



Brantford Animal Control Building Civil Works

Servicing Analysis

Project Location:

10 Kraemer's Way
Brantford, ON

Prepared for:

ROA Studio Inc.
67 King Street W
Chatham, ON

Prepared by:

MTE Consultants Inc.
365 Home Street
Stratford, ON N5A 2A5

May 28, 2024

MTE File No.: 54934-100





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1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by ROA Studio Inc. to complete a preliminary servicing analysis for the lands know as 10 Kraemer's Way in the City of Brantford. The subject site consists of approximately 1.45ha generally bounded by vacant industrial lands to the northeast, a stormwater management facility to the northwest, vacant industrial lands to the southwest, and Kraemer's Way to the south as shown on Figure 1.0.

It is proposed to construct a single building on a portion of the subject property with associated parking areas and driveway. The asphalt parking area for the proposed building was extended to the west for a future development purpose. The site plan was prepared by ROA Studio Inc. and forms the basis for the preliminary servicing designs (refer to Appendix A for site plan).



PROJECT
**BRANTFORD ANIMAL CONTROL
BUILDING CIVIL WORKS**

TITLE
LOCATION OF SITE

Drawn	TNH	Scale	N.T.S.
Checked	WHV	Project No.	54934-100
Date	2024-05-28	Rev No.	0

Figure
1.0

2.0 MUNICIPAL SERVICING

2.1 Sanitary Servicing

The sanitary sewage from the proposed development will be directed to the existing 300mm diameter sewers located within Kraemer's Way, which will convey flows to the east towards Oak Park Road. Connections to the existing sewage drainage system will be made in Kraemer's Way near the southeast corner of the subject property. To connect make this connection the existing municipal sewers will have to be extended approximately 50m along Kraemer's Way to service the subject lands. The existing 300mm diameter sewer is located at a depth of 4.0m below existing grades.

The preliminary sanitary servicing plan for the proposed development can be seen on Figure 2.0. The sanitary sewers are proposed to be constructed within the right-of-way at standard depths ranging from 4.0m (minimum) to 5.1m (maximum).

2.2 Water Distribution

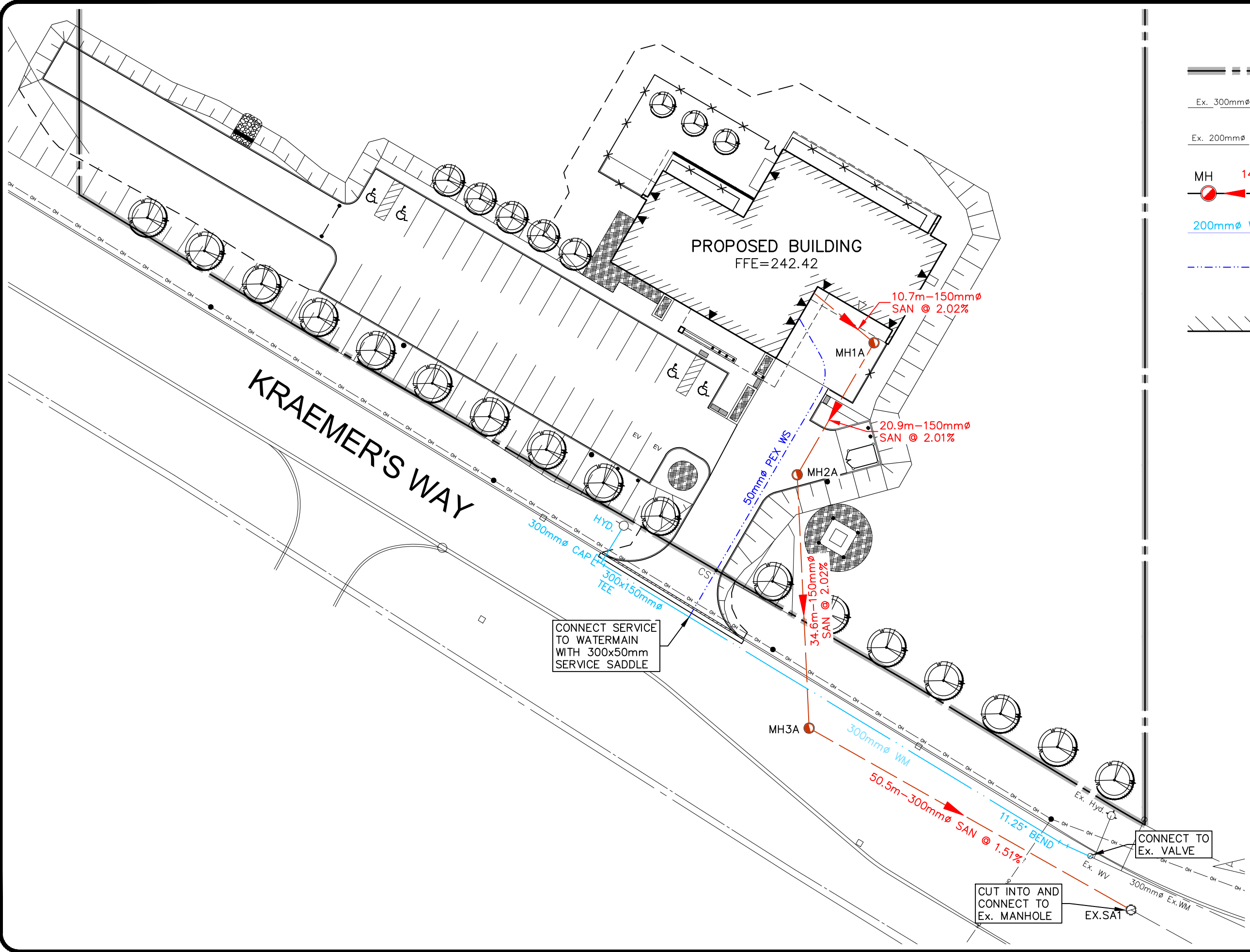
Water supply for the proposed development will be provided by a single connection to the existing watermain network within Kraemer's Way near the southeast property corner. The existing 300mm watermain terminates near the fire hydrant at the property line and will have to be extended approximately 75m along Kraemer's Way to service the subject lands.

The proposed service will consist of a 50mm diameter lateral that will tee into the watermain extension near the proposed site entrance. The existing and proposed water servicing networks are illustrated on Figure 2.0, which includes preliminary pipe sizes.

The existing pressures within the nearest hydrant have been determined to be at 93psi (refer to Appendix B for information) when tested in January of 2023. It is assumed that this will provide adequate pressure and flow for the proposed development.

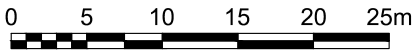
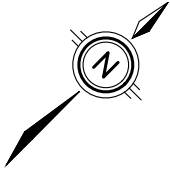
2.3 Storm Sewer Servicing

Stormwater runoff from the proposed development will be controlled by a combination of minor (storm sewers) and major (overland flows) drainage systems. Stormwater will be generally directed to proposed catch basins located within the parking areas. These catch basins will direct flows east though the subject property and will discharge to the existing 450mm diameter municipal storm sewer system near the southeast property corner by gravity. These storm sewers are proposed to be installed at depths ranging from 1.5m to 2.3m and will range in size from 300mm to 375mm in diameter. The preliminary storm servicing plan for the proposed development can be seen on Figure 3.0.



LEGEND

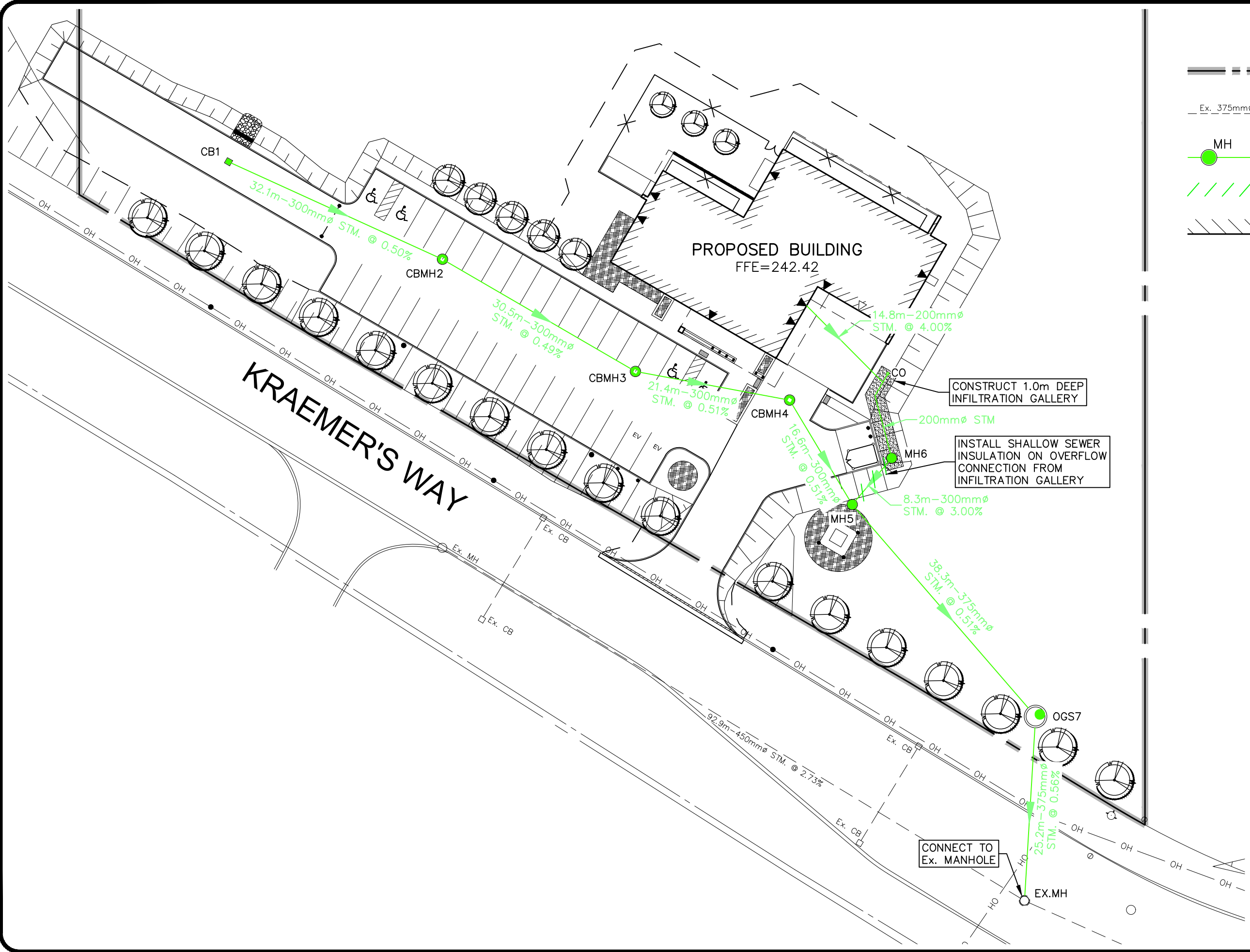
- SITE BOUNDARY
- Ex. 300mm \varnothing SAN Ex. MH Ex. SANITARY SEWER
- Ex. 200mm \varnothing WTM Ex. HYD. SET Ex. WATERMAIN
- MH 14.6m-200mm \varnothing SAN @ 1.5% SANITARY SEWER
- 200mm \varnothing WTM HYD. SET V. WATERMAIN
- WATER SERVICE
- CS CURB STOP
- PROPOSED BUILDING



PROJECT
**BRANTFORD ANIMAL CONTROL
BUILDING CIVIL WORKS**

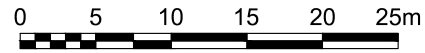
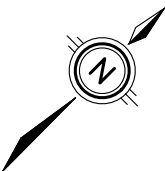
TITLE
**PRELIMINARY SANITARY AND
WATER SERVICING PLAN**


Drawn	TNH	Scale	1:500	Figure 2.0
Checked	WHV	Project No.	54934-100	
Date	2024-05-28	Rev No.	0	



LEGEND

- SITE BOUNDARY
- Ex. 375mm \varnothing STM --- Ex. MH --- EXISTING STORM SEWER
- MH 21.3m-300mm \varnothing STM @ 1.3% STORM SEWER
- /// SHALLOW PIPE INSULATION
- /// PROPOSED BUILDING





Engineers, Scientists, Surveyors

PROJECT

BRANTFORD ANIMAL CONTROL BUILDING CIVIL WORKS

TITLE

PRELIMINARY STORM SERVICING PLAN

Drawn	TNH	Scale	1:500	Figure
Checked	WHV	Project No.	54934-100	
Date	2024-05-28	Rev No.	0	

3.0

3.0 STORMWATER MANAGEMENT

3.1 Allowable/Pre-development Conditions

The existing land use for the subject property is inactive open lands. The subject lands generally direct water in a northerly direction via sheet-flows towards the adjacent commercial/industrial property and the existing stormwater management facility. The entire site is 1.46ha, but only 0.47ha of the subject property will be developed, with the rest of the lands remaining at existing conditions. For the purpose of this report, only the 0.47ha of the subject site that will be developed will be considered.

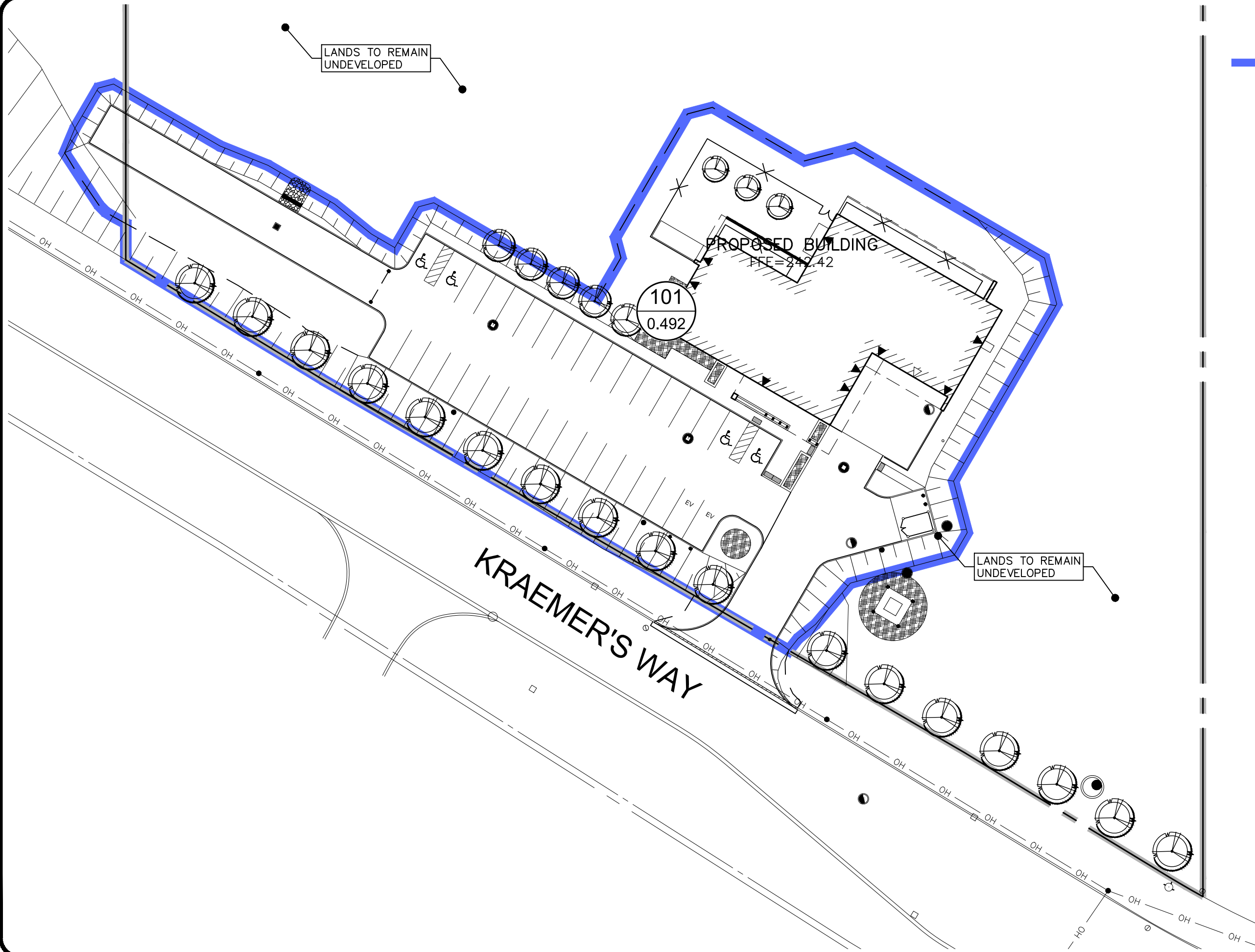
The allowable peak flow rates were determined using the modified rational method. Table 3.1 shows a summary of the allowable catchment areas and Table 3.2 shows a summary of the resulting peak flows for the development area. Refer to Appendix C for detailed calculations, and to Figure 4 for the catchment areas.

Table 3.1 – Summary of Allowable Catchment Areas

Catchment & Description		Area (m ²)	Percent Impervious	Runoff Coefficient 'C'
Catchment 101 (Uncontrolled development area)	Building	897.71	100.0	0.90
	Asphalt/Concrete	1,912.64	100.0	0.90
	Grass	2,113.92	0.0	0.20
Total / Average		4,921.27	57.0	0.60

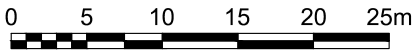
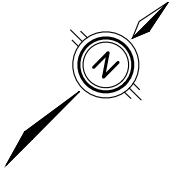
Table 3.2 – Summary of Allowable Peak Flows


Storm Event	Catchment 101 Peak Flows (L/s)	Allowable Peak Flows (L/s)
2-year	66.50	33.25
5-year	89.93	44.96
10-year	110.00	55.00
25-year	127.47	63.74
50-year	144.47	72.23
100-year	161.15	80.57



LEGEND

- CATCHMENT 101
- 101 SUB-CATCHMENT NUMBER
- 0.131 AREA (ha.)





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BRANTFORD ANIMAL CONTROL BUILDING CIVIL WORKS

TITLE

ALLOWABLE CATCHMENT AREAS

Drawn	TNH	Scale	1:500	Figure
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Date	2024-05-28	Rev No.	0	

4.0

3.2 Post-development Conditions

The City of Brantford has required the site to reduce the peak flow rates by at least 50%. This will be accomplished by utilizing surface storage within the proposed parking areas. An on-line orifice is proposed to be installed downstream of the ponding areas to control the flows discharged during minor storm events, and a concrete overflow weir will be installed at the perimeter of the asphalt area to control the flows from the major storm events.

The on-line orifice is proposed to be an 50mm diameter plate orifice installed within catch basin manhole 4 (CBMH4) on the downstream pipe at an invert elevation of 239.580m. The overflow weir is proposed to be installed as a rectangular 2.00m wide concrete weir as shown on the attached MTE drawings C101 and C102. The invert elevation for the weir is proposed to be 242.10m and will be 0.10m deep.

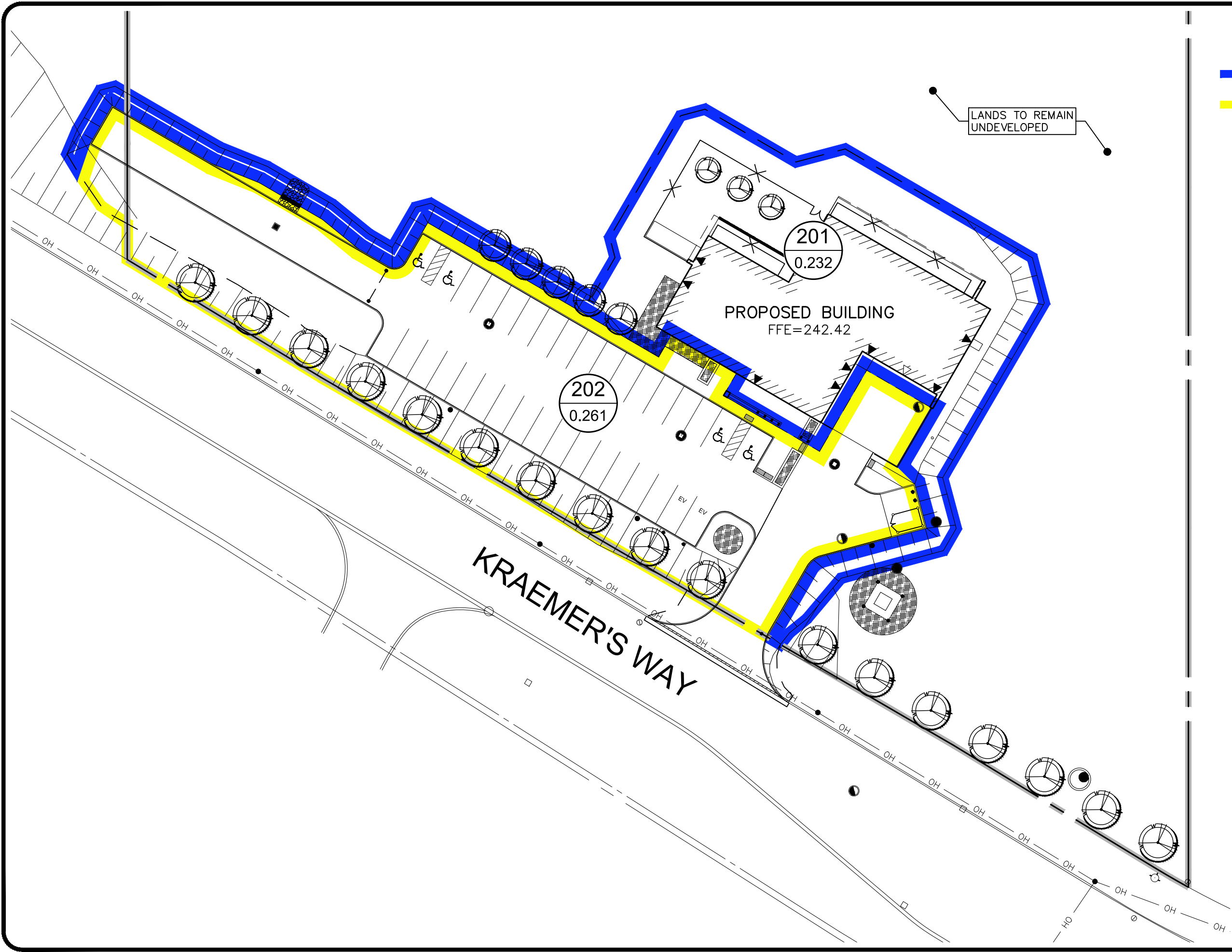
The post-development conditions were broken down into two different catchment areas as summarized below.

- Catchment 201 consists of the proposed development that will remain as uncontrolled. These areas include the areas at the rear of the building, and the embankments to the existing grades, and the proposed rooftop.
- Catchment 202 consists of the proposed development that will convey flows to the parking areas and will be controlled by the on-line orifice and the overflow weir.

The table below (Table 3.3) summarizes the post-development catchment characteristics that were used in the modeling, and Figure 6 illustrates the post-development catchment areas.

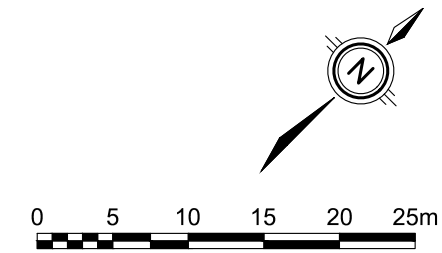
Table 3.3 – Summary of Post-Development Catchment Areas

Catchment & Description		Area (m ²)	Percent Impervious	Runoff Coefficient 'C'
Catchment 201 (Uncontrolled development area)	Building	897.71	100.0	0.90
	Asphalt/Concrete	17.88	100.0	0.90
	Grass	1,399.59	0.0	0.20
Total / Average		2,315.17	39.5	0.48
Catchment 202 (Controlled development area)	Building	0.00	100.0	0.90
	Asphalt/Concrete	1,894.76	100.0	0.90
	Grass	711.33	0.0	0.20
Total / Average		2,606.09	72.7	0.71



LEGEND

- CATCHMENT 201
- CATCHMENT 202
- SUB-CATCHMENT NUMBER
- AREA (ha.)



PROJECT			
BRANTFORD ANIMAL CONTROL BUILDING CIVIL WORKS			
TITLE			
POST-DEVELOPMENT CATCHMENT AREAS			
Drawn	TNH	Scale	1:500
Checked	WHV	Project No.	54934-100
Date	2024-05-28	Rev No.	0
			Figure 5.0

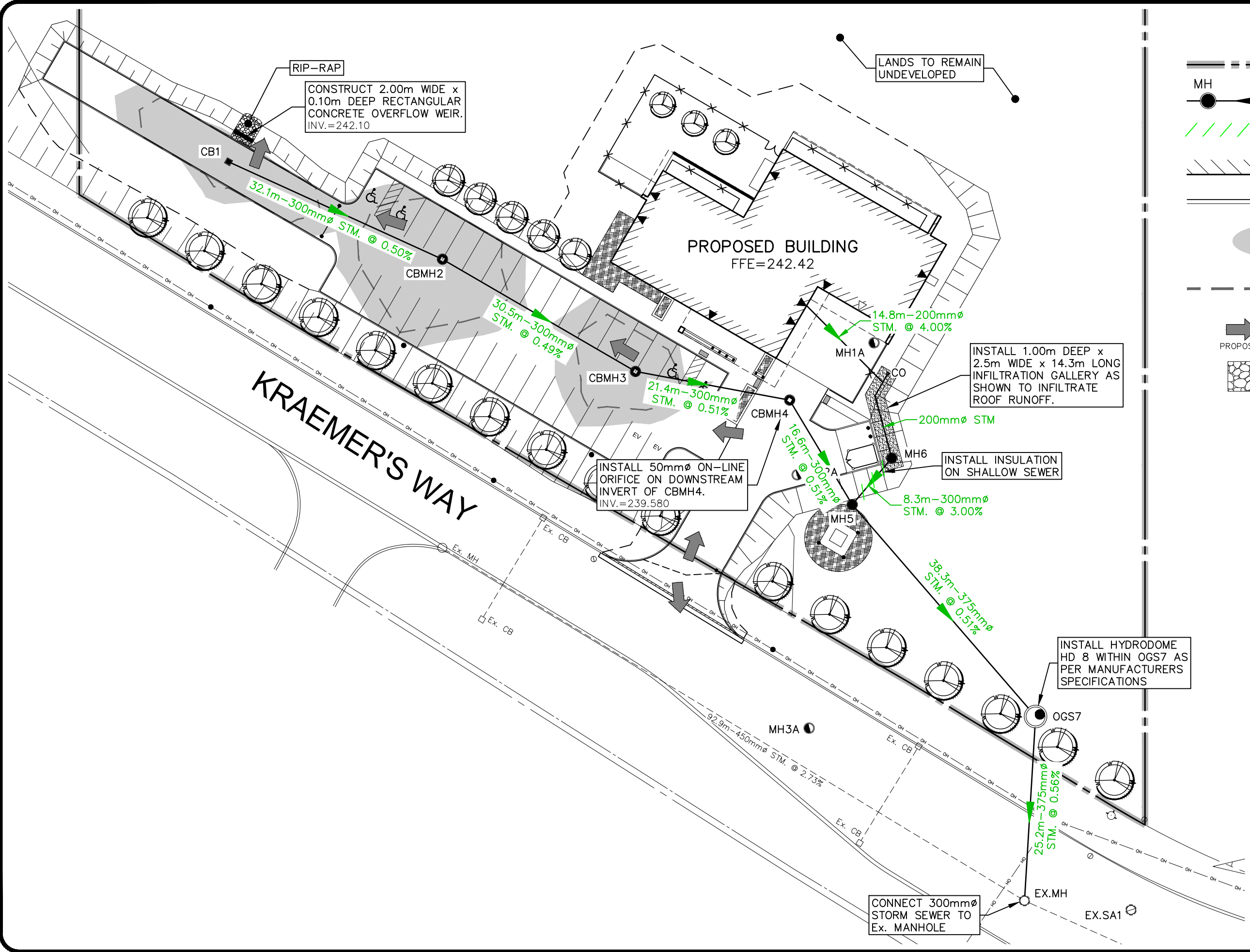
Table 3.4 summarizes the resulting post-development peak flow rates for each catchment area and for each storm event, and Table 3.5 summarizes the ponding limits and volumes for each storm event. It is noted that the tabulated results are conservative, as the infiltration gallery was not considered in the rational method calculations. A small portion of the uncontrolled flows calculated under the post-development conditions will be infiltrated instead of becoming uncontrolled runoff.

Table 3.4 – Summary of Post-Development Peak Flows

Storm Event	Allowable Peak Flows (L/s)	Post-Development Peak Flows			
		Uncontrolled (L/s)	50mm Dia. Orifice (L/s)	2.00m Weir (L/s)	Total (L/s)
2-year	33.25	24.89	8.11		33.00
5-year	44.96	33.66	8.17		41.83
10-year	55.00	41.17	8.21		49.38
25-year	63.74	47.71	8.25	0.42	56.68
50-year	72.23	54.07	8.26	3.04	65.37
100-year	80.57	60.32	8.27	6.21	74.79

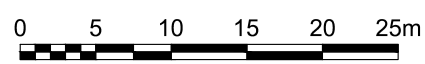
Table 3.5 – Summary of Post-Development Ponding Limits and Volumes


Storm Event	Maximum Ponding Elevation (m)	Maximum Ponding Volume (m ³)	Maximum Ponding Depths (m)
2-year	242.02	24.7	0.17
5-year	242.06	42.4	0.21
10-year	242.08	56.2	0.23
25-year	242.10	72.0	0.25
50-year	242.11	78.2	0.26
100-year	242.11	83.4	0.26



LEGEND

- SITE BOUNDARY
- MH
- 21.3m-300mm STM @ 1.3%
- STORM SEWER
- SHALLOW PIPE INSULATION
- PROPOSED BUILDING
- CONCRETE CURB (DROP CURB)
- 100 YEAR PONDING LIMIT (ELEV.=242.11)
- 5 YEAR PONDING LIMIT (ELEV.=242.05)
- OVERLAND FLOW ROUTE (MAJOR STORM)
- PROPOSED EXISTING
- RIP RAP





MTE
Engineers, Scientists, Surveyors

PROJECT
**BRANTFORD ANIMAL CONTROL
BUILDING CIVIL WORKS**

TITLE
**STORMWATER MANAGEMENT
FACILITIES**

Drawn TNH	Scale 1:500	Figure 6.0
Checked WHV	Project No. 54934-100	
Date 2024-05-28	Rev No. 0	

3.3 Water Quality Control

The site will require stormwater quality controls to obtain a minimum of an Enhanced Level of quality control as defined by the Ministry of the Environment, Conservation, and Parks (MECP). An Enhanced Level of quality control is defined by the MECP as removing 80% of the total suspended solids within the stormwater discharge. This will be achieved through the installation of an oil-grit separator (OGS) unit at the downstream end of the on-site storm sewers.

A HydroDome HD8 (or approved equivalent) is proposed to be installed within manhole OGS7 and will discharge treated flows directly into the existing municipal storm sewer system in Kraemer's Way. Using a contributing drainage area of catchment 202 plus the roof drainage, (0.355ha in total), an impervious percentage of 78.6%, and some other site characteristics, it was determined that the HD8 unit will be needed to provide the required 80% TSS removals using the ETV particle distribution. It is recommended that the contractor verify with the manufacturer actual percentage of flows treated to ensure a minimum removal is achieved.

Refer to Appendix D for the HydroDome HD8 unit sizing summary, a typical HydroDome detail, and operations and maintenance information for the proposed unit.

3.4 Water Balance

The subject site will also be required to infiltrate the first 15mm depths of all storm events for all of the proposed roof areas. This will be accomplished by installed infiltration trenches on-site and directing all roof drainage to them. The proposed site has a roof area of approximately 890m², which will require a total infiltration gallery volume of about 34m³ to fully infiltrate the first 15mm of each storm event.

The proposed infiltration gallery is designed to have a volume of 35.7m³ and will be installed along the east edge of the parking entrance. It is designed with a surface area of 35.7m² and a total depth of 1.00m. This gallery will receive flows only from the roof drainage and will be installed with cleanouts and an outlet manhole. The flows from the roof will discharge into the infiltration gallery through a perforated pipe installed near the top of the gallery. As the gallery fills up, flows will infiltrate into the existing soils and, once the gallery has reached peak capacity, any excess flows will be discharged into the outlet manhole. The outlet manhole will include an outlet pipe installed at a depth of 1.00m above the invert of the gallery, which conveys flows to the proposed storm sewer system and to the OGS unit. It is noted that the proposed orifice controls will be installed upstream of the infiltration gallery overflow connection.

3.5 Soil Erosion and Sediment Control

Precautions will be taken during construction to limit erosion and sedimentation. Erosion and Sediment Control Plans have been prepared and are shown on the attached MTE drawings C101 and C103. The plans illustrate the erosion and sediment control measures to be implemented during each phase of construction, which will limit impacts associated with site development.

Typically, the recommended construction sequence for erosion and sediment control measures will be as follows:

- Placement of all sediment control fencing where required;
- Placement of all temporary sediment control devices within existing catch basins;
- Stripping and strategic placement of topsoil stockpiles. Placement of sediment control fencing around all stockpile areas;

- Construction of the proposed storm sewers and surface ponding areas including the OGS unit and all quantity control measures;
- Placement of all temporary sediment control devices within each proposed catch basin and
- Re-vegetation of completed areas as soon as possible after construction, including those areas not slated for construction within 60 days.

Sediment control fencing shall consist of filter fabric attached to wood posts and sealed at ground level. It will be installed at the perimeter of the work areas and intermittently on sloped areas where required. Sediment control fencing will be placed around all topsoil stockpiles.

Access to topsoil or fill storage areas will be located on the upstream side of storage piles. This practice will ensure continuity of the sediment control fencing in the downslope direction which is most vulnerable to erosion and sediment deposition. Further, topsoil and hydroseed will be placed on all exposed areas following the completion of grading activities. Proposed areas with slopes greater than 4:1 shall be covered with an approved soil erosion control blanket immediately after construction.

It is recommended that during construction of the subject site, monitoring and inspection of the erosion and sediment controls be conducted to ensure the satisfactory performance of these measures.

Reporting of the inspection and monitoring results should be distributed to the City of Brantford and the local Conservation Authority. If it is found that the erosion and sediment control measures are not working adequately, they shall be augmented to the satisfaction of the City of Brantford and the local Conservation Authority, based on field decisions.

4.0 SUMMARY

Based on the foregoing analysis, the main findings of the functional servicing report for the proposed development are:

- i. The proposed development can be adequately serviced for storm, sanitary, and water through the extension of municipal watermain and sanitary sewers and through the installation of on-site storm sewers.
- ii. The sanitary sewage generated from the development will be conveyed to the existing 300mm diameter sewers within Kraemer's Way via gravity by extending the existing municipal sanitary sewers.
- iii. Water supply for the proposed development will be provided by extending the existing 300mm diameter municipal watermain and connecting a 50mm diameter service.
- iv. The stormwater management quantity control requirements for the proposed development can be accommodated by surface storage.
- v. The water balance requirements for the subject site are met by installing an infiltration gallery on-site.
- vi. The stormwater quality control requirements for the proposed development can be achieved by installing the HydroDome HD8 Oil Grit Separator (OGS) unit downstream of the quantity control devices within the proposed OGS7 manhole.
- vii. Overall site grading will provide for 'major' overland flow conveyances through the parking area and then northerly towards the existing stormwater management facility. Site grading will generally match existing road and boundary grades with appropriate slopes.

All of which is respectfully submitted,

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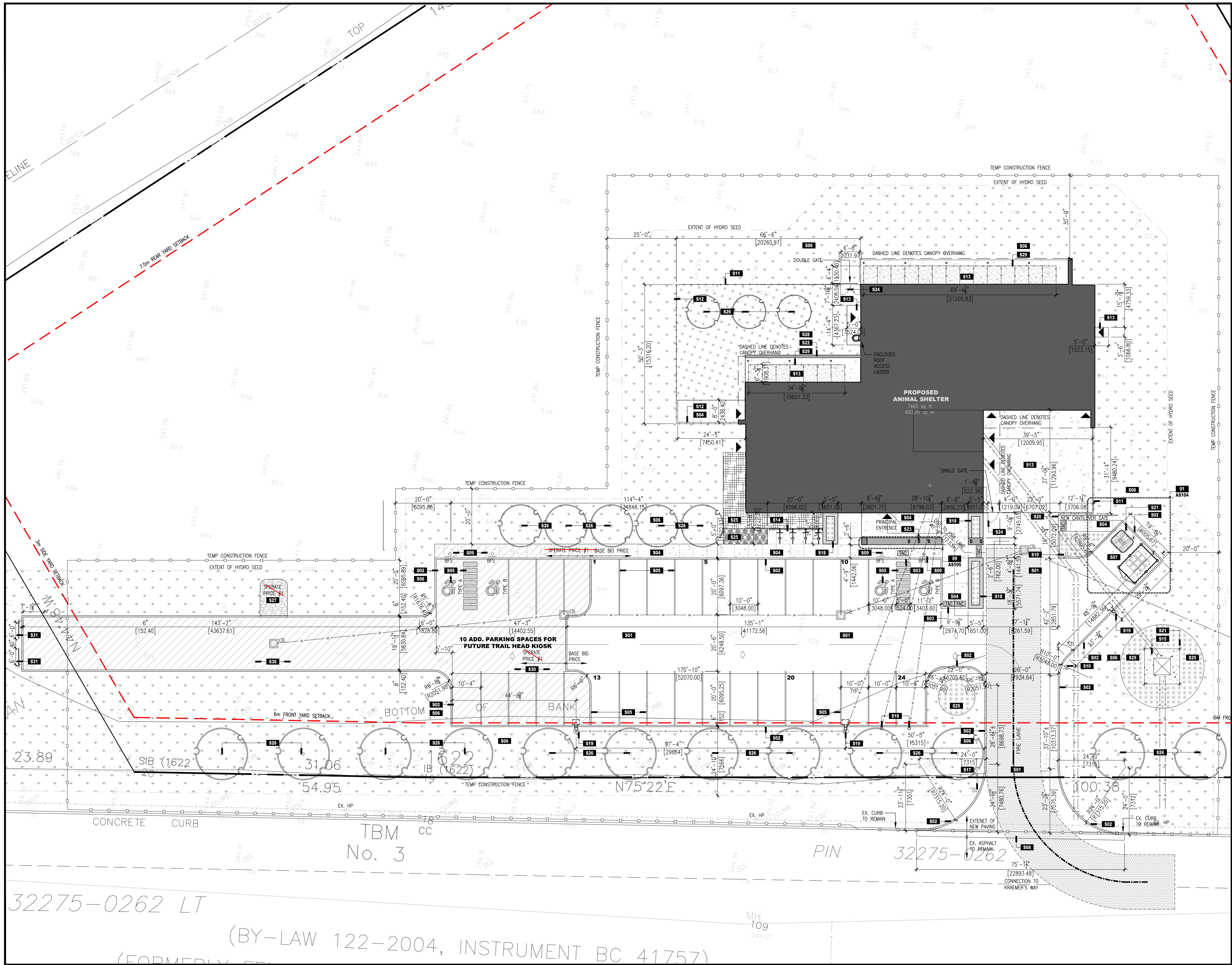
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Appendix A

Proposed Site Plan

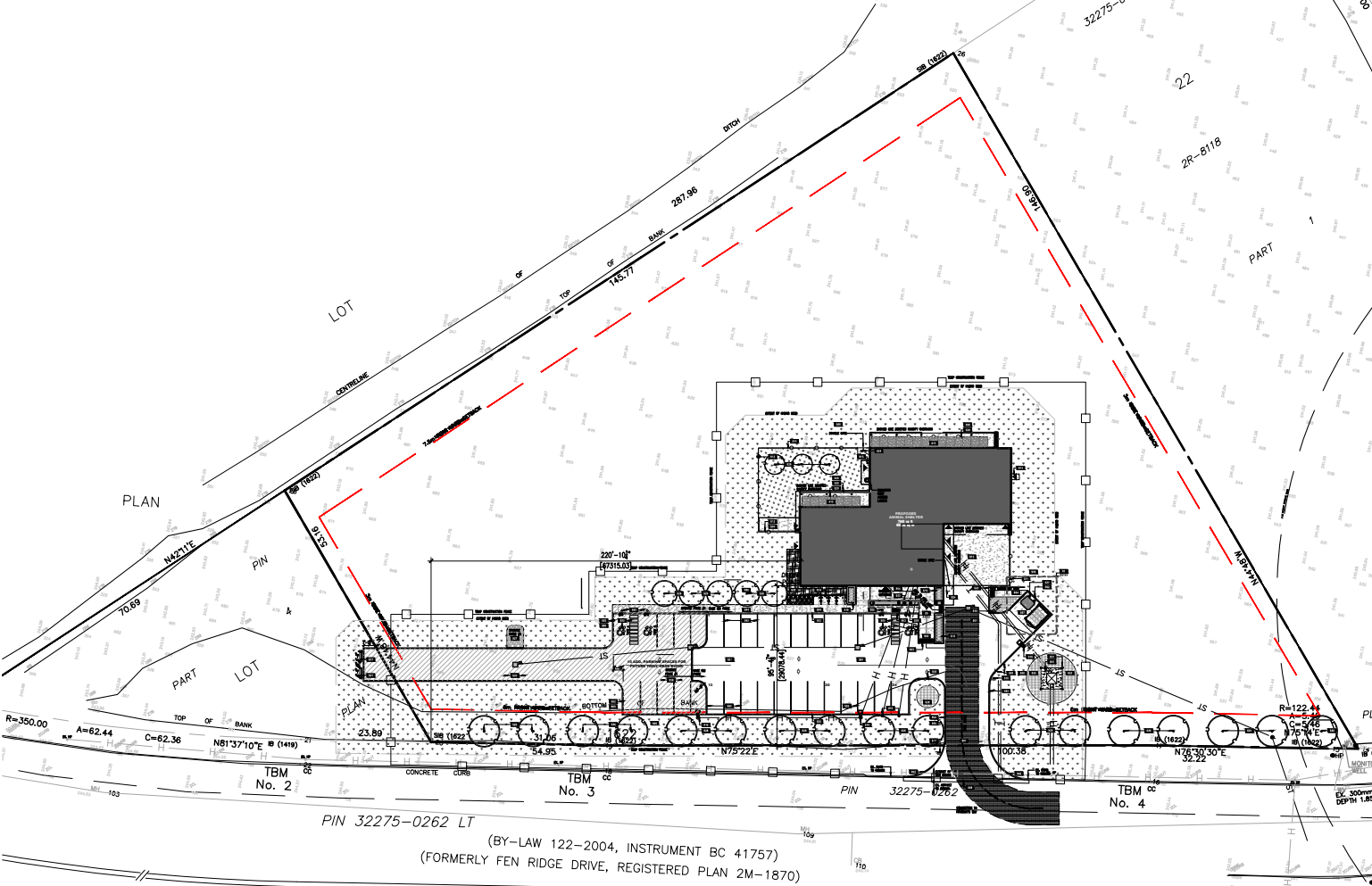




01 PARTIAL SITE PLAN - NEW

AS103 SCALE: 1/16" = 1'-0"

KEYPLAN



SITE CONSTRUCTION NOTES

TAG	CONSTRUCTION NOTES
S01	INSTALL NEW ASPHALT PAVING ON COMPACTED GRANULAR BASE. REFER TO CIVIL DRAWINGS FOR GRADING AND DETAILS.
S02	INSTALL NEW CONCRETE CURB. NEW CONC CURB TO MEET ALL MUNICIPAL STANDARDS. REFER TO CIVIL DWGS FOR DETAILS.
S03	DROP CURB AT THIS LOCATION. PROVIDE TACTILE SURFACE INDICATORS 12" FROM EDGE OF ASPHALT. REFER TO CIVIL DRAWINGS FOR ADD INFO.
S04	INSTALL NEW CONCRETE SIDEWALK. REFER TO CIVIL DRAWINGS FOR DETAILS.
S05	PAINT PARKING SPACE LINES & BARRIER FREE PARKING DESIGNATION TO MUNICIPAL STANDARDS. REFER TO DETAIL 03/AS104.
S06	PROVIDE TOPSOIL AND HYDROSEED. REFER TO LANDSCAPING FOR ADD INFO AND LOCATIONS.
S07	HEAVY DUTY CONCRETE APRON FOR GARBAGE ENCLOSURE. REFER TO CIVIL FOR ADD INFO AND DETAILING.
S08	THIS LINE DENOTES THE EXTENT OF NEW ASPHALT PAVING. PROVIDE CLEAN SAW-CUT AND LEVEL TRANSITION ONTO EXISTING ASPHALT PAVEMENT. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION.
S09	INSTALL NEW BARRIER FREE PARKING SIGNAGE AS PER DETAIL 04/AS104.
S10	PROVIDE NEW FIRE ROUTE PARKING SIGN AS PER DETAIL 05/AS104.
S11	PROVIDE AND INSTALL NEW 6"-0" CHAIN LINK FENCE AS PER DETAIL 07/AS104. REFER TO CIVIL FOR MORE INFO.
S12	AT THIS LOCATION CONTRACTOR TO INSTALL NEW 6'-0"CLF C/W PICK BOARD. FENCE AS PER DETAIL 08/AS104. REFER TO CIVIL FOR NEW GRADES.
S13	INSTALL NEW CONCRETE SLAB ON COMPACTED GRANULAR BASE. REFER TO LAYOUT PLAN AND STRUCTURAL FOR ADD. INFO.
S14	INSTALL NEW BICYCLE RACK ON THE CONCRETE SIDEWALK. REFER TO LANDSCAPE DRAWINGS FOR ADD INFO.
S15	ELECTRICAL TRANSFORMER. REFER TO ELECTRICAL DRAWINGS FOR DETAILS INCLUDING VAULT.
S16	PROVIDE NEW 4" CONDUIT C/W PULL WIRE FOR FUTURE EV CHARGING. APPROX. LOCATION OF CONDUIT SHOWN. CONTRACTOR TO CONFIRM ON SITE. REFER TO ELECTRICAL FOR ADDITIONAL INFO NAD DETAILING.
S17	NEW "STOP" SIGN AS PER ONTARIO TRAFFIC MANUAL "BOOK 5" & 2" SQUARE GLAZ. 12GA. STEEL POST ANCHOR AND TOP.
S18	INSTALL NEW CAST IN PLACE PLANTER BOX. REFER TO DETAIL LANDSCAPING FOR ADD INFO AND DETAILS.
S19	NEW LIGHT STANDARD C/W CONCRETE BASE AS PER DETAIL 01/AS104. REFER TO ELECTRICAL DWGS FOR ADD. INFO.

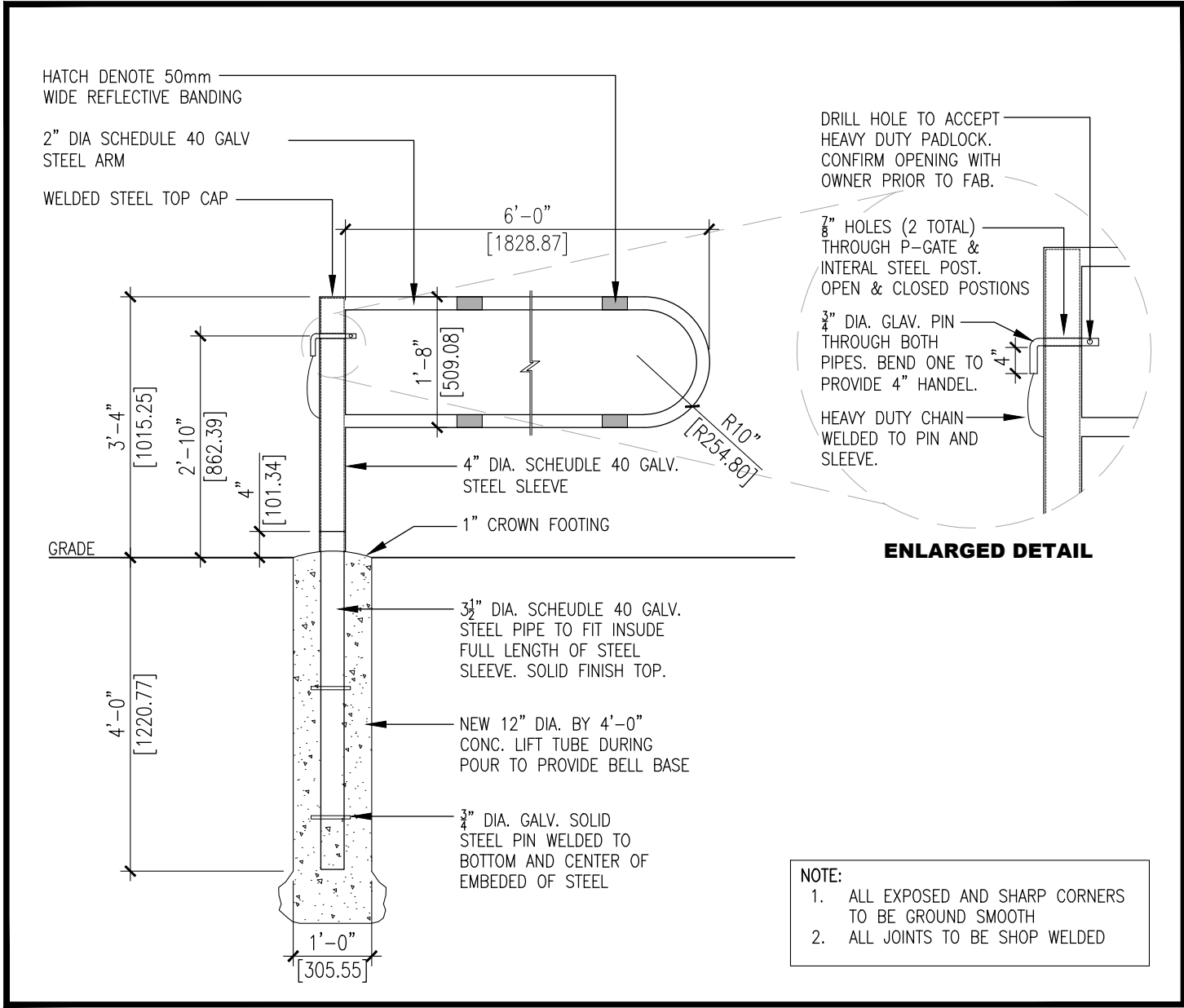
SITE CONSTRUCTION NOTES

TAG	CONSTRUCTION NOTES
S20	NEW CANTILEVER GATE. BASED ON XXX BY XXX. REFER TO DETAIL 0X/AS104.
S21	PROVIDE AND INSTALL NEW CONCRETE BOLLARD AS PER DETAIL 02/AS104.
S22	INSTALL NEW 12" PEA-STONE DRAINAGE STRIP. REFER TO LANDSCAPING FOR ADD INFO AND DETAILING.
S23	CANOPY FOUNDATION WALL REFER TO STRUCT FOR ADDITIONAL INFORMATION AND REINFORCING.
S24	MAN GATE C/W LEVER HARDWARE FOR BARRIER FREE ACCESS.
S25	NEW LANDSCAPE BED. REFER TO LANDSCAPE DRAWING FOR ADD INFO AND DETAILING.
S26	NEW TREE PLANTING. REFER TO LANDSCAPE DRAWINGS FOR ADD INFO AND TOTALS.
S27	RIP-RAP AS PER CIVIL DWG. REFER TO CIVIL FOR ADD INFO.
S28	HATCHED AREA TO BE SOD. REFER TO LANDSCAPING FOR ADD INFO.
S29	PROVIDE AND INSTALL NEW CHAIN LINK FENCE TO EXTEND TO UNDERSIDE OF CANOPY. AS PER DETAIL 06/AS104. REFER TO CIVIL FOR MORE INFO.
S30	SEPARATE PRICE #2: PORTION OF NEW PARKING LOT ASPHALT PAVING C/W CONCRETE CURB AND GRADING. REFER TO CIVIL FOR ADD INFO. AREA SHOWN HATCHED
S31	SEPARATE PRICE #2: CONTRACTOR TO SUPPLY AND INSTALL P-GATE. (2 TOTAL) REFER TO DETAIL 09/AS104 FOR ADD INFO.

SYMBOL LEGEND

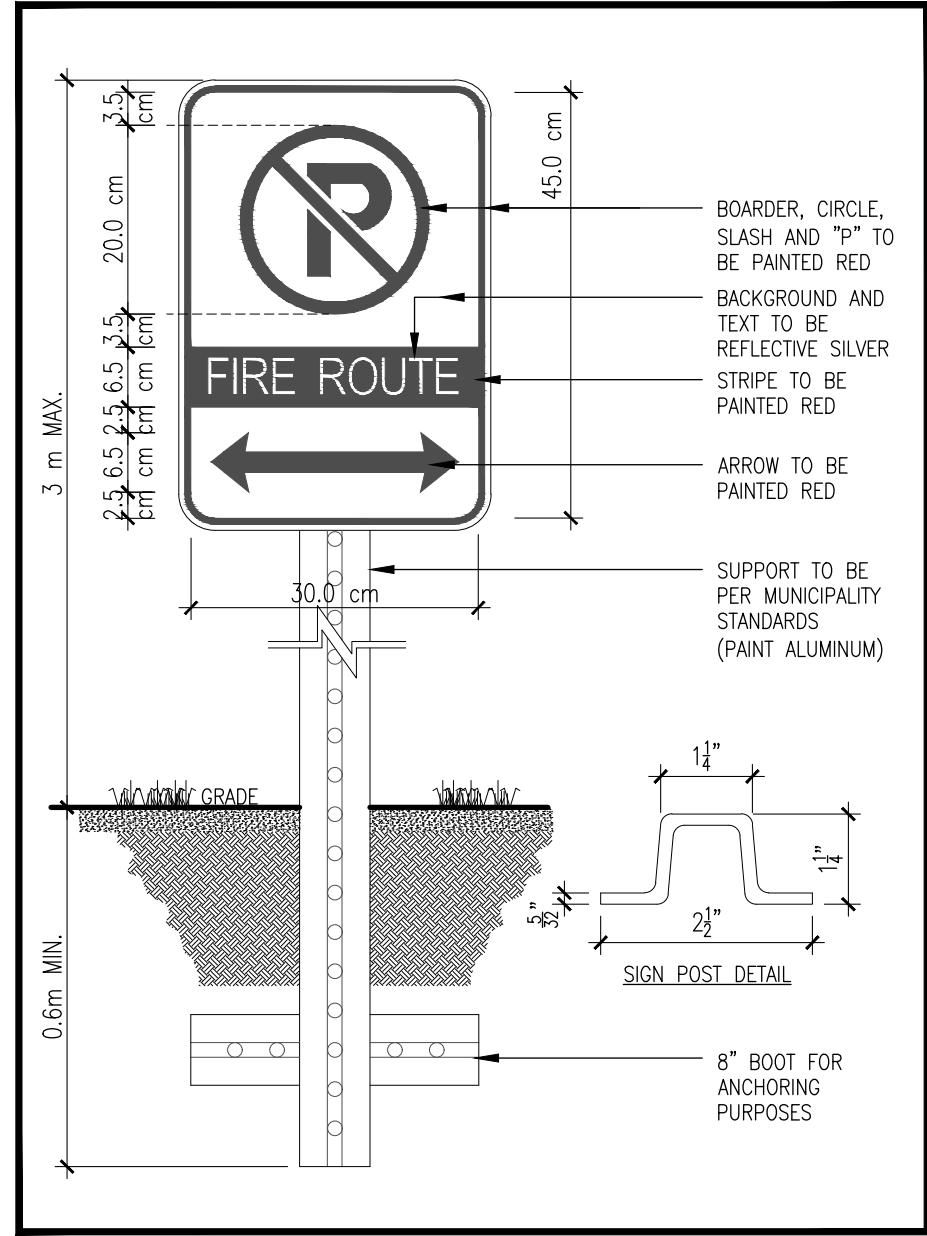
TAG	DESCRIPTION	TAG	DESCRIPTION	TAG	DESCRIPTION	TAG	DESCRIPTION
M	MECH. & ELEC TAG. SEE MECHANICAL DRAWINGS	P.B.	DOOR OPERATOR TAG ACTION BUTTON	—	TELEPHONE/FIBRE LINE REFER TO CIVIL DRAWINGS	—	HYDRO LINE REFER TO CIVIL DRAWINGS
M1	MATERIAL TAG		CONSTRUCTION NOTE	— GAS —	GAS LINE REFER TO CIVIL DRAWINGS	— SF —	STORM SEWER REFER TO CIVIL DRAWINGS
01 FLOOR PLAN	DRAWING TITLE	100	DEMOLITION NOTE	— WATER —	WATER LINE REFER TO CIVIL DRAWINGS	— SAN —	SANITARY LINE REFER TO CIVIL DRAWINGS
	BUILDING	TAC	BARRIER FREE TACTILE INDICATOR	HP	HYDRO POLE	---	PROPERTY LINE
	ENTRANCE EXIT	BF	BARRIER FREE MAIN ENTRANCE	FL	HYDRANT REFER TO CIVIL	N	NORTH ARROW
	CATCH BASIN REFER TO CIVIL DRAWINGS		PROPERTY IRON BAR				

NOTES	PROJECT IDENTIFICATION	DRAWING IDENTIFICATION	ORIENTATION	SUB-CONSULTANT	PRIME CONSULTANT	DISCIPLINE SEAL	DRAWING SUBMISSION(S)	INTERNAL INFO	COPYRIGHT 2024 [®]
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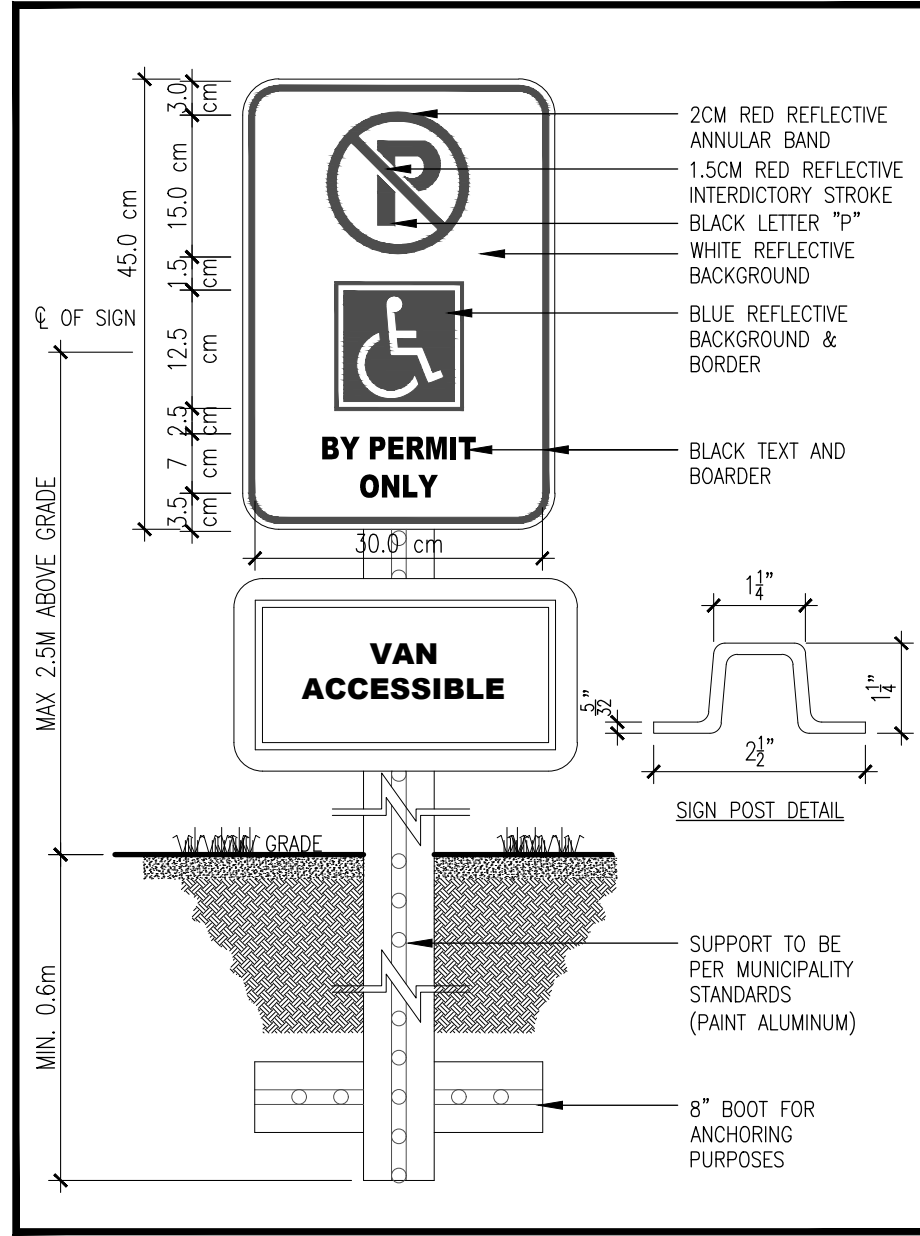
06 P-GATE TYPICAL DETAIL

AS104 SCALE: 1/2\"=1'-0"



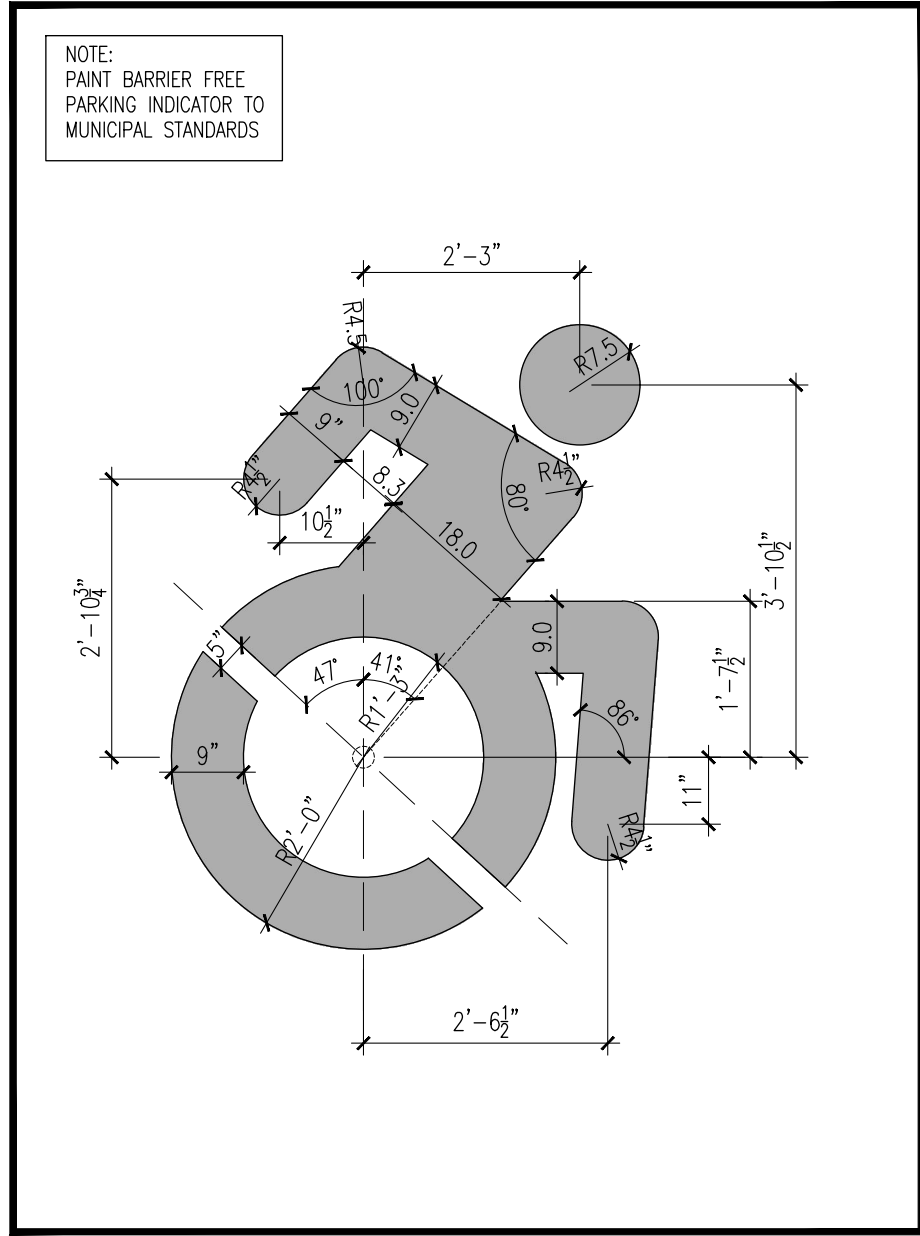
05 TYP. FIRE ROUTE SIGN (FRS.)

AS104 SCALE: 1 1/2\"=1'-0"



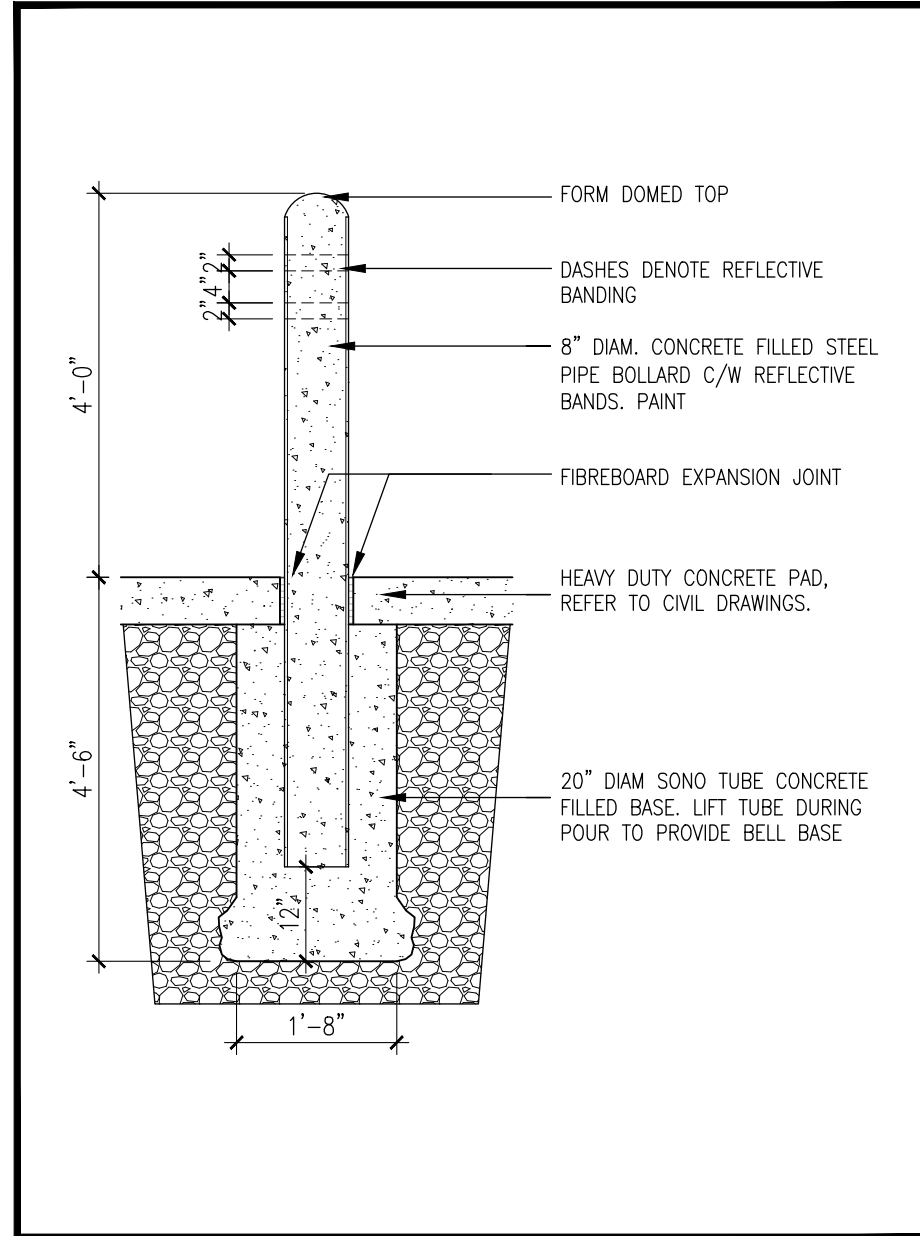
04 TYP. BARRIER FREE PARKING SIGN (BFS.)

AS104 SCALE: 1 1/2\"=1'-0"



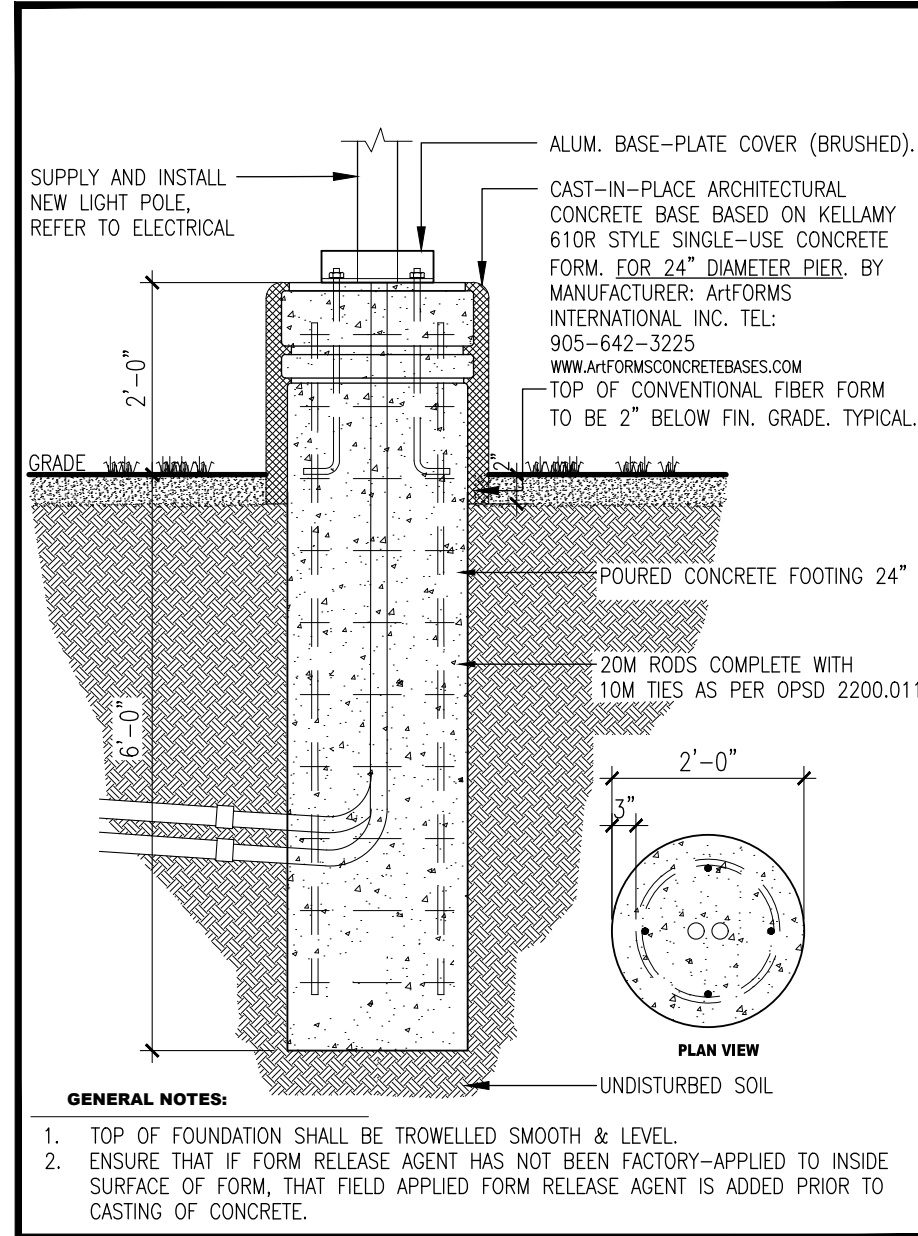
03 TYP. BARRIER FREE PARKING PAINTING

AS104 SCALE: 1/2\"=1'-0"



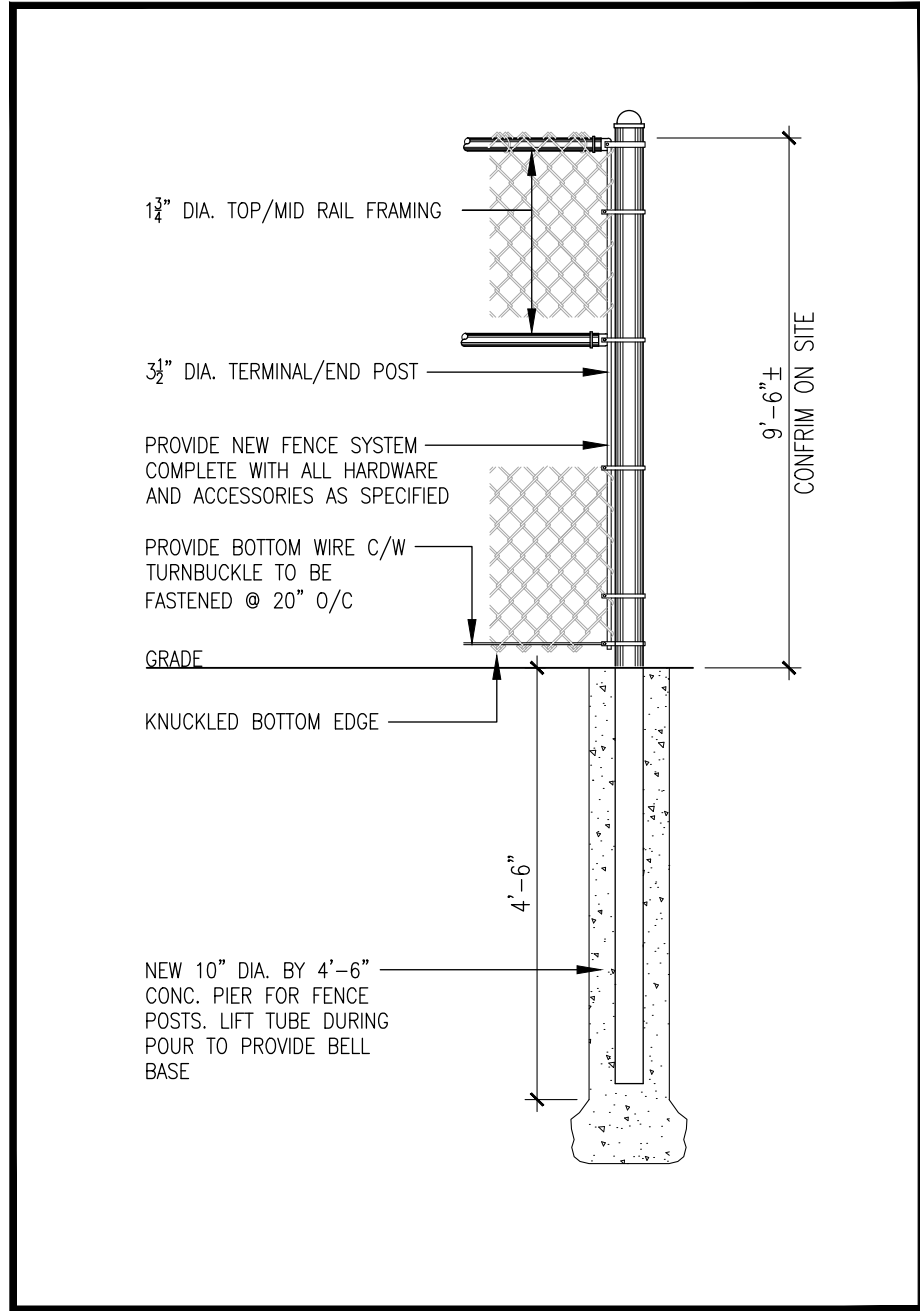
02 TYP. BOLLARD DETAIL

AS104 SCALE: 1/2\"=1'-0"



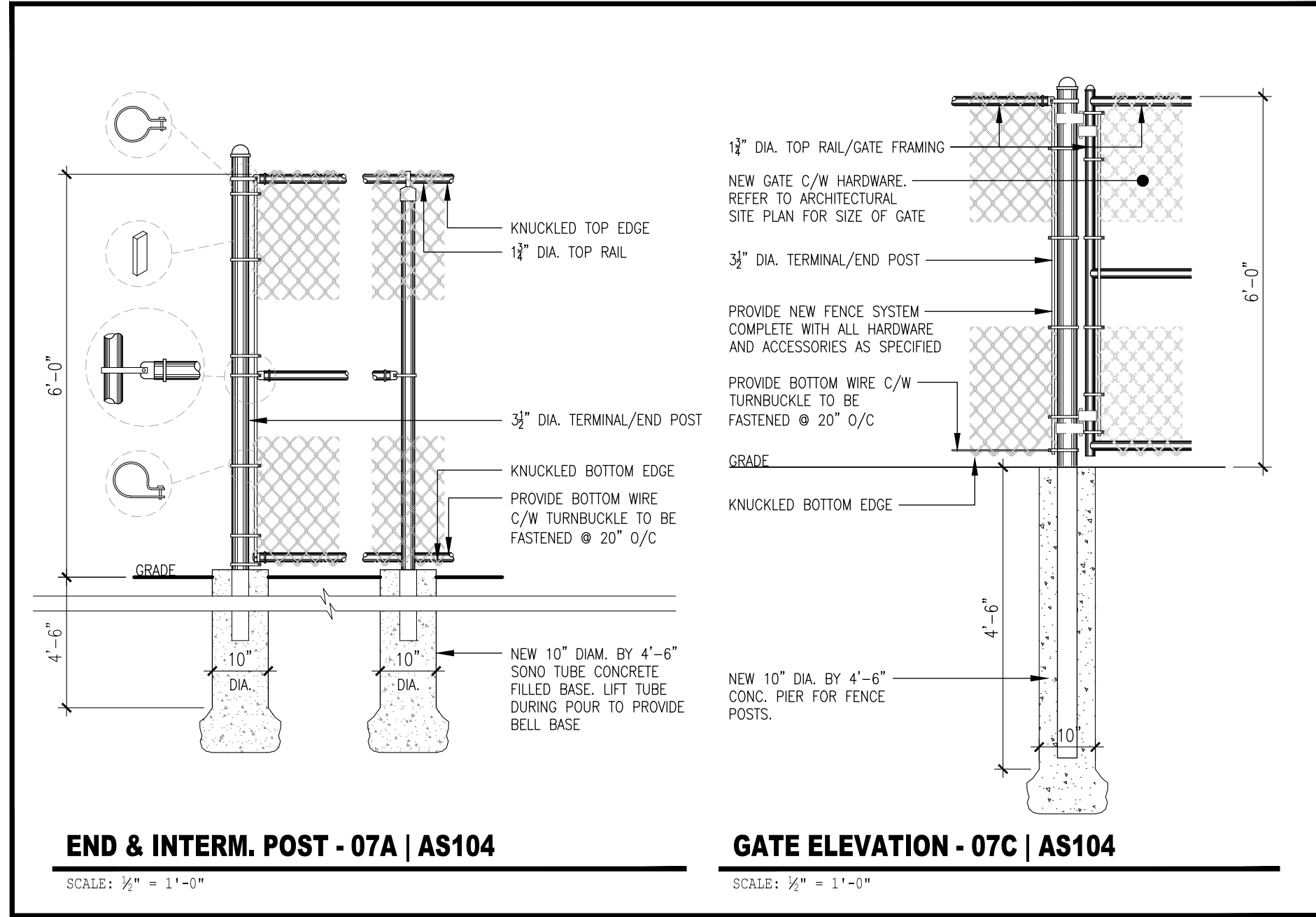
01 TYP. LIGHT STANDARD BASE DETAIL

AS104 SCALE: 1/2\"=1'-0"



08 CHAIN LINK FENCE - INDIVIDUAL KENNELS

AS104 SCALE: 1/2\"=1'-0"



07 TYP. CHAIN LINK FENCE DETAIL

AS104 SCALE: 1/2\"=1'-0"

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BRANTFORD ANIMAL SHELTER 10 KRAEMER'S WAY BRANTFORD, ONTARIO N3V 0A5 <div><div>DESIGN REVIEW</div><div>SITE PLAN APPROVAL</div><div>BUILDING PERMIT</div><div>BIDS DOCUMENTS</div><div>CONTRACT DOCUMENTS</div><div>CONSTRUCTION DOCUMENTS</div><div>AS-BUILT DOCUMENTS</div></div>	ARCHITECTURAL SITE DETAILS		 67 KING STREET WEST, CHATHAM ON N7M 1C7 TEL . 519.397.0943 EMAIL . info@roastudio.com			<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> 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Appendix B

Supporting Information

Travis Hanko

From: Amanda Anderson <AAnderson@brantford.ca>
Sent: Wednesday, March 20, 2024 2:05 PM
To: Jake Cassidy
Cc: Joseph Ouellette; Gord Gavrilovic; Ian Harrower
Subject: RE: Brantford Animal Shelter - Fire Hydrant Flow Test

Hi Jake,

Here is the info on H2700. Let me know if you need any other info :

Installed: May 13, 2007
Manufacturer: Mueller Company
Pressure: 93 PSI
Nozzle type: 2 small ports with Storz Connection
Condition: Good
Hydrant Shutoff Valve: 8312
Last edited date: 1/13/2023

Thank you,

Amanda Anderson
Project Management Specialist

City of Brantford – Public Works Commission
Facilities Capital Development, Engineering Services
519-759-4150 ext. 5493 • aanderson@brantford.ca
City of Brantford • www.brantford.ca

From: Jake Cassidy [mailto:jake@roastudio.com]
Sent: Wednesday, March 20, 2024 1:56 PM
To: Amanda Anderson
Cc: Joseph Ouellette; Gord Gavrilovic; Ian Harrower
Subject: RE: Brantford Animal Shelter - Fire Hydrant Flow Test

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Amanda,

Just hydrant H2700 will need to be tested. Thank you.

Regards,



Jake C. Cassidy | Design
Dipl. Architectural Technology

t. 519.397.0943
f. 519.480.0645 e. jake@roastudio.com
w. www.roastudio.com | www.roastudio.ca

M. 8:30a.m - 6:00p.m
T. 8:30a.m - 6:00p.m
W. 8:30a.m - 6:00p.m
T. 8:30a.m - 6:00p.m
F. 8:30a.m - 12:00p.m

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From: Amanda Anderson <AAnderson@brantford.ca>

Sent: Wednesday, March 20, 2024 1:50 PM

To: Jake Cassidy <jake@roastudio.com>

Cc: Joseph Ouellette <Joseph@roastudio.com>; Gord Gavrilovic <GGavrilovic@brantford.ca>; Ian Harrower <IHarrower@brantford.ca>

Subject: Brantford Animal Shelter - Fire Hydrant Flow Test

Hi Jake,

Below is a screenshot of the hydrants. I'm assuming you need the information on H2700, H2561. Do you need any others?



Thank you,

Amanda Anderson
Project Management Specialist

City of Brantford – Public Works Commission
Facilities Capital Development, Engineering Services
519-759-4150 ext. 5493 • aanderson@brantford.ca
City of Brantford • www.brantford.ca

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Appendix C

Preliminary Stormwater Management Analysis





Brantford Animal Control Building Civil Works

Stormwater Calculations

10 Kraemer's Way

City of Brantford, ON

Project Number: 54934-100

Date: May 28, 2024

Revised: N/A

Design By: T.Hanko

File: Q:\54934\100\Stormwater Management\54934-100_Rational Method_R00.xlsm

CALCULATION SHEET

Existing Condition

Rational Method

$Q = kCIA \text{ (L/s)}$

$k = 2.78$ (Conversion Factor)

$C =$ runoff coefficient

$I =$ rainfall intensity (mm/hr)

$A =$ contribution area (ha)

Total Catchment Area $A = 4,921.27 \text{ m}^2$
 $= \underline{0.492} \text{ ha}$

Catchment 101 - Allowable	Area	%Imp	C
Building	894.71 m ²	100.0%	0.90
Asphalt/Concrete	1,912.64 m ²	100.0%	0.90
Grasslands	2,113.92 m ²	0.0%	0.20
Total/Average=	4,921.27 m²	57.0%	0.60

IDF Data Brantford		(Catchment 101)					
Rainfall Event	A	B	C	t (min)	Intensity (mm/hr)	C	Q (L/s)
2-Year	743	6.0	0.7989	10	81.099	0.60	66.50
5-Year	1593	11.0	0.8789	10	109.677	0.60	89.93
10-Year	2221	12.0	0.9080	10	134.162	0.60	110.00
25-Year	3158	15.0	0.9355	10	155.467	0.60	127.47
50-Year	3886	16.0	0.9495	10	176.192	0.60	144.47
100-Year	4688	17.0	0.9624	10	196.536	0.60	161.15



Proposed Development

	Area	%Imp	C
Catchment 201 - Proposed Development (Uncontrolled)			
Proposed Building	897.71 m ²	100%	0.90
Prop. Asph./Conc.	17.88 m ²	100%	0.90
Prop. Grass	1,399.59 m ²	0%	0.20
Total/ Average =	2,315.17 m ²	39.5%	0.48
	Area	%Imp	C
Catchment 202 - Proposed Development (Controlled)			
Proposed Building	0.00 m ²	100%	0.90
Proposed Asph./Conc.	1,894.76 m ²	100%	0.90
Proposed Grass	711.33 m ²	0%	0.20
Total/ Average =	2,606.09 m ²	72.7%	0.71



Brantford Animal Control Building Civil Works
Stormwater Calculations
 10 Kraemer's Way
 City of Brantford, ON

Project Number: 54934-100
 Date: May 28, 2024
 Revised: N/A
 Design By: T.Hanko

CALCULATION SHEET

2 Year Controlled

File: Q:\54934\100\Stormwater Management\54934-100_Rational Method_R00.xlsm

Total Allowable=	33.25 L/s	A	B	C	
		743.000	6.000	0.799	
Proposed Release Rate=	33.00 L/s		Area	C	
		Controlled (1)	2606.1 m ²	0.71	
		Uncontrolled (2)	2315.2 m ²	0.48	

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	81.10	41.65	20.13	24.89	33.00
15	65.26	33.52	22.87	20.03	28.14
20	55.03	28.26	24.18	16.89	25.00
25	47.81	24.56	24.67	14.67	22.78
30	42.43	21.79	24.63	13.02	21.13
35	38.24	19.64	24.22	11.74	19.84
40	34.88	17.92	23.54	10.71	18.81
45	32.12	16.50	22.65	9.86	17.97
50	29.81	15.31	21.61	9.15	17.26
55	27.84	14.30	20.43	8.54	16.65
60	26.14	13.43	19.15	8.02	16.13
65	24.66	12.67	17.78	7.57	15.68
70	23.36	12.00	16.33	7.17	15.28
75	22.20	11.40	14.81	6.81	14.92
80	21.16	10.87	13.25	6.49	14.60
85	20.23	10.39	11.63	6.21	14.32
90	19.38	9.95	9.96	5.95	14.06
Storage Required=			24.67		
Storage Provided=			24.67		
HWL=		242.02 m		Q _{total} =	8.11 L/s

Orifice 1		Asphalt Weir	
Orifice Diameter=	50.00 mm	Wier	
Area=	1.96E-03 m ²	M=	1.705
Invert=	239.58 m	Invert=	242.10 m
C=	0.60	L=	2.00 m
H=	2.44 m	H=	0.00 m
Q=	8.11 L/s	Q _{wier} =	0.00 L/s



Brantford Animal Control Building Civil Works
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Date: May 28, 2024

Revised: N/A

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CALCULATION SHEET

5 Year Controlled

		A	B	C	
Total Allowable=	44.96 L/s	1593.000	11.000	0.879	
Proposed Release Rate=	41.83 L/s				
			Area		C
		Controlled (1)	2606.1 m ²		0.71
		Uncontrolled (2)	2315.2 m ²		0.48

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	109.68	56.33	28.90	33.66	41.83
15	90.91	46.69	34.67	27.90	36.07
20	77.89	40.00	38.20	23.90	32.08
25	68.29	35.08	40.36	20.96	29.13
30	60.92	31.29	41.61	18.70	26.87
35	55.06	28.28	42.22	16.90	25.07
40	50.28	25.83	42.37	15.43	23.60
45	46.32	23.79	42.16	14.21	22.39
50	42.96	22.07	41.68	13.19	21.36
55	40.09	20.59	40.98	12.30	20.48
60	37.60	19.31	40.09	11.54	19.71
65	35.41	18.19	39.06	10.87	19.04
70	33.48	17.20	37.91	10.28	18.45
75	31.77	16.32	36.65	9.75	17.92
80	30.23	15.53	35.29	9.28	17.45
85	28.84	14.81	33.86	8.85	17.02
90	27.58	14.17	32.37	8.46	16.64
Storage Required=			42.37		
Storage Provided=			42.37		
HWL=		242.06 m		Q _{total} =	8.17 L/s

Orifice 1		Asphalt Weir	
Orifice Diameter=	50.00 mm	Wier	
Area=	1.96E-03 m ²	M=	1.705
Invert=	239.58 m	Invert=	242.10 m
C=	0.60	L=	2.00 m
H=	2.48 m	H=	0.00 m
Q=	8.17 L/s	Q _{wier} =	0.00 L/s



Brantford Animal Control Building Civil Works
Stormwater Calculations
10 Kraemer's Way
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Revised: N/A

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CALCULATION SHEET

10 Year Controlled

		A	B	C	
Total Allowable=		2221	12	0.908	
Proposed Release Rate=		Area			C
		Controlled (1)			0.71
		Uncontrolled (2)			0.48

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	134.16	68.91	36.42	41.17	49.38
15	111.40	57.22	44.11	34.19	42.40
20	95.47	49.04	48.99	29.30	37.51
25	83.68	42.98	52.16	25.68	33.89
30	74.58	38.31	54.18	22.89	31.10
35	67.34	34.59	55.40	20.67	28.88
40	61.44	31.55	56.03	18.85	27.06
45	56.52	29.03	56.22	17.35	25.55
50	52.37	26.90	56.07	16.07	24.28
55	48.81	25.07	55.64	14.98	23.19
60	45.72	23.48	54.99	14.03	22.24
65	43.01	22.09	54.15	13.20	21.41
70	40.63	20.87	53.16	12.47	20.68
75	38.50	19.77	52.05	11.82	20.02
80	36.60	18.80	50.82	11.23	19.44
85	34.88	17.91	49.50	10.70	18.91
90	33.32	17.12	48.10	10.23	18.43

Storage Required= 56.22

Storage Provided= 56.22

HWL= 242.08 m Q_{total}= 8.21 L/s

Orifice 1		Asphalt Weir	
Orifice Diameter=		Wier	
Area=		M=	1.705
Invert=		Invert=	242.10 m
C=		L=	2.00 m
H=		H=	0.00 m
Q=		Q _{wier} =	0.00 L/s



Brantford Animal Control Building Civil Works
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 10 Kraemer's Way
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CALCULATION SHEET

25 Year Controlled

		A	B	C	
Total Allowable=	63.74 L/s	3158	15	0.9355	
Proposed Release Rate=	56.38 L/s				
			Area		C
		Controlled (1)	2606.1 m ²		0.71
		Uncontrolled (2)	2315.2 m ²		0.48

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	155.47	79.85	42.71	47.71	56.38
15	131.09	67.33	52.80	40.23	48.89
20	113.48	58.29	59.55	34.83	43.49
25	100.16	51.44	64.17	30.74	39.40
30	89.71	46.08	67.34	27.53	36.20
35	81.29	41.75	69.48	24.95	33.61
40	74.35	38.19	70.86	22.82	31.48
45	68.54	35.20	71.66	21.04	29.70
50	63.60	32.66	72.00	19.52	28.18
55	59.34	30.48	71.98	18.21	26.87
60	55.63	28.57	71.67	17.07	25.74
65	52.37	26.90	71.11	16.07	24.74
70	49.48	25.41	70.35	15.19	23.85
75	46.90	24.09	69.42	14.39	23.06
80	44.59	22.90	68.35	13.68	22.35
85	42.50	21.83	67.15	13.04	21.71
90	40.61	20.86	65.84	12.46	21.13

Storage Required= 72.00

Storage Provided= 72.00

HWL= 242.10 m Q_{total}= 8.66 L/s

Orifice 1		Asphalt Weir	
Orifice Diameter=	50.00 mm	Wier	
Area=	1.96E-03 m ²	M=	1.705
Invert=	239.58 m	Invert=	242.10 m
C=	0.60	L=	2.00 m
H=	2.52 m	H=	0.00 m
Q=	8.25 L/s	Q _{wier} =	0.42 L/s



Brantford Animal Control Building Civil Works
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Project Number: 54934-100

Date: May 28, 2024

Revised: N/A

Design By: T.Hanko

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CALCULATION SHEET

50 Year Controlled

Total Allowable= 72.23 L/s

Proposed Release Rate= 65.37 L/s

A	B	C
3886	16	0.9495

	Area	C
Controlled (1)	2606.1 m ²	0.71
Uncontrolled (2)	2315.2 m ²	0.48

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	176.19	90.50	47.52	54.07	65.37
15	149.09	76.58	58.75	45.76	57.06
20	129.36	66.44	66.17	39.70	51.00
25	114.33	58.72	71.13	35.09	46.39
30	102.50	52.64	74.42	31.46	42.76
35	92.93	47.73	76.50	28.52	39.82
40	85.04	43.68	77.70	26.10	37.40
45	78.40	40.27	78.21	24.06	35.36
50	72.75	37.37	78.20	22.33	33.63
55	67.88	34.86	77.76	20.83	32.13
60	63.63	32.68	76.97	19.53	30.83
65	59.90	30.76	75.90	18.38	29.68
70	56.58	29.06	74.60	17.37	28.67
75	53.63	27.54	73.10	16.46	27.76
80	50.97	26.18	71.42	15.64	26.94
85	48.57	24.95	69.60	14.91	26.21
90	46.40	23.83	67.65	14.24	25.54

Storage Required= 78.21

Storage Provided= 78.21

HWL= 242.11 m Q_{total}= 11.30 L/s

Orifice 1
 Orifice Diameter= 50.00 mm
 Area= 1.96E-03 m²
 Invert= 239.58 m
 C= 0.60
 H= 2.53 m
 Q= 8.26 L/s

Asphalt Weir
Wier
 M= 1.705
 Invert= 242.10 m
 L= 2.00 m
 H= 0.01 m
 Q_{wier}= 3.04 L/s



Brantford Animal Control Building Civil Works
Stormwater Calculations
 10 Kraemer's Way
 City of Brantford, ON

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CALCULATION SHEET

100 Year Controlled

		A	B	C	
Total Allowable=	80.57 L/s	4688	17	0.9624	
Proposed Release Rate=	74.79 L/s				
			Area		C
		Controlled (1)	2606.1 m ²		0.71
		Uncontrolled (2)	2315.2 m ²		0.48

Time (min)	Intensity (mm/hr)	Run-off ¹ (L/s)	Storage Required (m ³)	Run-off ² (L/s)	Total Site Run-off (L/s)
10	196.54	100.94	51.88	60.32	74.79
15	166.89	85.72	64.12	51.22	65.70
20	145.13	74.54	72.07	44.54	59.02
25	128.46	65.98	77.25	39.42	53.90
30	115.28	59.21	80.52	35.38	49.86
35	104.59	53.72	82.41	32.10	46.58
40	95.75	49.18	83.28	29.38	43.86
45	88.31	45.36	83.37	27.10	41.58
50	81.95	42.09	82.85	25.15	39.63
55	76.47	39.28	81.83	23.47	37.95
60	71.69	36.82	80.43	22.00	36.48
65	67.47	34.66	78.69	20.71	35.19
70	63.74	32.74	76.69	19.56	34.04
75	60.40	31.02	74.45	18.54	33.01
80	57.40	29.48	72.02	17.62	32.09
85	54.69	28.09	69.42	16.78	31.26
90	52.23	26.83	66.68	16.03	30.51
	Storage Required=	83.37			
	Storage Provided=	83.37			
	HWL=	242.11 m		Q _{total} =	14.48 L/s

Orifice 1		Asphalt Weir	
Orifice Diameter=	50.00 mm	Wier	
Area=	1.96E-03 m ²	M=	1.705
Invert=	239.58 m	Invert=	242.10 m
C=	0.60	L=	2.00 m
H=	2.53 m	H=	0.01 m
Q=	8.27 L/s	Q _{wier} =	6.21 L/s



Brantford Animal Control Building Civil Works
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10 Kraemer's Way
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CALCULATION SHEET

Stage Storage

Elevation step (m)	Grade Elevation	Pipe Storage	Surface Storage	Total Vol
0.01	241.85		0.00	0.00
	241.86		0.16	0.16
	241.87		0.31	0.31
	241.88		0.47	0.47
	241.89		0.62	0.62
	241.90		0.78	0.78
	241.91		1.69	1.69
	241.92		2.59	2.59
	241.93		3.50	3.50
	241.94		4.40	4.40
	241.95		5.31	5.31
	241.96		7.56	7.56
	241.97		9.82	9.82
	241.98		12.07	12.07
	241.99		14.33	14.33
	242.00		16.58	16.58
	242.01		20.71	20.71
	242.02		24.83	24.83
	242.03		28.96	28.96
	242.04		33.08	33.08
	242.05		37.21	37.21
	242.06		43.72	43.72
	242.07		50.23	50.23
	242.08		56.73	56.73
	242.09		63.24	63.24
	242.10		69.75	69.75
	242.11		78.88	78.88
	242.12		88.01	88.01
	242.13		97.15	97.15
	242.14		106.28	106.28
	242.15		115.41	115.41
	242.16		126.82	126.82
	242.17		138.24	138.24
	242.18		149.65	149.65
	242.19		161.07	161.07
	242.20		172.48	172.48

← 2.00m Concrete Weir

Appendix D

OGS Unit Typical Details and Maintenance Information



Hydroworks Sizing Summary

Brantford Animal Shelter

Civil Works

05-28-2024

Recommended Size: HydroDome HD 8

Hydroworks Sizing Program Version 5.8.5

A HydroDome HD 8 is recommended to provide 80 % annual TSS removal based on a drainage area of 0.3554 (ha) with an imperviousness of 78.6 % and Kitchener / Waterloo, Ontario rainfall for the ETV particle size distribution.

The recommended HydroDome HD 8 treats 100 % of the annual runoff and provides 80 % annual TSS removal for the Kitchener / Waterloo rainfall records and ETV particle size distribution.

The HydroDome has a siphon which creates a discontinuity in headloss. The given peak flow of .045 (m³/s) is less than the full pipe flow of .13 (m³/s) indicating free flow in the pipe during the peak flow assuming no tailwater condition. Partial pipe flow was assumed for the headloss calculations. The headloss was calculated to be 213 (mm) above the crown of the 375 (mm) outlet pipe.

This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.

If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

The sizing program is for sizing purposes only and does not address any site specific parameters such as hydraulic gradeline, tailwater submergence, groundwater, soils bearing capacity, etc. Headloss calculations are not a hydraulic gradeline calculation since this requires a starting water level and an analysis of the entire system downstream of the HydroDome .

TSS Removal Sizing Summary

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Site Parameters
 Area (ha) 0.3554
 Imperviousness (%) 78.6

Units
☐ U.S.
☒ Metric

Rainfall Station
 Kitchener / Waterloo Ontario
 1998 To 2018 Rainfall Timestep = 15 min.

Project Title (2 lines)
 Brantford Animal Shelter
 Civil Works

Outlet Pipe
 Diam. (mm) 375 Peak Design Flow (m3/s) 0.045
 Slope (%) .56

Lab Sizing Results ☐ Post Treatment Recharge

HydroDome Annual Sizing Results

Model #	Qlow (m3/s)	Qtot (m3/s)	Flow Capture (%)	TSS Removal (%)
Unavailable	.009	.009	100 %	55 %
HD 4	.009	.009	100 %	65 %
HD 5	.009	.009	100 %	65 %
HD 6	.009	.009	100 %	73 %
Unavailable	.009	.009	100 %	80 %
HD 8	.009	.009	100 %	80 %
HD 10	.009	.009	100 %	81 %
HD 12	.009	.009	100 %	83 %

Particle Size Distribution

Size (um)	%	SG
1	5	2.65
4	5	2.65
6	5	2.65
7	5	2.65
18	15	2.65
45	10	2.65
70	5	2.65
90	10	2.65
125	15	2.65
200	15	2.65

Note: Results vary significantly based on particle size distribution

Simulate

TSS Particle Size Distribution

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

TSS Particle Size Distribution

Size (um)	%	SG
1	5	2.65
4	5	2.65
6	5	2.65
7	5	2.65
18	15	2.65
45	10	2.65
70	5	2.65
90	10	2.65
125	15	2.65
200	15	2.65
400	5	2.65
850	5	2.65
*		

Notes:

1. To change data just click a cell and type in the new value(s)
2. To add a row just go to the bottom of the table and start typing.
3. To delete a row, select the row by clicking on the first pointer column, then press delete
4. To sort the table click on one of the column headings

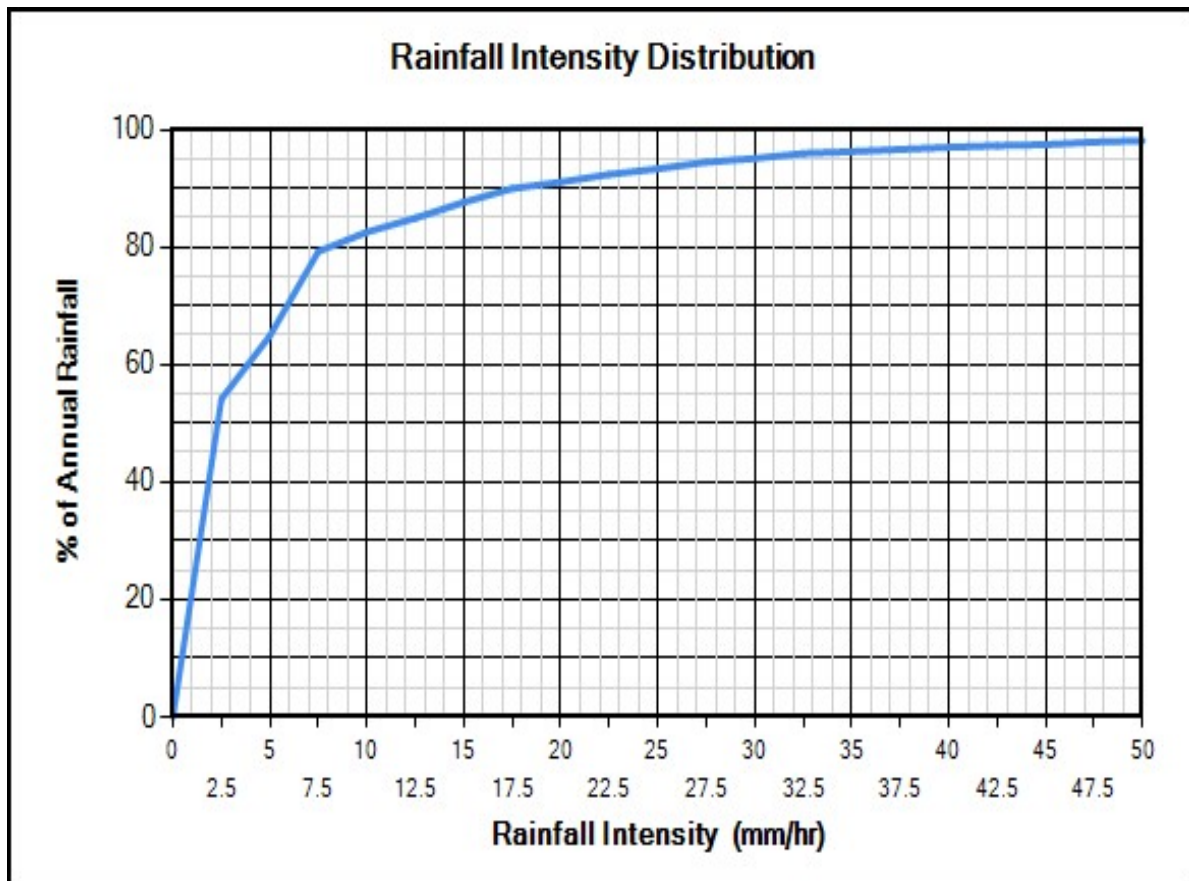
TSS Distributions

- ☒ ETV Canada
- ☐ Standard HDS Design
- ☐ Alden Laboratory
- ☐ OK110
- ☐ Toronto
- ☐ Ontario Fine
- ☐ ETV Canada (Calgary)
- ☐ Calgary Forebay
- ☐ Kitchener
- ☐ User Defined

Clear

You must select a particle size distribution for TSS to simulate TSS removal

Water Temp (C) 20



Site Physical Characteristics

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Catchment Parameters

Width (m) Imperv. Mannings n Maintenance Frequency (months)

Perv Mannings n

Slope (%) Imp. Depress. Storage (mm)

Perv. Depress. Storage (mm)

Daily Evaporation (mm/day)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	2.54	2.54	3.8100...	3.8100...	3.8100...	2.54	2.54	0	0

Infiltration

Max. Infiltration Rate (mm/hr)

Min. Infiltration Rate (mm/hr)

Infiltration Decay Rate (1/s)

Infiltration Regen. Rate (1/s)

Catch Basins

of Catch basins

Constant Baseflow

Roof Runoff (m3/s)

Resets all parameters excluding input catchment width.

Dimensions And Capacities

Hydroworks Siphon Separator Sizing Program - HydroDome

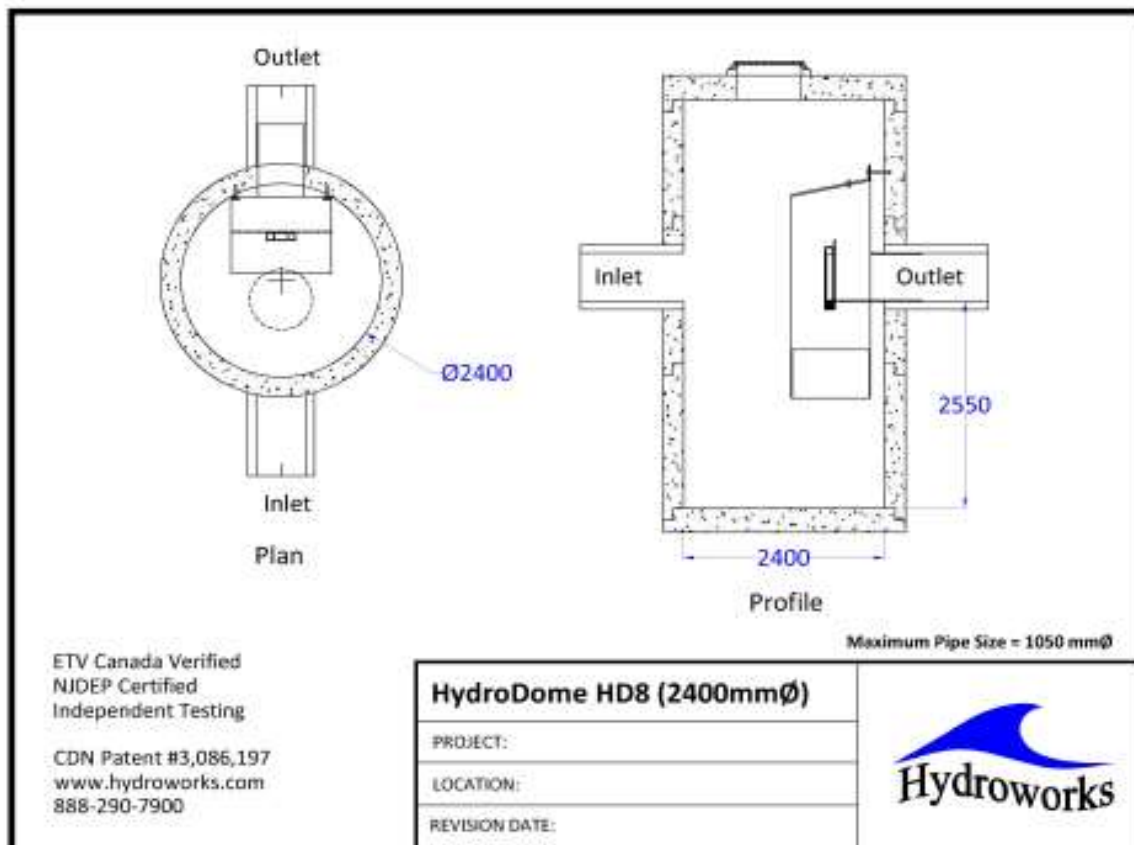
File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Dimensions and Capacities					
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
Unavailable	0.91	1.22	123	0.5	0.8
HD 4	1.22	1.37	266	0.9	1.6
HD 5	1.52	1.68	483	1.7	3.1
HD 6	1.83	1.98	803	2.9	5.2
HD 7	2.13	2.29	1226	4.6	8.2
HD 8	2.44	2.59	1863	6.8	12.1
HD 10	3.05	3.2	3617	13	23.4
HD 12	3.66	3.81	6225	22.2	40

Depth = Depth from outlet invert to inside bottom of tank

Generic HD 8 CAD Drawing



TSS Buildup And Washoff

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

TSS Buildup

☐ Power Linear
☒ Exponential
☐ Michaelis-Menton
☐ No Buildup Required

TSS Washoff

☒ Power-Exponential
☐ Rating Curve (no upper limit)
☐ Rating Curve (limited to buildup)
☐ Event Mean Concentration

Street Sweeping

Efficiency (%) 30
Start Month May
Stop Month Sep
Frequency (days) 30
Available Fraction .3

Soil Erosion

☐ Add Erosion to TSS

Reset to Default Values

TSS Buildup Parameters

Limit (kg/ha) 28.02
Coeff (kg/ha) 67.25
Exponent .5

TSS Washoff Parameters

Coefficient .0855
Exponent 1.1

TSS Buildup

☒ Based on Area
☐ Based on Curb Length

Upstream Quantity Storage

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Quantity Control Storage

	Storage (m3)	Discharge (m3/s)
▶	0	0.0082
	0.8	0.0083
	5.5	0.0084
	17.1	0.0085
	38.3	0.0086
	71.4	0.0087
	117	0.0437
	173.2	0.1134
*		

Clear

Other Parameters

Flagged Issues

If there is underground detention storage upstream of the HydroDome please contact Hydroworks to ensure it has been modeled correctly.

Hydroworks Sizing Program - Version 5.8.5

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1-800-290-7900

www.hydroworks.com

Specifications

1. The separator must be designed based on the following criteria:

Flow Criteria	
Water Quality Flow cfs (L/s)	
Peak Design Flow cfs (L/s)	

TSS Removal Criteria	
Annual TSS Removal (%)	
NJDEP/ETV Canada TSS	
OK110 Sand	
F95 Sand	
Other	

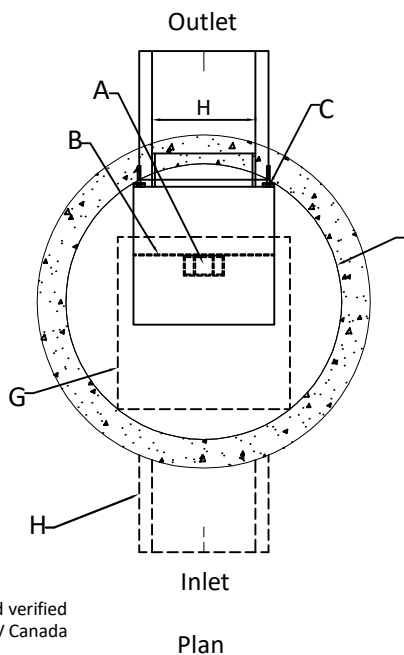
2. The separator must be independently tested and verified to the 2013 NJDEP separator protocol and 2014 ETV Canada Separator protocol

3. Vendor testing and/or field testing is not acceptable to determine an alternate equal due to the lack of repeatability.

Notes:

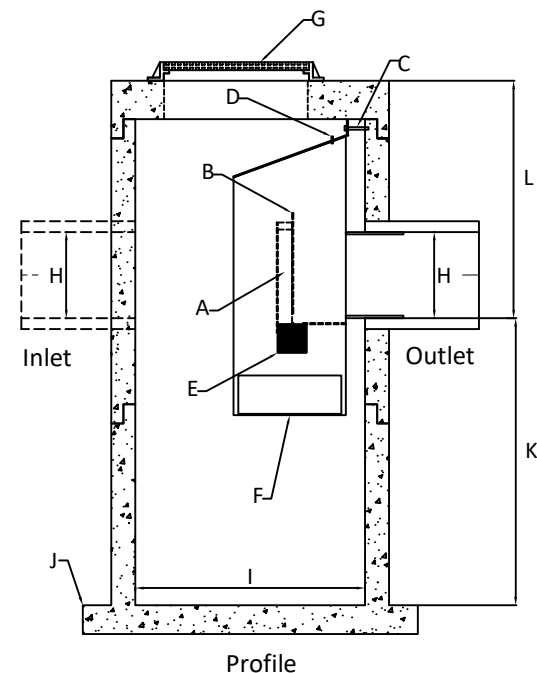
1. Sump depths shown are typical. Additional depth can be added as required.
2. Single or multiple inlet pipes allowed.
3. Drops allowed.
4. Inlet Grate Shown. HydroDome can be designed with a closed cover if required.
5. Oil capacities given are spill capacities.
6. Sediment depths are maximum holding capacities and not recommended capacities for regular maintenance.
7. Capacities are rounded down to nearest 5 gal or ft3 (5L or 0.1 m3 for metric units)
8. Minimum rim to top of structure [L] required may vary for HydroDome. Please call Hydroworks for site-specific design questions.
9. Hydraulics vary with pipe size and model number. Please call Hydroworks for site-specific headloss calculations.

HydroDome by Hydroworks, LLC
U.S. Patent # 10,801,196
www.hydroworks.com
888-290-7900



HydroDome Components

- A. Siphon
- B. Overflow Weir
- C. Wall Anchor
- D. Air Check Valve
- E. Coarse Foam Debris Screen
- F. Perforated Bottom
- G. Grate or Cover
- H. Inlet and Outlet Pipes
- I. Structure Diameter
- J. Base Extension
- K. Sump Depth
- L. Invert to Top of Structure



HydroDome Dimensions / Capacities *

Model	Diameter ft (m) I	Sump Depth ft (m) K	Max. Pipe in (mm) H	Total Volume gal (L)	Oil Spill Volume gal (L)	Sediment Volume ft3 (m3)
HD 3	3 (0.9)	4 (1.2)	18 (450)	210 (800)	30 (120)	15 (0.5)
HD 4	4 (1.2)	4.5 (1.4)	21 (525)	420 (1600)	70 (265)	30 (0.9)
HD 5	5 (1.5)	5.5 (1.7)	27 (675)	805 (3055)	125 (480)	60 (1.7)
HD 6	6 (1.8)	6.5 (2.0)	33 (825)	1375 (5200)	210 (800)	100 (2.9)
HD 7	7 (2.1)	7.5 (2.3)	39 (975)	2155 (8170)	320 (1225)	160 (4.6)
HD 8	8 (2.4)	8.5 (2.6)	42 (1050)	3195 (12095)	490 (1860)	235 (6.8)
HD 10	10 (3.0)	10.5 (3.2)	54 (1350)	6165 (23350)	955 (3615)	455 (13.0)
HD 12	12 (3.6)	12.5 (3.8)	66 (1650)	10575 (40030)	1640 (6220)	780 (22.2)

* HD dimensions can be customized to provide custom oil or sediment volumes

Hydroworks HydroDome

PROJECT:

LOCATION:

REVISION DATE: 01/24/2022





Hydroworks® HydroDome

Operations & Maintenance Manual

Version 1.0

Please call Hydroworks at 888-290-7900 or email us at support@hydroworks.com if you have any questions regarding the Inspection Checklist. Please email a copy of the completed checklist to Hydroworks at support@hydroworks.com for our records.

Introduction

The HydroDome (Figure 1) is a state-of-the-art hydrodynamic separator. HydroDome can be used for water quality and quantity flow control if desired.

Hydrodynamic separators remove solids, debris and lighter than water (oil, trash, floating debris) pollutants from stormwater. Hydrodynamic separators and other water quality measures are mandated by regulatory agencies (Town/City, State, Federal Government) to protect storm water quality from pollution generated by urban development (traffic, people) as part of new development permitting requirements.

As storm water treatment structures fill up with pollutants they become less and less effective in removing new pollution. Therefore, it is important that storm water treatment structures be maintained on a regular basis to ensure that they are operating at optimum performance. The HydroDome is no different in this regard and this manual has been assembled to provide the owner/operator with the necessary information to inspect and coordinate maintenance of their HydroDome.

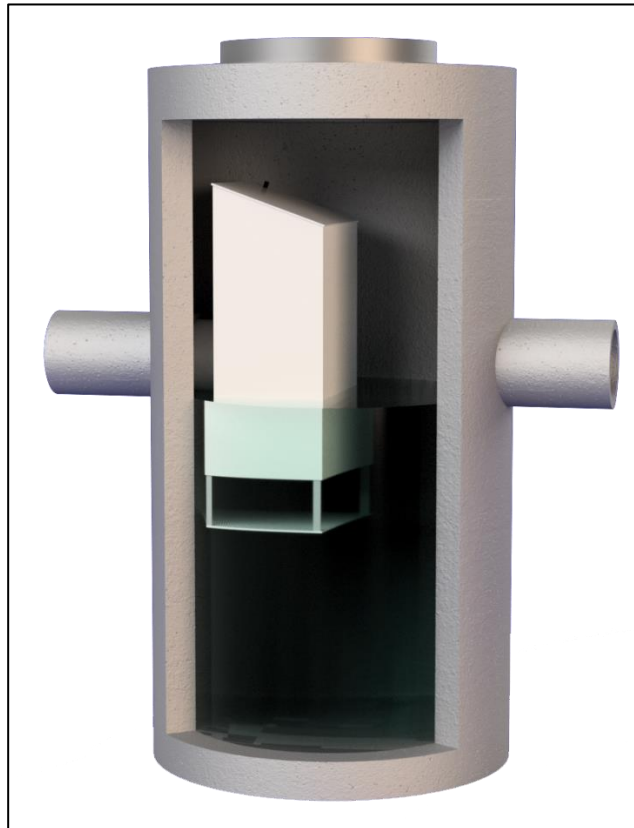


Figure 1. Hydroworks HydroDome

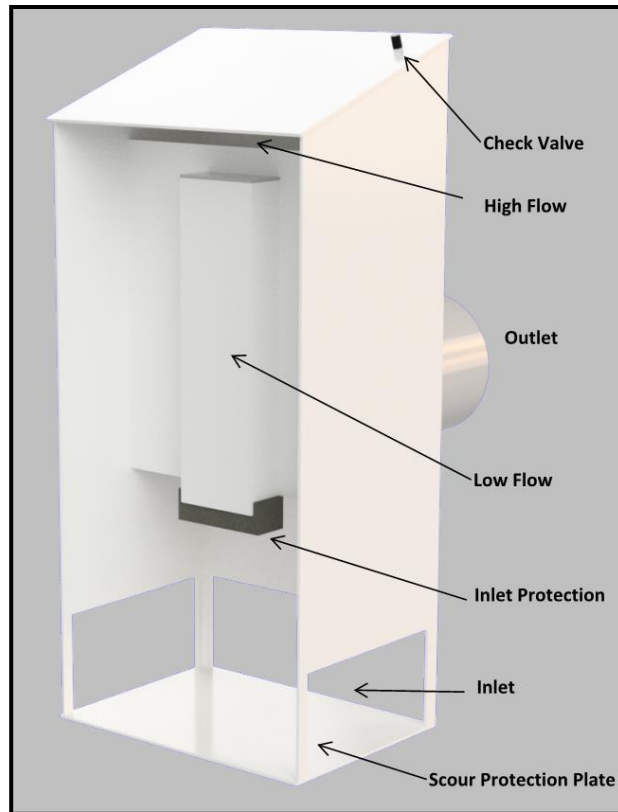


Figure 2 HydroDome Internal Components

Inspection

Procedure

Floatables

A visual inspection can be conducted for floatables by removing the cover/grate and looking down into the separator.

TSS/Sediment

Inspection for TSS build-up can be conducted using a Sludge Judge®, Core Pro®, AccuSludge® or equivalent sampling device that allows the measurement of the depth of TSS/sediment in the unit. These devices typically have a ball valve at the bottom of the tube that allows water and TSS to flow into the tube when lowering the tube into the unit. Once the unit touches the bottom of the device, it is quickly pulled upward such that the water and TSS in the tube forces the ball valve closed allowing the user to see a full core of water/TSS in the unit. Several readings (2 or 3) should be made at different locations of the structure to ensure that an accurate TSS depth measurement is recorded.

Operation

The water level during periods without rain should be near the outlet invert of the structure. If the water level remains near the top of the HydroDome this may suggest that there is an obstruction downstream of the HydroDome or that the inlet protection at the HydroDome may need to be cleaned.

Frequency

Construction Period

The HydroDome separator should be inspected every four weeks and after every large storm (over 0.5" (12.5 mm) of rain) during the construction period.

Post-Construction Period

The Hydroworks HydroDome separator should be inspected during the first year of operation for normal stabilized sites (grassed or paved areas). If the unit is subject to oil spills or runoff from unstabilized areas (storage piles, exposed soils), the HydroDome separator should be inspected more frequently (4 times per year). The initial annual inspection will indicate the required frequency of inspection and maintenance if the unit was maintained after the construction period.

Reporting

Reports should be prepared as part of each inspection and include the following information:

1. Date of inspection
2. GPS coordinates of Hydroworks unit
3. Time since last rainfall
4. Date of last inspection
5. Installation deficiencies (missing parts, incorrect installation of parts)
6. Structural deficiencies (concrete cracks, broken parts)
7. Operational deficiencies (leaks, elevated water level)
8. Presence of oil sheen or depth of oil layer
9. Estimate of depth/volume of floatables (trash, leaves) captured
10. Sediment depth measured
11. Recommendations for any repairs and/or maintenance for the unit
12. Estimation of time before maintenance is required if not required at time of inspection

A sample inspection checklist is provided at the end of this manual.



Maintenance

Procedure

The Hydroworks HydroDome unit is typically maintained using a vacuum truck. There are numerous companies that can maintain the HydroDome separator. Maintenance with a vacuum truck involves removing all of the water and sediment together. The water is then separated from the sediment on the truck or at the disposal facility.

The area around the HydroDome provides clear access to the bottom of the structure (Figure 3). This is the area where a vacuum hose would be lowered to clean the unit.

In instances where a vacuum truck is not available other maintenance methods (i.e. clamshell bucket) can be used, but they will be less effective. If a clamshell bucket is used the water must be decanted prior to cleaning since the sediment is under water and typically fine in nature.

The local municipality should be consulted for the allowable disposal options for both water and sediments prior to any maintenance operation. Once the water is decanted the sediment can be removed with the clamshell bucket.

Maintenance of a Hydroworks HydroDome unit will typically take 1 to 2 hours depending on size of unit and using a vacuum truck. Cleaning may take longer for other cleaning methods (i.e. clamshell bucket).

Inlet protection (Figure 2) in the form of a coarse foam screen is located at the inlet to the siphon opening in the HydroDome to ensure the opening does not become clogged. Although it is not anticipated that the inlet protection will have to be replaced on a regular basis since the inlet protection is protected by the submerged entrance to the HydroDome and is backflushed by the siphon after each storm, the inlet protection should be checked each time the HydroDome is inspected or maintained. The inlet protection is removable and should be rinsed with water to ensure any debris caught on the protection is discarded. Unless damaged, the inlet protection can be reinstalled. A replacement piece can be bought through Hydroworks and/or retail stores. Hydroworks can provide information on the inlet protection and where it can be bought. A sign that the inlet protection needs cleaning/replacement would be a water level near the crown of the outlet pipe in the structure during periods with no flow (i.e. unit does not drain down to the pipe invert).



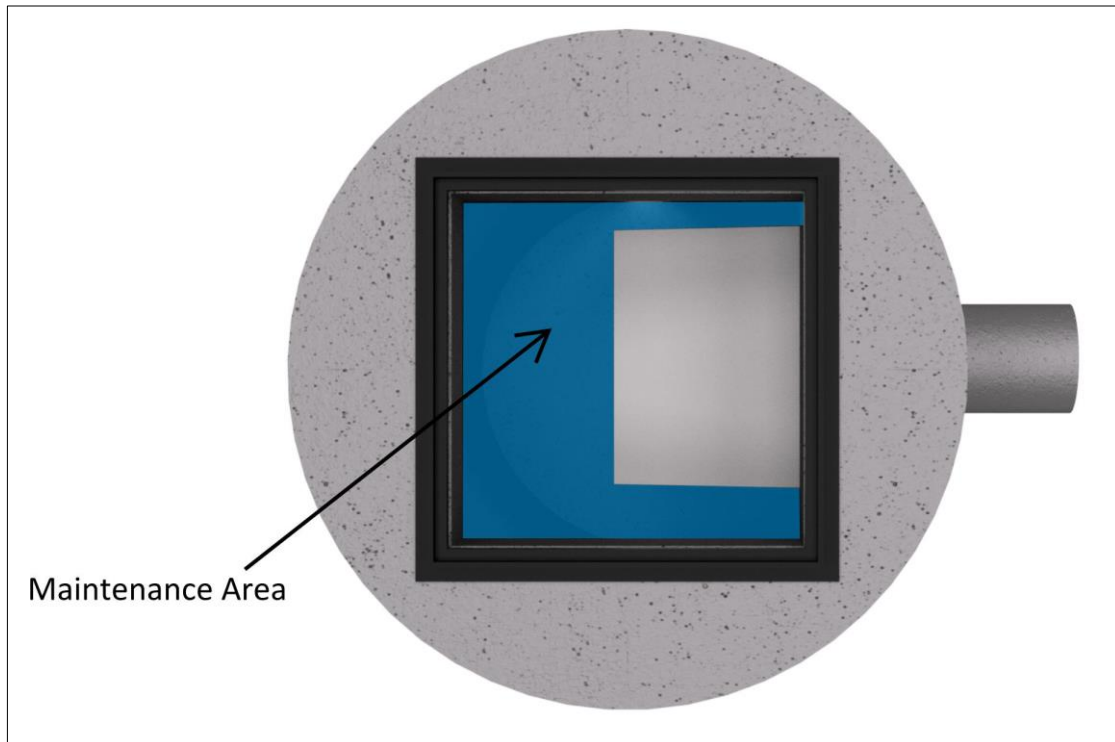


Figure 3. HydroDome Maintenance Access

Frequency

Construction Period

A HydroDome separator can fill with construction sediment quickly during the construction period. The HydroDome must be maintained during the construction period when the depth of TSS/sediment reaches 24" (600 mm). It must also be maintained during the construction period if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the area of the separator

The HydroDome separator should be maintained at the end of the construction period, prior to operation for the post-construction period.

Post-Construction Period

The maintenance for sediment accumulation is required if the depth of sediment is 1 ft or greater in separators with standard water (sump) depths (Table 1).

There will be designs with increased sediment storage based on specifications or site-specific criteria. Please contact Hydroworks at 888-290-7900 to inquire whether your HydroDome was designed with extra sump depth to extend the frequency of maintenance.



The HydroDome separator must also be maintained if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 75% of the water surface of the separator.

Table 1 Standard Dimensions for Hydroworks HydroDome Models

Model	Diameter ft (mm)	Maintenance Sediment Depth in (mm)
HD 3	3 (900)	12 (300)
HD 4	4 (1200)	12 (300)
HD 5	5 (1500)	12 (300)
HD 6	6 (1800)	12 (300)
HD 7	7 (2100)	12 (300)
HD 8	8 (2400)	12 (300)
HD 10	10 (3000)	12 (300)
HD 12	12 (3600)	12 (300)



HYDRODOME INSPECTION SHEET

Date _____
Date of Last Inspection _____

Site _____
City _____
State _____
Owner _____

GPS Coordinates _____

Date of last rainfall _____

Site Characteristics

	Yes	No
Soil erosion evident	<input type="checkbox"/>	<input type="checkbox"/>
Exposed material storage on site	<input type="checkbox"/>	<input type="checkbox"/>
Large exposure to leaf litter (lots of trees)	<input type="checkbox"/>	<input type="checkbox"/>
High traffic (vehicle) area	<input type="checkbox"/>	<input type="checkbox"/>

HydroDome

	Yes	No
Obstructions in the inlet	<input type="checkbox"/> *	<input type="checkbox"/>
Damage to HydroDome (cracked, broken, loose pieces)	<input type="checkbox"/> **	<input type="checkbox"/>
Improperly installed outlet pipe	<input type="checkbox"/> ***	<input type="checkbox"/>
Internal component damage (cracked, broken, loose pieces)	<input type="checkbox"/> **	<input type="checkbox"/>
Floating debris in the separator (oil, leaves, trash)	<input type="checkbox"/>	<input type="checkbox"/>
Large debris visible in the separator	<input type="checkbox"/> *	<input type="checkbox"/>
Concrete cracks/deficiencies	<input type="checkbox"/> ***	<input type="checkbox"/>
Exposed rebar	<input type="checkbox"/> **	<input type="checkbox"/>
Raised water level (water level close to top of HydroDome)	<input type="checkbox"/> ***	<input type="checkbox"/>
Water seepage (water level not at outlet pipe invert)	<input type="checkbox"/> ***	<input type="checkbox"/>
Water level depth below outlet pipe invert	_____ "	

Routine Measurements

Floating debris depth	< 0.5" (13mm)	<input type="checkbox"/>	>0.5" 13mm)	<input type="checkbox"/> *
Floating debris coverage	< 75% of surface area	<input type="checkbox"/>	> 75% surface area	<input type="checkbox"/> *
Sludge depth	< 12" (300mm)	<input type="checkbox"/>	> 12" (300mm)	<input type="checkbox"/> *

* Maintenance required
** Repairs required
*** Further investigation is required

Note: Inspections should not be made within 24 hours of a storm to allow the water to drain from the structure to assess a raised water level or water level seepage



Other Comments: _____

[illegible]



Hydroworks® HydroDome

One Year Limited Warranty

Hydroworks, LLC warrants, to the purchaser and subsequent owner(s) during the warranty period subject to the terms and conditions hereof, the Hydroworks HydroDome to be free from defects in material and workmanship under normal use and service, when properly installed, used, inspected and maintained in accordance with Hydroworks written instructions, for the period of the warranty. The standard warranty period is 1 year.

The warranty period begins once the separator has been manufactured and is available for delivery. Any components determined to be defective, either by failure or by inspection, in material and workmanship will be repaired, replaced or remanufactured at Hydroworks' option provided, however, that by doing so Hydroworks, LLC will not be obligated to replace an entire insert or concrete section, or the complete unit. This warranty does not cover shipping charges, damages, labor, any costs incurred to obtain access to the unit, any costs to repair/replace any surface treatment/cover after repair/replacement, or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to any material that has been disassembled or modified without prior approval of Hydroworks, LLC, that has been subjected to misuse, misapplication, neglect, alteration, accident or act of God, or that has not been installed, inspected, operated or maintained in accordance with Hydroworks, LLC instructions and is in lieu of all other warranties expressed or implied. Hydroworks, LLC does not authorize any representative or other person to expand or otherwise modify this limited warranty.

The owner shall provide Hydroworks, LLC with written notice of any alleged defect in material or workmanship including a detailed description of the alleged defect upon discovery of the defect. Hydroworks, LLC should be contacted at 136 Central Ave., Clark, NJ 07066 or any other address as supplied by Hydroworks, LLC. (888-290-7900).

This limited warranty is exclusive. There are no other warranties, express or implied, or merchantability or fitness for a particular purpose and none shall be created whether under the uniform commercial code, custom or usage in the industry or the course of dealings between the parties. Hydroworks, LLC will replace any goods that are defective under this warranty as the sole and exclusive remedy for breach of this warranty.

Subject to the foregoing, all conditions, warranties, terms, undertakings or liabilities (including liability as to negligence), expressed or implied, and howsoever arising, as to the condition, suitability, fitness, safety, or title to the Hydroworks HydroDome are hereby negated and excluded and Hydroworks, LLC gives and makes no such representation, warranty or undertaking except as expressly set forth herein. Under no circumstances shall Hydroworks, LLC be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the HydroDome, or the cost of other goods or services related to the purchase and installation of the HydroDome. For this Limited Warranty to apply, the HydroDome must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Hydroworks' written installation instructions.

Hydroworks, LLC expressly disclaims liability for special, consequential or incidental damages (even if it has been advised of the possibility of the same) or breach of expressed or implied warranty. Hydroworks, LLC shall not be liable for penalties or liquidated damages, including loss of production and profits; labor and materials; overhead costs; or other loss or expense incurred by the purchaser or any third party. Specifically excluded from limited warranty coverage are damages to the HydroDome arising from ordinary wear and tear; alteration, accident, misuse, abuse or neglect; improper maintenance, failure of the product due to improper installation of the concrete sections or improper sizing; or any other event not caused by Hydroworks, LLC. This limited warranty represents Hydroworks' sole liability to the purchaser for claims related to the HydroDome, whether the claim is based upon contract, tort, or other legal basis.