Stormwater Management and Servicing Report

Navan Stacked Town Homes
6001-6005 Renaud Road
Orleans, Ontario

Prepared for:

Landric Homes Inc.
63 chemin de Montreal Est
Gatineau (QC) J8M 1K3

Attention: Matthew Firestone

LRL File No.: 210216

December 24th, 2021

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1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Landric Homes Inc. to complete a Stormwater Management Analysis and Servicing Brief for a proposed development of stacked townhomes located at 6001-6005 Renaud Rd, Orleans, Ottawa. The legal description of the property is Part of Lot 7, Concession 3, geographic Township of Gloucester**,** city of Ottawa.

Figure 1: Arial View of Proposed Development

The site at 6001-6005 Renaud Road has approximately 75 metres of frontage on the east side of Renaud Road and maximum depth of approximately 61 metres. The overall lot area is approximately **0.46 ha.** The site is currently zoned DR (Development Reserve Zone), and is occupied by two detached residential dwellings (2-storey and 1.5-storey buildings). The majority of the site is landscaped with some paved surfaces.

The development proposes four (4) blocks of 3-storey stacked townhome buildings with walk-out basements, consisting altogether of 36 units. The proposed development will also feature a surface parking lot as well as sheltered garages to accommodate parking demands.

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater considerations, LRL Associates Ltd. should be advised to review the report recommendations.

2 Existing Site and Drainage Description

The subject site measures ***0.46 ha*** and is gently sloped north from Renaud road to Zieglar Street. Existing elevations range from 75.65m along south property line fronting Renaud St to 74.34m along north property line fronting Zieglar St.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-way:

Renaud Road:

- 300 mm diameter DI watermain
- 300 & 400 mm diameter forcemains
- 600 mm diameter concrete sanitary sewer
- 1350 mm diameter concrete storm sewer

3 Scope of Work

As per applicable guidelines, the scope of work includes the following:

Stormwater management

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity objectives will be achieved.

Water services

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow.
- Describe the proposed water distribution network and connection to the existing system.

Sanitary services

- Describe the existing sanitary sewers available to receive wastewater from the building.
- Calculate peak flow rates from the development.
- Describe the proposed sanitary sewer system.
- Review impact of increased sanitary flow on downstream sanitary sewer.

4 REGULATORY APPROVALS

An MECP Environmental Compliance Approval is not expected to be required for installation of the proposed storm and sanitary sewers within the site. A Permit to Take Water is not anticipated to be required for pumping requirements for sewer installation. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site development. No other approval requirements from other regulatory agencies are anticipated.

5 WATER SUPPLY AND FIRE PROTECTION

5.1 Existing Water Supply Services and Fire Hydrant Coverage

The subject property lies within the City of Ottawa 2E water distribution network pressure zone. The subject property is located within proximity of an existing 300 mm dia. watermain along Renaud Road. There are currently several existing fire hydrants available to service the subject property. Refer to ***Appendix B*** for the location of fire hydrants.

5.2 Water Supply Servicing Design

The subject property is proposed to be serviced via a closed loop network of 150 mm diameter watermain connected to the existing 300 mm watermain within Renaud Road. Refer to Site Servicing Plan C.401 in ***Appendix E*** for servicing layout.

Table 1 summarizes the City of Ottawa Design Guidelines design parameters employed in the preparation of the water demand estimate.

Table 1: ***City of Ottawa Design Guidelines Design Parameters***

Design Parameter	Value
Residential Bachelor / 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Average Daily Demand	280 L/d/per
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Desired operating pressure range during normal operating conditions	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure shall not exceed	552 kPa
During fire flow operating conditions pressure must not drop below	140 kPa
**Table updated to reflect technical Bulletin ISDTB-2018-02*	

The interior layout and architectural floor plans have been reviewed, and it was determined that the proposed development will house thirty-six (36) stacked town units. Based on the City of Ottawa Design guidelines for population projection, this translates to approximately 97.2 residents. Table 2 below summarizes the proposed development as interpreted using table 4.1 of the City of Ottawa Design Guidelines.

Table 2: ***Development Residential Population Estimate***

Proposed Unit type	Persons Per Unit	Number of Units	Population
Townhouse	2.7	36	97.2
		Total Residential Population	**97.2**

The required water supply requirements for the residential units in proposed building have been calculated using the following formula:

Where:

$$Q = (q \times P \times M)$$

q = average water consumption (L/capita/day)
P = design population (capita)
M = Peak factor

Using a calculated Maximum Day Factor and Peak Hour factor of **5.8** and **8.7** respectively as per Table 3-3 in the *MOE Design Guidelines*, anticipated demands were calculated as follows:

- Average daily domestic water demand is **0.32** L/s,
- Maximum daily demand is **1.83** L/s, and
- Maximum hourly is **15.95** L/s.

Refer to ***Appendix B*** for water demand calculations.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in ***Appendix B***. Table 3 below summarizes boundary conditions for the proposed development.

Table 3: ***Summary of Anticipated Demands and Boundary Conditions***

Design Parameter	**Anticipated Demand (L/min)**	**Boundary Conditions @ Renaud Road (m H2O / kPa)**
Average Daily Demand	19	130.7 / 544.7
Max Day + Fire Flow (Block 1+2)	110 + 19,000	111.7 / 357.8
Max Day + Fire Flow (Block 3+4)	110 + 21,000	108.4 / 325.4
Peak Hour	957	126.7 / 505.4
**Assumed Ground elevation at connection point = 75.10 m.*		
Water demand calculation per City of Ottawa Water Design guidelines. ***See Appendix B*** *for details.*		

As indicated in Table 3, pressures in all scenarios meet the required pressure range stated in Table 1 as per City of Ottawa Design Guidelines. Refer to ***Appendix B*** for Boundary Conditions.

The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect, see ***Appendix A*** for collaborating correspondence:

- Type of construction – Wood Frame Construction;
- Occupancy type – Limited Combustibility; and
- Sprinkler Protection – Non-Sprinklered.

As per technical bulletin *ISTB-2018-02*, all wood frame structures separated by less than 3 m must be considered as a single fire area. Therefore, floor areas for Blocks 1 & 2, and similarly blocks 3& 4, were combined when estimating fire demands. The estimated fire flow demand was estimated to be **19,000 L/min** for blocks 1 & 2 combined, and **21,000 L/min** for blocks 3 & 4. See ***Appendix B*** for details.

There are several existing fire hydrants within 300 m to the proposed buildings that are available to meet the required fire flow demands stated above. Refer to ***Appendix B*** for fire hydrant locations.

Table 4 below summarizes the aggregate fire flow of the contributing hydrants within 300 m to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 4: ***Fire Protection Summary Table***

Building	Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Fire Hydrant(s) within 150m	Fire Hydrant(s) within 300m	Available Combined Fire Flow (L/min)
BLOCKS 1 + 2	19,000	1	4	-	(1 x 5678) + (4 x 3785) = 20,818
BLOCKS 3 + 4	21,000	1	3	3	(1 x 5678) + (3 x 3785) + (3 x 2839) = 25,550

As sown in Table 4, the total available fire flow from contributing hydrants is sufficient to provide adequate fire flow for the proposed buildings.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

6 SANITARY SERVICE

6.1 Existing Sanitary Sewer Services

The subject property is tributary to the Forest valley trunk sewer. There is an existing 600 mm dia. sanitary sewer within Renaud Road across from the subject site that ultimately conveys flows to the Forest Valley trunk sewer.

The subject property falls within the area contemplated in the *Gloucester East Urban Community Infrastructure Servicing Study Update (**Gloucester EUC)**,* prepared by Stantec, revision date March 2005. Refer to Drainage Plan extracted from the *Gloucester EUC* in ***Appendix C.***

The post development total wet wastewater flow was calculated to be is **1.26 L/s** as a result of proposed residential population and a small portion of infiltration. Refer to ***Appendix C*** for further information on the calculated sanitary flows.

As per the design sheet extracted from the Gloucester EUC, the existing 600 mm dia. sanitary sewer within Renaud Road is sloped at 0.60% and is calculated to have a maximum capacity of **496.14 L/s**, refer to ***Appendix C*** for extracted design sheet. As per the extracted design sheet, the existing trunk has an available capacity of 40.4%, or **200.44 L/s**. Therefore, it is anticipated that the existing local sewer network has sufficient capacity to accommodate the proposed development.

6.2 Sanitary Sewer Servicing Design

The proposed development will be serviced via a 200 mm dia. sanitary sewer network which will connect to the existing 600mm dia. sanitary sewer located within Renaud Road. Refer to LRL drawing C.401 for the proposed sanitary servicing.

The parameters used to calculate the anticipated sanitary flows are; residential average population per unit of 2.7 persons for townhouse units, a residential daily demand of 280 L/p/day, a residential peaking factor of 4.0 and a total infiltration rate of 0.33 L/s/ha. Based on these parameters and the total site area of 0.46 ha, the total wet wastewater flow was calculated as **1.26 L/s**. Refer to ***Appendix C*** for the site sanitary sewer design sheet.

7 STORMWATER MANAGEMENT

7.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system as such, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

In pre-development conditions, the stormwater runoff would flow uncontrolled overland to the towards the Renaud Road right-of-way. There is an existing 1350 mm diameter storm sewer within Renaud Road right-of-way. Refer to ***Appendix D*** for pre- and post-development watershed information.

7.2 Design Criteria

The stormwater management criteria for this development are based on the criteria stated in the ***Gloucester EUC Study****, a*s well as pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City standards), as well as the Ministry of the Environment's Stormwater Planning and Design Manual, 2003 (SWMP Manual).

7.2.1 Water Quality

The subject property lies within the Ottawa River East sub-watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

As per the ***Gloucester EUC Study***, the subject property falls within the tributary area of SWM Pond 3, refer to Figure 6 as well as the Drainage Plan extracted from the ***Gloucester EUC Study*** included in ***Appendix D.*** Therefore, it was determined that no further treatment is required for stormwater runoff from the proposed development. Correspondence with RVCA is included in ***Appendix A***.

7.2.2 Water Quantity

Based on ***Gloucester EUC Study***, the following stormwater management requirements were identified for the subject site:

- Meet an allowable release of 85 L/s/ha;
- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site; and

The allowable release rate for the subject site was calculated to be **39.09 L/s**. Refer to ***Appendix D*** for calculations.

7.3 Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site to quantify the detention storage required for quantity control of the development. Refer to ***Appendix D*** for storage calculations.

7.4 Proposed Stormwater Quantity Controls

The proposed stormwater management quantity control for this development will be accomplished by utilizing an inlet control device to restrict flows to the allowable release rate. Storage required as a result of quantity control will be accomplished through a combination of surface storage and underground storm chambers in the parking lot.

The subject site is proposed to be serviced via a network of 250mm and 375mm diameter storm sewers that outlet to the existing 1350 mm diameter storm sewer within Renaud Road. The proposed site storm sewer and stormwater management system are shown on drawing C.401 and detailed calculations, including the design sheet, can be found in ***Appendix D***.

The existing site is delineated by catchments EWS-01 which currently drains uncontrolled towards the Renaud Road right-of-way.

The site has been analyzed and post development watersheds have been allocated. Watershed WS-01 (0.094 ha), consisting of landscaping and a paved ramp, will flow uncontrolled. The runoff will be conveyed to the Renaud Road and Zieglar Street rights-of-way, as per the grading plan C301.

Overland flow within watershed WS-02 (0.366 ha) will be captured by catchbasins CB01 and CB02. A Hydrovex 100 VHV-1 ICD is proposed at CB01 to restricted collected runoff to a specific release rate. Grading proposed will provide positive overland drainage to the proposed storm water collection and control systems.

Table 5 below summarizes post-development drainage areas. Calculations can be seen in ***Appendix D.***

Table 5: ***Drainage Areas***

Drainage Area Name	Area	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
WS-01 (uncontrolled)	0.094	0.40	0.50
WS-02 (controlled)	0.366	0.83	1.00

Table 6 below summarize the release rates and storage volumes required to meet the allowable release rate of **39.09 L/s** for 100-year flow rates.

Table 6: ***Stormwater Release Rate & Storage Volume Summary (100 Year)***

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m^3)	Total Available Storage (m^3)
WS-01 (Un-controlled)	0.094	23.34	0	0
WS-02 (Controlled)	0.366	15.75	148.21	156.83
TOTAL	**0.460**	**39.09**	**148.21**	**156.83**

It is estimated that 23.34 L/s of runoff will flow uncontrolled from WS-01 towards the Renaud and Zieglar street right-of-way.

Runoff collected in WS-02 will be attenuated oin site and discharged at a specific release rate of 15.75 L/s via a Hydrovex 100-VHV-1 ICD located at the invert of CB01, refer to ***Appendix D*** for additional info on ICD. It is calculated that a total **148.21 m^3** of storage will be required to attenuate flows to the allowable release rate. The project runoff exceeding the allowable release rate will be stored on-site via surface ponding at the parking lot as well as Stormtech underground chambers Model MC-3500 (or approved equivalent). Total proposed surface ponding provides approx. **30.91 m^3** and the proposed underground chambers provide **125.92 m^3** to provide a total storage of **156.83 m^3**, refer to ***Appendix D*** for additional info on Stormtech chambers. The 100-year maximum ponding depths can be found on drawing "C601 – Stormwater Management Plan" of ***Appendix E***.

8 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction. Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS 577. Refer to LRL Associates drawing C.101 for erosion and sediment control details.

9 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 1509 Merivale Road presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

Water Service

- The maximum required fire flow was calculated at **21,000 L/min** using the FUS method.
- There are at least seven (7) existing fire hydrants available to service the proposed development. They will provide a combined fire flow of **25,550 L/min** to the site.
- The new development/expansion will be serviced with a new 150 mmΦ closed loop watermain network to be connected to the existing 300mmΦ watermain within Renaud Road.
- Boundary conditions received from the City of Ottawa indicate that sufficient pressure is available to service the proposed site.

Sanitary Service

- The anticipated sanitary flow from the proposed development is **1.26 L/s.**
- The proposed development will be serviced by a 200 mm diameter sanitary sewer network that connects to the existing 600 mm dia. sanitary sewer within Renaud Road.

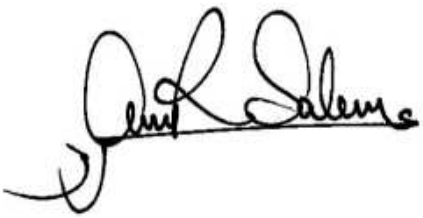
Stormwater Management

- Th subject property is serviced by existing SWM Pond 3 as per the ***Gloucester EUC Study***. Hence additional quality control measures are not proposed.
- The storm water release rates from the proposed development will meet the pre-allocated rate of **85 L/s/ha** stated in the ***Gloucester EUC Study***. The total allowable release rate was calculated to be **39.09 L/s**.
- Stormwater quantity control objectives will be met through on-site storm water ponding and sub-surface storage in the parking lot.

10 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document. If you have any questions or comments, please contact the undersigned.

Prepared by:
LRL Associates Ltd.



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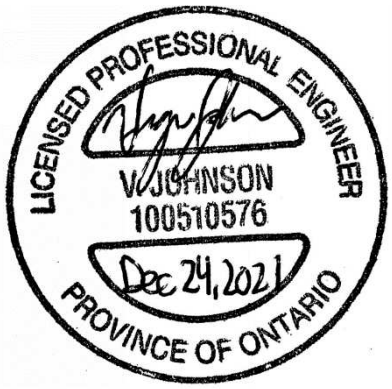


Virginia Johnson, P.Eng

APPENDIX A

Pre-consultation / Correspondence

MEMO

Date: July 16, 2021

To / Destinataire	Steve Belan, Planner
From / Expéditeur	Natasha Baird, Senior Engineer, Infrastructure Approvals
Subject / Objet	**Pre-Application Consultation** **6001 and 6007 Renaud Road** **Proposed Residential Development.**

File No. PC2020-0295

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications

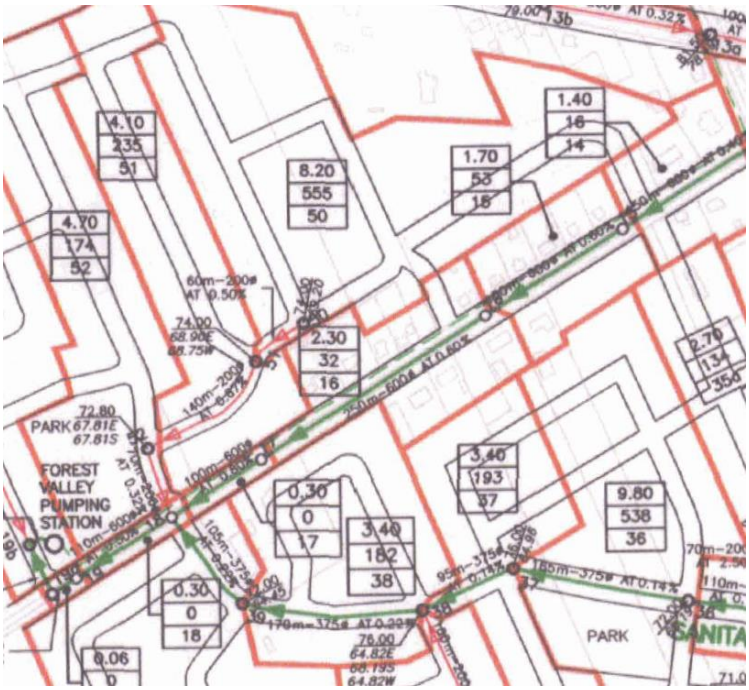
2. Servicing and site works shall be in accordance with the following documents:

   - ⇨ Ottawa Sewer Design Guidelines (October 2012)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   - ⇨ City of Ottawa Accessibility Design Standards (2012)
   - ⇨ Ottawa Standard Tender Documents (latest version)
   - ⇨ Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

4. EUC CDP and Background Studies: The parcels are situated on East Urban Community (EUC) Phase 1 lands, and there is the Phase 1 Community Design Plan (CDP) and associated background studies which accompany this document, such as the 2005 Gloucester EUC Infrastructure Study Update (Stantec) which sets out the infrastructure plan for the CDP area, and the 2004 Geotechnical Considerations: East Urban Community study (Golder), amongst others. Note that a CDP for the Phase 2 lands (bordering Mer Bleue Rd. to the east, Mer Bleue bog to the south, and Renaud Rd. to the North) was finalized in 2013 and the direction of this CDP supersedes the requirements set out in the Phase 1 CDP. These documents are to be consulted accordingly, and the proposed design is to be consistent with these documents.

5. The sanitary servicing criteria is subject to Forest Valley PS and capacity is required. Please refer to the EUC Master Servicing Study from Stantec (dated March 2005).



6. The Stormwater Management Criteria, for the subject site, is to be based on the EUC Master Servicing Study from Stantec (dated March 2005).

7. Servicing: Renaud Road – existing 305mm watermain., existing 1350mm storm sewer, existing 600mm sanitary sewer. There is 30cm reserve at Ziegler Street, where there is existing 205mm watermain, existing 250mm sanitary sewer and 750mm and 825mm storm sewer.

8. Deep Services (Storm, Sanitary & Water Supply)

   i. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*

   ii. *Connections to trunk sewers and easement sewers are typically not permitted.*

   iii. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*

iv. *Provide information on the type of connection permitted*

Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*

b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. *No submerged outlet connections.*

9. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

10. MECP ECA Requirements:

An MECP Environmental Compliance Approval (Municipal Sewage Works) will only be required if multiple parcels are proposed for this development. This

application will be under the ToR Program. For your information, I have included the email to the Ottawa District office, but you are not required to contact them.

For residential applications: moeccottawaseage@ontario.ca

11. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

12. Provide comments from the conservation authority. It is recommended to consult the office prior to submitting an application. The major overland flow route is susceptible to discharge to the Mud Creek Watershed which is part of the Rideau Valley Conservation Authority. Please contact Jamie Batchelor at the RVCA: https://www.rvca.ca/contact-us. Please refer to the Mud Creek Cumulative Impact Study.

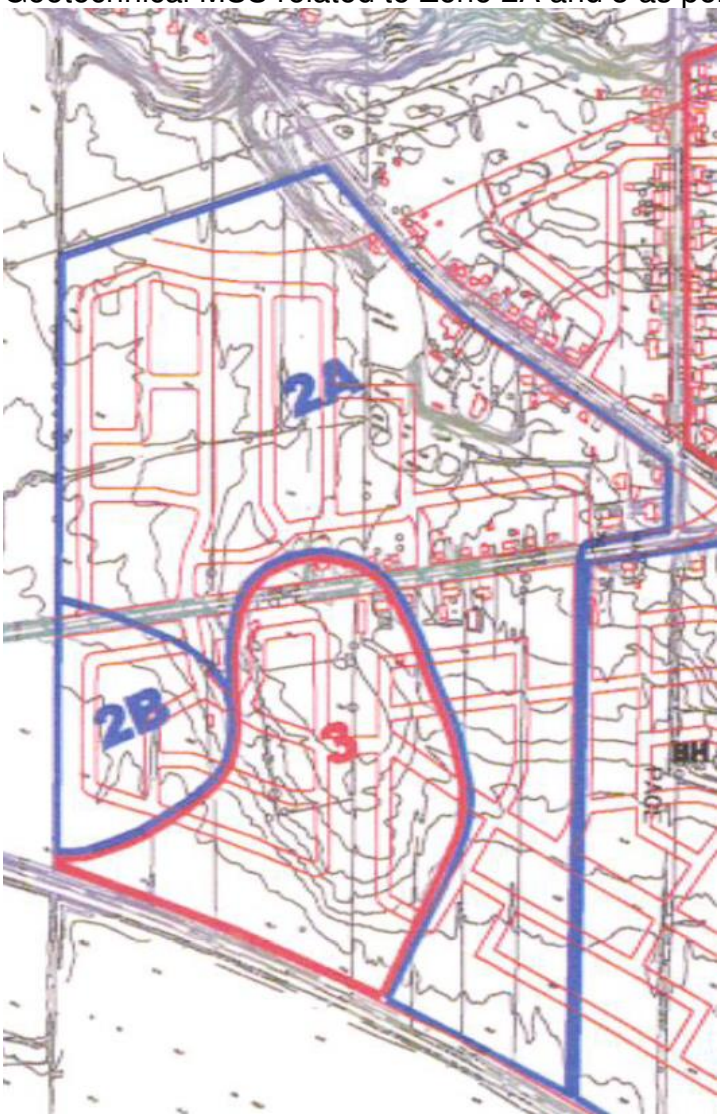
13. Development Charges (DC): The site is subject to an Area Specific DC as it falls within Area E-3 of the Gloucester East Urban Centre Stormwater Facilities By-Law 2019-165. Further information regarding DC calculations, exemptions, indexing of rates can be obtained through Gary Baker, DC Program Coordinator (gary.baker@ottawa.ca).

14. Gloucester EUC Cost Sharing Agreement dated February 2008 between participating Owners: Rivard/Monarch, Richcraft, Minto, DCR Phoenix, Claridge, and Ashcroft: The site is subject to an existing EUC Ownership Cost Sharing Agreement which is administered by a Trustee on behalf of the ownership group. It is recommended that the Applicant contact the Trustee to discuss the terms of the agreement as a Non-Participating Owner (an owner of a land shown on the plans attached in Schedule D of the Agreement, and who is not party to this Agreement). The Trustee is Kris Kilborn at Stantec Consulting Ltd. (kris.kilborn@stantec.com).

15. Geotechnical Considerations: East Urban Community study was completed in 2004 by Golder. The study covers the EUC lands and provided findings with respect to the type of development proposed and landform (topography, and the fact that the area predominantly consists of surficial sand and silty sand over sensitive marine clay soils). These can bring some constraints along with them, specifically:

    a. grade raise restrictions
    b. slope stability (around the drainage features and the escarpment)
    c. relatively high groundwater levels.

Geotechnical MSS related to Zone 2A and 3 as per the MSS:



Zone 2

Zone 2 encompasses the area south and west of Navan Road with the exception of Zone 3 and includes the Escarpment lands. The subsurface condition typically consists of discontinuous deposits of surficial sand and silty sand typically 1.5 to 2.0m in depth overlying sensitive weathered silty clay of 2.0 to 3.0m. Surficial sand and silty sand deposits exceed 3.0m in some areas and are absent in others. The soil conditions in Zone 2 are similar to Zone 1 with varying strengths and a thinner weathered crust. The un-drained shear strength of the un-weathered silty clay is in the order of 20 to 25 kPa suggesting it is compressible. Groundwater levels are shallow, ranging in depth from the ground surface to within 1.0 to 1.5m of the ground surface.

The subsurface conditions within the escarpment are similar, with a thicker crust and deeper groundwater levels reflecting better drainage.

Due to the variability in data, making it difficult to establish grade restrictions for all of Zone 2, it was divided into two parts, Zone 2A and Zone 2B. Within Zone 2A, which includes almost all of Zone 2, a maximum grade raise restriction of 0.5m is acceptable, with no grade raise preferred. Conversely, a maximum grade raise of 2.0m is acceptable in Zone 2B.

Zone 2A is not well suited for development of higher-density structures using conventional spread footings. Even with the grade raise, conventional houses may not be feasible through all of Zone 2A, requiring wider footings or shallower foundations consistent with "high ranch" style homes.

Higher density developments on conventional spread footings are possible in Zone 2B provided grade raises are minimized to allow sufficient remaining capacity to support additional structure loads.

Zone 3

Zone 3 covers a portion of the low-lying areas south of Fourth Line Road and consists of glacial till overlain by a thick deposit of weathered silty clay. There is no practical limit to the grade raise permitted in Zone 3 but, for planning purposes, a reasonable limit of 3m was proposed. The area is well suited for mid-rise and possibly high-rise buildings on conventional spread footings.

Table 1
Feasible Building Structures Supported on Spread Footings within Zones 1, 2, 3 and MUC

Building Structures	Geographical Zones			
	1	2	3	MUC
Up to 2 storey timber frame w or w/o basements and at-grade garage (i.e. conventional suburban housing and/or "high ranch" style homes)		✓ (2A) [1]		
Up to 2 storey timber frame w basements and at-grade garage (i.e. conventional suburban housing)				✓
Up to 3 storey timber frame w or w/o basements (i.e. stacked townhouses)	✓[2]			
Up to 3 storey (possibly 4 storey) timber frame w/o basements (i.e. townhouses or apartment buildings)				✓
Up to 3 storey timber frame w basements, w/o at grade garages or w garage in basement (i.e. stacked townhouses with depressed driveways)				✓
Up to 3 storey (possibly 4 storey) timber frame w concrete framed ground floor and basement level parking garages				✓
Higher density type developments		✓ (2B)	✓	

Note:
[1] Lack of good quality geotechnical information within the area and consequently guideline may be too conservative. Type of housing (conventional suburban versus "high ranch" style homes) depends on the servicing feasibility given the 0-0.5m grade raise restriction.
[2] Up to 3 storey timber framed w or w/o basements (i.e. stacked townhouses) may only be semi-feasible if supported on spread footings.

Given the grade raise and the building restrictions, please contact a geotechnical engineer to determine what possible development can occur based on the discussion in the MSS report. Further geotechnical investigation will be required to clarify the possible types of development.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, ext. 27995 or by email at Natasha.baird@ottawa.ca.

Amr Salem

From: krisbenes openplan.ca <krisbenes@openplan.ca>
Sent: December 7, 2021 2:51 PM
To: Amr Salem
Cc: Matthew Firestone
Subject: RE: LRL210216 - 6001/6005 Renaud - FUS Calcs, Architectural Input

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Amr,
Sorry for the delay…
My responses are below in green.
Thanks,

Kristopher Benes
BAS, M.Arch, OAA, MRAIC
Principal Architect

Open Plan Architects Inc.
2305 Hillary Ave.,
Ottawa, ON K1H 7J2
KrisBenes@openplan.ca
613-883-5090

Please note: OPA will be closed between December 17th and January 3rd, inclusive, for the holidays.

CELEBRATING
10 YEARS !
2011 - 2021

From: Amr Salem <asalem@lrl.ca>
Sent: December 6, 2021 12:13 PM
To: krisbenes openplan.ca <krisbenes@openplan.ca>
Cc: Matthew Firestone <matthew.firestone@landrichomes.com>
Subject: RE: LRL210216 - 6001/6005 Renaud - FUS Calcs, Architectural Input

Hey Kris,

Just following up on this to get in our boundary condition request to the City.

Let me know if you have questions answering any of the below.

Thanks,
Amr Salem, PMP®
B.Eng, Civil Engineering Services

LRL Engineering
5430 Canotek Road
Ottawa, Ontario K1J 9G2
T (613) 842-3434 or (877) 632-5664 ext 248
F (613) 842-4338
E asalem@lrl.ca
W www.lrl.ca

From: Amr Salem
Sent: November 25, 2021 3:38 PM
To: krisbenes@openplan.ca
Cc: Matthew Firestone <matthew.firestone@landrichomes.com>
Subject: LRL210216 - 6001/6005 Renaud - FUS Calcs, Architectural Input
Importance: High

Hey Kris,

I'm looking to get your input on the following to help me estimate the fireflow demand for the development;

- Can you confirm that a total of 36 stacked towns are proposed. **(KB) correct, 18 stacked for a total of 36 units.**

- Can you confirm the total floor area for each block?
  (KB) Gross floor areas per block (taken to exterior face of exterior wall, no exclusion for stairs, but garages are not included):
  Block 1 (6 units): 840 square metres
  Block 2 (12 units): 1,678 square metres
  Block 3 (8 units): 1,119 square metres
  Block 4 (10 units): 1,399 square metres
  The numbers may change by +/- 5% let's say because we are finalizing interior layouts and some of the windows may get pushed in/pulled out. Therefore, assume based on worst case please.

- Can you confirm if sprinklers are proposed for all buildings? If yes, please specify if sprinkler system will be ***fully supervised*** and ***automatic***? **(KB) not required to meet code for part 9 buildings. So, they would only be sprinklered if Landric elected to make them so.**

- Kindly provide the **ISO class** for the building as per ISO Guide sections 1, 2 and 3. I have included a brief summary of ISO Guide (review chapter 2 for construction types) as well as the section from the City's technical bulletin. Note that ISO refers only to fire-resistive for fire ratings not less than 1-hour. **(KB) I would assume that we should assign the lowest value, Class 1. There will be some non-combustible elements, but generally assume this is primarily wood frame walls, joists and trusses.**

A. *Determine the type of construction.*

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require ⅔ (67%) or more of the total wall area and ⅔ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

Thanks!

Amr Salem, PMP®
B.Eng, Civil Engineering Services
LRL Engineering
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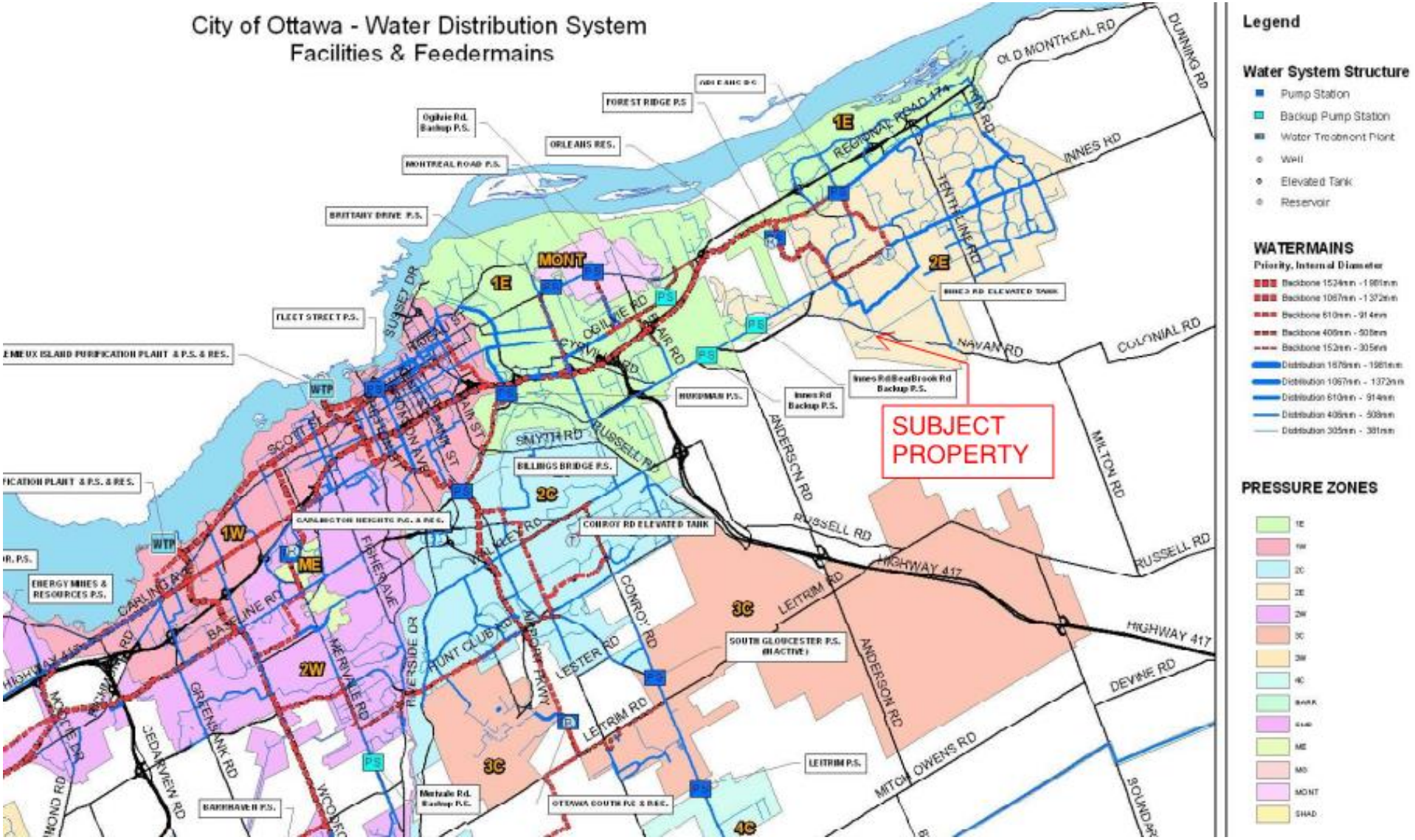
APPENDIX B

Water Supply Calculations


City of Ottawa - Water Distribution System
Facilities & Feedermains
SUBJECT PROPERTY
Legend
Water System Structure
Pump Station
Backup Pump Station
Water Treatment Plant
Well
Elevated Tank
Reservoir
WATERMAINS
Priority, Internal Diameter
PRESSURE ZONES
1E
1W
2C
2E
2W
3C
3E
4C
ME
MD
MONT
SHAD
FOREST RIDGE P.S
Ogilvie Rd. Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
WTP
BILLINGS BRIDGE P.S.
CONROY RD ELEVATED TANK
SOUTH GLOUCESTER P.S. (INACTIVE)
LEITRIM P.S.
BARRHAVEN P.S.
Innes Rd Backup P.S.
Innes Rd/BearBrook Rd Backup P.S.
OLD MONTREAL RD
DUNNING RD
REGIONAL ROAD 174
INNES RD
TENTH LINE RD
NAVAN RD
COLONIAL RD
MILTON RD
RUSSELL RD
ANDERSON RD
LEITRIM RD
HIGHWAY 417
DEVINE RD
MITCH OWENS RD
CONROY RD
LESTER RD
HUNT CLUB RD
MERIVALE RD
RIVERSIDE DR
GREENBANK RD
JEDBURGH RD
BASELINE RD
CARLING AVE
FISHER AVE
SCOTT ST
SMYTH RD
WALKLEY RD
OGILVIE RD
MONTREAL RD
SUSSEX DR

Boundary Conditions
6001 & 6005 Renaud Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	19	0.32
Maximum Daily Demand	110	1.83
Peak Hour	957	15.95
Fire Flow Demand #1	19,000	316.67
Fire Flow Demand #2	21,000	350.00

Location

Results

Connection 1 – Renaud Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	79.0
Peak Hour	126.7	73.3
Max Day plus Fire 1	111.7	51.9
Max Day plus Fire 2	108.4	47.2

Ground Elevation = 75.1 m

Connection 2 – Renaud Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	78.2
Peak Hour	126.7	72.5
Max Day plus Fire 1	112.2	51.9
Max Day plus Fire 2	109.0	47.3

Ground Elevation = 75.7 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Water Supply Calculations

LRL File No.	210216
Date	November 25, 2021
Prepared by	Amr Salem
Project Location	6001/6005 Renaud

Residential Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Unit Type	Persons Per Unit	Number of Units	Population
Townhouse	2.7	36	97.2
	Total	**36**	**97.2**

Average Water Consumption Rate	280	L/c/d		
Average Day Demand	**27,216**	**L/d**	**0.32**	**L/s**
Maximum Day Factor	5.8		(MOE Table 3-3)	
Maximum Daily Demand	**158,107**	**L/d**	**1.83**	**L/s**
Peak Hour Factor	8.7		(MOE Table 3-3)	
Maximum Hour Demand	**1,378,347**	**L/d**	**15.95**	**L/s**

Water Service Pipe Sizing

Q = VA

Where: V = velocity
A = area of pipe
Q = flow rate

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) =	$(4Q/\pi V)^{1/2}$	
=	0.106	m
=	106	mm
Proposed pipe diameter (d) =	**150**	mm
=	**6**	Inches

Fire Flow Calculations
BLOCKS 1 + 2

LRL File No. 210216
Date December 8, 2021
Method Fire Underwriters Survey (FUS)
Prepared by Amr Salem

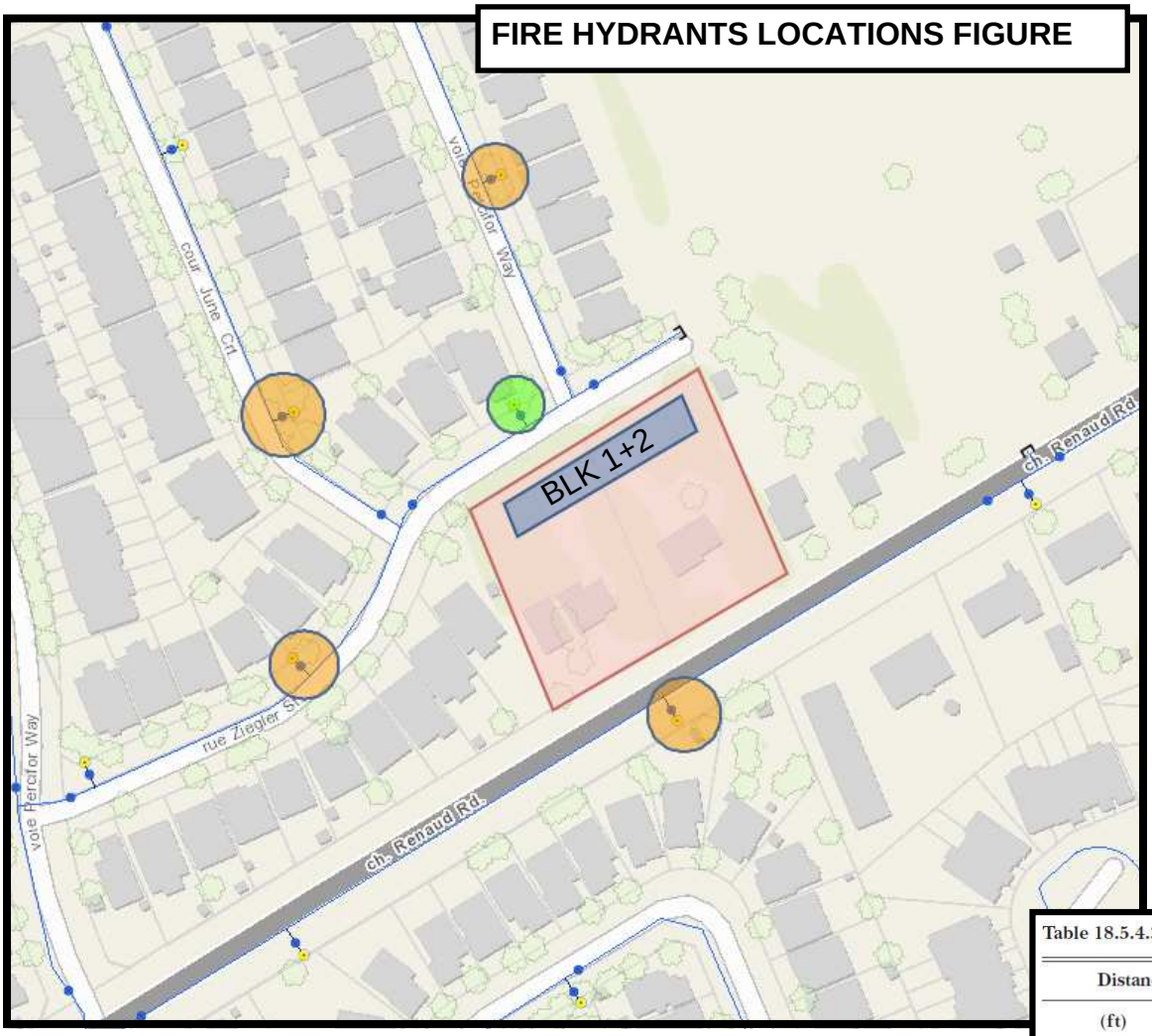
Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Wood Frame	**1.5**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area *(+5% contingency)*					**2,644**	m^2	
3	Obtain fire flow before reductions	Required fire flow	Fire Flow = 220 x C x $A^{0.5}$				L/min	**16,968**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**14,423**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	False	**0%**	L/min	**14,423**
			Water supply is standard for both the system and fire department hose lines	-10%	False	**0%**		
			Fully supervised system	-10%	False	**0%**		
6	Choose separation	Exposure distance between units	North side	20.1 to 30m	10%		L/min	**19,471**
			East side	>30m	0%			
			South side	20.1 to 30m	10%			
			West side	10.1 to 20m	15%	**35%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume				Minimum required fire flow rate (rounded to nearest 1000)		L/min	**19,000**
					Minimum required fire flow rate		L/s	**316.7**
					Required duration of fire flow		hr	**4.25**

Fire Flow Calculations
BLOCKS 3+4

LRL File No. 210216
Date December 8, 2021
Method Fire Underwriters Survey (FUS)
Prepared by Amr Salem

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Wood Frame	**1.5**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area *(+ 5% contingency)*					**2,644**	m^2	
3	Obtain fire flow before reductions	Required fire flow	Fire Flow = 220 x C x $A^{0.5}$				L/min	**16,968**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**14,423**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	False	**0%**	L/min	**14,423**
			Water supply is standard for both the system and fire department hose lines	-10%	False	**0%**		
			Fully supervised system	-10%	False	**0%**		
6	Choose separation	Exposure distance between units	North side	20.1 to 30m	10%		L/min	**20,913**
			East side	3.1 to 10m	20%			
			South side	>30m	0%			
			West side	10.1 to 20m	15%	**45%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume	Minimum required fire flow rate (rounded to nearest 1000)					L/min	**21,000**
		Minimum required fire flow rate					L/s	**350.0**
		Required duration of fire flow					hr	**4.5**

FIRE HYDRANTS LOCATIONS FIGURE



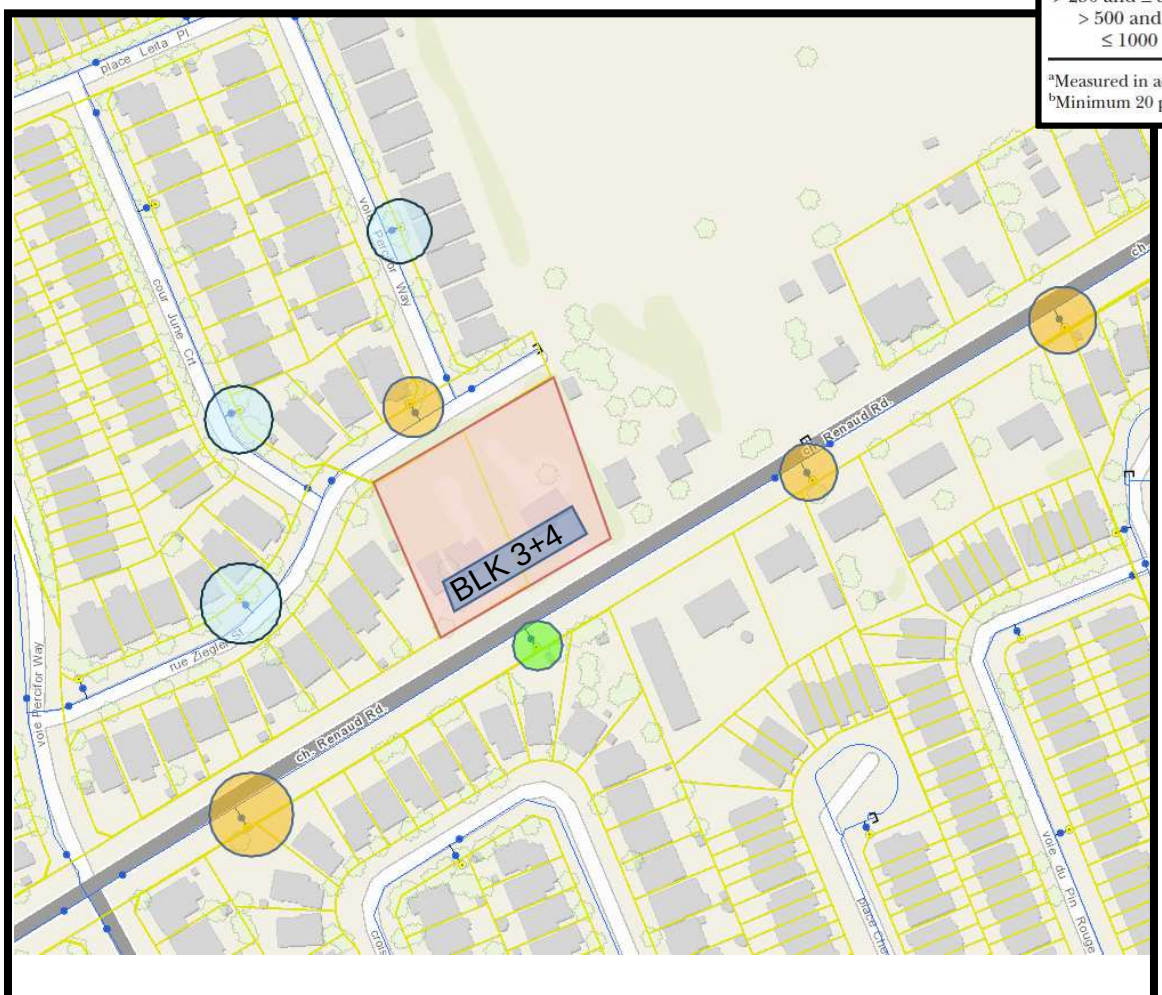
LEGEND

- Hydrants within 75m
- Hydrants within 150m
- Hydrants within 300m

Table 18.5.4.3 Maximum Fire Hydrant Fire Flow Capacity

Distance to Building[a]		Maximum Capacity[b]	
(ft)	(m)	(gpm)	(L/min)
≤ 250	≤ 76	1500	5678
> 250 and ≤ 500	> 76 and ≤ 152	1000	3785
> 500 and ≤ 1000	> 152 and ≤ 305	750	2839

[a]Measured in accordance with 18.5.1.4 and 18.5.1.5.
[b]Minimum 20 psi (139.9 kPa) residual pressure.



APPENDIX C

Wastewater Collection Calculations
Supporting Documents

LRL File No. 210216
Project: 36 stacked towns
Location: 6001/6005 Renaud Rd
Date: December 23, 2021

Sanitary Design Parameters

Average Daily Flow = 280 L/p/day
Commercial & Institutional Flow = 50000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Maximum Residential Peak Factor = 4.0
Commercial & Institutional Peak Factor = 1.5
Industrial Peak Factor = as per Appendix 4-B = 7
Extraneous Flow = 0.33L/s/gross ha

Pipe Design Parameters

Minimum Velocity = 0.60 m/s
Manning's n = 0.013

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE					
STREET	FROM MH	TO MH	AREA (Ha)	POP.	CUMMULATIVE AREA (Ha)	CUMMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)
SITE	MH5	MH4	0.046	48.6	0.05	48.6	4.0	0.63	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.046	0.046	0.02	0.65	58.9	200	0.35%	PVC	19.40	0.62
SITE	MH4	MH2			0.00	48.6	4.0	0.63	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.000	0.00	0.63	162.0	200	0.35%	PVC	19.40	0.62
SITE	MH3	MH2		48.6	0.00	48.6	4.0	0.63	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.000	0.00	0.63	64.7	200	0.35%	PVC	19.40	0.62
SITE	MH2	MH1			0.00	97.2	4.0	1.26	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.000	0.00	1.26	21.4	200	0.35%	PVC	19.40	0.62
SITE	MH1	EX. MH			0.00	0.0	4.0	0.00	0.000	0.000	0.00	0.00	7.0	0.0	0.0	0.00	0.000	0.000	0.00	0.00	10.7	200	1.00%	PVC	32.80	1.04

NOTES: Existing inverts and slopes are estimated. They are to be confirmed on-site.

Designed: A.S.	PROJECT: Navan stacked Towns		
Checked: V.J.	LOCATION: 6001/6005 Renaud Rd		
Dwg. Reference: C.401	File Ref.: 200295	Date: 2021-04-19	Sheet No. 1 of 1

N

- SANITARY SEWER AND MANHOLE (12a)
- SANITARY TRUNK SEWER AND MANHOLE (12)
- SANITARY FORCEMAIN
- SANITARY CATCHMENT AREA
- ORIGINAL GROUND / OBVERT (71.90 / 67.33)
- AREA (ha) / POPULATION / MANHOLE No. (3.25 / 56 / 2)
- AREA (ha) / POPULATION / MANHOLE No. / INST (INSTUTIONAL) ha / IND (INDUSTRIAL) ha / COM (COMMERCIAL) ha (3.25 / 56 / 2 / 3.2 INST)
- * EQUIVALENT AREA (17.7 l/s ALLOWABLE PEAK FLOW UNDER C of O SEWER USE AGREEMENT)

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
WALL ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY
SUBJECT PROPERTY
SANITARY TRUNK No.1
SANITARY TRUNK No.2
SANITARY TRUNK No.3
SANITARY TRUNK No.4
SCHOOL
PARK
INSTIT.
INSTITUTIONAL
COMMERCIAL
ESCARPMENT
FIRE HALL
FOREST VALLEY PUMPING STATION
WSI LANDFILL
LOCAL PUMP STA. No.1
LOCAL PUMP STA. No.2

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE SERVICING STUDY UPDATE

SANITARY SEWER SYSTEM

Scale: 0 40 120 200m
Dwg. No.: SAN
Dwn By: E.C. Date: 04.10.29 Revision: 2

SANITARY SEWER CALCULATION SHEET

LOCATION		RESIDENTIAL AREA AND POPULATION						COMM		INDUST			INST		C+I+I	PEAK FLOW				PIPE												
FROM M.H.	TO M H	AREA (ha)	POP	CUMULATIVE AREA (ha)	CUMULATIVE POP	PEAK FACT	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INF&T. FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	DIAMETER NOM (mm)	DIAMETER ACT (mm)	SLOPE (%)	CAP. (FULL) (L/s)	Q/Qcap (%)	VEL (FULL) (m/s)	Upstream OG (m)	Downstream OG (m)	Upstream Invert (m)	Upstream Obvert (m)	Downstream Invert (m)	Downstream Obvert (m)	Drop Structure (m)	US Frost Depth (m)	DS Frost Depth (m)
1	2	3.75	56	3.75	56	4.00	0.91		0.00		0.00			0.00	0.00	3.75	= 3.75	0.91	1.82	250	200	203.2	0.32	19.35	9.4%	0.60	88.25	88.00	84.83	85.03	84.03	84.23		3.22	3.77
2	3	5.20	181	8.45	237	4.00	3.84		0.00		0.00			0.00	0.00	5.20	= 8.45	2.37	8.21	320	200	203.2	0.32	19.35	32.1%	0.60	88.00	87.80	84.03	84.23	83.00	83.21		3.77	4.36
3	4	19.75	995	28.20	1232	3.74	18.66		0.00		0.00			0.00	0.00	19.75	= 28.20	7.90	26.56	320	250	254.0	0.24	30.39	87.4%	0.60	87.60	87.50	82.95	83.21	82.18	82.44		4.39	5.06
4A	4	19.80	979	19.80	979	3.81	15.10		0.00		0.00			0.00	0.00	19.80	= 19.80	6.54	20.64	368	250	254.0	0.24	30.39	67.9%	0.60	88.00	87.50	83.83	84.08	82.95	83.20		3.92	4.30
4	5	7.10	185	55.10	2396	3.52	34.19		0.00		0.00		3.10	3.10	2.69	10.20	= 58.20	16.30	53.18	310	375	381.0	0.14	58.43	77.7%	0.60	87.50	87.50	82.06	82.44	81.62	82.00		5.06	5.50
5A	5	7.90	362	7.90	362	4.00	5.87		0.00		0.00			0.00	0.00	7.90	= 7.90	2.21	8.08	320	200	203.2	0.65	27.58	29.3%	0.85	87.40	87.60	84.05	84.25	81.07	82.17		3.15	5.43
5	6	2.40	170	65.40	2928	3.45	40.94		0.00		0.00			3.10	2.69	2.40	= 68.50	19.18	62.81	295	375	381.0	0.14	58.43	91.8%	0.60	87.50	87.50	81.62	82.00	81.21	81.59		5.80	5.91
6	7	15.90	787	81.30	3715	3.36	50.60		0.00		0.00			3.10	2.69	15.90	= 84.40	23.63	76.82	115	450	457.2	0.11	98.64	78.0%	0.60	87.50	87.50	81.13	81.59	81.01	81.46		5.91	6.04
7	8	6.80	353	88.10	4068	3.33	54.83		0.00		0.00			3.10	2.69	6.80	= 91.20	25.54	83.03	235	450	457.2	0.11	98.64	84.2%	0.60	87.50	86.90	81.01	81.46	80.75	81.21		6.04	5.69
8A	8	11.85	826	11.85	826	3.85	12.89		0.00		0.00			0.00	0.00	11.85	= 11.85	3.32	16.21	150	200	203.2	0.50	24.19	67.0%	0.75	86.50	86.90	81.45	81.65	80.70	80.80		4.85	6.00
8	9	2.60	128	102.55	5022	3.24	65.98		0.00		0.00		2.20	5.30	4.60	4.80	= 107.85	30.20	100.78	170	525	533.4	0.10	141.87	71.0%	0.63	86.90	87.00	80.37	80.90	80.20	80.73		6.00	6.27
9A	9	5.45	300	5.45	300	4.00	4.86		0.00		0.00			0.00	0.00	5.45	= 5.45	1.53	6.38	85	200	203.2	0.32	19.35	33.0%	0.60	87.00	87.00	81.42	81.62	81.14	81.35		5.38	5.65
9	10	2.70	0	110.70	5322	3.22	69.42		0.00		0.00			5.30	4.60	2.70	= 116.00	32.48	106.50	275	525	533.4	0.10	141.87	75.1%	0.63	87.00	87.00	80.20	80.73	79.92	80.46		6.27	6.58
10A	10	14.80	731	14.80	731	3.88	11.50		0.00		0.00		0.60	0.60	0.52	15.40	= 15.40	4.31	16.34	270	200	203.2	0.32	19.35	84.4%	0.60	87.50	87.00	83.56	83.76	82.69	82.90		3.74	4.10
10	11	4.30	117	129.80	6170	3.18	78.96		0.00		0.00		2.40	8.30	7.20	6.70	= 138.10	38.67	124.84	405	525	533.4	0.10	141.87	88.0%	0.63	87.00	85.50	79.92	80.46	79.52	80.05		6.58	6.45
11A	11	8.00	393	8.00	393	4.00	0.36		0.00		0.00			0.00	0.00	8.00	= 8.00	2.24	8.60	95	200	203.2	0.32	19.35	44.4%	0.60	85.00	85.50	80.42	80.62	80.11	80.32		5.38	5.18
11B	11	5.90	352	5.90	352	4.00	5.70		0.00		0.00			0.00	0.00	5.90	= 5.90	1.65	7.36	90	200	203.2	0.32	19.35	38.0%	0.60	86.00	85.50	81.69	81.89	81.40	81.60		4.11	3.90
11	12	1.90	16	145.60	6931	3.11	87.34		0.00		0.00			8.30	7.20	1.90	= 153.90	43.09	137.63	230	600	609.6	0.100	202.55	68.0%	0.69	85.50	83.90	78.44	80.06	79.21	79.82		5.45	4.08
25D	25C	7.40	48	7.40	48	4.00	0.78		0.00		0.00			0.00	0.00	7.40	= 7.40	2.07	2.85	420	200	203.2	0.32	19.35	14.7%	0.80	86.30	86.00	83.02	83.22	81.67	81.88		3.08	4.12
LOCAL PS 2	25C	4.55	22	4.55	22	4.00	0.36		0.00		0.00			0.00	0.00	4.55	= 4.55	1.27	1.64	300		0.0		0.00	#DIV/0!	#DIV/0!	82.00	86.00		79.50		[illegible]		2.50	2.70
25G	25E	7.40	496	7.40	496	3.98	7.99		0.00		0.00			0.00	0.00	7.40	7.40	2.07	10.06	230	200	203.2	0.32	19.35	52.0%	0.60	81.50	81.00	78.80	79.00	78.06	78.26		2.50	2.74
25F	25E	4.60	272	4.60	272	4.00	4.41		0.00		0.00			0.00	0.00	4.60	4.60	1.29	5.70	120	200	203.2	2.60	54.10	10.5%	1.67	84.00	81.00	81.30	81.50	78.30	78.50		2.50	2.50
25E	LOCAL PS 1	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	70	200	203.2	0.32	19.35	79.6%	0.60	81.00	81.00	78.06	78.26	77.84	78.04		2.74	2.56
LOCAL PS 1	25C	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	340		0.0		0.00	#DIV/0!	#DIV/0!	81.00	86.00		78.50		83.50		2.50	2.50
25C	25B	7.00	51	30.95	890	3.83	13.81		0.00		0.00			0.00	0.00	7.00	30.95	8.67	22.48	450	300	304.8	0.19	43.97	51.1%	0.60	86.00	85.50	81.57	81.88	80.70	81.00		4.12	5.50
25B	25A	11.80	337	42.75	1226	3.74	18.59		0.00		0.00			0.00	0.00	11.80	42.75	11.97	30.56	295	375	381.0	0.14	58.43	44.7%	0.60	85.50	86.50	80.62	81.00	80.21	80.59		5.50	5.91
25A	25	17.00	845	59.75	2071	3.67	29.99		0.00		0.00			0.00	0.00	17.00	59.75	16.73	46.72	405	375	381.0	0.14	58.43	68.3%	0.60	86.50	86.50	80.21	80.59	79.64	80.02		5.91	6.48
20	21	8.75	506	8.75	506	3.97	8.13		0.00		0.00		2.55	2.55	2.21	11.30	11.30	3.16	13.51	320	200	203.2	0.32	19.35	69.8%	0.60	87.00	86.80	83.91	84.11	82.88	83.09		2.69	3.71
21	22	7.00	160	15.75	666	3.91	10.53		0.00	1.00	1.00	6.50	8.30	10.85	12.05	16.30	27.60	7.73	30.31	335	300	304.8	0.19	43.97	68.9%	0.60	86.80	87.00	82.78	83.09	82.14	82.45		3.71	4.55
22	23	7.30	440	23.05	1106	3.77	16.89		0.00		1.00	6.50		10.85	12.05	7.30	34.90	9.77	38.71	275	300	304.8	0.19	43.97	88.0%	0.60	87.00	86.50	82.14	82.45	81.62	81.93		4.55	4.57
23B	23A	15.70	565	15.70	565	3.95	9.03		0.00		0.00			0.00	0.00	15.70	15.70	4.40	19.43	325	250	254.0	0.45	41.38	32.4%	0.82	86.80	86.00	82.52	82.77	81.07	81.32		4.03	4.68
23A	23	9.40	584	25.10	1149	3.76	17.50		0.00		0.00			0.00	0.00	9.40	25.10	7.03	24.53	310	300	304.8	0.19	43.97	55.8%	0.69	86.50	86.50	81.02	81.32	80.43	80.73		4.68	5.77
23	24	2.80	120	50.75	2374	3.53	33.92		0.00		1.00	6.50	3.30	14.15	14.92	5.90	65.90	18.45	57.29	315	375	381.0	0.22	65.79	78.4%	0.75	86.50	86.50	80.35	80.73	79.66	80.04		5.77	6.46
24A	24	25.10	544	25.10	544	3.96	8.72		0.00		0.00			0.00	0.00	25.10	25.10	7.03	15.74	235	200	203.2	0.32	19.35	81.3%	0.60	86.00	86.50	83.00	83.20	82.24	82.45		2.80	4.05
24	26	0.80	0	76.65	2918	3.45	40.82		0.00		1.00	6.50		14.15	14.92	0.80	91.80	25.70	81.44	235	450	457.2	0.11	98.64	82.6%	0.60	86.50	86.50	79.58	80.04	79.33	79.78		6.46	6.72
LANDFILL PS	25	0.00	0	0.00	0	4.00	0.00		0.00	10.40	10.40	4.20		0.00	17.69	10.40	10.40	2.91		120		0.0		0.00	#VALUE!	#DIV/0!	80.00	86.50	77.50	77.50		84.00		2.50	2.50
25	26	8.30	79	144.70	5089	3.24	66.75		0.00		11.40	4.15		14.15	31.45	8.30	170.25	47.67	145.87	380	600	609.6	0.10	202.55	72.0%	0.69	86.50	86.50	79.17	79.78	78.79	79.40		6.72	7.10
26A	26	6.90	360	6.90	360	4.00	6.83		0.00		0.00		1.30	1.30	1.13	8.20	8.20	2.30	9.26	175	200	203.2	0.32	19.35	47.8%	0.60	86.00	86.50	81.00	81.20	80.44	80.64		4.80	5.86
26	12	2.80	6	154.40	5455	3.21	70.93		0.00		11.40	4.15		16.45	32.58	2.80	181.25	50.75	154.26	720	600	609.6	0.10	202.55	76.2%	0.69	86.50	83.90	78.79	79.40	78.07	78.68		7.10	5.22
12	13	0.60	32	300.60	12418	2.86	143.91	0.90	0.90		11.40	4.15		23.75	40.56	1.50	336.65	94.20	278.74	60	600	609.6	0.30	350.83	79.5%	1.20	83.90	82.50	78.07	78.68	77.69	78.50		5.22	4.00
13C	13	5.60	353	5.60	353	4.00	5.71		0.00		0.00			0.00	0.00	5.60	5.60	1.57	7.28	160	200	203.2	0.66	27.79	26.2%	0.88	83.50	82.50	80.80	81.00	79.61	80.01		2.50	2.49
13B	13A	10.50	314	10.50	314	4.00	6.09		0.00		0.00			0.00	0.00	10.50	10.50	2.94	8.03	160	200	203.2	0.32	19.35	41.5%	0.60	81.50	81.50	78.80	79.00	78.28	78.49		2.50	3.01
13A	13	6.60	90	17.10	404	4.00	6.54		0.00		0.00			0.00	0.00	6.60	17.10	4.79	11.33	100	200	203.2	0.32	19.35	58.5%	0.60	81.50	82.50	78.28	78.49	77.96	78.17		3.01	4.33
13	14	0.26	0	323.56	13175	2.83	151.30	0.54	1.44		11.40	4.15		23.75	41.03	0.80	360.15	100.84	293.17	100	600	609.6	0.40	405.10	72.4%	1.39	82.50	80.80	76.91	77.52	76.51	77.12	0.65	4.98	3.68
14	15	1.40	18	324.96	13191	2.83	151.46		1.44		11.40	4.15		23.75	41.03	1.40	361.55	101.23	293.72	150	600	609.6	0.40	405.10	72.5%	1.39	80.80	78.40	75.88	76.47	75.26	75.87	0.65	4.33	2.53
15	16	1.70	63	326.66	13244	2.83	151.97		1.44		11.40	4.15		23.75	41.03	1.70	363.25	101.71	294.71	150	600	609.6	0.60	496.14	59.4%	1.70	78.40	77.00	74.76	75.37	73.86	74.47	0.50	3.03	2.53
16	17	2.30	32	328.96	13276	2.83	152.78		1.44		11.40	4.15		23.75	41.03	2.30	365.55	102.35	293.67	250	600	609.6	0.60	496.14	59.6%	1.70	77.00	73.60	73.66	74.47	72.96	73.67		3.63	3.03
17	18	0.30	0	329.26	13276	2.83	152.28		1.44		11.40	4.15		23.75	41.03	0.30	365.85	102.44	293.75	100	600	609.6	0.80	572.90	51.6%	1.96	76.00	73.00	70.66	71.27	69.86	70.47	1.70	4.73	2.53
30	31	4.80	252	4.80	252	4.00	4.06		0.00		0.00			0.00	0.00	4.80	4.60	1.34	8.43	150	200	203.2	2.50	64.10	10.0%	1.67	83.60	79.00	80.26	80.46	79.51	79.71		3.04	2.29
31	32	1.40	34	6.20	286	4.00	4.63	1.30	1.30					0.00	1.13	2.70	7.50	2.10	7.86	205	200	203.2	3.90	87.57	11.6%	2.06	79.00	71.00	76.30	76.50	68.30	68.51	0.21	2.50	2.50
32A	32	5.50	336	5.50	336	4.00	5.44		0.00		0.00			0.00	0.00	5.50	5.50	1.54	6.98	80	300	304.8	0.19	43.97	15.9%	0.60	70.50	71.00	66.24	66.54	66.08	66.39		3.96	4.61
32	33	4.05	38	15.75	659	3.91	10.44		1.30		0.00			0.00	1.13	4.05	17.05	4.77	16.35	160	300	304.8	0.19	43.97	37.2%	0.60	71.00	70.80	66.08	66.39	65.78	66.08		4.61	4.72
33A	33	4.00	252	4.00	252	4.00	4.06		0.00		0.00			0.00	0.00	4.00	4.00	1.12	5.20	85	200	203.2	0.32	19.35	26.9%	0.60	70.50	70.80	66.07	66.37	65.79	66.00		4.23	4.80
33	34	0.90	42	20.65	953	3.81	14.73		1.30		0.00		2.80	2.80	3.56	3.70	24.75	6.93	25.22	165	300	304.8	0.19	43.97	57.3%	0.60	70.80	70.50	65.69	66.00	65.34	65.55		4.80	4.85
34A	34	3.70	176	3.70	176	4.00	2.86		0.00		0.00			0.00	0.00	3.70	3.70	1.04	3.89	80	200	203.2	2.00	48.36	8.0%	1.49	71.50	70.50	68.80	69.00	67.20	67.40		2.50	3.10
34	35	3.80	227	28.15	1357	3.71	20.39		1.30		0.00			2.80	3.56	3.80	32.25	9.03	32.98	160	300	304.8	0.19	43.97	75.0%	0.60	70.50	71.00	65.34	65.55	65.04	65.34		4.65	5.66
35C	35B	7.30	445	7.30	445	4.00	7.21		0.00		0.00			0.00	0.00	7.30	7.30	2.04	9.26	160	200	203.2	1.90	47.16	19.6%	1.45	75.00	72.00	72.30	72.50	69.26	69.46		2.50	2.54
35B	35A	0.90	50	8.20	495	3.98	7.98		0.00		0.00			0.00	0.00	0.90	8.20	2.31	10.30	85	200	203.2	0.32	19.35	53.2%	0.60	72.00	72.00	69.26	69.46	68.88	69.19		2.54	2.81
35A	35	2.70	134	10.90	630	3.92	10.01		0.00		0.00			0.00	0.00	2.70	10.90	3.07	13.07	70	200	203.2	2.50	54.10	24.2%	1.67	72.00	71.00	67.99	68.20	66.24	66.45	0.99	3.80	4.55
35	36	0.73	42	39.84	2029	3.58	29.43		1.30		0.00			2.80	3.56	0.73	43.94	12.30	45.29	110	375	381.0	0.14	58.43	68.2%	0.60	71.00	72.00	64.96	65.34	64.81	65.19		5.96	6.81
36	37	9.80	538	49.64	2566	3.50	36.38		1.30		0.00			2.80	3.56	9.80	53.74	15.05	54.98	165	375	381.0	0.14	58.43	80.3%	0.60	72.00	76.00	64.81	65.19	64.58	64.96		6.81	11.04
37	38	3.40	193	53.04	2759	3.47	38.82		1.30		0.00			2.80	3.56	3.40	57.14	16.00	58.38	95	375	381.0	0.14	58.43	85.3%	0.60	76.00	76.00	64.58	64.96	64.44	64.82		11.04	11.19

APPENDIX D

Stormwater Management Calculations
Supporting Documents
Hydrovex ICD
Stormtech Chaber Details

FUTURE ROADS

AREAS WHERE FLOW IS DIVERTED TO ADJACENT SUB-WATERSHED

DRY POND WHICH REQUIRES EXCAVATION

DRY POND USING NATURAL DEPRESSIONS / RAVINES

STORMWATER FLOW ROUTE

POND TRIBUTARY AREA

SUB-WATERSHED BOUNDARY

PLAN IS TAKEN FROM THE CITY OF GLOUCESTER, EAST URBAN COMMUNITY, MASTER DRAINAGE PLAN BY GORE & STORRIE LIMITED, DATED SEPT. 1991.

RECOMMENDED SWM POND LOCATIONS
EAST URBAN COMMUNITY
City of Ottawa

0 0.5 1.0km

Figure 6

STORM SEWER AND MANHOLE
STORM TRUNK SEWER AND MANHOLE
STORM CATCHMENT AREA
30m CREEK BUFFER
ORIGINAL GROUND / OBVERT
AREA (ha) / RUNOFF COEFFICIENT / MANHOLE No.
AREAS OF INSUFFICIENT COVER

1. "PONDS 1 AND 3 EAST URBAN COMMUNITY DESIGN BRIEF" (STANTEC CONSULTING, APRIL 2001)
2. "CITY OF GLOUCESTER EAST URBAN COMMUNITY MASTER DRAINAGE PLAN" (GORE & STORRIE, 1992)
3. WATER LEVEL TO BE CONFIRMED AS PART OF THE REDESIGN OF POND 3.

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
WALL ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY
WSI LANDFILL
SUBJECT PROPERTY
STORM TRUNK SEWER No.1
STORM TRUNK SEWER No.2
STORM TRUNK SEWER No.3
STORM TRUNK SEWER No.4
STORM TRUNK SEWER No.5
STORM TRUNK SEWER No.6
POND 1
100 YR. WL=83.00m
NWL=80.10m
POND 2
100 YR. WL=80.00m
(2)
POND 3
100 YR. WL=68.50m
NWL=67.00m
(3)
SCHOOL
PARK
INSTIT.
INSTITUTIONAL
COMMERCIAL
ESCARPMENT
FIRE HALL

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE SERVICING STUDY UPDATE

STORM SEWER SYSTEM

Scale 1:5000 (0 40 120 200m) | Dwg. No. STM
Dwn. By E.C. | Date 04.10.29 | Revision 2

LRL Associates Ltd.
Storm Watershed Summary

LRL File No.	210216
Project:	36-Stacked Townhouses
Location:	6001/6005 RENAUD
Date:	December 16, 2021
Designed:	Amr Salem
Drawing Reference:	C701/C702

Pre-Development Catchments

WATERSHED	C = 0.2	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
EWS-01	4035.9	0.0	563.1	4599.0	0.460	0.29
TOTAL	**4035.9**	**0.0**	**563.1**	**4599.0**	**0.460**	**0.29**

Post-Development Catchments

WATERSHED	C = 0.20	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
WS-01(UNCONTROLLED)	666.0	0.0	270.0	936.0	0.094	0.40
WS-02 (CONTROLLED)	360.0	0.0	3303.0	3663.0	0.366	0.83
TOTAL	**1026.0**	**0.0**	**3573.0**	**4599.0**	**0.4599**	**0.74**

LRL File No. 200817
Project: 6001/6005 RENAUD
Location: Hwy 17 at Old Hwy 17, Rockland
Date: April 13, 2021
Designed: Amr Salem
Drawing Ref.: C.601

Stormwater Management
100-Year Design Sheet

Runoff Equation

$Q = 2.78CIA$ (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management

Total Area = 0.460 ha

Allowable Release Rate= 39.09 L/s **Per pre-allocated release rate of 85L/s/ha as per EUC Master Servicing Study (Stantec 2005)*

Post-development Stormwater Management

					ΣR_{avg}	ΣR_{100}
Controlled	Total Site Area =	0.4599	ha	ΣR_C	0.74	0.93
	WS-02	0.366	ha	R_C	0.83	1.00
	Total Controlled =	0.366	ha	ΣR_C	0.83	1.00
Un-controlled	WS-01	0.094	ha	R_C	0.40	0.50
	Total Un-Controlled =	0.094	ha	ΣR_C	0.40	0.50

Post-development Stormwater Management (Uncontrolled Catchment WS-01)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **a = 1735.688** **b = 0.820** **C = 6.014**

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	178.6	23.34	0.00	23.34

Post-development Stormwater Management (WS-02)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **a = 1735.688** **b = 0.820** **C = 6.014**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	181.83	99.65	15.75	0.00	15.75
15	142.9	145.51	116.79	15.75	0.00	15.75
20	120.0	122.15	127.68	15.75	0.00	15.75
25	103.8	105.75	135.00	15.75	0.00	15.75
30	91.9	93.55	140.04	15.75	0.00	15.75
35	82.6	84.09	143.52	15.75	0.00	15.75
40	75.1	76.52	145.86	15.75	0.00	15.75
45	69.1	70.32	147.33	15.75	0.00	15.75
50	64.0	65.13	148.13	15.75	0.00	15.75
60	55.9	56.92	148.21	15.75	0.00	15.75
70	49.8	50.70	146.80	15.75	0.00	15.75
80	45.0	45.81	144.32	15.75	0.00	15.75
90	41.1	41.86	141.02	15.75	0.00	15.75
100	37.9	38.60	137.09	15.75	0.00	15.75
110	35.2	35.85	132.65	15.75	0.00	15.75
120	32.9	33.50	127.79	15.75	0.00	15.75

Total Storage Required = 148.21 m^3 refer to LRL Plan C.601
Available Storage = 156.83 m^3

Inlet Control Device (ICD)
Discharge = 15.75 L/s
Head = 3.20 m

Summary of release Rates and Storage Volumes

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m^3)	Total Available Storage (m^3)
WS-01	0.094	23.34	0	0
WS-02	0.366	15.75	148.21	156.83
TOTAL	**0.460**	**39.09**	**148.21**	**156.83**

LRL Associates Ltd.

Storm Design Sheet

LRL File No.	210216
Project:	36 Stacked Towns
Location:	6001/6005 RENAUD
Date:	December 21, 2021
Designed:	Amr Salem
Drawing Reference:	C.401

Storm Design Parameters

Rational Method Q = 2.78CIA

Q = Peak flow in litres per second (L/s)
A = Drainage area in hectares (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

Ottawa Macdonald-Cartier International Airport IDF curve equation (5 year event, intensity in mm/hr)

$I = 998.071 / (T_c + 6.053)^{0.814}$

Min. velocity = 0.80 m/s

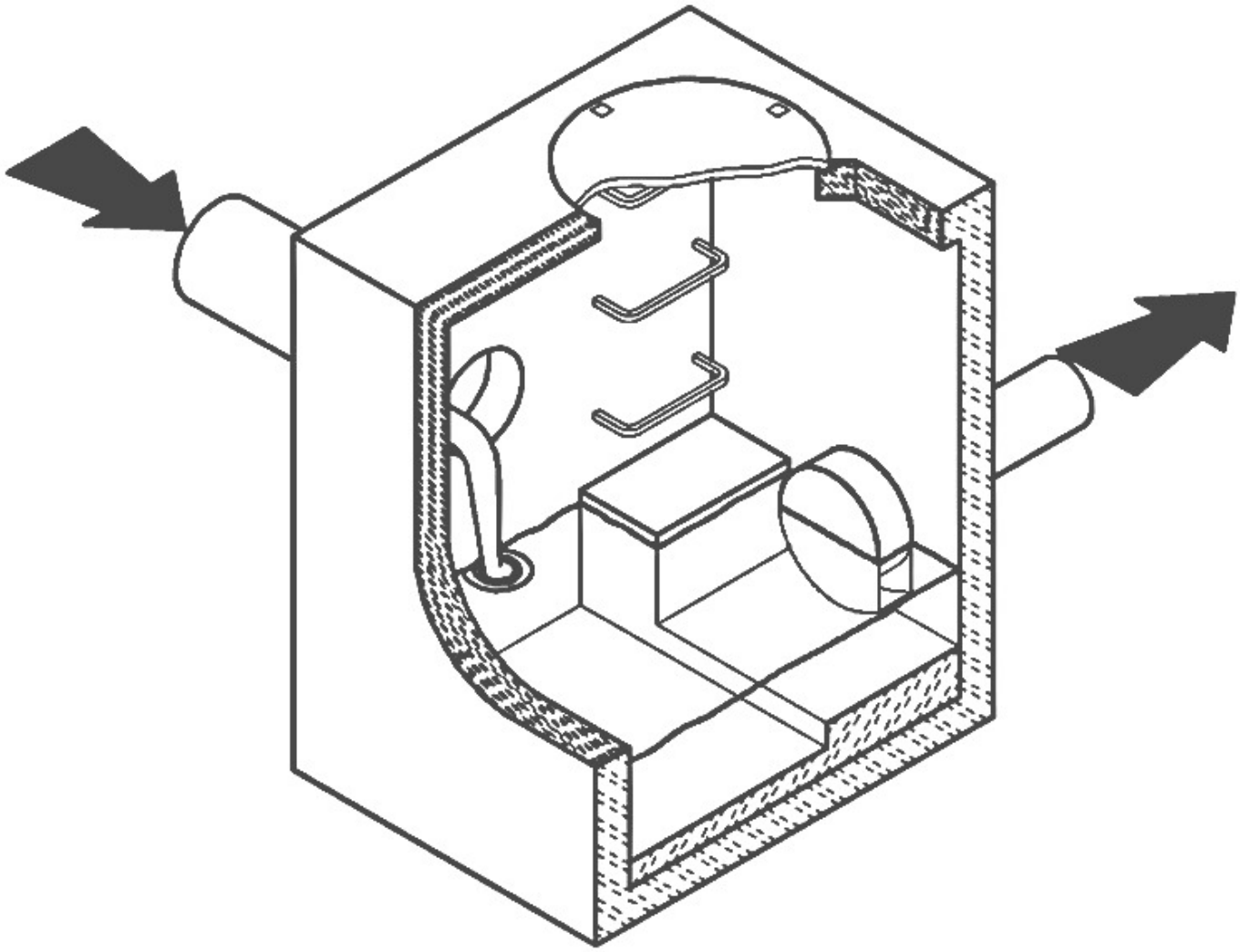
Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From MH	To MH	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
WS-02	STM MH300	STM MH200	0.036	0.000	0.330	0.846	0.85	10.00	104.2	88.19	15.75	375	PVC	0.49%	63.4	122.7	1.11	0.95	0.72
	STM MH200	STM MH100	0.000	0.000	0.000	0.000	0.85	10.95	99.4	84.16	1.90	375	PVC	0.51%	19.5	125.2	1.13	0.29	0.67
	STM MH100	EX. STM	0.00	0.00	0.00	0.000	0.85	11.24	98.1	83.02	17.65	375	PVC	1.01%	19.9	176.2	1.60	0.21	0.47

CSO/STORMWATER MANAGEMENT

HYDROVEX® VHV / SVHV

Vertical Vortex Flow Regulator



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APPLICATIONS

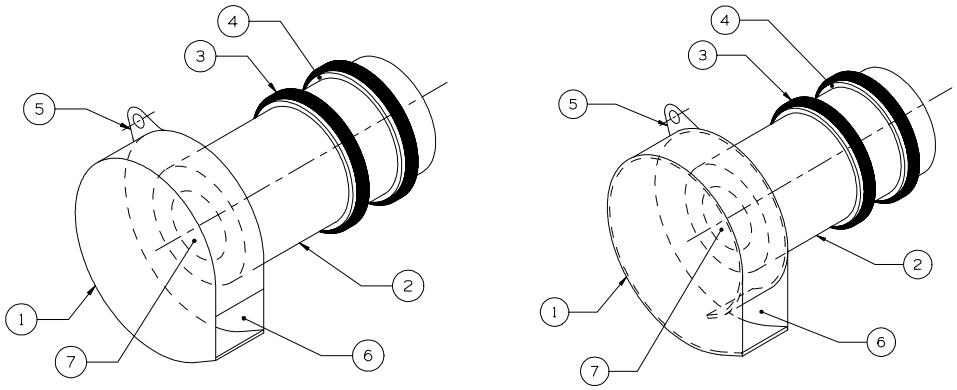
One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm, uncontrolled flows may overload the drainage system and cause flooding. Due to increased velocities, sewer pipe wear is increased dramatically and results in network deterioration. In a combined sewer system, the wastewater treatment plant may also experience significant increases in flows during storms, thereby losing its treatment efficiency.

A simple means of controlling excessive water runoff is by controlling excessive flows at their origin (manholes). **John Meunier Inc.** manufactures the **HYDROVEX® VHV / SVHV** line of vortex flow regulators to control stormwater flows in sewer networks, as well as manholes.

The vortex flow regulator design is based on the fluid mechanics principle of the forced vortex. This grants flow regulation without any moving parts, thus reducing maintenance. The operation of the regulator, depending on the upstream head and discharge, switches between orifice flow (gravity flow) and vortex flow. Although the concept is quite simple, over 12 years of research have been carried out in order to get a high performance.

The **HYDROVEX® VHV / SVHV** Vertical Vortex Flow Regulators **(refer to Figure 1)** are manufactured entirely of stainless steel, and consist of a hollow body (**1**) (in which flow control takes place) and an outlet orifice (**7**). Two rubber "O" rings (**3**) seal and retain the unit inside the outlet pipe. Two stainless steel retaining rings (**4**) are welded on the outlet sleeve to ensure that there is no shifting of the "O" rings during installation and use.

1. **BODY**
2. **SLEEVE**
3. **O-RING**
4. **RETAINING RINGS (SQUARE BAR)**
5. **ANCHOR PLATE**
6. **INLET**
7. **OUTLET ORIFICE**



VHV ***SVHV***

FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTREX FLOW REGULATORS

ADVANTAGES

- The **HYDROVEX® VHV / SVHV** line of flow regulators are manufactured entirely of stainless steel, making them durable and corrosion resistant.
- Having no moving parts, they require minimal maintenance.
- The geometry of the **HYDROVEX® VHV / SVHV** flow regulators allows a control equal to an orifice plate, having a cross section area 4 to 6 times smaller. This decreases the chance of blockage of the regulator, due to sediments and debris found in stormwater flows. **Figure 2** illustrates the comparison between a regulator model 100 SVHV-2 and an equivalent orifice plate. One can see that for the same height of water, the regulator controls a flow approximately four times smaller than an equivalent orifice plate.
- Installation of the **HYDROVEX® VHV / SVHV** flow regulators is quick and straightforward and is performed after all civil works are completed.
- Installation requires no special tools or equipment and may be carried out by any contractor.
- Installation may be carried out in existing structures.

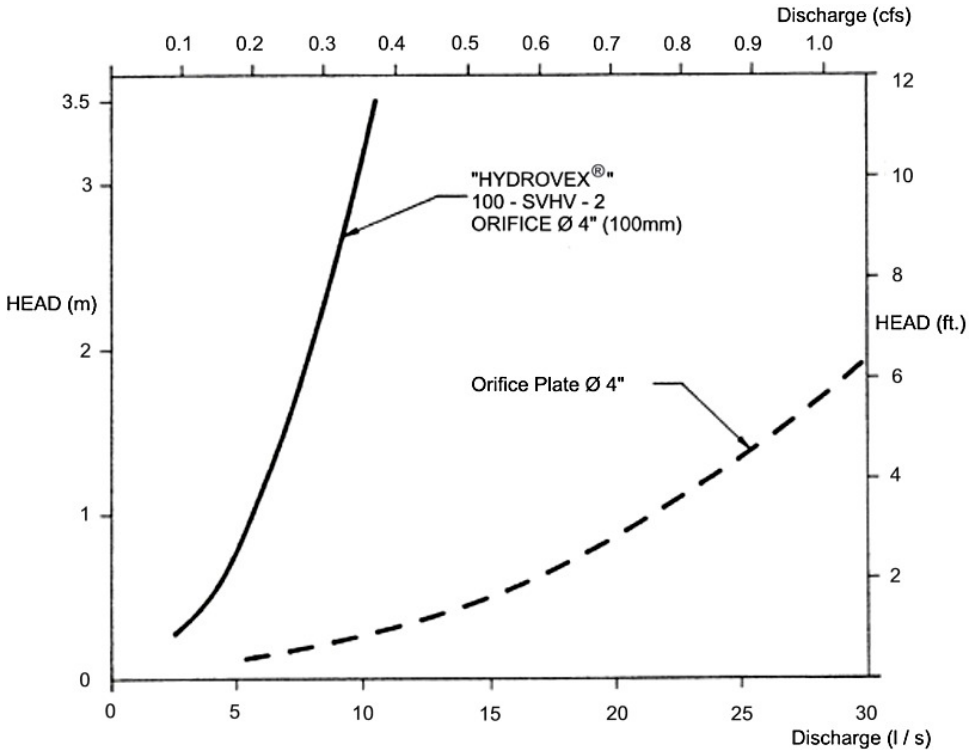


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

Selection of a **VHV or SVHV** regulator can be easily made using the selection charts found at the back of this brochure (see **Figure 3**). These charts are a graphical representation of the maximum upstream water pressure (head) and the maximum discharge at the manhole outlet. The maximum design head is the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by John Meunier Inc. personnel prior to fabrication.

Example:

✓ Maximum design head	2m (6.56 ft.)
✓ Maximum discharge	6 L/s (0.2 cfs)
✓ Using **Figure 3** - VHV	model required is a **75 VHV-1**

INSTALLATION REQUIREMENTS

All **HYDROVEX® VHV / SVHV** flow regulators can be installed in circular or square manholes. **Figure 4** gives the various minimum dimensions required for a given regulator. ***It is imperative to respect the minimum clearances shown to ensure easy installation and proper functioning of the regulator.***

SPECIFICATIONS

In order to specify a **HYDROVEX®** regulator, the following parameters must be defined:

- The model number (ex: 75-VHV-1)
- The diameter and type of outlet pipe (ex: 6" diam. SDR 35)
- The desired discharge (ex: 6 l/s or 0.21 CFS)
- The upstream head (ex: 2 m or 6.56 ft.) *
- The manhole diameter (ex: 36" diam.)
- The minimum clearance "H" (ex: 10 inches)
- The material type (ex: 304 s/s, 11 Ga. standard)

* ***Upstream head is defined as the difference in elevation between the maximum upstream water level and the invert of the outlet pipe where the HYDROVEX® flow regulator is to be installed.***

PLEASE NOTE THAT WHEN REQUESTING A PROPOSAL, WE SIMPLY REQUIRE THAT YOU PROVIDE US WITH THE FOLLOWING:

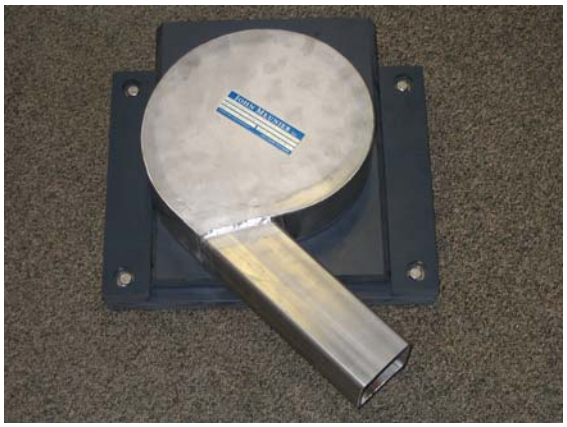
- ***project design flow rate***
- ***pressure head***
- ***chamber's outlet pipe diameter and type***

Typical VHV model in factory

OPTIONS

FV – SVHV (mounted on sliding plate)

VHV-1-O (standard model with odour control inlet)



FV – VHV-O (mounted on sliding plate with odour control inlet)

VHV with Gooseneck assembly in existing chamber without minimum release at the bottom

VHV with air vent for minimal slopes

HYDROVEX®

VHV Vertical Vortex Flow Regulator

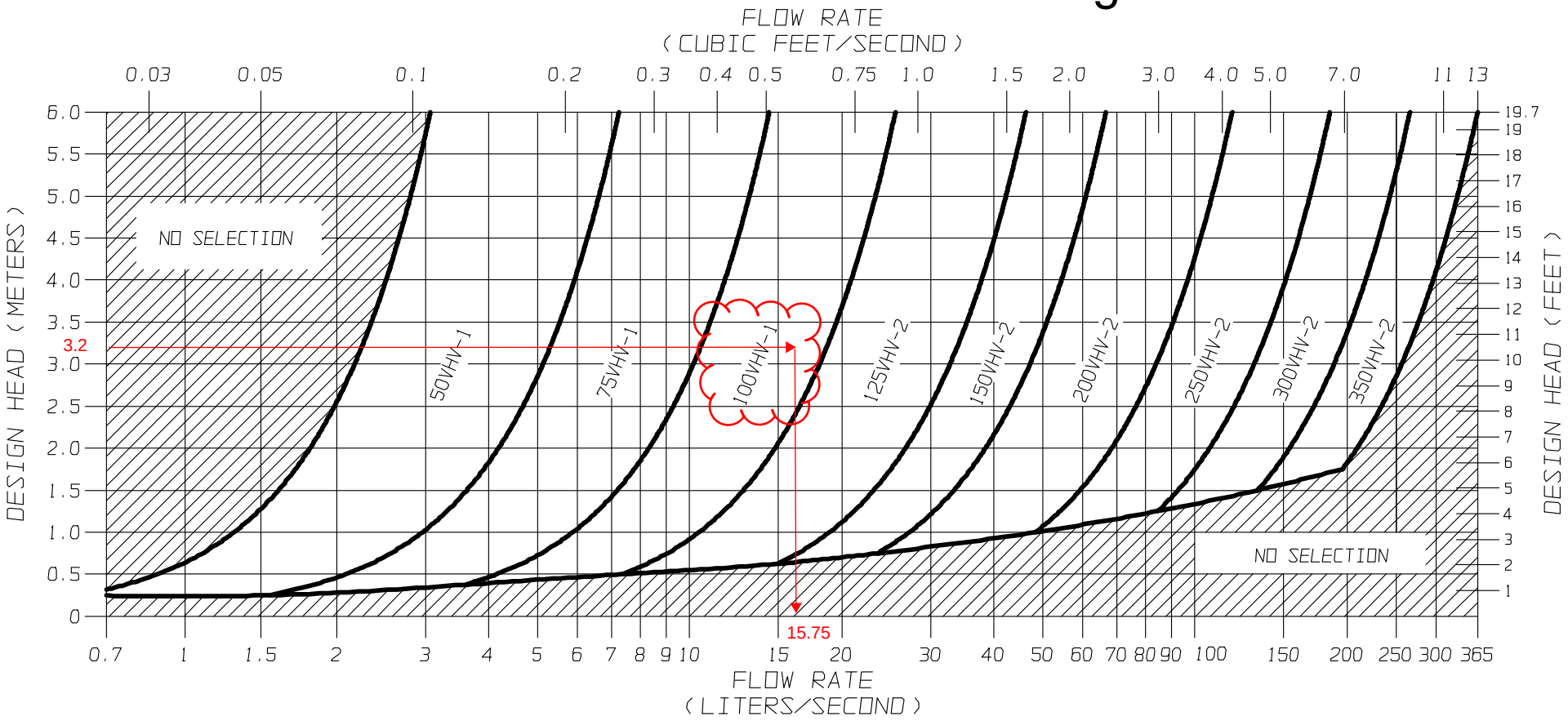


FIGURE 3 - VHV

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HYDROVEX®

SVHV Vertical Vortex Flow Regulator

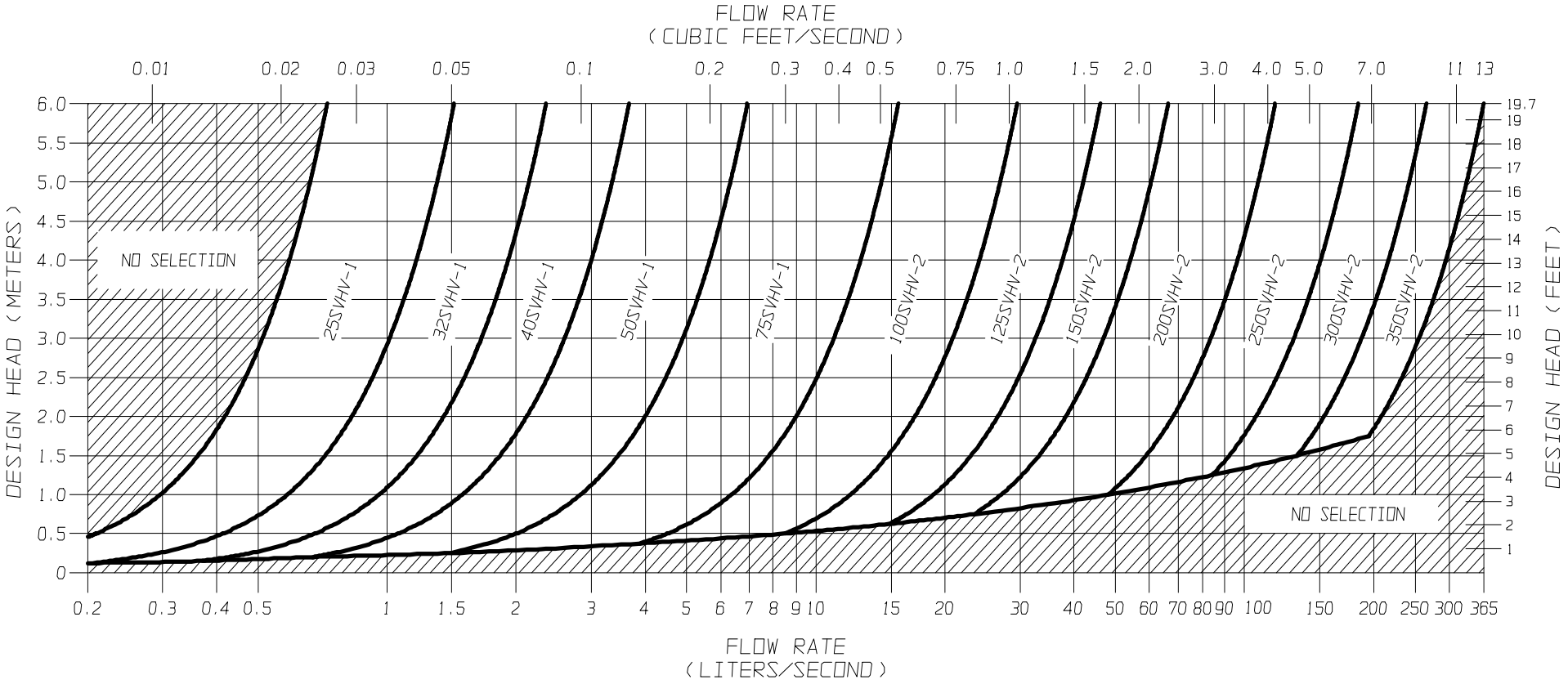

FIGURE 3 - SVHV

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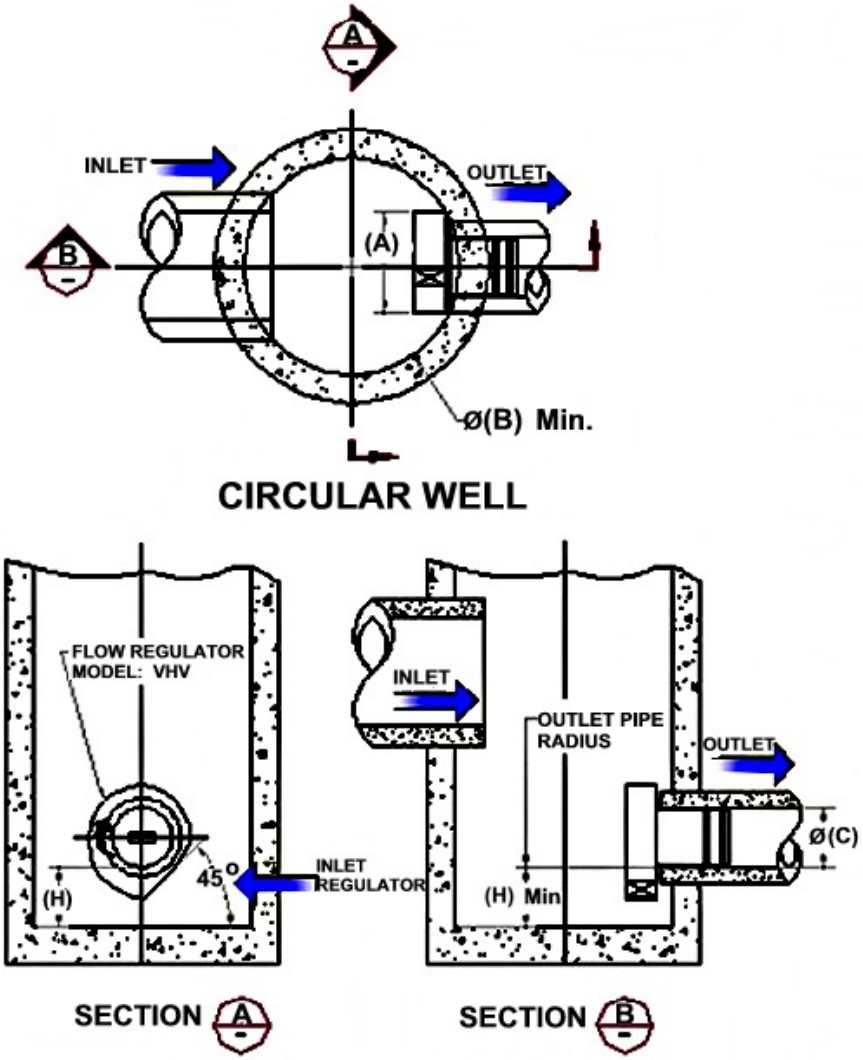
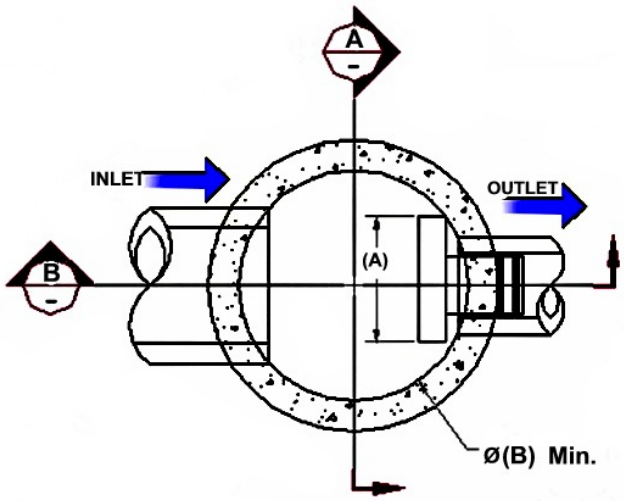
FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	900	36	150	6	200	8
125VHV-2	275	11	900	36	150	6	200	8
150VHV-2	350	14	900	36	150	6	225	9
200VHV-2	450	18	1200	48	200	8	300	12
250VHV-2	575	23	1200	48	250	10	350	14
300VHV-2	675	27	1600	64	250	10	400	16
350VHV-2	800	32	1800	72	300	12	500	20

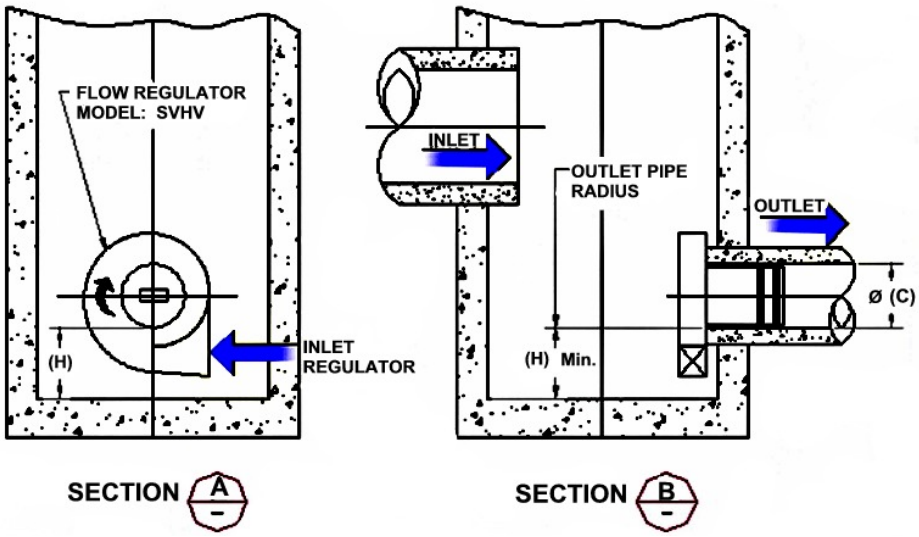


FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL SVHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	900	36	150	6	275	11
100 SVHV-2	275	11	900	36	150	6	250	10
125 SVHV-2	350	14	900	36	150	6	300	12
150 SVHV-2	425	17	1200	48	150	6	350	14
200 SVHV-2	575	23	1600	64	200	8	450	18
250 SVHV-2	700	28	1800	72	250	10	550	22
300 SVHV-2	850	34	2400	96	250	10	650	26
350 SVHV-2	1000	40	2400	96	250	10	700	28



CIRCULAR WELL

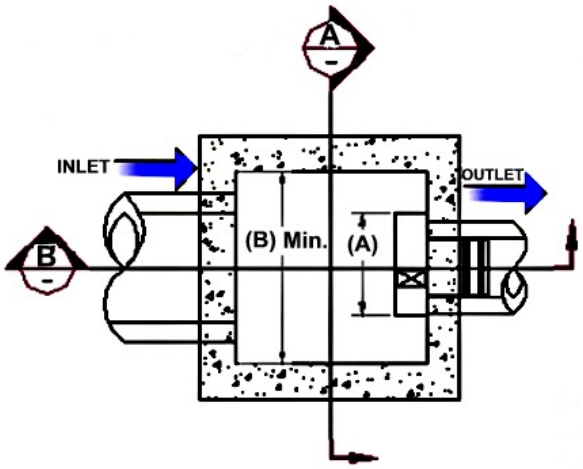


SECTION A **SECTION B**

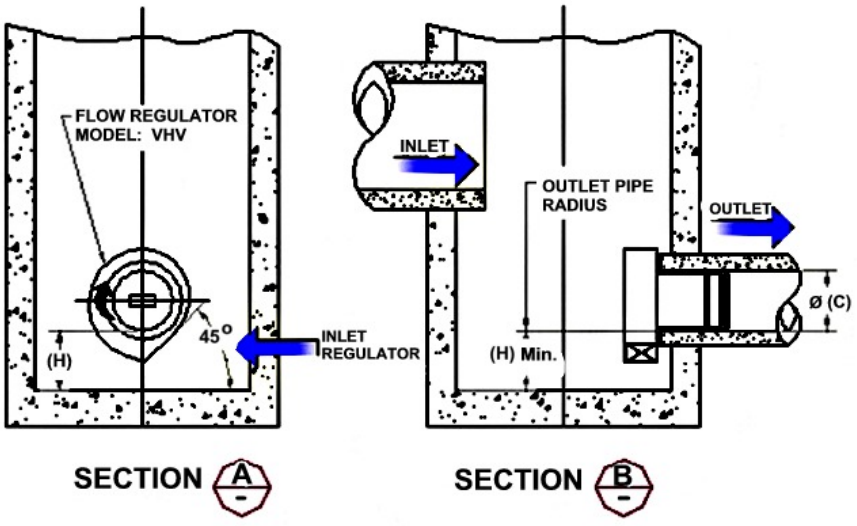
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Chamber Width		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	600	24	150	6	200	8
125VHV-2	275	11	600	24	150	6	200	8
150VHV-2	350	14	600	24	150	6	225	9
200VHV-2	450	18	900	36	200	8	300	12
250VHV-2	575	23	900	36	250	10	350	14
300VHV-2	675	27	1200	48	250	10	400	16
350VHV-2	800	32	1200	48	300	12	500	20

NOTE: ***In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.***



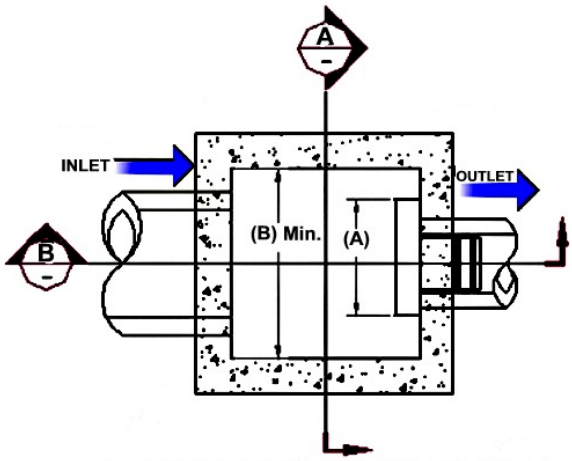
SQUARE / RECTANGULAR WELL



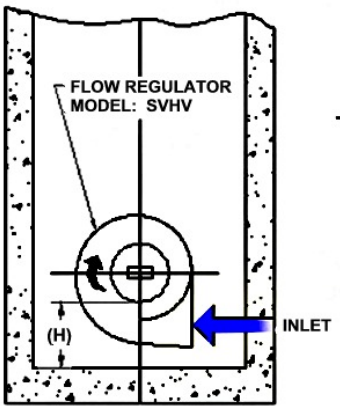
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL SVHV)

Model Number	Regulator Diameter		Minimum Chamber Width		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	600	24	150	6	275	11
100 SVHV-2	275	11	600	24	150	6	250	10
125 SVHV-2	350	14	600	24	150	6	300	12
150 SVHV-2	425	17	600	24	150	6	350	14
200 SVHV-2	575	23	900	36	200	8	450	18
250 SVHV-2	700	28	900	36	250	10	550	22
300 SVHV-2	850	34	1200	48	250	10	650	26
350 SVHV-2	1000	40	1200	48	250	10	700	28

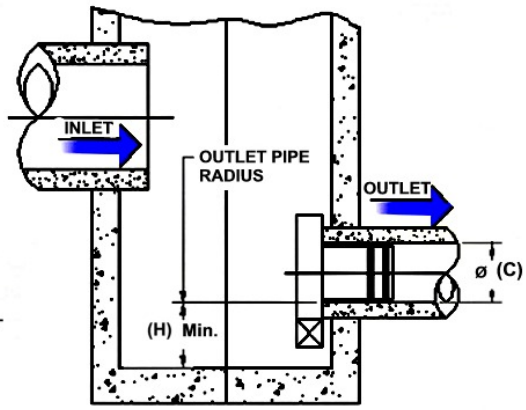
NOTE: ***In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.***



SQUARE / RECTANGULAR WELL



SECTION A



SECTION B

INSTALLATION

The installation of a **HYDROVEX®** regulator may be undertaken once the manhole and piping is in place. Installation consists of simply fitting the regulator into the outlet pipe of the manhole. **John Meunier Inc.** recommends the use of a lubricant on the outlet pipe, in order to facilitate the insertion and orientation of the flow controller.

MAINTENANCE

HYDROVEX® regulators are manufactured in such a way as to be maintenance free; however, a periodic inspection (every 3-6 months) is suggested in order to ensure that neither the inlet nor the outlet has become blocked with debris. The manhole should undergo periodically, particularly after major storms, inspection and cleaning as established by the municipality

GUARANTY

The **HYDROVEX®** line of **VHV / SVHV** regulators are guaranteed against both design and manufacturing defects for a period of 5 years. Should a unit be defective, **John Meunier Inc.** is solely responsible for either modification or replacement of the unit.

John Meunier Inc.
ISO 9001 : 2008

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Revised: 2011-05-03

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteASSIST™
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

NAVAN STACKED TOWNS

OTTAWA, AL

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

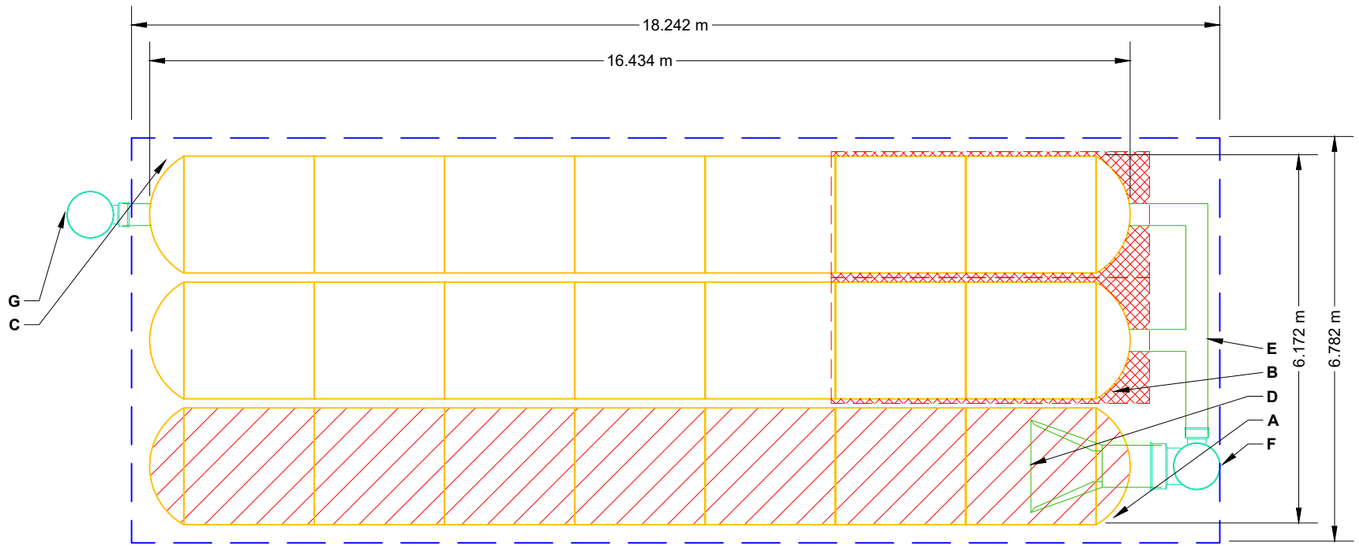
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
21	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	3.810
6	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.981
305	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.829
229	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.829
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.829
123.7	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	1.676
		TOP OF MC-3500 CHAMBER:	1.372
		300 mm x 300 mm TOP MANIFOLD INVERT:	0.898
		600 mm ISOLATOR ROW PLUS INVERT:	0.281
123.7	SYSTEM AREA (m^2)	300 mm BOTTOM CONNECTION INVERT:	0.263
50.0	SYSTEM PERIMETER (m)	BOTTOM OF MC-3500 CHAMBER:	0.229
		BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
PREFABRICATED END CAP	B	300 mm TOP CORED END CAP, PART#: MC3500IEPP12T / TYP OF ALL 300 mm TOP CONNECTIONS	671 mm	
PREFABRICATED END CAP	C	300 mm BOTTOM CORED END CAP, PART#: MC3500IEPP12B / TYP OF ALL 300 mm BOTTOM CONNECTIONS	34 mm	
FLAMP	D	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MC350024RAMP (TYP 2 PLACES)		
MANIFOLD	E	300 mm x 300 mm TOP MANIFOLD, ADS N-12	670 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	F	750 mm DIAMETER (610 mm SUMP MIN)		140 L/s IN
NYLOPLAST (OUTLET)	G	750 mm DIAMETER (DESIGN BY ENGINEER)		57 L/s OUT



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

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PROJECT #:

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ADS
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HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 100

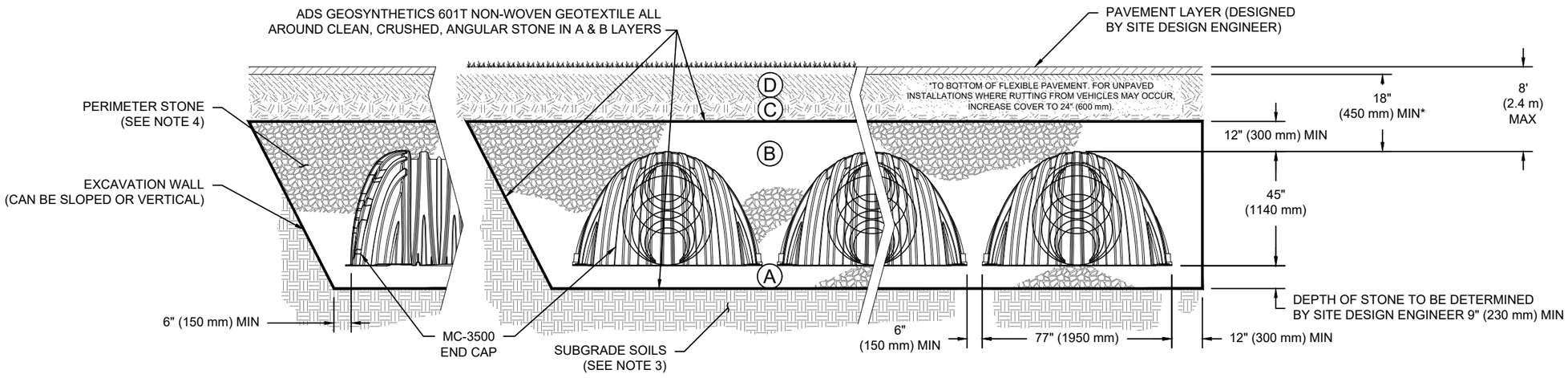
StormTech® Chamber System

888-892-2694 | WWW.STORMTECH.COM

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

NAVAN STACKED TOWNS
OTTAWA, AL
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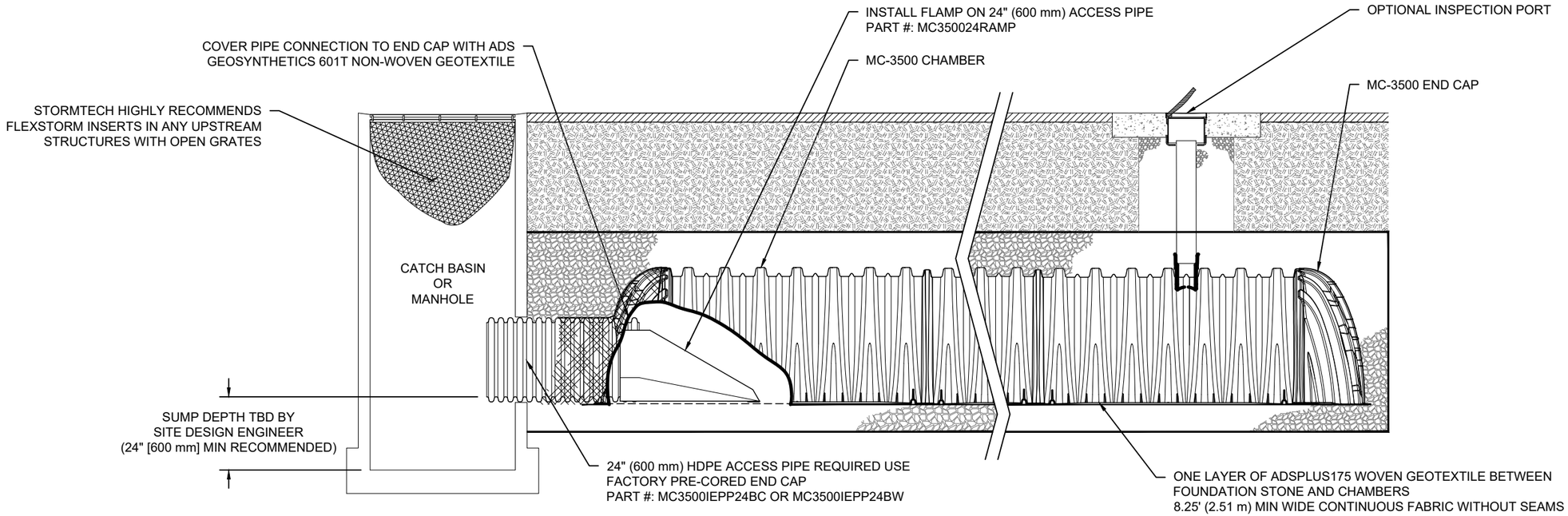

MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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MC-3500 TECHNICAL SPECIFICATION

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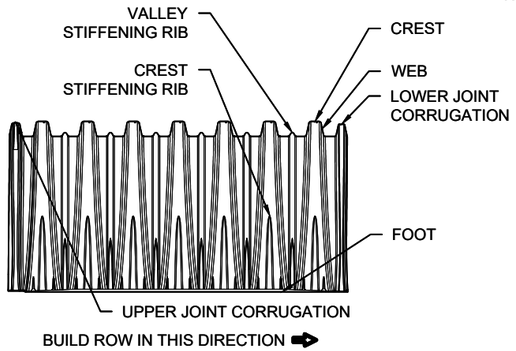
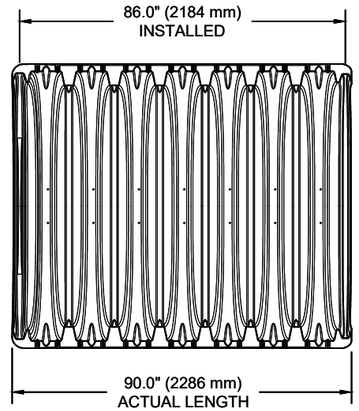
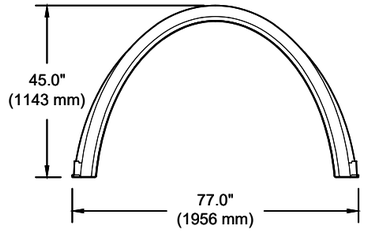
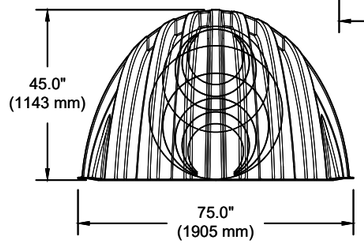
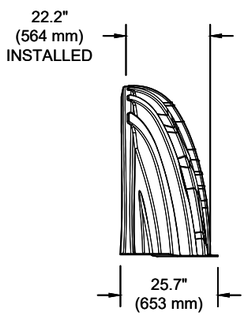










NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

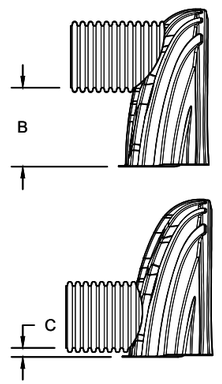
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

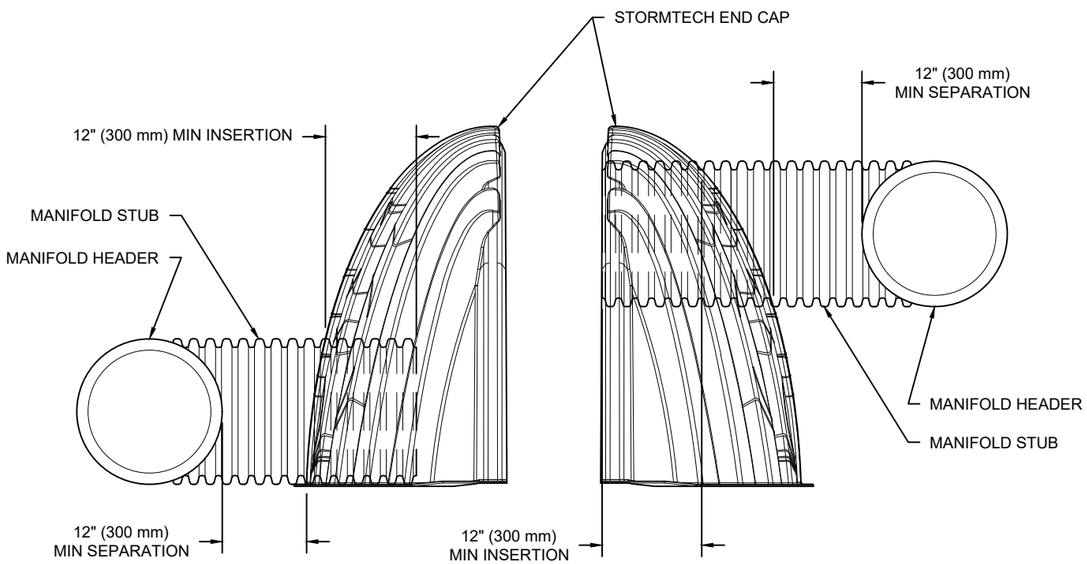
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

NAVAN STACKED TOWNS
OTTAWA, AL

DATE: | DRAWN: AU | PROJECT #: | CHECKED: N/A

DESCRIPTION	CHK	DRW	DATE

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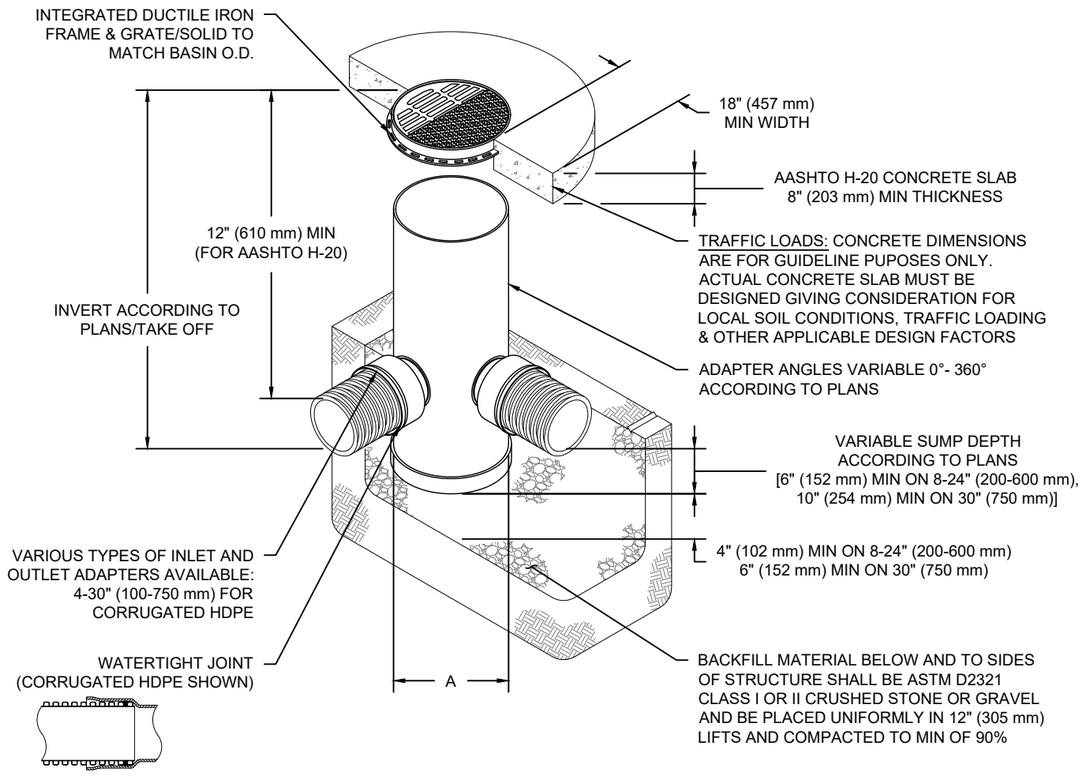
ADS

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

NAVAN STACKED TOWNS
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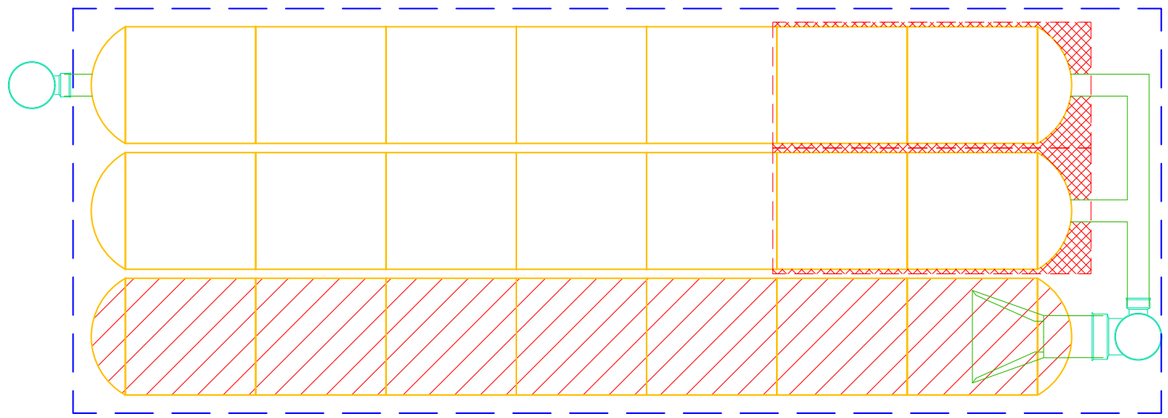

APPENDIX E

Civil Engineering Drawings

NAVAN STACKED TOWN HOMES
6001 / 6005 RENAUD ROAD, OTTAWA, ON.

REVISION 01

KEY PLAN (N.T.S.)

DRAWING INDEX	
TITLE PAGE	
GENERAL NOTES	C001
SEDIMENT AND EROSION CONTROL PLAN	C101
DEMOLITION PLAN	C102
SITE DEVELOPMENT PLAN	C201
GRADING AND DRAINAGE PLAN	C301
SERVICING PLAN	C401
STORMWATER MANAGEMENT PLAN	C601
PRE-DEVELOPMENT WATERSHED PLAN	C701
POST-DEVELOPMENT WATERSHED PLAN	C702
CONSTRUCTION DETAIL PLAN	C901

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NAVAN STACKED TOWN HOMES
6001/6005 RENAUD ROAD, OTTAWA, ON.
REV.01 - ISSUED FOR MUNICIPAL APPROVAL - DEC 24, 2021
LRL PROJECT no: 210216

GENERAL NOTES

1. ALL WORKS MATERIALS SHALL CONFIRM TO THE LAST REVISION OF THE STANDARDS AND SPECIFICATIONS FOR THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
2. THE CONTRACTORS SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTORS SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION , TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION, ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTORS TO CONFIRM UTILITY LOCATIONS AND NOTIFY ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT CONTRACTORS EXPENSE.
4. ANY AREA BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE. RELOCATING OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR DETECTED BY THE ENGINEER AT THE EXPENSE OF DEVELOPERS.
5. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 'OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS'. THE GENERAL CONTRACTORS SHALL BE DEEMED TO BE THE 'CONTRACTOR' AS DEFINED IN THE ACT.
6. ALL THE CONSTRUCTION SIGNAGE MUST CONFIRM TO THE MINISTRY OF TRANSPORTATION OF ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES PER LATEST AMENDMENT.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THE CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES TO PREVENT CONFLICTS.
8. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
9. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS RECEIVED FROM THE ENGINEER.
10. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
11. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE REFER TO THE SITE SERVICING AND STORMWATER MANAGEMENT REPORT.
12. ALL SEWERS CONSTRUCTED WITH GRADES LESS THAN 1.0% SHALL BE INSTALLED USING LASER ALIGNMENT AND CHECKED WITH LEVEL INSTRUMENT PRIOR TO BACKFILLING.
13. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF THE SAME.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL BEDDING, OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH AS SPECIFIED BY OPSD IS EXCEEDED.
15. ALL PIPE/CULVERT SECTION SIZES REFER TO INSIDE DIMENSIONS.
16. SHOULD DEEPLY BURIED ARCHAEOLOGICAL REMAINS BE FOUND ON THE PROPERTY DURING CONSTRUCTION ACTIVITIES, THE HERITAGE OPERATIONS UNIT OF THE ONTARIO MINISTRY OF CULTURE MUST BE NOTIFIED IMMEDIATELY.
17. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO ANY TREE CUTTING/REMOVAL.
18. DRAWINGS SHALL BE READ ON CONJUNCTION WITH ARCHITECTURAL SITE PLAN.
19. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER ON SET OF AS CONSTRUCTED SITE SERVICING AND GRADING DRAWINGS.
20. BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION DEPICTED ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM THEIR CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN MANNER THAT STRICTLY MEETS THE REQUIREMENT OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT THEIR OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVELY FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES ARRANGED IN SUCH MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCE, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR OTHER RECOGNIZED TECHNOLOGIES AND METHOD AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF OPSS 577 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIME WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT THE MOMENT'S NOTICE.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP). THE ESCP WILL CONSIST OF WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTOR, IN THE WORKING ARE ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO THE SEWER WATERCOURSE AND AVOIDS DAMAGE TO CONTROL MEASURES. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH REQUIREMENTS FRO EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BRACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY THE APPLICABLE REGULATORY AGENCY. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL

WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR TAT ALL, THE CONTRACTOR ADMINISTRATOR OR A REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

SPILL CONTROL NOTES

1. ALL CONSTRUCTION EQUIPMENT SHALL BE RE-FUELED, MAINTAINED, AND STORED NO LESS THAN 30 METRES FROM WATERCOURSE, STEAMS, CREEKS, WOODLOTS, AND ANY ENVIRONMENTALLY SENSITIVE AREAS, OR AS OTHERWISE SPECIFIED.
2. THE CONTRACTOR MUST IMPLEMENT ALL NECESSARY MEASURES IN ORDER TO PREVENT LEAKS, DISCHARGES OR SPILLS OF POLLUTANTS, DELETERIOUS MATERIALS, OR OTHER SUCH MATERIALS OR SUBSTANCES WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT.
3. IN THE EVENT OF A LEAK, DISCHARGE OR SPILL OF POLLUTANT, DELETERIOUS MATERIAL OR OTHER SUCH MATERIAL OR SUBSTANCE WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT, THE CONTRACTOR SHALL:
   - 3.1. IMMEDIATELY NOTIFY APPROPRIATE FEDERAL, PROVINCIAL, AND LOCAL GOVERNMENT MINISTRIES, DEPARTMENTS, AGENCIES, AND AUTHORITIES OF THE INCIDENT IN ACCORDANCE WITH ALL CURRENT LAWS, LEGISLATION, ACTS, BY-LAWS, PERMITS, APPROVALS, ETC.
   - 3.2. TAKE IMMEDIATE MEASURES TO CONTAIN THE MATERIAL OR SUBSTANCE, AND TO TAKE SUCH MEASURES TO MITIGATE AGAINST ADVERSE IMPACTS TO THE NATURAL ENVIRONMENT.
   - 3.3. RESTORE THE AFFECTED AREA TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION.

MUD MAT NOTES

1. THE GRANULAR MATERIAL WILL REQUIRE PERIODIC REPLACEMENT AS IT BECOMES CONTAMINATED BY VEHICLE TRAFFIC.
2. SEDIMENT SHALL BE CLEANED FROM PUBLIC ROADS AT THE END OF EACH DAY.
3. SEDIMENT SHALL BE REMOVED FROM PUBLIC ROADS BY SHOVELING OR SWEEPING AND DISPOSED OR PROPERLY IN A CONTROLLED SEDIMENT DISPOSAL AREA.

SITE GRADING NOTES

1. PRIOR TO THE COMMENCEMENT OF THE SITE GRADING WORKS, ALL SILTATION CONTROL DEVICES SHALL BE INSTALLED AND OPERATIONAL PER EROSION CONTROL PLAN.
2. ALL GRANULAR AND PAVEMENT FOR ROADS/PARKING AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
3. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD AND PARKING AREAS ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
4. CONCRETE CURB SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. SC1.1 PROVISION SHALL BE MADE OR CURB DEPRESSIONS AS INDICATED ON ARCHITECTURAL SITE PLAN. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD SC1.4. ALL CURBS, CONCRETE ISLANDS, AND SIDEWALKS SHOWN O THIS DRAWING ARE TO BR PRICED IN SITE WORKS PORTION OF THE CONTRACT.
5. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. R10 AND OPSD 509.010 AND OPSS 310.
6. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 30MM AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 30MM LIFTS.
8. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR BACKFILLING.
9. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
10. ALL PAVEMENT MARKING FEATURES AND SITE SIGNAGE SHALL BE PLACED PER ARCHITECTURAL SITE PLAN. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT PAINT.
11. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
12. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
13. SIDEWALKS TO BE 13MM & BEVELED AT 2:1 OR 6MM WITH NO BEVEL REQUIRED BELOW THE FINISHED FLOOR SLAB ELEVATION AT ENTRANCES REQUIRED TO BE BARRIER-FREE, UNLESS OTHERWISE NOTED. ALL IN ACCORDANCE WITH OBC 3.8.1.3 & OTTAWA ACCESSIBILITY DESIGN STANDARDS.
14. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

ROADWORK SPECIFICATIONS

15. ROADWORK TO BE COMPLETED IN ACCORDANCE WITH GEOTECHNICAL REPORT, PREPARED BY LRL ASSOCIATES. DATED NOVEMBER 2020.
16. AL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND STOCK PILLED ON SITE AS DIRECTED BY NATIONAL MUNICIPALITY.
17. THE SUBGRADE SHALL BE CROWNED AND SLOPED AT LEAST 2% AND PROOF ROLLED WITH HEAVY ROLLERS.
18. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'A', TYPE II COMPACTED IN MAXIMUM 300MM LIFTS.
19. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO MINIMUM OF 100% STANDARD PROCTOR DENSITY MAXIMUM DRY DENSITY (SPMDD).

SANITARY, FOUNDATION DRAIN, STORM SEWER AND WATERMAIN NOTES

GENERAL

1. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
2. CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5M LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUB-BEDDING, AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPATIBLE BROWN SILTY CLAY PLACED IN MAXIMUM 225MM LIFTS AND COMPACTED TO A MINIMUM OF 95% SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT 60M INTERVALS IN THE SERVICE TRENCHES.
3. SERVICES TO BUILDING TO BE TERMINATED 1.0M FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
4. ALL MAINTENANCE STRUCTURE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY. A MINIMUM OF 300MM AROUND STRUCTURES.
5. "MODULOC" OR APPROVED PRE-CAST MAINTENANCE STRUCTURE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
6. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
7. DROP STRUCTURES SHALL BE IN ACCORDANCE WITH OPSD 1003.01, IF APPLICABLE.
8. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO RECORDING IN A FORMAT ACCEPTABLE TO ENGINEER. ALL SEWER ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS AND NECESSARY REPAIRS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE ENGINEER.
9. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF WEAR COURSE ASPHALT.

SANITARY

10. ALL SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD). AND SPECIFICATIONS (OPSS).
11. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
12. EXISTING MAINTENANCE STRUCTURES TO BE RE-BENCHED WHERE A NEW CONNECTION IS MADE.
13. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
14. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
15. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.
16. 100MM THICK HIGH-DENSITY GRADE 'A' POLYSTYRENE INSULATION TO BE INSTALLED IN ACCORDANCE WITH CITY STD W22 WHERE INDICATED ON DRAWING SSP-1.

STORM

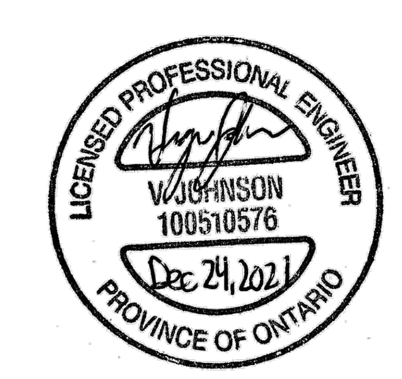
17. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
18. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
19. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
20. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
21. CATCH BASIN LEADS SHALL BE IN 200MM DIA. AT 1% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
22. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
23. ALL CATCH BASIN LEAD INVERTS TO BE 1.5M BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
24. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED , THE CONTRACTOR IS REQUIRED TO PROVIDE AND SHALL BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
25. ALL ROAD AND PARKING LOT CATCH BASINS TO BE INSTALLED WITH ORTHOGONALLY PLACED SUBDRAINS IN ACCORDANCE WITH DETAIL. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
26. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30 AND S31, WHERE APPLICABLE.
27. RIP-RAP TREATMENT SEWER AND CULVERT OUTLETS PER OPSD 810.010.
28. ALL STORM SEWER/ CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE.
29. ALL STORM MANHOLES WITH PIPE LESS THAN 900MM IN DIAMETER SHALL BE CONSTRUCTED WITH A 300MM SUMP AS PER SDG, CLAUSE 6.2.6.

WATERMAIN

30. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
31. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
32. ALL WATER SERVICES LESS THAN OR EQUAL TO 50MM IN DIAMETER TO BE TYPE 'K' COPPER.
33. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17. UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY THE PROJECT GEOTECHNICAL ENGINEER.
34. ALL PVC WATERMAINS, SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W.36.
35. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD.25.5 AND W25.6.
36. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
37. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
38. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25.3 AND W25.4.
39. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
40. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. W25,2 AND W25, RESPECTIVELY.
41. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4M.
42. THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER/UTILITY IS 0.5M PER MOE GUIDELINES. FOR CROSSING UNDER SEWERS, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING TO ENSURE THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
43. ALL WATERMAINS SHALL HAVE A MINIMUM COVER OR 2.4M, OTHERWISE THERMAL INSULATION IS REQUIRED AS PER STD DWG W22.
44. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20.
45. FIRE HYDRANT INSTALLATION AS PER STD DWG W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10M ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W18.
46. BUILDING SERVICE TO BE CAPPED 1.0M OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12M BACK FROM STUB.
47. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
48. ALL WATERMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT ENVIRONMENT. IT IS RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
49. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50MM BLOW OFF UNLESS OTHERWISE NOTED.

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021



NOT AUTHENTIC UNLESS SIGNED AND DATED

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DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

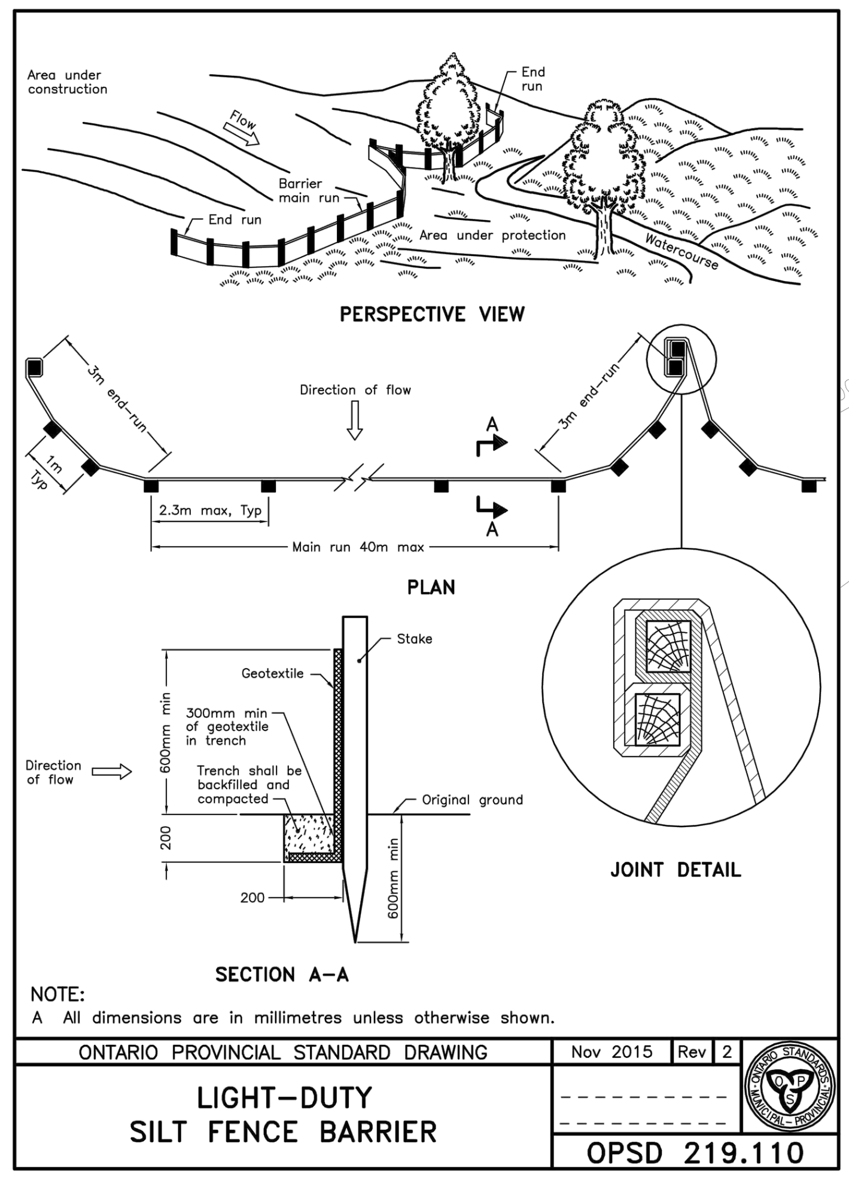
PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

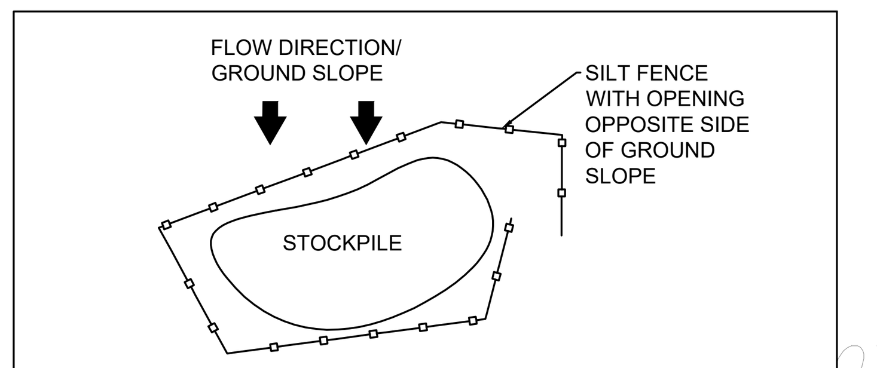
DRAWING TITLE
GENERAL NOTES

PROJECT NO.
210216

DATE
NOVEMBER 2021

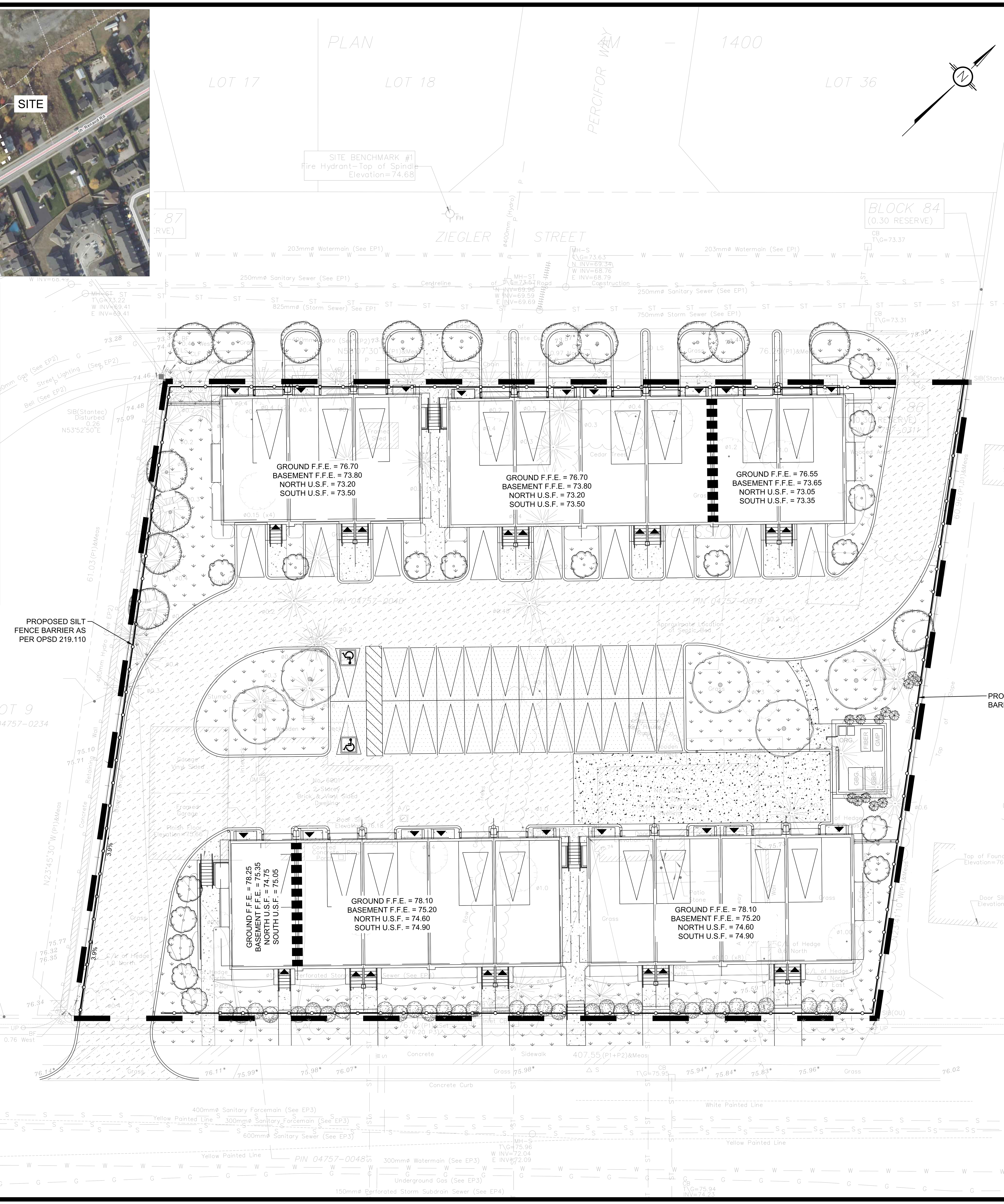
C001





STOCKPILE EROSION PROTECTION

N.T.S.



LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
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- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED 135mmØ SAN SERVICE
- PROPOSED WATERMAIN
- PROPOSED 25mmØ PEX WTR SERVICE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX — WATERSHED NAME
- CONTROLLED — RUNOFF COEFFICIENT
- AREA / RUNOFF — AREA IN HECTARES

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5m 2 0 5m

SCALE: 1:200

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER — V. JOHNSON — 100510576 — Dec 24, 2021 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL ENGINEERING | INGÉNIERIE

5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LANDRIC HOMES
1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.
210216

DATE
NOVEMBER 2021

C101

SITE BENCHMARK #1
Fire Hydrant-Top of Spindle
Elevation=74.68

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
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- RUNOFF COEFFICIENT
- AREA IN HECTARES

EXISTING SHED TO BE REMOVED

EXISTING TREES AND SHRUBS ON SITE TO BE CLEARED WITHIN NEW CONSTRUCTION LIMITS (TYP.)

EXISTING GARDEN TO BE REMOVED

EXISTING SEPTIC BED TO BE EXCAVATED & PROPERLY DISPOSED. BACKFILL WITH ENGINEER APPROVED SUITABLE MATERIAL.

EXISTING 2 STOREY HOUSE w/ATTACHED DECK TO BE DEMOLISHED & FOUNDATION REMOVED. BACKFILL WITH ENGINEER APPROVED SUITABLE MATERIAL.

EXISTING 1 ½ STOREY HOUSE w/ATTACHED DECK AND SHED TO BE DEMOLISHED & FOUNDATION REMOVED. BACKFILL WITH ENGINEER APPROVED SUITABLE MATERIAL.

EXISTING GARAGE & SLAB TO BE DEMOLISHED

EXISTING ASPHALT DRIVEWAY TO BE REMOVED

EXISTING BRICK PILLARS TO BE REMOVED

EXISTING TIMBER RETAINING WALL TO BE DEMOLISHED

EXISTING ASPHALT DRIVEWAY TO BE REMOVED

ALL EXISTING SERVICES ARE TO BE REMOVED AND CAPPED AT MAIN

PIN 04757-0311
PIN 04757-0040
PIN 04757-0019
PIN 04757-0234
PIN 04757-0310
PIN 04757-0048
PIN 04757-0023

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5m 2 0 5m
SCALE: 1:200

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No.	REVISIONS	BY	DATE
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LICENSED PROFESSIONAL ENGINEER
WILLIAM JOHNSON
100510576
Dec 24, 2021
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRJ
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www.lrl.ca I (613) 842-3434

CLIENT
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1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
DEMOLITION PLAN

PROJECT NO.
210216
DATE
NOVEMBER 2021

C102

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm) AUTOMOBILE PARKING	THICKNESS (mm) TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL.3 A/C (PG 58-28)	50	40
BINDER	HL.8 A/C (PG 58-28)	--	50
BASECOURSE	OPSS GRANULAR "A"	150	150
SUBBASE	OPSS GRANULAR "B" TYPE II	300	450

NOTE:
REFER TO GEOTECHNICAL INVESTIGATION BY PATERSON GROUP DATED APRIL 23, 2021. IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.

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5m 2 0 5m
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PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
210216

DATE
NOVEMBER 2021

C301

SITE BENCHMARK #1
Fire Hydrant–Top of Spindle
Elevation=74.68

Caution: Rogers, Bell, Hydro and Gas services on North Side of Ziegler are not shown.

Caution: Rogers, Bell and Hydro on North Side of Ziegler are not shown.

ZIEGLAR ST

BLOCK 1
6 UNITS
(G.F.A. = ±840m²)

GROUND F.F.E. = 76.70
BASEMENT F.F.E. = 73.80
NORTH U.S.F. = 73.20
SOUTH U.S.F. = 73.50

BLOCK 2
12 UNITS
(G.F.A. = ±1680m²)

GROUND F.F.E. = 76.70
BASEMENT F.F.E. = 73.80
NORTH U.S.F. = 73.20
SOUTH U.S.F. = 73.50

GROUND F.F.E. = 76.55
BASEMENT F.F.E. = 73.65
NORTH U.S.F. = 73.05
SOUTH U.S.F. = 73.35

PROP SAN MH4
T/G = 74.82
NE INV = 72.90
SE INV = 72.87

PROP SAN MH5
T/G = 75.03
SW INV = 73.10

PROP STM MH400
T/G = 75.02
NE INV = 71.38
SE INV =71.32

PROPOSED CB01
T/L=74.55
INV = 72.46
C/W HYDROVEX 400VHV1 ICD
100-YR Q = 15.75 L/s
H = 3.2m

PROP STM 58.9m - 200mmØ PVC DR-35 @ 0.35%

PROP STM 57.4m - 250mmØ PVC DR-35 @ 0.56%

PROPOSED STORMTECH CHAMBERS MODEL MC-3500 (OR APPROVED EQUIVALENT)
SEE DETAIL IN C901
U/G VOL AVAILABLE = 125.92m³
INV = 72.50

PROPOSED CB01
T/L=74.55
INV = 72.95

PROP STM MH500
T/G = 74.73
SW INV = 71.70

50mm BLOW OFF VALVE & SCHEDULE 40 GALVANIZED RISER PIPE C/W CONCRETE THRUST BLOCK PER OPSD 1104.030

PROP SAN MH3
T/G = 75.38
SW INV = 73.06

PROP STM MH300
T/G = 75.09
SW INV = 71.55

PROP STM 16.2m - 250mmØ PVC DR-35 @ 0.50%

PROP 10.1m - 250mmØ CB LEAD DR-35 @ 1.0%

PROP 150mmØ WATERMAIN

PROP SAN 62.6m - 200mmØ PVC DR-35 @ 0.35%

PROP STM 63.4m - 375mmØ PVC DR-35 @ 0.49%

CONNECT TO 375mmØ STM
375mmØ INV = 71.34
375mmØ SPRINGLINE ELEV = 71.52
PROP. INV. = 71.40

BLOCK 4
10 UNITS
(G.F.A. = ±1400m²)

GROUND F.F.E. = 78.10
BASEMENT F.F.E. = 75.20
NORTH U.S.F. = 74.60
SOUTH U.S.F. = 74.90

GROUND F.F.E. = 78.25
BASEMENT F.F.E. = 75.35
NORTH U.S.F. = 74.75
SOUTH U.S.F. = 75.05

BLOCK 3
8 UNITS
(G.F.A. = ±1120m²)

GROUND F.F.E. = 78.10
BASEMENT F.F.E. = 75.20
NORTH U.S.F. = 74.60
SOUTH U.S.F. = 74.90

P.C.2
SAN INV = 72.38
PROP STM OBV =71.49
CLEARANCE = 0.89m

PROP SAN MH2
T/G = 76.22
NE INV = 72.84
NW INV = 72.81
SE INV = 72.78

PROP STM MH200
T/G = 75.26
NE INV = 71.24
NW INV = 71.24
SE INV = 71.18

PROP SAN MH1
T/G = 74.53
NW INV = 72.71
SE INV = 72.68

PROP STM MH100
T/G =76.21
NW INV = 71.08
SE INV = 71.05

PROP SAN 10.7m - 200mmØ PVC DR-35 @ 1.00%

PROP STM 19.9m - 375mmØ PVC DR-35 @ 1.01%

P.C.3
EX. FORCEMAIN OBV = ±72.28
PROP SAN INV = 72.58
CLEARANCE = 0.30m

EX 600mmø SAN @ ±0.66%

CONNECT TO EX. 600mmØ SAN PER CITY STD S11
EX. INV = ±71.78
EX. SPRINGLINE ELEV = ±72.08
PROP INV = 72.08

P.C.1
EX. FORCEMAIN INV = ±71.89
PROP STM OBV = 71.33
CLEARANCE = 0.56m

P.C.2
EX. SAN INV = ±71.79
PROP STM OBV = 71.32
CLEARANCE = 0.47m

PROP CONNECTION TO 305mmØ WATERMAIN BY CITY FORCES.
EXCAVATION AND REINSTATEMENT BY CONTRACTOR.
T/G = ±76.11
EX. WATERMAIN OBV =±73.71

PROP CONNECTION TO 305mmØ WATERMAIN BY CITY FORCES.
EXCAVATION AND REINSTATEMENT BY CONTRACTOR.
T/G = ±76.11
EX. WATERMAIN OBV =±73.71

EX 1350mmø STM @ ±0.81%

CONNECT TO EX. 1350mmØ STM
EX. INV = 70.15±
EX. SPRINGLINE ELEV = ±70.83
PROP INV = 70.85

SITE BENCHMARK #2
Fire Hydrant–Top of Spindle
Elevation=76.88

RENAUD RD

ZIEGLER STREET

LOT 9
PIN 04757–0234

LOT 8

BLOCK 85
(0.30 RESERVE)
PIN 04757–0310

BLOCK 84
(0.30 RESERVE)
PIN 04757–0311

PIN 04757–0019

PIN 04757–0048

Top of Foundation Elevation=76.74

Door Sill Elevation=77.00

LEGEND:

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- PROPOSED FENCE
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- PROPOSED RIP RAP
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- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED 135mmØ SAN SERVICE
- PROPOSED WATERMAIN
- PROPOSED 25mmØ PEX WTR SERVICE
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- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING MANHOLE
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- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED AREA RUNOFF — WATERSHED NAME / RUNOFF COEFFICIENT
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5m 2 0 5m
SCALE: 1:200

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
DEC 24, 2021
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road I Ottawa, ON, K1J 9G2
www.lrl.ca I (613) 842-3434

CLIENT
LANDRIC HOMES
1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
210216

DATE
NOVEMBER 2021

C401

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
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- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
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- WTR WTR WTR PROPOSED WATERMAIN
- PROPOSED 135mmØ SAN SERVICE
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- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT

WS-XX (CONTROLLED) — AREA — RUNOFF

- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

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5m 2 0 5m
SCALE: 1:200

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER — V. JOHNSON — 100510576 — Dec 24, 2021 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRJ
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LANDRIC HOMES
1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

PROJECT NO.
210216

DATE
NOVEMBER 2021

C601

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED SWALE ELEVATION
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- PROPOSED OVERLAND MAJOR FLOW ROUTE
- STM STM STM PROPOSED STORM SEWER
- SAN SAN SAN PROPOSED SANITARY SEWER
- WTR WTR WTR PROPOSED WATERMAIN
- PROPOSED 135mmØ SAN SERVICE
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- PROPOSED MANHOLE
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- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED / AREA / RUNOFF — WATERSHED NAME; RUNOFF COEFFICIENT; AREA IN HECTARES

EWS-01 UN-CONTROLLED 0.460 0.29

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5m 2 0 5m
SCALE: 1:200

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01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER — W. JOHNSON — 100510576 — Dec 24, 2021 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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CLIENT
LANDRIC HOMES
1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

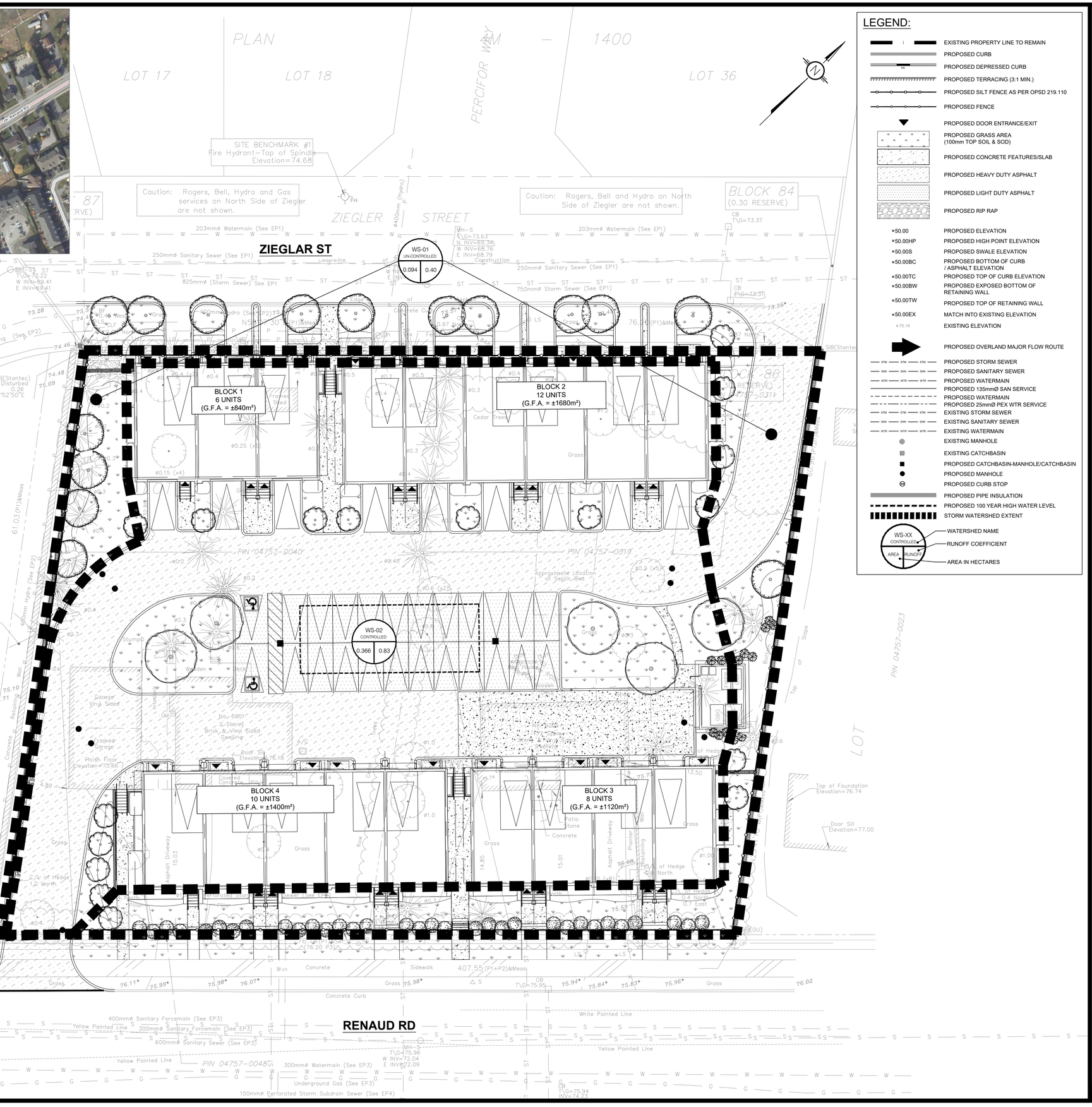
DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
PRE-DEVELOPMENT
WATERSHED PLAN

PROJECT NO. 210216
DATE NOVEMBER 2021

C701



LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- ×50.00TW PROPOSED TOP OF RETAINING WALL
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED 135mmØ SAN SERVICE
- PROPOSED WATERMAIN
- PROPOSED 25mmØ PEX WTR SERVICE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED — WATERSHED NAME
- AREA — RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES, THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

5m 2 0 5m
SCALE: 1:200

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 24, 2021
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LANDRIC HOMES
1173 CYRVILLE RD, SUITE 202,
OTTAWA ON K1J 7S6

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NAVAN STACKED TOWN HOMES
6001/6005 RENAUD RD,
OTTAWA, ONTARIO

DRAWING TITLE
POST-DEVELOPMENT
WATERSHED PLAN

PROJECT NO.
210216

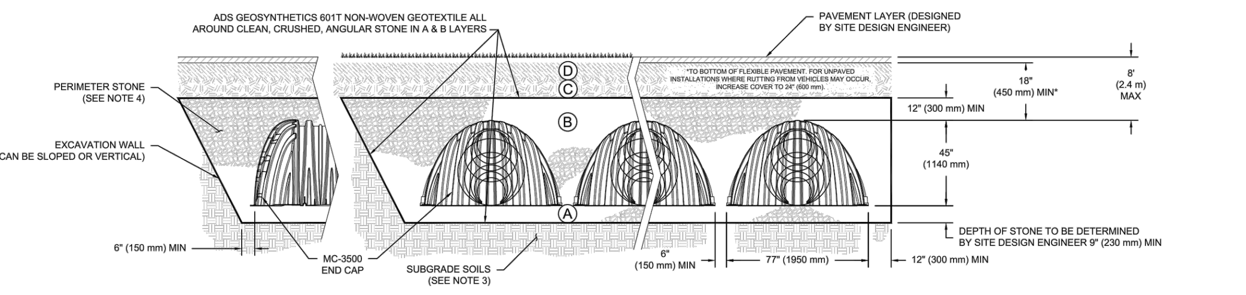
DATE
NOVEMBER 2021

C702

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

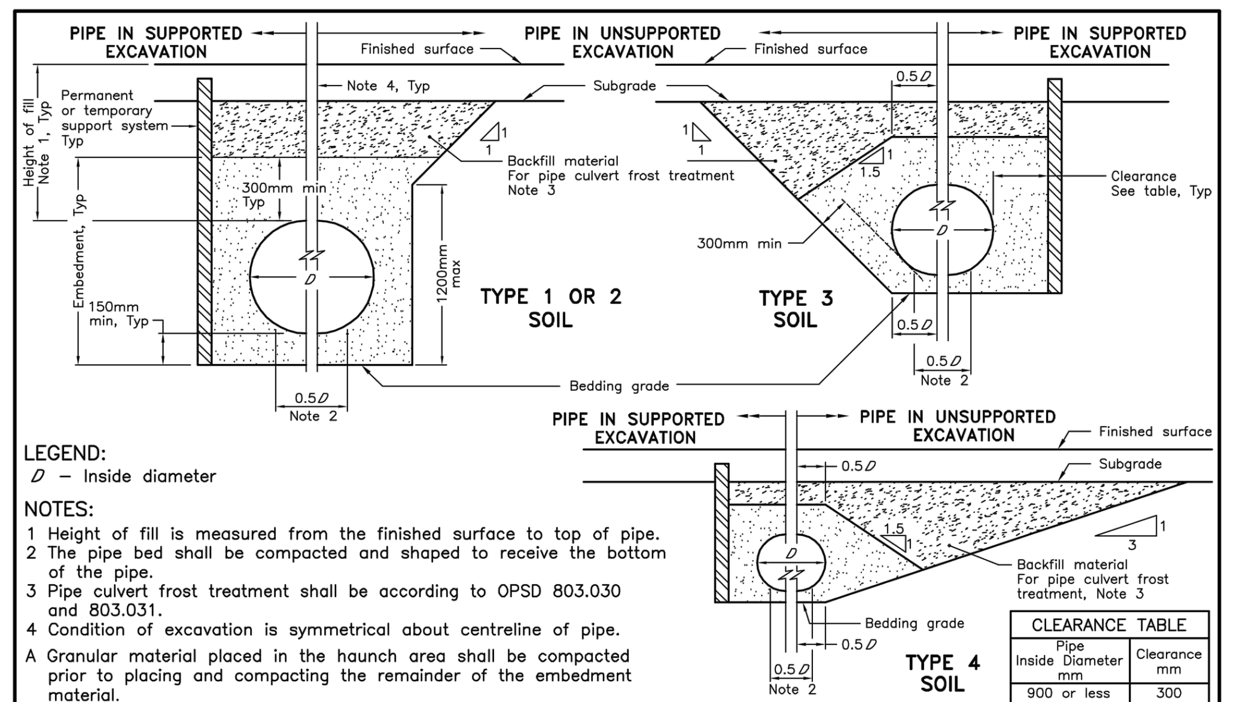
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

NAVAN STACKED TOWNS — OTTAWA, AL — DRAWN: AU — CHECKED: N/A — StormTech® Chamber System — 888-892-2694 | WWW.STORMTECH.COM — ADS 4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473 — SHEET 3 OF 6



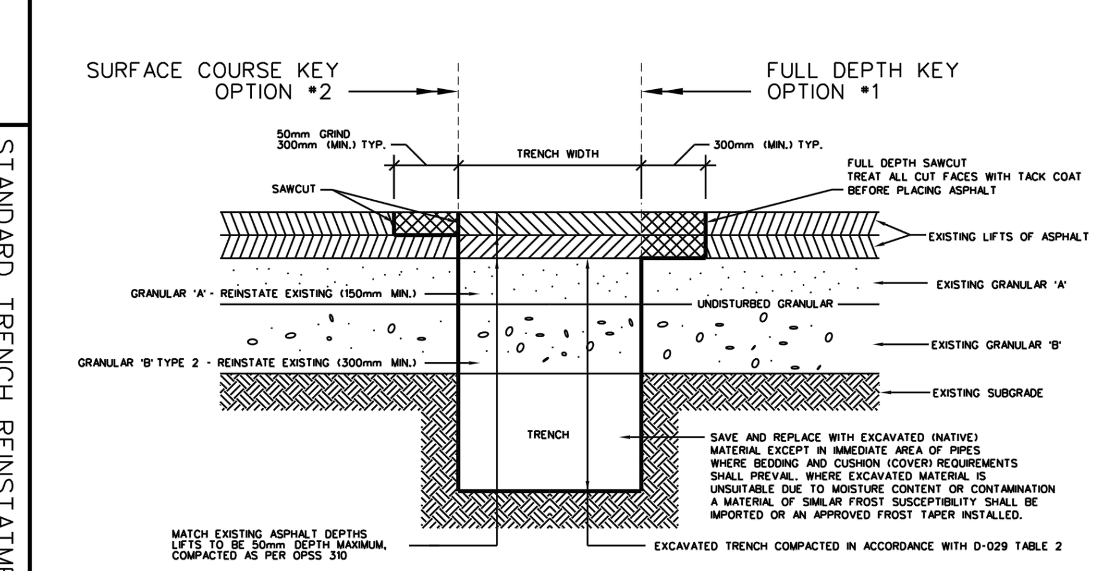
CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

LEGEND:
D – Inside diameter

NOTES:
1 Height of fill is measured from the finished surface to top of pipe.
2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
4 Condition of excavation is symmetrical about centreline of pipe.
A Granular material placed in the haunch area shall be compacted prior to placing and compacting the remainder of the embedment material.
B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
C All dimensions are in metres unless otherwise shown.

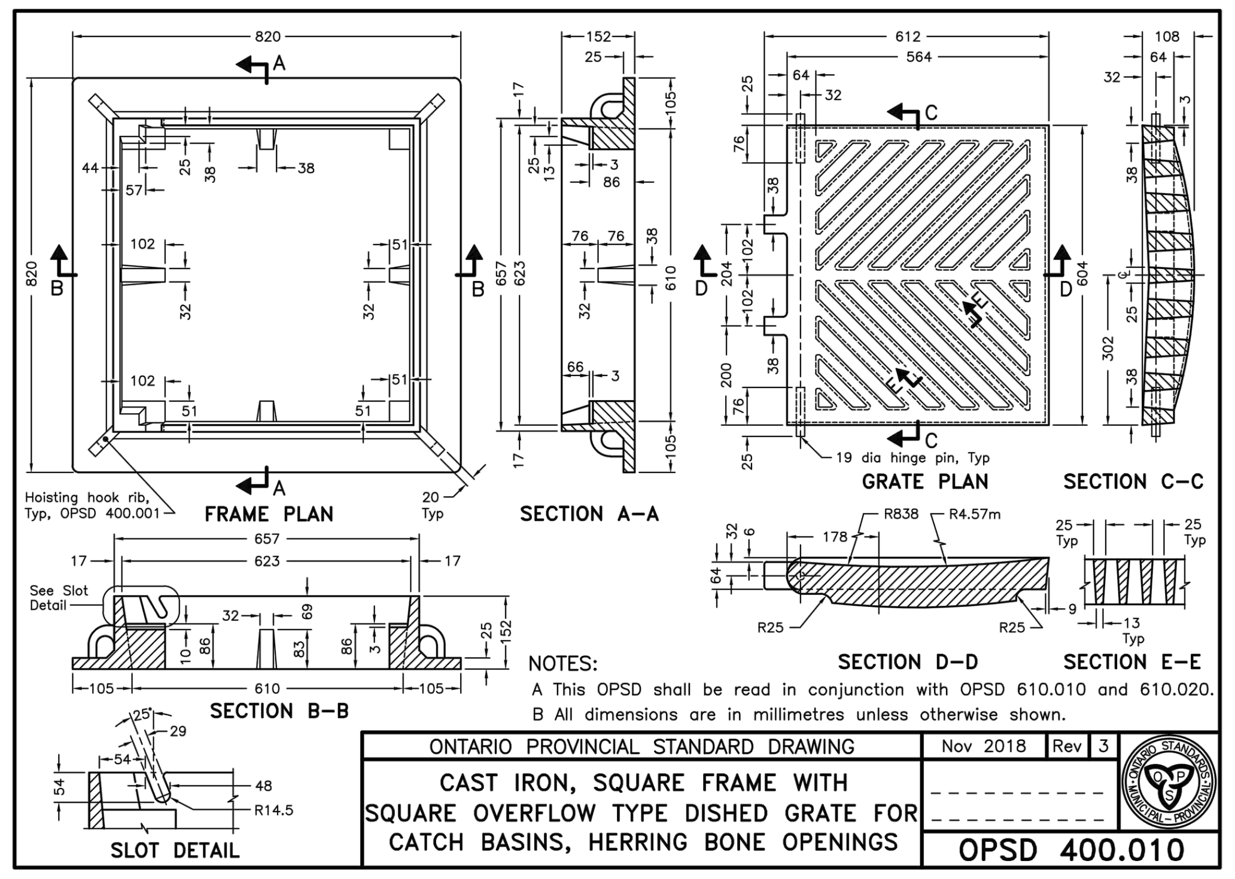
ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2014 — Rev 3
FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION
OPSD 802.010

STANDARD TRENCH REINSTATMENT IN PAVED SURFACE



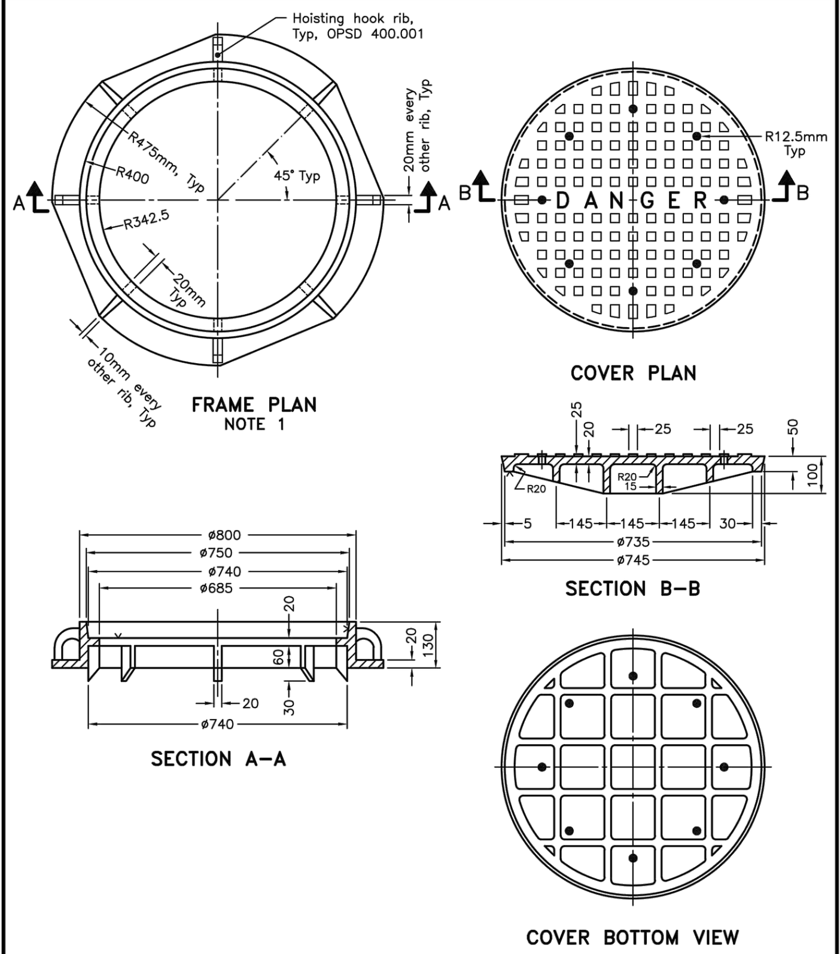
NOTES
1. ALL EXISTING ASPHALT TO BE SAW CUT.
2. UNLESS SPECIFIED ELSEWHERE, SURFACE COURSE ASPHALT SUPERPAVE 12.5mm LEVEL B (PG58-34) AND BASE COURSE ASPHALT SUPERPAVE 19.0mm LEVEL B (PG58-34) IS TO BE USED.
3. UNLESS SPECIFIED ELSEWHERE, WHERE EXISTING PAVEMENT STRUCTURE EXCEEDS 150mm IN DEPTH, ASPHALT REINSTATEMENT SHALL BE 150mm AND GRANULAR "A" FOR THE REMAINDER.
4. UNLESS SPECIFIED ELSEWHERE, WHERE AN UNDERLYING LAYER OF CONCRETE PAVEMENT EXISTS, REINSTATEMENT SHALL CONSIST OF 150mm OF SUPERPAVE 19.0mm LEVEL B (PG58-34) COMPACTED IN LIFTS.
5. UNLESS SPECIFIED ELSEWHERE, HOT MIX ASPHALT PLACEMENT AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH F-3130.

DATE: MAY 2001 — REV. DATE: MARCH 2017 — DWG. No.: R10



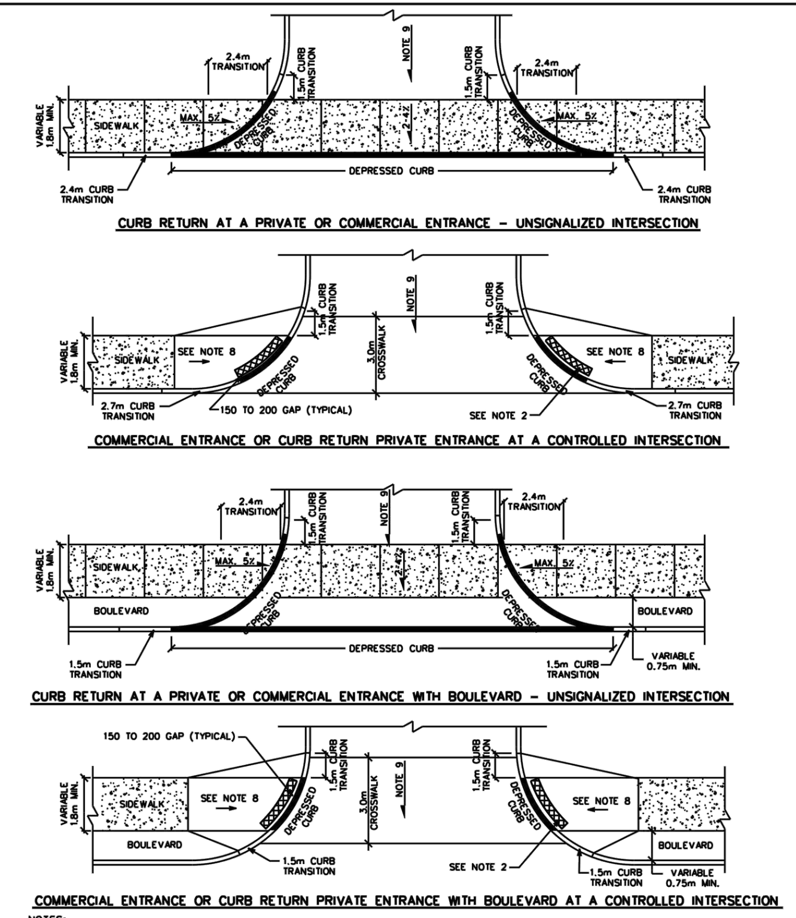
NOTES:
A This OPSD shall be read in conjunction with OPSD 610.010 and 610.020.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2018 — Rev 3
CAST IRON, SQUARE FRAME WITH SQUARE OVERFLOW TYPE DISHED GRATE FOR CATCH BASINS, HERRING BONE OPENINGS
OPSD 400.010



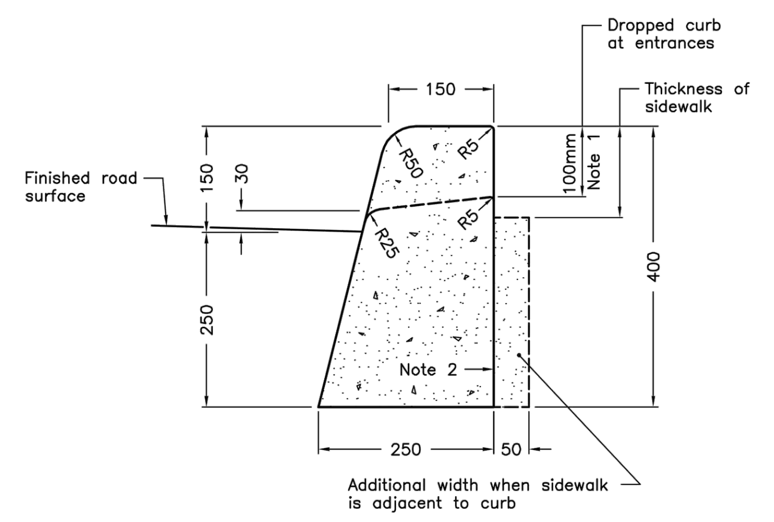
NOTE:
1 As an option, frame may be completely round.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2018 — Rev 4
CAST IRON, CIRCULAR FRAME WITH CIRCULAR 745mm COVER FOR MAINTENANCE HOLES
OPSD 401.020



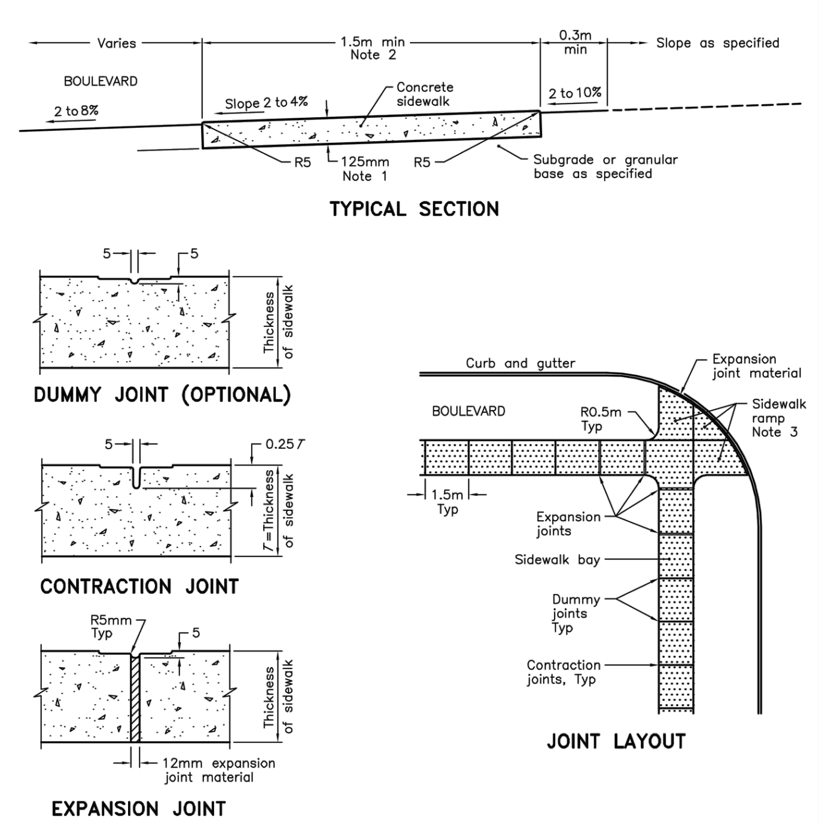
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
2. APPROVED 610 X WIDTH OF CURB RAMP (1500MIN) TACTILE WALKING SURFACE INDICATOR, RADIUS TO MATCH CURB. DRAIN GROOVES AS PER SC7.
3. CURB DETAILS SEE SC1.1, SC1.2 AND SC1.3.
4. SIDEWALK DETAILS SEE SC2 AND SC3.
5. CURB RAMPS AS PER SC6 AND SC7.
6. CONTROLLED MEANS SIGNALIZED OR A 4-WAY STOP INTERSECTION.
7. SUBJECT TO AVOIDANCE OF MEDIANS, CROSSWALK LINES TO BE CENTRED ON THE CURB RAMP.
8. FOR CURB RAMPS, SLOPE OF 2% TO 5%, MAXIMUM 8%.
9. MAXIMUM SLOPE VARIES, SEE PRIVATE APPROACH BYLAW

CURB RETURN ENTRANCES — DATE: MARCH 2007 — REV. DATE: MARCH 2017 — DWG. No.: SC7.1



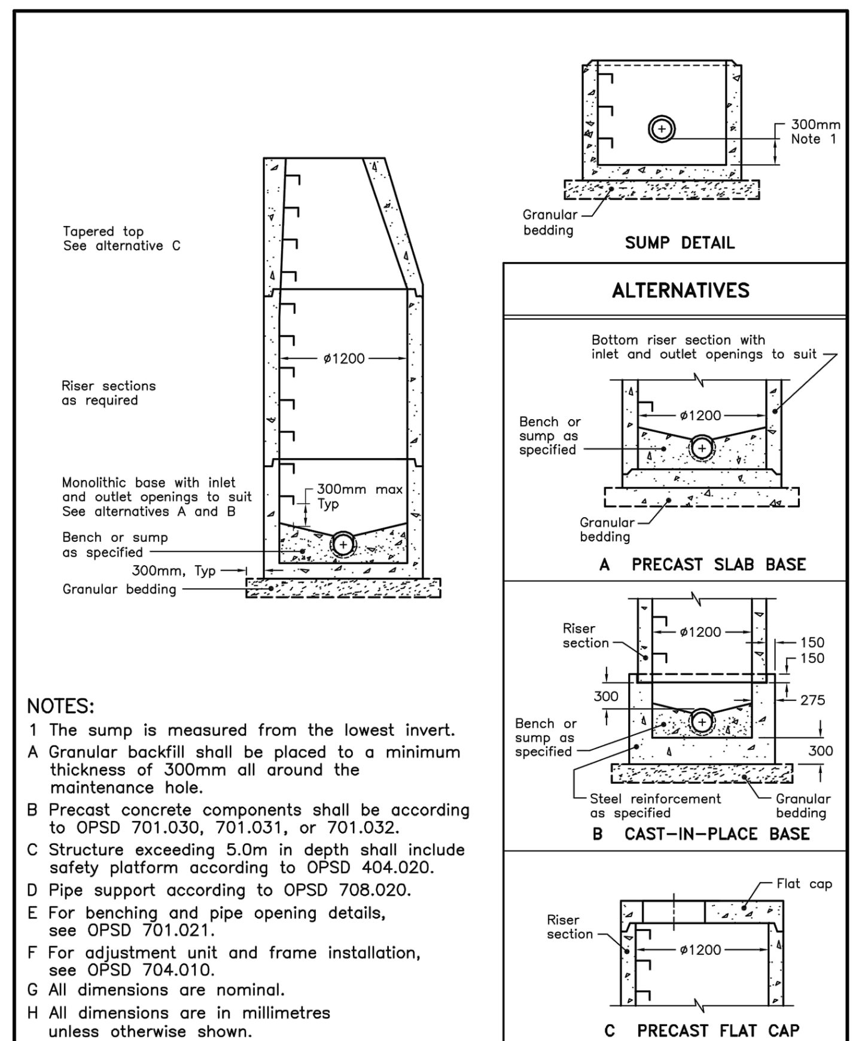
NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2012 — Rev 2
CONCRETE BARRIER CURB
OPSD 600.110



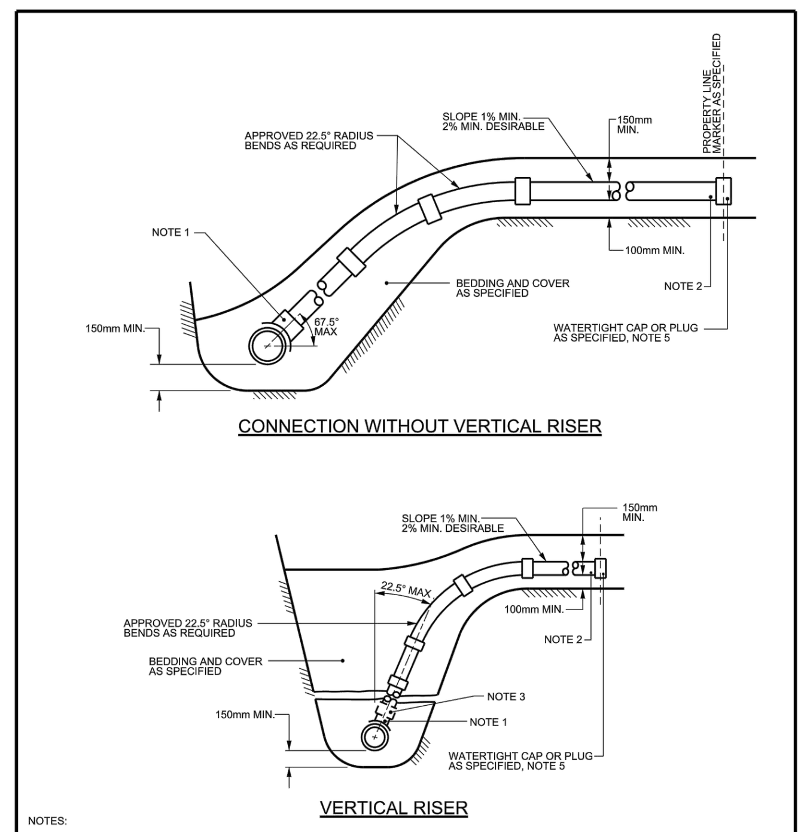
NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2015 — Rev 2
CONCRETE SIDEWALK
OPSD 310.010



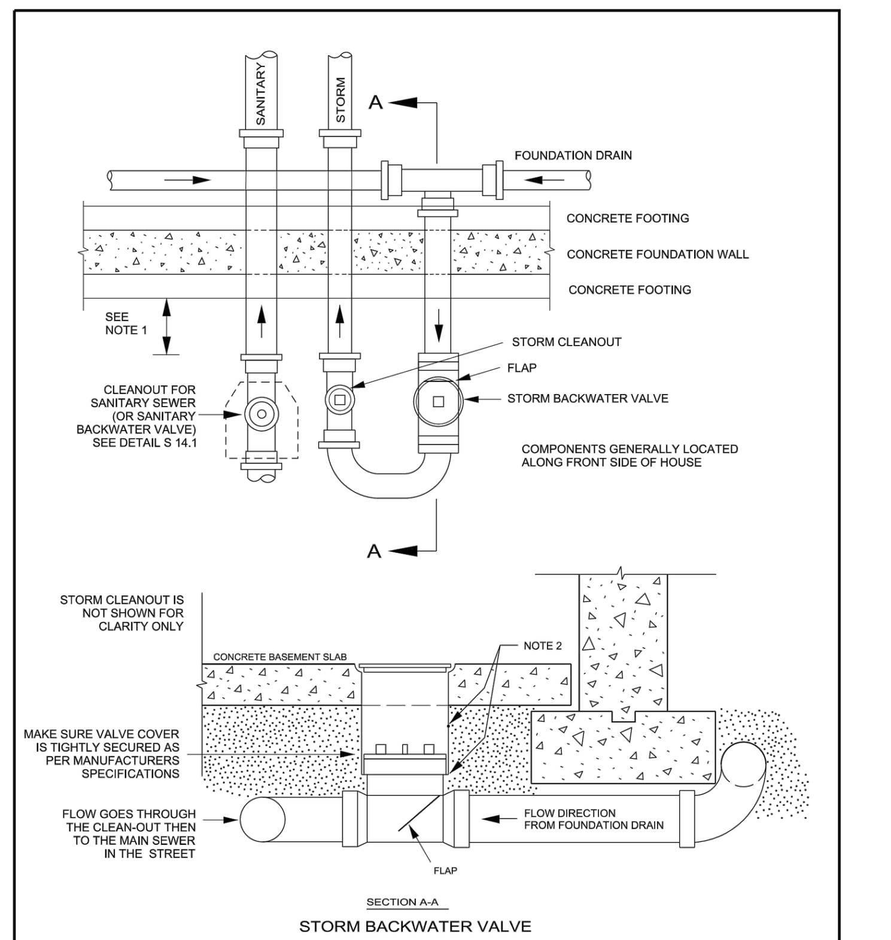
NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
D Pipe support according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING — Nov 2014 — Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER
OPSD 701.010



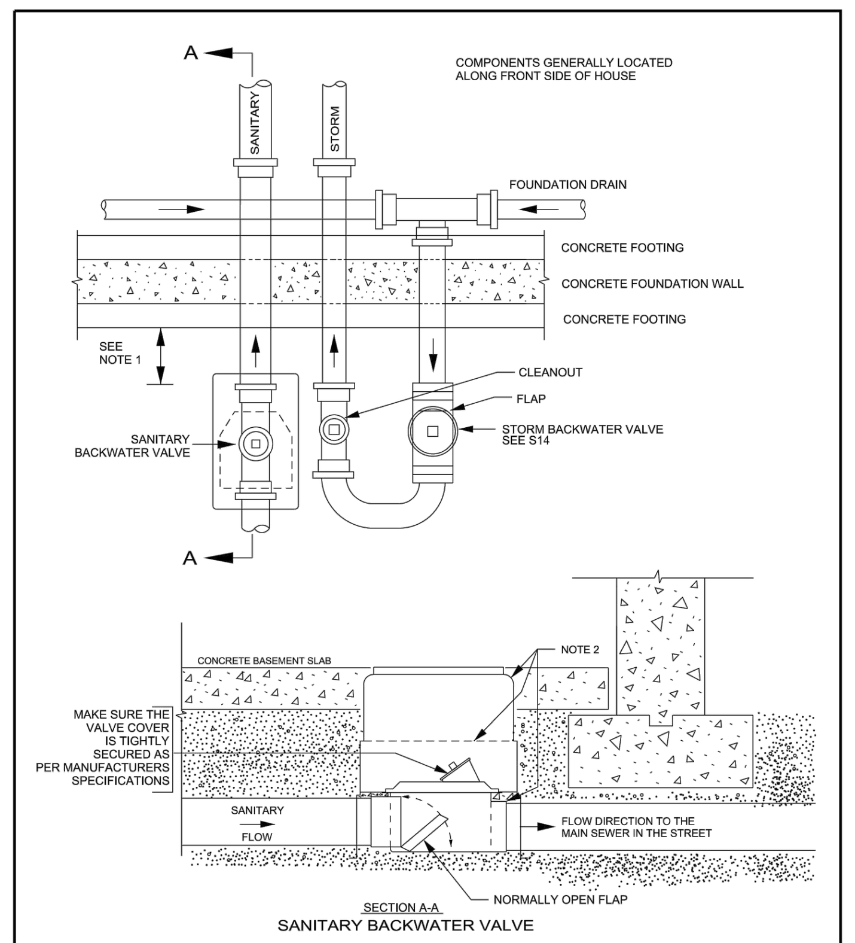
NOTES:
1. ALL DIAMETERES OF SERVICE CONNECTIONS THAT HAVE NOMINAL DIAMETERS NO GREATER THAN 50% OF THE NOMINAL DIAMETER OF THE RIGID SEWER PIPE SHALL BE MADE USING A BELL END INSERT AS PER S11.2 OR AN APPROVED RUBBER GASKETED INSERT, INSTALLED ABOVE THE SPRING LINE.
2. SANITARY SERVICES TO BE 135mm AND STORM SERVICES TO BE 100mm FOR NEW RESIDENCES UNLESS SPECIFIED OTHERWISE. SERVICE PIPE AND RADIUS BENDS TO BE APPROVED CSA B182.2, SDR28 PRODUCTS UNLESS SPECIFIED OTHERWISE.
3. APPROVED CONTROLLED SETTLEMENT JOINTS OPTIONAL FOR SERVICE CONNECTIONS TO MAIN SEWERS UP TO 5m DEEP. WHERE APPROVED, CONNECTIONS TO SEWERS OVER 5m DEEP REQUIRE APPROVED CONTROLLED SETTLEMENT JOINTS.
4. VERTICAL RISER SHALL BE SAME AS SERVICE PIPE UNLESS OTHERWISE SPECIFIED.
5. CAP OR PLUG AT THE PROPERTY LINE SHALL BE ADEQUATELY BRACED TO WITHSTAND TESTING PRESSURE.
6. FOR NEW CONSTRUCTION, INSERTS MUST BE INSTALLED ON THE MAIN PIPE BEFORE THAT PIPE IS LAID. FOR SERVICES/BRANCHES 375mm DIA. OR LESS, APPROVED "CORED TEES" MAY BE USED.
7. APPROVED CUT-IN TOOL MUST BE USED FOR FIELD MADE CONNECTIONS.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

N.T.S.
SEWER SERVICE CONNECTIONS FOR RIGID MAIN SEWER PIPE (MODIFIED OPSD-1006.010) — DATE: MARCH 2006 — REV. DATE: MARCH 2014 — DWG. No.: S11



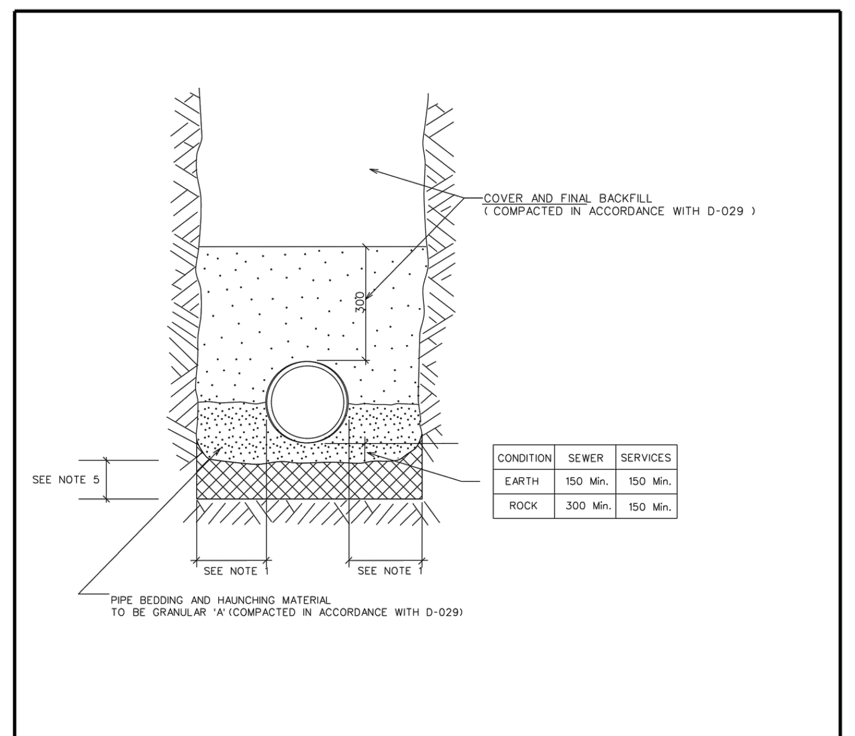
NOTES:
1. BACKWATER VALVE, CLEAN-OUTS AND ANY OTHER FITTINGS MUST BE INSTALLED A MINIMUM OF 300mm INSIDE OF THE BASEMENT FOOTING. THIS IS TO ENSURE THERE IS SUFFICIENT ROOM TO REPLACE THESE COMPONENTS IN THE FUTURE WITHOUT HAVING TO DAMAGE THE FOOTING/WALL DURING THE PROCESS
2. JOINTS BETWEEN THE SLEEVE AND THE BACKWATER VALVE AND THE FLOOR SHALL BE WATERTIGHT.

N.T.S.
FOUNDATION DRAIN BACKWATER VALVE INSTALLATION — DATE: DEC. 2002 — REV. DATE: MARCH 2011 — DWG. No.: S14



NOTES:
1. BACKWATER VALVE, CLEAN-OUTS AND ANY OTHER FITTINGS MUST BE INSTALLED A MINIMUM OF 300mm INSIDE OF THE BASEMENT FOOTING. THIS IS TO ENSURE THERE IS SUFFICIENT ROOM TO REPLACE THESE COMPONENTS IN THE FUTURE WITHOUT HAVING TO DAMAGE THE FOOTING/WALL DURING THE PROCESS
2. JOINTS BETWEEN THE ACCESS BOX SECTIONS AND THE ACCESS BOX AND THE BACKWATER VALVE AND THE FLOOR SLAB SHALL BE SEALED.

N.T.S.
SANITARY BACKWATER VALVE INSTALLATION TYPE 1 — DATE: MARCH 2010 — REV. DATE: MARCH 2011 — DWG. No.: S14.1



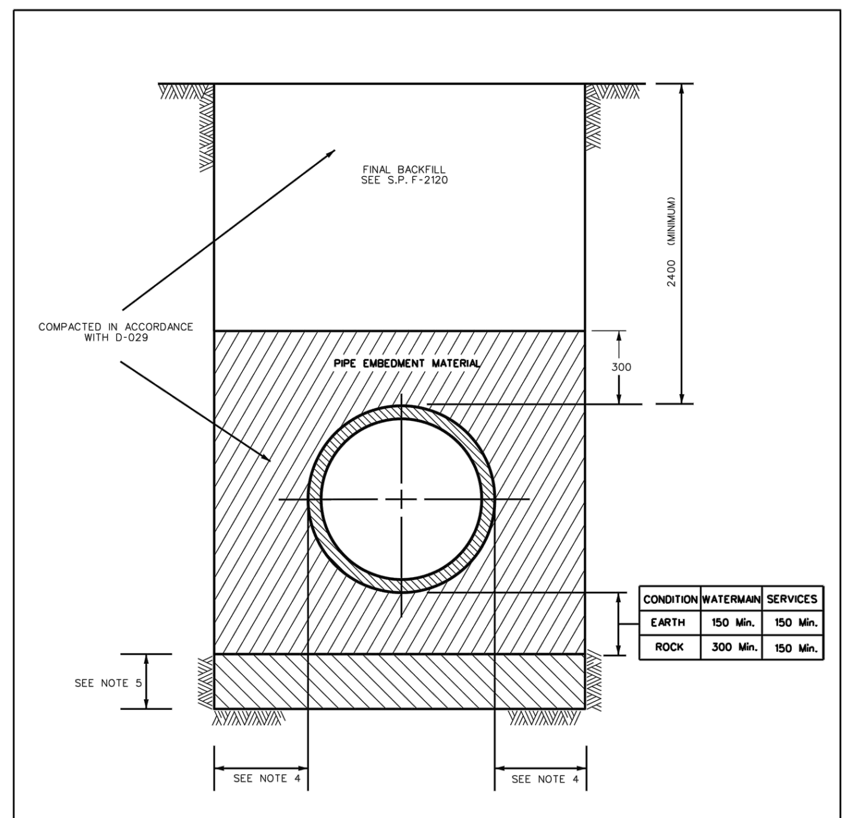
CONDITION	SEWER	SERVICES
EARTH	150 Min.	150 Min.
ROCK	300 Min.	150 Min.

NOTES:
1.

PIPE INSIDE DIAMETER (mm)	CLEARANCE (mm)
900 OR LESS	CONC 450 PVC 450
OVER 900	500

2. FINAL BACKFILL - APPROVED NATIVE MATERIAL OR SELECT SUBGRADE IN ACCORDANCE WITH F-2120.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
4. INITIAL BACKFILL MATERIAL - CONCRETE PIPE - SAND, GRANULAR 'A' - PVC PIPE - GRANULAR 'A'
5. WHEN APPROVED BY THE CONTRACT ADMINISTRATOR, POOR SOILS SHALL BE EXCAVATED TO CREATE A FOUNDATION THAT SHALL BE FILLED TO THE BOTTOM OF THE BEDDING WITH GRANULAR 'B'.

SINGLE TRENCH (SEWER & SEWER SERVICES) — DATE: MAY 2001 — REV. DATE: MARCH 2016 — DWG. No.: S6



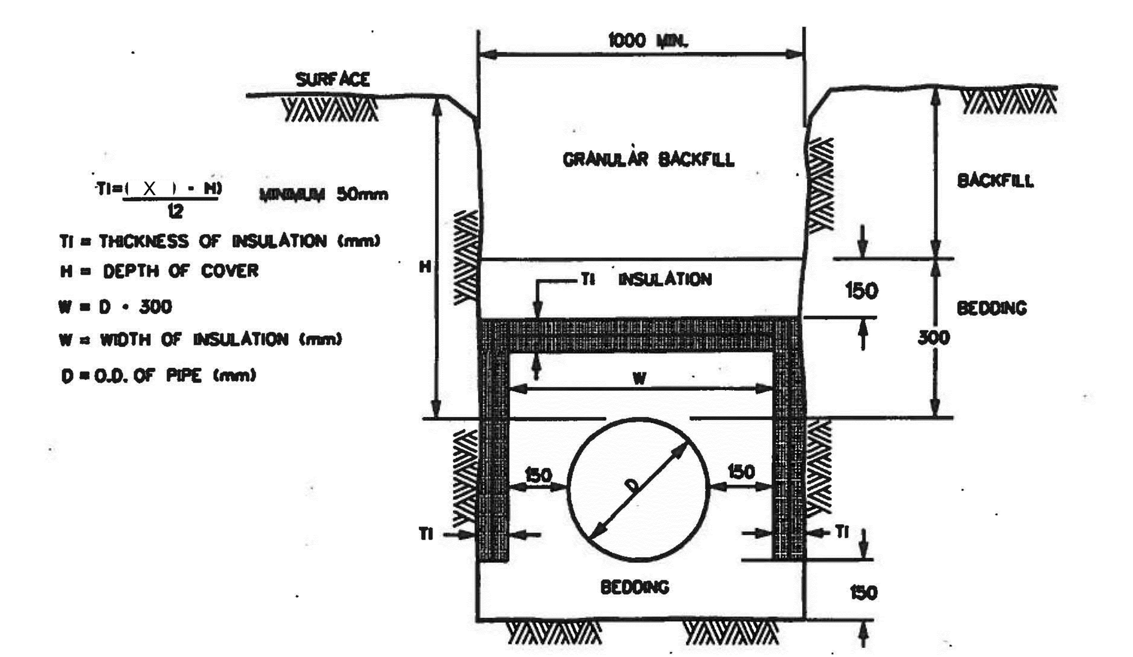
CONDITION	WATERMAIN	SERVICES
EARTH	150 Min.	150 Min.
ROCK	300 Min.	150 Min.

NOTES:
1. PIPE EMBEDMENT MATERIAL - GRANULAR 'A'.
2. FINAL BACKFILL - APPROVED NATIVE MATERIAL OR SELECT SUBGRADE IN ACCORDANCE WITH F-2120
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
4.

PIPE OUTSIDE DIA. (mm)	CLEARANCE (mm)
900 or LESS	450
OVER 900	500

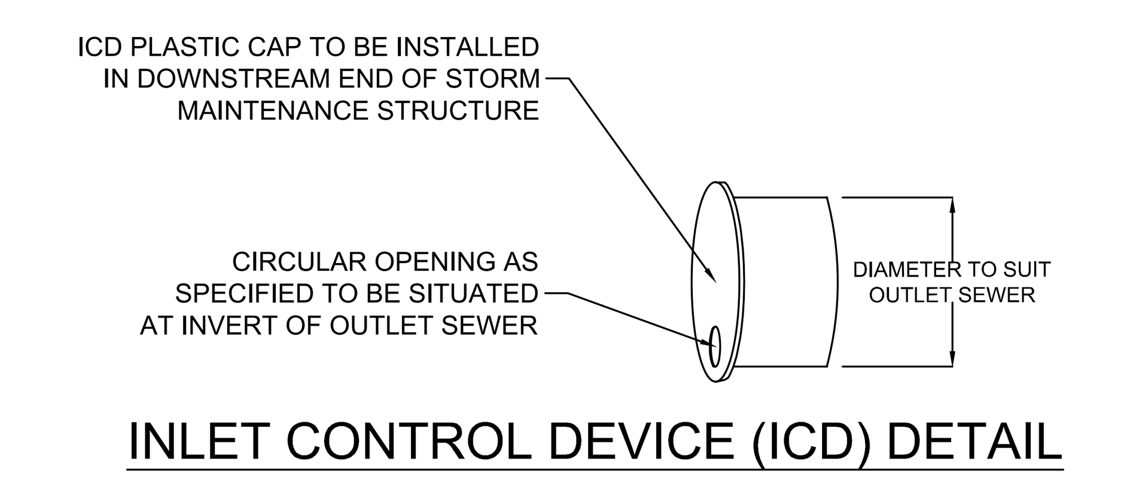
5. WHEN APPROVED BY THE CONTRACT ADMINISTRATOR, POOR SOILS SHALL BE EXCAVATED TO CREATE A FOUNDATION THAT SHALL BE FILLED TO THE BEDDING WITH GRANULAR 'B'.

STANDARD TRENCH DETAIL — DATE: MAY 2001 — REV. DATE: MARCH 2016 — DWG. No.: W17



NOTES:
-FOR STORM INSULATION USE AN X VALUE OF 2000 IN THE ABOVE "TI" EQUATION.
-FOR SANITARY INSULATION USE AN X VALUE OF 2500 IN THE ABOVE "TI" EQUATION.
-FOR WATERMAIN INSULATION USE AN X VALUE OF 2400 IN THE ABOVE "TI" EQUATION.
-INCREMENTS OF INSULATION THICKNESS SHALL BE ADJUSTABLE TO 25mm.
-STAGGER JOINTS OF MULTIPLE SHEETS.
-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.

TYPICAL STORM AND SANITARYSEWER AND WATERMAIN INSULATION DETAIL
(N.T.S.)



INLET CONTROL DEVICE (ICD) DETAIL PLASTIC "PLUG" STYLE
(N.T.S.)

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES. THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

SUBJECT TO APPROVAL

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	24 DEC 2021

LICENSED PROFESSIONAL ENGINEER — V. JOHNSON — 100510576 — Dec 24, 2021 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT: LANDRIC HOMES, 1173 CYRVILLE RD, SUITE 202, OTTAWA ON K1J 7S6

DESIGNED BY: A.S. — DRAWN BY: A.S. — APPROVED BY: V.J.

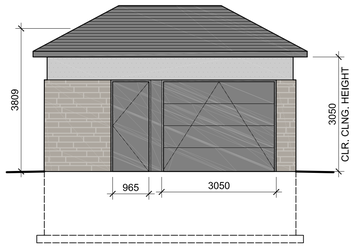
PROJECT: NAVAN STACKED TOWN HOMES, 6001/6005 RENAUD RD, OTTAWA, ONTARIO

DRAWING TITLE: CONSTRUCTION DETAIL PLAN

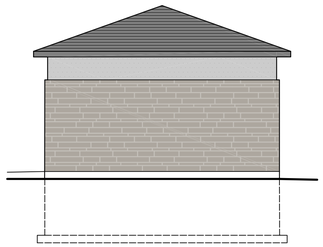
PROJECT NO. 210216
DATE: NOVEMBER 2021
C901

DRAWINGS/FIGURES

Proposed Site Plan
Legal Survey
As-builts

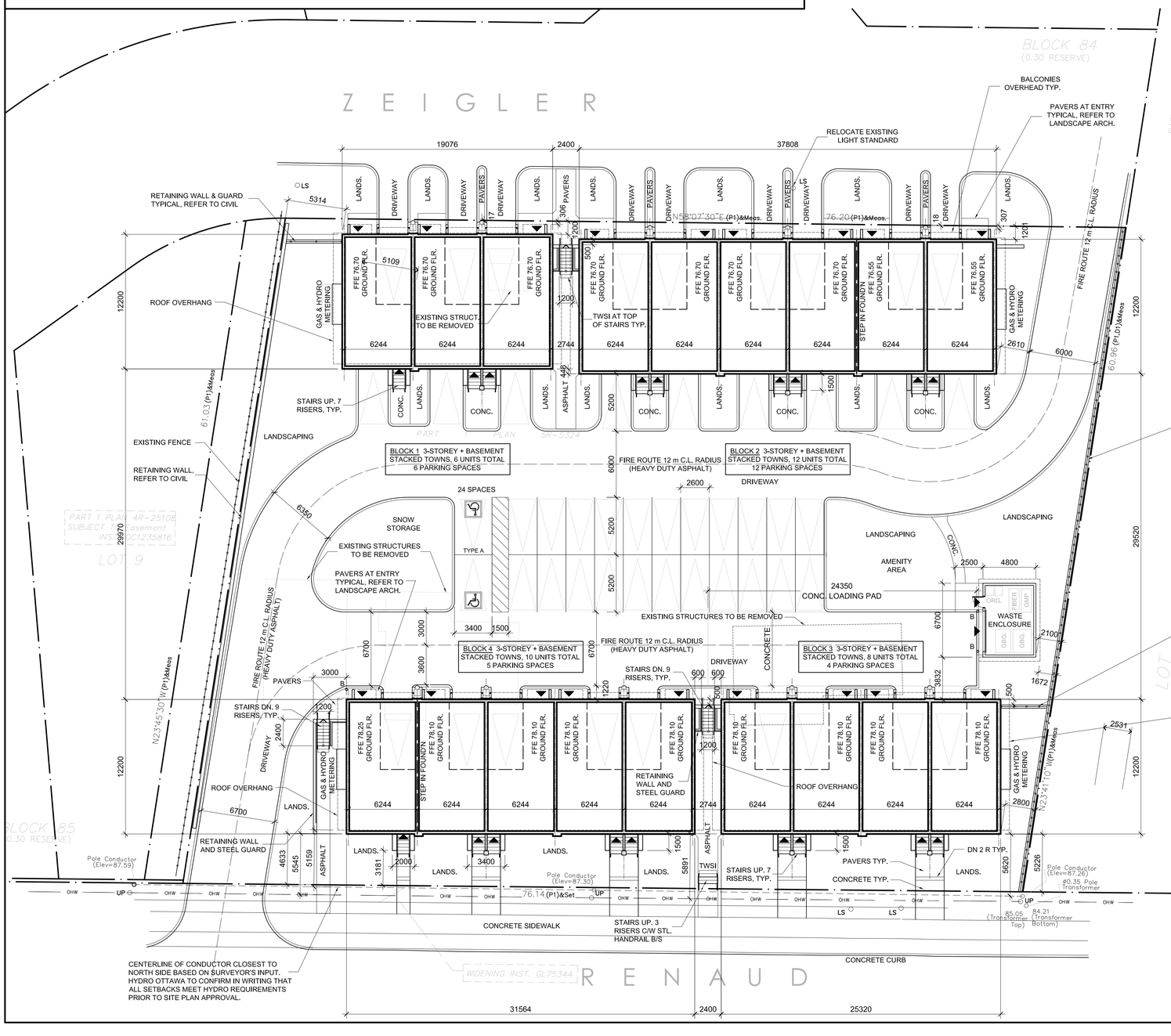


FRONT (WEST) ELEVATION



SIDE ELEVATIONS (REAR SIM)

WASTE SHED
ELEVATIONS
2 / A001
1 : 75



TRUE NORTH

SURVEY INFORMATION TAKEN FROM SURVEY PREPARED BY ANNIS O'SULLIVAN VOLLEBEKK LTD., JOB NO.: E-1136-21, DATED: MAY 14, 2021

PROPOSED
SITE PLAN
1 / A001
1 : 200

ADDRESS: 6001 - 6005 RENAUD ROAD, OTTAWA

PROJECT STATISTICS :

TOTAL UNITS: 36

DATA x BLOCK:

	UNITS	BUILDING AREA	APPROX. GFA
BLOCK 1	6		840 m²
BLOCK 2	12		1,680 m²
BLOCK 3	8		1,120 m²
BLOCK 4	10		1,400 m²

ZONING MECHANISM	REQUIRED	PROVIDED	NOTES :
UNITS:	DR	R4Z	RE-ZONING REQUIRED
THE FOLLOWING TABLE IS BASED ON R4Z ZONE:			
LOT AREA:	450 m²	4,598 m²	
LOT WIDTH:	18 m	76.140 / 76.200	RENAUD / ZEIGLER
MAX. BUILDING HEIGHT:	15 m	12.4 m / 14.1 m	AT HIGH GRADE / LOW GRADE
FRONT YARD:	3 m	1.2 m / 4.5 m	SUBJECT TO ZONING CHANGE
SIDE YARD:	3 m / 6 m	2.8 m / 5.3 m 2,5 m / 5,1 m	SUBJECT TO ZONING CHANGE FOR SERVICE SHEDS
REAR YARD:	3 m	N/A	
PARKING SPACES:	51 (1.4x36 DU)	51	
AMENITY AREA:	216 m² (6 m² / DU)	241 m²	
LANDSCAPED AREA:	30%	32% (1,457m²)	

WASTE AND RECYCLING REQUIREMENTS :

STREAM	REQUIRED CAPACITY	PROVIDED
GARBAGE:	0,231 YD³ / DU x 36: 9 YD³	4 YD³ FEL + 6 YD³ FEL
GMP:	0.018 YD³ / DU x 36: 1 YD³	2 YD³ FEL
FIBER:	0.062 YD³ / DU x 36: 3 YD³	3 YD³ FEL
ORGANICS:	240 L GREEN BIN / 50 DU	2 x 240 L BIN

CLIENT / OWNER :

LANDRIC HOMES
63 CHEMIN DE MONTREAL EST
GATINEAU, QC J8M 1K3
819-663-0003

rev. / issue	description	date MM/DD/YY
02	ISSUED FOR COORD. / MODS. TO WASTE BLDG.	23 DEC. 2021
01	ISSUED FOR S.P.C. & REZONING	17 DEC. 2021

professional stamp

project north

Kristopher D. Benes, OAA, MRAIC, LEED AP

OPA open plan architects inc.
architecture | interiors | concepts

2305 HILLARY AVE. | OTTAWA | ON | K1H 7J2
613.883.5090 | info@openplan.ca

project

LANDRIC HOMES
STACKED TOWN HOMES
6001 - 6005 RENAUD ROAD, OTTAWA

drawing

CONCEPT SITE PLAN

drawn	KDB	date	FEBRUARY 2021
approved	KDB	revision	0
project no.	2101	scale	AS SHOWN
drawing no.	A001		

TOPOGRAPHICAL PLAN OF SURVEY OF

PART OF LOT 7
CONCESSION 3 (OTTAWA FRONT)
(Geographic Township of Gloucester)
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the regulations made under them.
2. The survey was completed on May 7, 2021.

May 14, 2021 — Date

"Tyler Allison"
Tyler J. Allison
Ontario Land Surveyor

Rev.	Date	
1	Oct. 1/21	Add Pole Conductors and Pole Transformer

ANNIS, O'SULLIVAN, VOLLEBEKK LTD. grants to Landric Homes ("The Client"), their solicitors, mortgagees, and other related parties, permission to use original, signed, sealed copies of the Topographical Plan of Survey in transactions involving The Client.

Notes & Legend

	Denotes	
—□—	"	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
OU	"	Origin Unknown
NBW	"	Nail & Washer
(WIT)	"	Witness
Meas.	"	Measured
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
(PI)	"	Registered Plan 4M-1400
(P2)	"	Registered Plan 4M-1373
(P3)	"	Plan 5R-5324
(P4)	"	Plan by Stantec Job No. 161650000-109, Ref 4M-1400
EPI	"	Plan and Profile of Ziegler Street (T.L. Mak Engineer Consultants, Project 805-47) Drawing P-2 Rev. 5 "As Recorded" 07/22/14
EP2	"	City of Ottawa U.C.C. Central Registry Data, Sheet J-29-24, Dated August 2015
EP3	"	Plan and Profile of Renaud Road (Stantec Project 160400704) Drawing PP-2 Rev. 7 "As Recorded" 11/12/12
EP4	"	City of Ottawa U.C.C. Central Registry Data, Sheet J-29-30, Dated August 2015
(DI)	"	Inst. CT257733
	"	Deciduous Tree
	"	Coniferous Tree
FH	"	Fire Hydrant
MH-ST	"	Maintenance Hole (Storm Sewer)
MH-S	"	Maintenance Hole (Sanitary)
MH	"	Maintenance Hole (Unitentified)
CB	"	Catch Basin
GM	"	Gas Meter
S	"	Sign
CLF	"	Chain Link Fence
BF	"	Board Fence
UP	"	Utility Pole
LS	"	Light Standard
A/C	"	Air Conditioner
Ø	"	Diameter
+ 65.00	"	Location of Elevations
+ 65.00*	"	Top of Concrete Curb Elevation
+ 65.00	"	Top of Retaining Wall Elevation
C/L	"	Centreline
	"	Property Line
ST	"	Underground Storm Sewer
S	"	Underground Sanitary Sewer
W	"	Underground Water
P	"	Underground Power
G	"	Underground Gas
OHW	"	Overhead Wires

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-11295

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN ACCORDANCE WITH Regulation 1026, Section 29 (3)

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations and are referenced to Specified Control Points 01919680184 and 01919843761, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

01919680184	Northing	5040610.16	Easting	384736.56
01919843761	Northing	5036178.12	Easting	372436.11

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

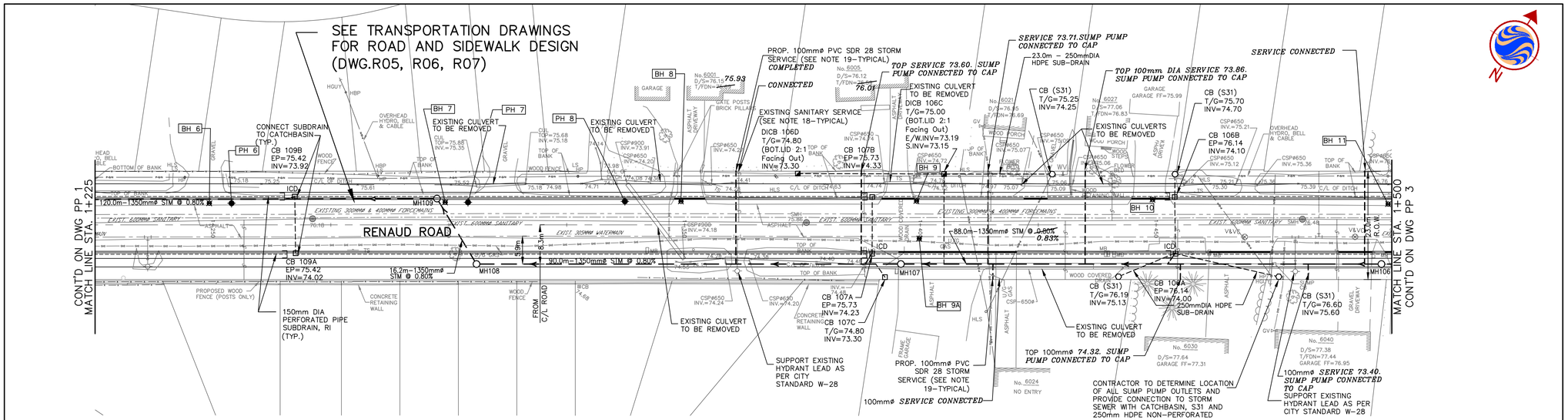
UTILITY NOTES

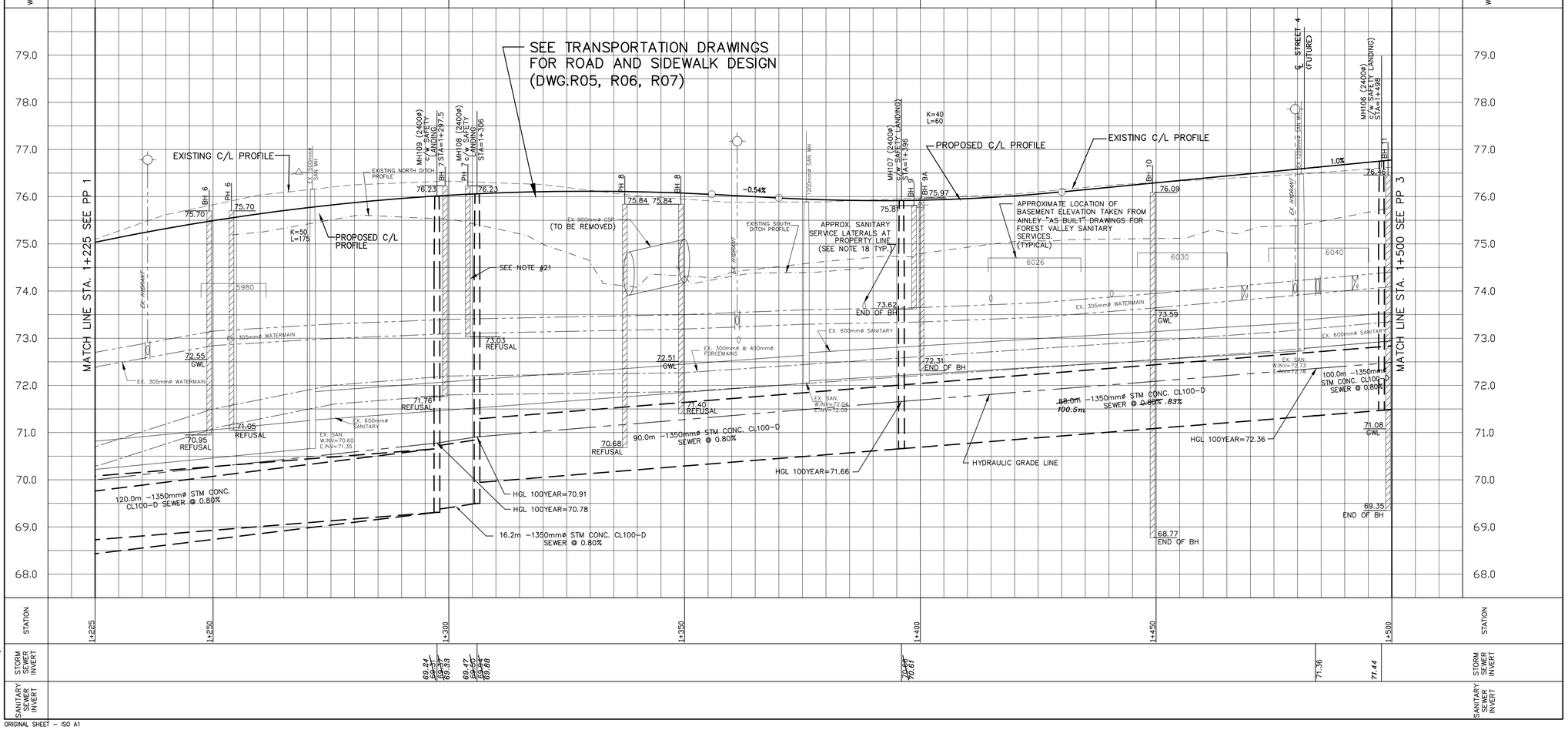
1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
4. Underground services (including invert elevations) shown are compiled from EP1, EP2, EP3 and EP4 and are subject to field confirmation.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
165 Bay Street
Embrun, Ont. K0A 1W1
Phone: (613) 443-3364
Email: embrun@aovltd.com
Ontario Land Surveyors

Job No. E-11136-21 A.M.

ROAD ALLOWANCE BETWEEN CONCESSIONS 3 AND 4 (OTTAWA FRONT) KNOWN AS RENAUD ROAD (FOURTH LINE ROAD)





Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

Stantec

Notes

1 ALL MATERIALS AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH OPS AND CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS AND OPSD SUPPLEMENT, ONTARIO PROVINCIAL STANDARDS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.

2 THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME INCLUDING WATER PERMIT AND ASSOCIATED COSTS.

3 SERVICE AND UTILITY LOCATIONS ARE APPROXIMATE, CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING SERVICES AND UTILITIES PRIOR TO ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING LOCATES FROM ALL UTILITY COMPANIES TO LOCATE EXISTING UTILITIES PRIOR TO EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.

4 ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER & THE CITY. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 509.010 AND OPSS 310.

5 STORM SEWERS 375mm DIA. OR SMALLER SHALL BE PVC SDR 35. STORM SEWERS LARGER THAN 375mm DIA. SHALL BE CONCRETE CSA A 257 CLASS 100 D.

6 STORM MANHOLES SIZE SHALL BE AS INDICATED ON THE PROFILES IN ACCORDANCE WITH OPSD c/w FRAME AND COVER AS PER CITY OF OTTAWA S24.1 AND S25.

7 STREET CBs SHALL BE CURB INLET TYPE AS PER CITY STANDARD S3. FRAME AND COVER AS PER CITY STANDARD S22 AND S23, AND PROVIDED WITH 150mmø SPACERS. ALL CBs SHALL HAVE 600mmø SUMPS. CB LEADS SHALL BE 200mmø (MIN.) PVC SDR35 AT 1.0% MIN. ALL STREET CBs WILL BE INTERCONNECTED WITH ICDs. SEE SCHEDULE ON DWG. OSD–1.

8 THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION FOR RECEIVING STORM SEWERS OR DRAINAGE DURING CONSTRUCTION ACTIVITIES. (ie: FILTER CLOTH ON CATCH BASINS, STRAW BALE CHECK DAMS AND SEDIMENT CONTROLS AROUND ALL DISTURBED AREAS). DEWATERING SHALL BE PUMPED INTO SEDIMENT TRAPS. (SEE EROSION CONTROL PLAN).

9 GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300 mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA

10 SEWER TRENCH SHALL CONSIST OF A CLASS "B" BEDDING AS PER CITY OF OTTAWA STANDARDS S6 AND S7. COMPACTION SHALL BE A MINIMUM OF 98% STANDARD PROCTOR DENSITY.

11 ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.

12 ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEWED BY THE CITY OF OTTAWA PRIOR TO TREE CUTTING.

13 CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW.

14 ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE CONSULTANT.

15 SUB–EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.

16 CONCRETE CURBS SHALL BE CONSTRUCTED AS PER CITY STANDARD SC1.1

17 ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

18 RECONNECT EXISTING SANITARY SERVICE LATERALS FROM EXISTING RESIDENTAL UNITS AS REQUIRED AS PER CITY STANDARD S11.

19 STORM SERVICE LATERALS TO BE INSTALL FOR THE EXISTING RESIDENTS ALONG RENAUD ROAD TO PROPERTY LINE AS REQUIRED AS PER CITY STANDARD S11. CONNECTION LOCATION AND INV. TO BE DETERMINED IN FIELD. (INVERT AT PROPERTY LINE SHALL BE A MINIMUM OF 3.0m BELOW TOP OF FOUNDATION WALL.)

20 150mmø SUBDRAIN TO BE INSTALLED 300mm BELOW SUBGRADE LEVEL CONTINUOUS ALONG BOTH SIDES OF PAVEMENT, CONNECTED TO CATCHBASINS.

21 REFER TO GEOTECHNICAL REPORT BY PATERSONGROUP DATED NOVEMBER 17, 2008 FOR TEST PIT INFORMATION AND GEOTECHNICAL RECOMMENDATIONS.

7	*AS RECORDED*	*GBU*	*GT*	*11.12.12*
6	*AS RECORDED*	*CTL*	*PM*	*11.03.25*
5	ISSUED FOR CONSTRUCTION	NI	TJW	10.04.01
4	ISSUED FOR TENDER	NI	TJW	09.04.17
3	ADD FRONT YARD GRADING	NI	TJW	09.02.25
2	REVISED AS PER CITY COMMENTS/ ADD BOREHOLES INFORMATION	NI	TJW	08.12.01
1	REVISED STORM SEWER ALIGNMENT AS PER CITY COMMENTS	NI	TJW	08.10.17
0	1ST SUBMISSION	NI	TJW	08.08.12
Revision		By	Appd.	YY.MM.DD
File Name: 160400704C–SP&PP		NI	PM	TJW	08.07.10
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Seal

RECORD DRAWING
DATE DEC. 12/11

Client/Project

CLARIDGE HOMES (CARSON) INC.

RENAUD ROAD IMPROVEMENTS

Ottawa ON Canada

Title

RENAUD ROAD
STA. 1+225 TO STA. 1+500

Project No. 160400704

Scale 1:500H 0 5 15 25m
1:50V 0 0.5 1.5 2.5m

Drawing No. PP-2

Sheet 4 of 12

Revision 7

V:\01-ACA\active\160400704_renaudroad\design\drawing\160400704C- SP & PROFILES-CC.dwg
2010-04-05 10:00AM by rocella

ORIGINAL SHEET – ISO A1