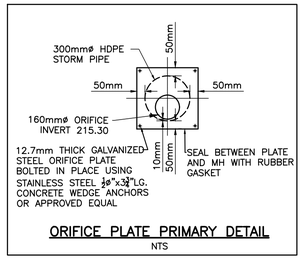
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 4
PRECAST CONCRETE DITCH INLETS 600 x 1200mm		
	OPSD 705.040	



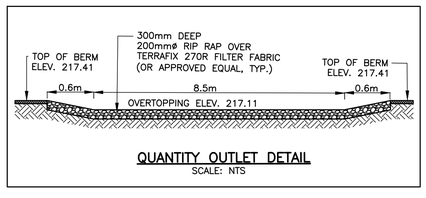
EMERGENCY OVERFLOW DETAIL
SCALE: NTS



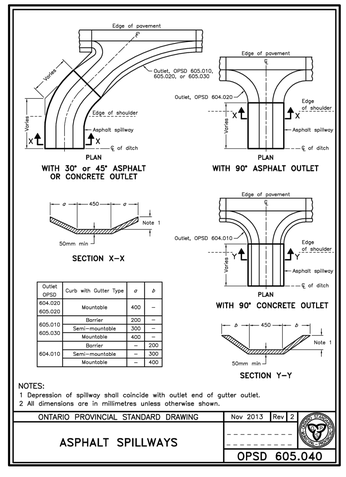
INFILTRATION TRENCH DETAIL
SCALE: NTS



ORIFICE PLATE PRIMARY DETAIL
NTS



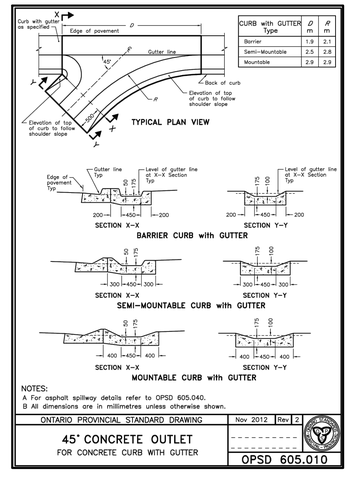
QUANTITY OUTLET DETAIL
SCALE: NTS



Outlet OPSD	Curb with Gutter Type	a	b
604.020 605.020	Mountable	400	–
605.010 605.020	Barrier	200	–
	Semi–mountable	300	–
	Mountable	400	–
604.010	Barrier	–	200
	Semi–mountable	–	300
	Mountable	–	400

NOTES:
1 Depression of spillway shall coincide with outlet end of gutter outlet.
2 All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev 2
ASPHALT SPILLWAYS		
	OPSD 605.040	



CURB with GUTTER Type	D m	R m
Barrier	1.9	2.1
Semi–Mountable	2.5	2.8
Mountable	2.9	2.9

NOTES:
A For asphalt spillway details refer to OPSD 605.040.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
45° CONCRETE OUTLET FOR CONCRETE CURB WITH GUTTER		
	OPSD 605.010	

BENCHMARKS

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NOTES

LEGAL AND TOPOGRAPHIC INFORMATION FROM 'PLAN OF SURVEY OF PART OF THE NORTH HALF OF LOT 100 CONCESSION 1 (EAST OF PENETANGUISHENE ROAD) GEOGRAPHIC TOWNSHIP OF TAY NOW IN THE TOWN OF MIDLAND COUNTY OF SIMCOE' PREPARED BY J. D. BARNES LIMITED DATED: 01/22/2023

No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	AUG. 2024

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J. A. NEMISZ
100181826
Sept. 25, 2024
PROVINCE OF ONTARIO

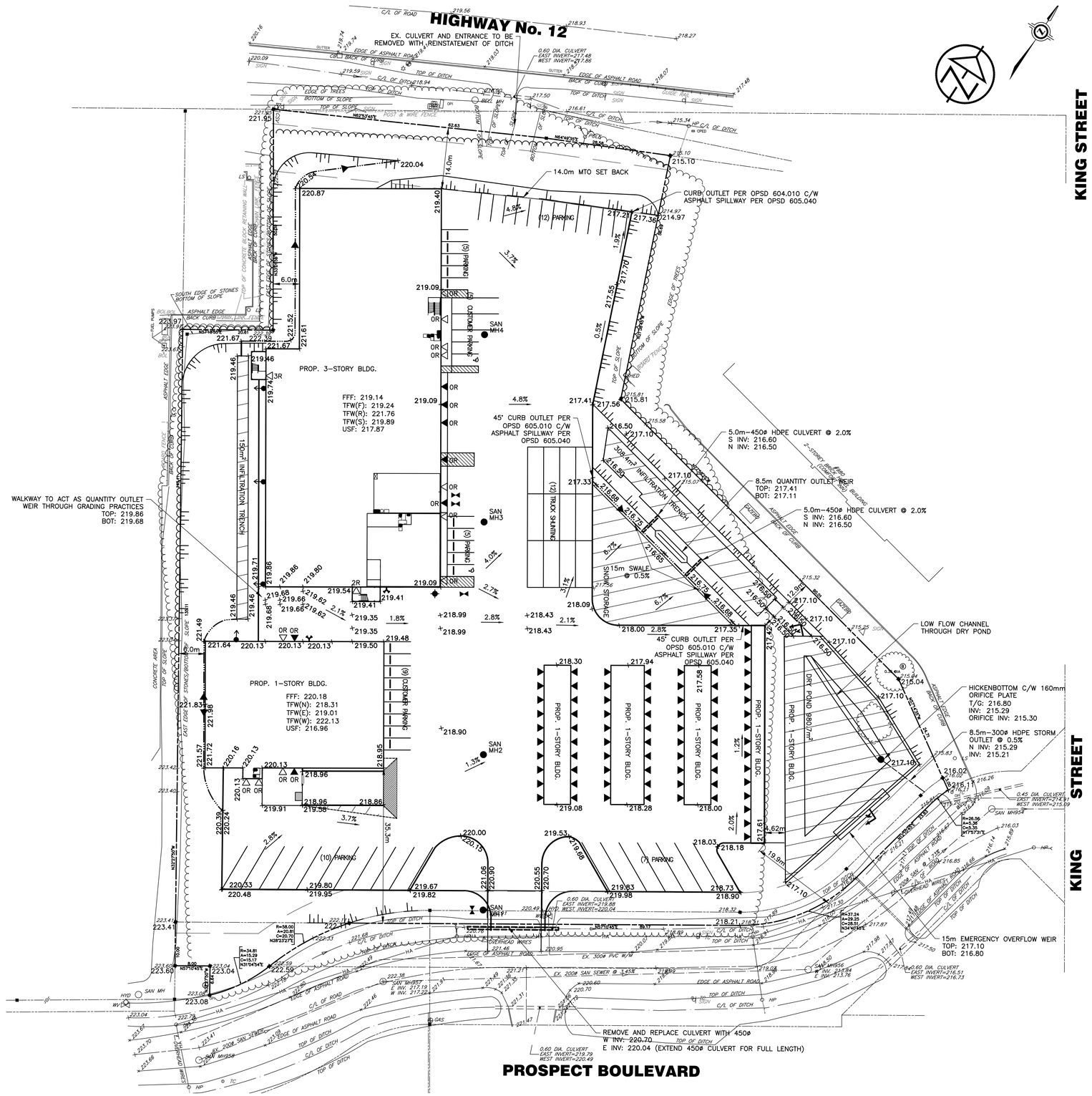
16728 HIGHWAY 12
(PART OF THE NORTH HALF OF LOT 100 CONCESSION 1)
TOWN OF MIDLAND

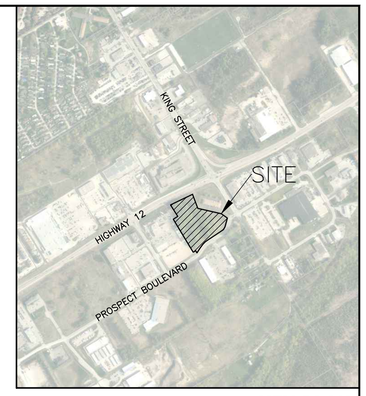
NOTES AND DETAILS

TATHAM ENGINEERING

DESIGN: JH	FILE: 324816	DWG:
DRAWN: JH	DATE: AUG. 2024	**DET-1**
CHECK: JN	SCALE: 1:500	

Drawing Name: 324816–DET–1.dwg, Plotted: Sep 25, 2024





KEY PLAN

LEGEND

217.50	PROPOSED GROUND ELEVATION
221.50	EXISTING GROUND ELEVATION
	PROPERTY LINE
	EXISTING DITCH
STM MH	FUTURE STORM SEWER
	FUTURE STORM MH
CB	FUTURE STORM CB
1.9%	PROPOSED OVERLAND FLOW DIRECTION
OGS	PROPOSED MH C/W OGS UNIT
221.00	EXISTING CONTOURS
WV	PROPOSED WATER VALVE
HYD	PROPOSED HYDRANT & VALVE
HYD	EXISTING HYDRANT
	PROPOSED CULVERT
	POTENTIAL ROOF DRAIN
	FIRE DEPARTMENT CONNECTION

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

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No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	AUG. 2024

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
J. A. NEMISZ
100181826
Sept. 25, 2024
324816
PROVINCE OF ONTARIO

16728 HIGHWAY 12

(PART OF THE NORTH HALF OF LOT 100 CONCESSION 1)

TOWN OF MIDLAND

LOT GRADING PLAN

TATHAM ENGINEERING

DESIGN: JH	FILE: 324816	DWG:	LG.1
DRAWN: JH	DATE: AUG. 2024		
CHECK: JN	SCALE: 1:500		

Drawing Name: 324816-LG01.dwg, Plotted: Sep 25, 2024

LEGEND

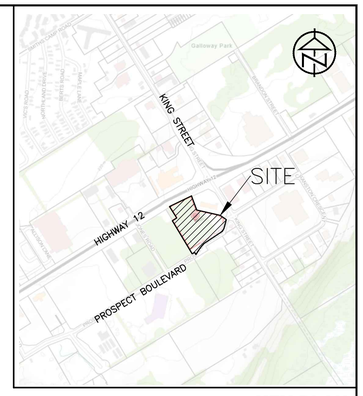
- SILT/TREE PROTECTION FENCE OPSD 219.131
- SBCD — STRAW BALE FLOW CHECK DAM OPSD 219.180
- RCD — PERMANENT ROCK CHECK DAM OPSD 219.211
- STONE MUD MAT
- CATCH BASIN FILTER

SILTATION AND EROSION CONTROL NOTES

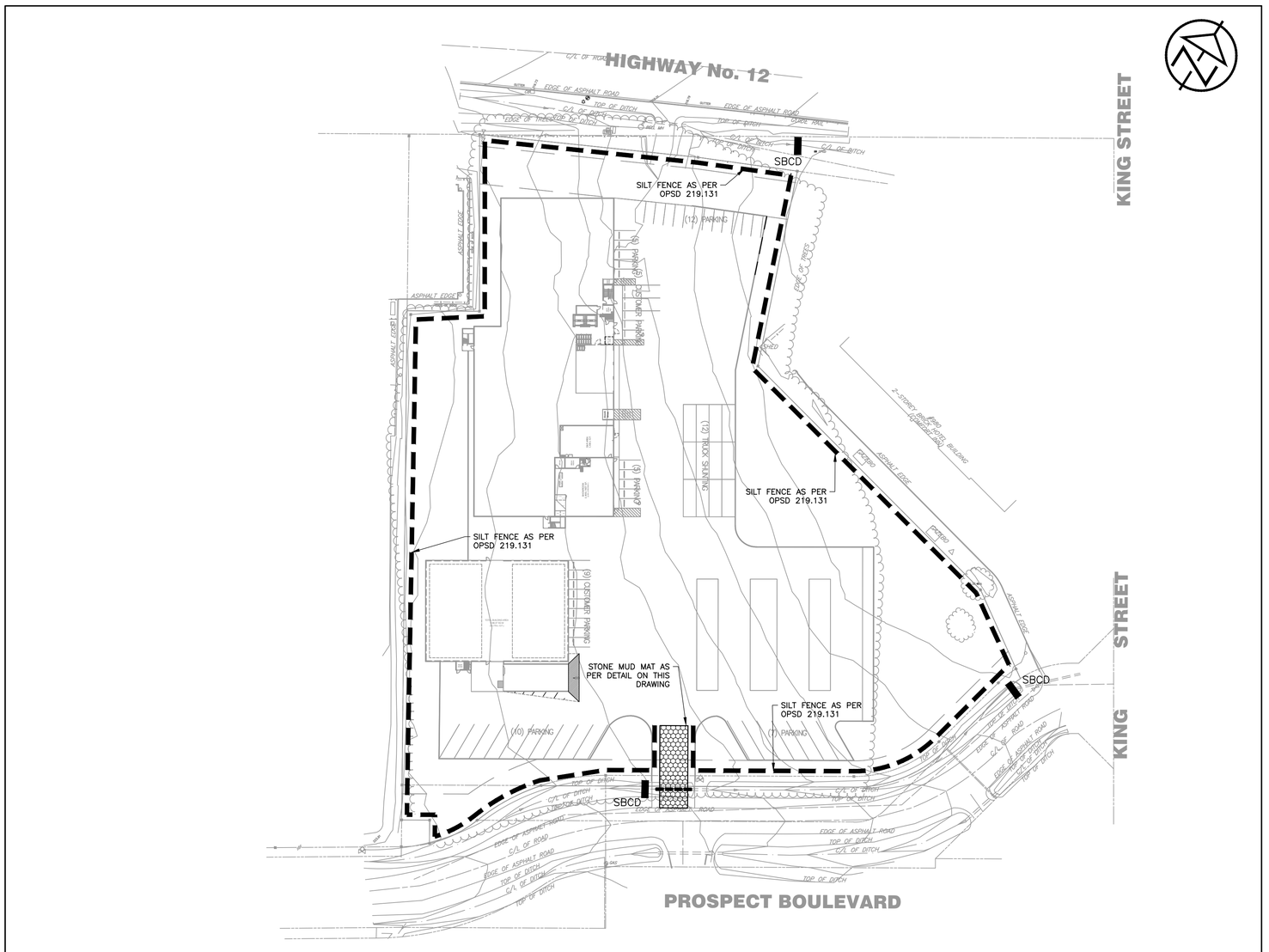
1. ALL SILTATION AND EROSION CONTROL MEASURES TO BE IN PLACE PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO INSTALL AND MAINTAIN SILTATION CONTROL DEVICES AT LOCATIONS SHOWN, OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR IF ADDITIONAL CONTROLS ARE DEEMED NECESSARY.
3. CONTRACTOR TO ARRANGE PRE-CONSTRUCTION MEETING WITH CONTRACT ADMINISTRATOR IMMEDIATELY AFTER PLACING ALL SILTATION CONTROL DEVICES.
4. SILTATION CONTROL DEVICES TO BE INSPECTED BY CONTRACTOR WEEKLY AND AFTER EACH RAINFALL. REPAIRS TO SILTATION CONTROL DEVICES TO BE COMPLETED PROMPTLY WHEN REQUIRED.
5. THE CONTRACT ADMINISTRATOR WILL INSPECT THE SEDIMENT AND EROSION CONTROL MEASURES PERIODICALLY, AND AFTER EACH MAJOR STORM EVENT. THE CONTRACT ADMINISTRATOR WILL NOTIFY THE CONTRACTOR OF CORRECTIVE ACTIONS REQUIRED AS SOON AS DEFICIENCIES ARE NOTED. THE CONTRACTOR MAINTAINS ULTIMATE RESPONSIBILITY TO ENSURE PROPER SEDIMENT AND EROSION CONTROL MEASURES ARE IMPLEMENTED AND MAINTAINED. ALL DEFICIENCIES AND CORRECTIVE MEASURES WILL BE DOCUMENTED BY THE CONTRACTOR IN A WEEKLY INSPECTION REPORT. A COPY OF THE WEEKLY INSPECTION REPORT WILL BE PROVIDED TO THE CONTRACT ADMINISTRATOR.
6. CONTRACTOR TO REMOVE SILTATION CONTROL DEVICES ONLY AFTER ALL PAVING IS COMPLETED AND VEGETATION HAS STABILIZED.
7. ALL SILT FENCE PER OPSD 219.131 (SEE DETAIL ON THIS DRAWING) .

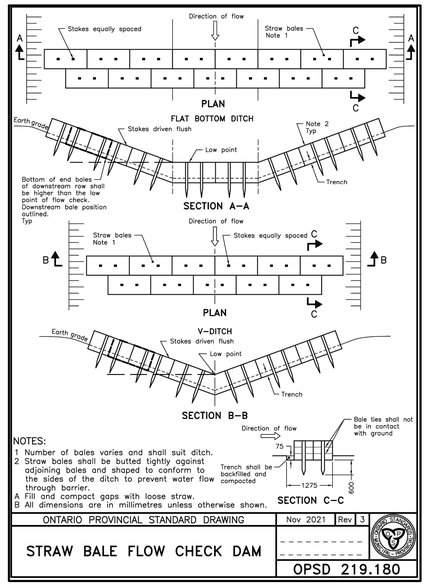
CONSTRUCTION ENTRANCE NOTES

1. CONSTRUCT AND MAINTAIN CONSTRUCTION ENTRANCE AS SHOWN AND IN ACCORDANCE WITH O.P.S.D. 301.020.
2. ALL CONSTRUCTION VEHICLES TO ACCESS THE SITE USING THE DESIGNATED CONSTRUCTION ENTRANCE.
3. CONTRACTOR TO INSTALL AND MAINTAIN STONE MUD MAT AS DETAILED.
4. REMOVE TOPSOIL (WHERE APPLICABLE) BEFORE INSTALLING CONSTRUCTION ENTRANCE.
5. PROMPTLY REMOVE ANY MUD OR DUST WHICH IS TRANSPORTED BEYOND THE STONE MUD MAT TO MAINTAIN EXISTING ROAD DRIVING CONDITION.
6. ENTRANCE RADII TO BE MINIMUM 8.0m.

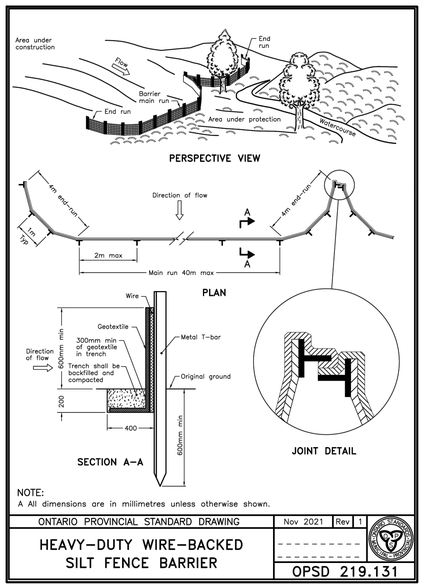


KEY PLAN

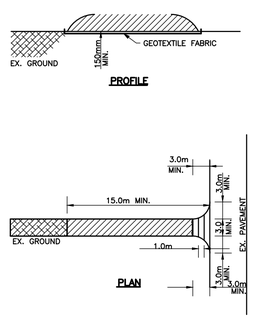




ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
STRAW BALE FLOW CHECK DAM		OPSD 219.180



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 1
HEAVY–DUTY WIRE–BACKED SILT FENCE BARRIER		OPSD 219.131



STONE SIZE

THE STONE PAD SHALL BE A MIN. 150mm THICK. USE 50#mm STONE OR RECLAIMED CONCRETE EQUIVALENT FOR FIRST 10m FROM ADJACENT ROAD & 150mm# STONE FOR REMAINDER OF STONE PAD.

LENGTH

AS REQUIRED BUT NOT LESS THAN 15m (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 10m MIN. LENGTH WOULD APPLY).

WIDTH

3m MIN. BUT NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS AND EGRESS OCCURS.

GEOTEXTILE FABRIC

(TERRAFIX 270R OR EQUAL) WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.

SURFACE WATER

ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.

MAINTENANCE

THE CONTRACTOR SHALL MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY BY THE CONTRACTOR. UPON OBSERVATION OF CONTINUOUS MUD TRACKING ONTO ADJACENT STREETS, THE STONE MAT IS TO BE FULLY REPLACED.

WASHING

WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

INSPECTION AND REQUIRED MAINTENANCE AFTER EACH RAIN SHALL BE PROVIDED BY THE CONTRACTOR.

STONE MUD MAT DETAIL
SCALE: NTS

BENCHMARKS

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NOTES

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No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	AUG. 2024

ENGINEER STAMP

LICENCED PROFESSIONAL ENGINEER — J. A. NEMISZ — 100181826 — Sept. 25, 2024 — 324816 — PROVINCE OF ONTARIO

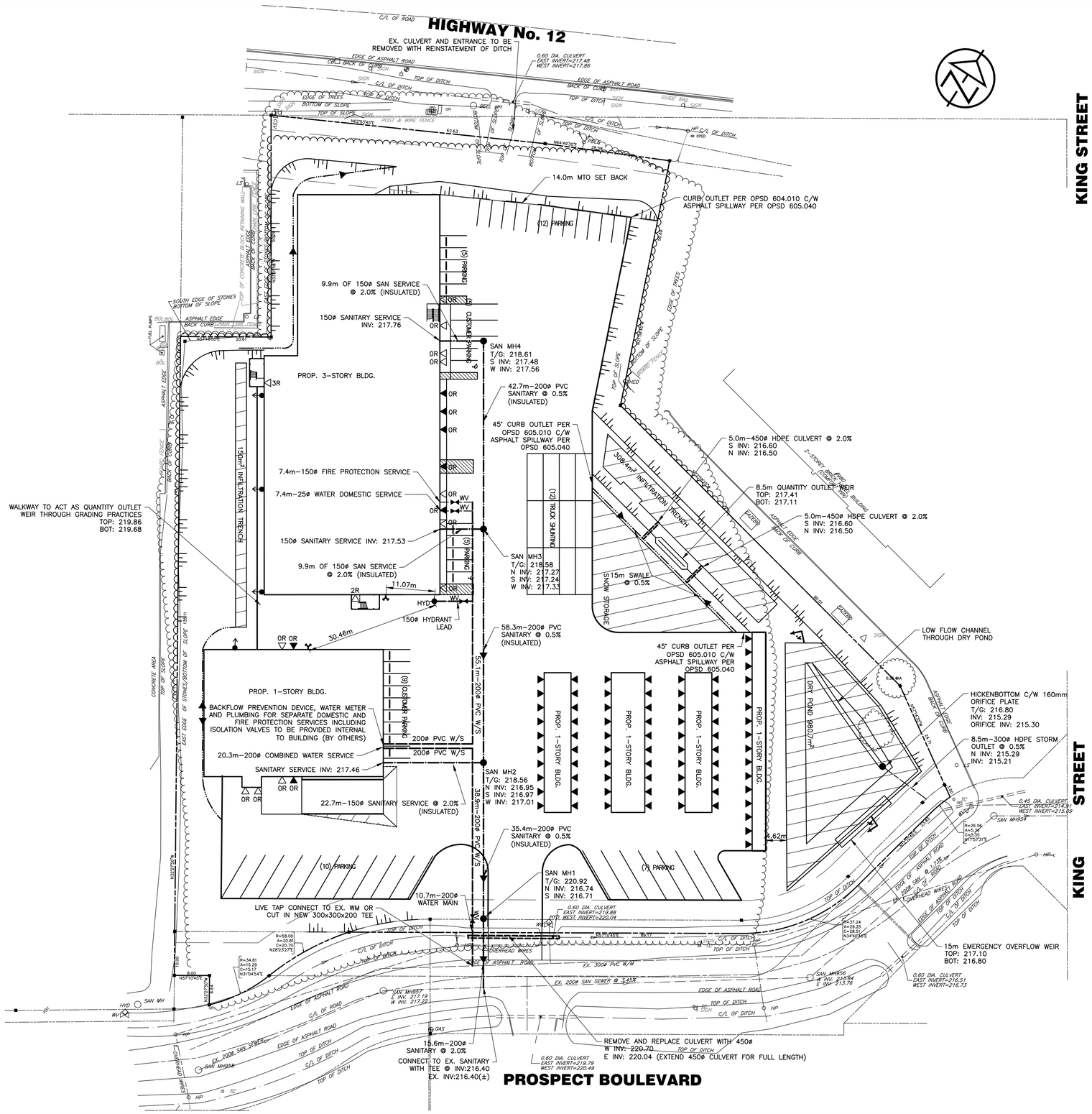
16728 HIGHWAY 12
(PART OF THE NORTH HALF OF LOT 100 CONCESSION 1)
TOWN OF MIDLAND

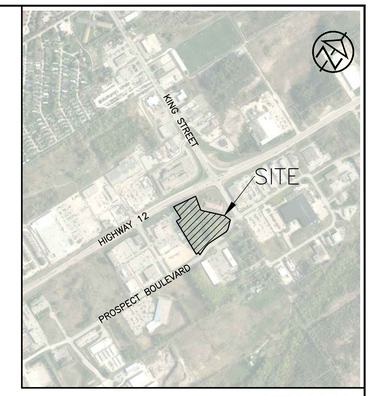
EROSION & SILTATION CONTROL PLAN

TATHAM ENGINEERING

DESIGN: JH/MPO	FILE: 324816	DWG: ESC-1
DRAWN: JH/MPO	DATE: AUG. 2024	
CHECK: JN	SCALE: 1:750	

Drawing Name: 324816-SC-1.dwg, Plotted: Sep 25, 2024





KEY PLAN

LEGEND

- PROPERTY LINE
- EXISTING DITCH
- EXISTING STORM SEWER
- STM MH — EXISTING STORM MH
- CB — EXISTING STORM CB
- 200ø SAN — PROPOSED SANITARY SEWER/ SIZE/ DIRECTION OF FLOW
- 450ø STM — PROPOSED STORM SEWER/ SIZE/ DIRECTION OF FLOW
- 150ø WATERMAIN — WATERMAIN/SIZE
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- PROPOSED DITCH
- SAN MH2 — PROPOSED SANITARY MANHOLE/ NUMBER
- STM MH2 — PROPOSED STORM MANHOLE/ NUMBER
- HYD & WV — PROPOSED HYDRANT & WATER VALVE
- WV — PROPOSED WATER VALVE
- CSV — PROPOSED WATER CURB STOP
- POTENTIAL ROOF DRAIN
- ENTRANCE/EXIT – VEHICULAR
- ENTRANCE/EXIT – PEDESTRIAN
- HYD — EXISTING HYDRANT
- PROPOSED CULVERT
- FIRE DEPARTMENT CONNECTION

DISCLAIMER AND COPYRIGHT

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BENCHMARKS

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No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	AUG. 2024

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — J. A. NEMISZ 100181826 — Sept. 25, 2024 — PROVINCE OF ONTARIO

16728 HIGHWAY 12
(PART OF THE NORTH HALF OF LOT 100 CONCESSION 1)
TOWN OF MIDLAND

TATHAM ENGINEERING

GENERAL SERVICING PLAN

DESIGN: JH/WL	FILE: 324816	DWG:	GS.1
DRAWN: JH/WL	DATE: AUG. 2024		
CHECK: JN	SCALE: 1:500		

Drawing Name: 324816-SS01.dwg, Plotted: Sep 25, 2024