Site Servicing Report & Stormwater Management Study

The Hindu Heritage Center of Ottawa-Carleton
4835 Bank Street
Ottawa, Ontario K1X 1G6

Prepared for:

The Hindu Heritage Center of Ottawa-Carleton
c/o Lloyd Philips & Associates Ltd.
1827 Woodward Drive, Suite 109
Ottawa, Ontario K2C 0P9

Attention: Mr. Harish Gupta

LRL File No.: 170132

March 11, 2020

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EXECUTIVE SUMMARY

LRL Associates Ltd. has been mandated by Harish Gupta, of the Hindu Heritage Centre, to prepare a site servicing report and SWM study for the new assembly hall development at the Hindu Heritage Center of Ottawa-Carleton located at 4835 Bank Street, Ottawa, Ontario.

The analysis concluded that the 1/5 and 1/100-year post development runoff discharge can be controlled to the 1/5-year pre-development levels or less. We also demonstrated that an enhanced water quality protection level of 80% TSS removal can be achieved using a stormwater treatment unit (Jellyfish Filter) prior to discharging stormwater into the existing watercourse.

Furthermore, the proposed water distribution network will be adequate to service the new assembly hall building. The maximum hourly demand is calculated at 8.18 L/s, and the corresponding operating pressure at 453 kPa (65.67 psi). The maximum hourly demand including fire flow is 74.88 L/s, and the resulting residual pressure is 253 kPa (36.7 psi), and the fire flow available at 140 kPa (20 psi) is 95.57 L/s.

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APPENDICES

1 INTRODUCTION

LRL Associates Ltd. has been mandated by Lloyd Philips & Associates Ltd. to prepare a site servicing report and stormwater management study for the development of a new assembly hall at the Hindu Heritage Center of Ottawa-Carleton, located at 4835 Bank Street, Ottawa, Ontario. The property is legally described as Part of Lot 22, Concession 5 (Rideau Front), Geographic Township of Gloucester, City of Ottawa. The Key Plan for the proposed site has been included in Appendix A.

The subject property is rectangular in shape, with a frontage of 101.92 m and depth of 401.53 m. The property's total surface area is 4.06 ha. The West portion of the site is currently composed of an existing single storey temple (combined gross floor area of 1062 m^2, with basement) with landscaped area bordering it's North, West and South ends. An existing asphalt parking lot is located adjacent to the East end of the temple. An asphalt roadway (Temple Road) follows the South property line below the landscape area & existing temple, providing access to the existing parking lot. At roughly the center of the property lies an existing creek, running South to North. All property located East of the creek is wooded area.

The proposed addition, the assembly hall, will be a single-story building (with full basement). The proposed development will have a total gross main floor area of 1560 m^2. The assembly hall will be located East of the existing temple and parking lot, and West of the creek.

Currently, the existing building is serviced by a 150mmØ water service running West to East along Temple Road. In order to provide water to the proposed development, the service will need to be extended roughly 131m Easterly. The new water service will be designed in order to supply the new domestic and fire flow building demands, as well as the proposed fire hydrant.

As there are no sanitary mains are located along Bank Street, the proposed building will have to be serviced by a septic system. The proposed septic system will be located directly South of the proposed assembly hall. It will be designed to suit the new building sanitary needs as per the Ontario Building Code - Part 8. The Ottawa Septic System Office (OSSO) will be issuing the permit for the new septic system.

As per the City of Ottawa's requirements, all storm runoff will be controlled to pre-development levels for a 5-year storm event. All surplus runoff will be conveyed to, and controlled in a detention area before being treated and discharged to the existing water course. Stormwater quality control will meet the 80% minimum TSS removal requirements, as per the South Nation Conservation Area (SNCA) requirements.

This report has been prepared in consideration of the terms and conditions noted above. Should there be any changes in the design features, which may relate to the water or sanitary considerations, LRL Associates Ltd. should be advised in order to review the report's recommendations.

2 FIELDWORK

The topographic survey of the property was conducted on April 27th, 2017 by Annis, Sullivan Vollebeckk Ltd. (Ontario Land Surveyors). A site benchmark was established during the survey for future construction use. The benchmark provided is the top of spindle (elevation 100.17 m) of

the existing fire hydrant found between the existing temple and existing access roadway, at the South-West corner of the existing parking lot.

3 POST DEVELOPMENT ALLOWABLE RELEASE RATE CALCULATIONS

The stormwater management criteria for this development are based on pre-consultation with City of Ottawa officials (which occurred June 5th, 2019), 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).

As discussed during the pre-consultation meeting, all storm events up to and including the 100-year event would are to be controlled to the 5-year pre-development level, using a maximum runoff coefficient of C = 0.5 and time of concentration of 10 minutes. The runoff generated from the existing site was calculated using the Rational Method, as follows:

$$Q = 2.78 \times C \times I \times A$$

Where,

C = the runoff coefficient (C = 0.46)

I = the rainfall intensity (mm/hr) (I_5 = 104.2 mm/hr at a Tc = 10 min)

A = Area (2.273 ha)

$$Q_{\text{allowable 1/5yr (pre-dev)}} = 2.78 \times 0.46 \times 104.2 \text{ mm/hr} \times 2.273 \text{ ha} = 303.21 \text{ L/s}$$

Though the calculated allowable pre-development release rate was found to be 303.21 L/s, it was determined that the most cost-effective and appropriate means of developing the site would be to reduce the flow rate and encourage greater stormwater retention on-site i.e. a large retention area at the rear of the property.

The rear of the property is large enough to accommodate a substantial detention area without causing any inconvenience to the patrons. Having the retention area span over a larger area would increase ground infiltration and treatment of the detained stormwater. By reducing the release rate from the outlet of the site and implementing the upsized detention area, there are cost savings from the ultimately downsized the quality control device.

In addition, the detention area will serve to improve the open land use and site development aesthetic with a natural pathway interwoven around the detention area.

To achieve the aforementioned, it was determined that the release rate would be controlled to 50 L/s. The release rate will be controlled by installing an inlet control devices (ICD) in the outlet maintenance hole (MH01) whereas the excess runoff will be conveyed to and stored in the proposed detention area, upstream of MH01. Please refer to Appendix C for greater details regarding the proposed ICD.

The maximum storage volumes required to contain the 5 and 100-year post-development storm events were calculated to be **211.83 m³** and **603.03 m³**, respectively. The detailed storage calculations can be found in Appendix N.

4 QUANTITY CONTROL

All overland flow will be conveyed to the proposed retention area, located at the South-East corner of the proposed temple, by means of the existing grading, as well as the addition of two proposed swales (running West to East along the North & South of the proposed development) and the extension of the existing ditch (running West to East along the South property line). The excess runoff will ultimately be stored above ground in the proposed detention area located near the South-East corner of the proposed new building. No ponding will occur on the existing landscaped area, parking lot or pathways during high-level storm events. However, during the 5 and 100-year storm events, some ponding will occur in the swale to the North, and the ditch South of the detention area, due to the proposed grading of these elements. The Stormwater Management plan (DWG C601) , provided in Appendix F, demonstrates the extent of storage and high-water levels for both the 100- and 5-year storm events.

AutoCAD Civil 3D was used to determine the maximum storage volume and high-water level of the proposed detention area. A Cut/Fill table was generated by the program, which can be seen in Appendix D of the report. The maximum storage volume generated by Civil 3D (605.94 m^3) was found to be greater than the required storage previously calculated (603.03 m^3). Therefore, the detention area, ditch & will be sufficient to retain the excess runoff generated by a 100-year major storm event.

5 STORM RUNOFF QUALITY REQUIREMENTS

As previously mentioned, the site will be graded / developed so that the post-development runoff will ultimately be discharged into the existing water course running through the center of the property. As discussed in the pre-consultation meeting with the City of Ottawa, in order to meet the water quality objective, it is required that we achieve an enhanced level of protection of 80% total suspended solid (TSS) removal. This can be achieved through the use of a water quality treatment unit.

Considering the post-development watershed area that required water quality treatment (1.804 ha), (as seen in Appendix B – Post-Development Watershed Plan), it is proposed to install an “Stormceptor” Jellyfish JF6 oil/grit separator as the treatment unit. The Jellyfish JF6 will serve to remove 89% of the TSS while treating 90% off the annual runoff. Please refer to Appendix E for the selection, type and additional information on the treatment unit.

As an additional cost-effective means of improving the quality of run-off on-site, we have promoted the use of ground infiltration. The proposed ditch at the South will be constructed at a very low gradient of 0.5%. The design intent behind this is to promote natural infiltration and decrease sediment conveyance. To minimize the ditch surface ponding, the ditch will be constructed with a subdrain & clear stone trench. The subdrain will ultimately discharge into the proposed detention area.

6 WATER SERVICE

6.1 Domestic Water Demand

The average domestic water demand, the maximum daily domestic water demand and the maximum hourly domestic water demand were calculated using the number of equivalent plumbing fixtures (as per the OBC) for the proposed new assembly hall building. The plumbing fixtures were determined based on the Architectural Drawings, as seen in Appendix G.

Table 1 included below demonstrates the type, quantity and equivalent number of fixtures units proposed in the new development.

Table 1 - Number of Equivalent Plumbing Fixtures

Fixture Description	Quantity	Hydraulic Load (Public Use)	Fixture Units
Toilet	23	2.2	50.6
Sink	23	1.5	34.5
Shower	2	3	6
Mop service sink	2	2.25	4.5
Urinal	8	3	24
Total			**120**

The domestic water demand was determined based on the calculated total fixture units. To summarize, a total equivalent fixture unit count of 120 resulted an average daily water demand of 3.03 L/s (261,648 L/day), a maximum daily demand of 4.54 L/s (392,471 L/day), and a maximum hourly demand of 8.18 L/s (706,448 L/day). Detailed calculations can be found in Appendix J.

The water service connection to the new building was designed and sized to obtain a pipe velocity below 2.0 m/s. Considering that the building will be serviced by a 150mm diameter water pipe, no pressure issues are expected (refer to section 6.2 for greater detail). The new water service layout can be found in the Servicing Plan, included in Appendix H.

6.2 Expected Water Service Pressure

The residual pressures at the new building is estimated by adding the maximum domestic hourly demand of 8.18 L/s to the fire flow demand of 66.7 L/s. This works out to a total of 74.88 L/s. The calculated pressure of 36.67 psi (253 kPa) was found to be greater than the 20 psi (140 kPa) required by the design criterion imposed by the Ministry of the Environment, Conservation & Parks (MECP) (calculations can be found in Appendix K). For the maximum hourly demand, the lowest pressure obtained at the new building connection was 65.67 psi (453 kPa), which is greater than the 20 psi (140 kPa) as required by the MECP guideline. The pressure drop calculations on the site were performed based on the maximum static pressure of 70 psi (483 kPa) on Bank Street. The detailed pipe pressure loss calculations can be found in Appendix K.

6.3 Fire Flow Requirements

The minimum fire flow rate required has been calculated using the Fire Underwriters Survey (FUS) method. The fire flow is derived from the proposed building surface area, the type of construction, the combustibility and the separation distances to other adjacent buildings. The surface area of the proposed assembly hall building is 1560 square meters. The required fire flow rate was determined to be 4,000 L/min (66.7 L/s). Detailed calculations can be found in Appendix L.

To ensure that the proposed 150 mm dia. watermain can supply the required fire flow via the proposed new fire hydrant on-site, additional flow calculations have been performed. The maximum amount of water that can be evacuated from the hydrant's 100 mm dia. pumper truck

nozzle was calculated using the orifice equation, included below, and the boundary conditions supplied by the City of Ottawa:

$$Q = 0.88a\sqrt{2gh}$$

Where:

Q = flow in m^3/s

a = orifice area of 100 mm dia. pumper truck nozzle in m^2

g = acceleration due to gravity (9.81 m/s^2)

h = water head in m (43.9m equivalent of 62.5 psi under Max Day + fire)

Therefore,

Q = 0.88 x (0.05 m x 0.05 m x 3.1416) x $\sqrt{2}$ x 9.81 m/s^2 x 43.9 m

= 0.203 m^3/s

= 203 L/s > 66.7 L/s i.e. the new 150mmØ watermain feeding the new fire hydrant will be able to supply more fire flow than the required fire flow.

6.4 Boundary Conditions

The boundary conditions for this development were obtained from the City of Ottawa on February 12th, 2020, based on the calculated water demands and fire flow. The maximum and minimum water pressure provided for Bank Street are 482.65 kPa (70.0 psi) and 442.43 kPa (64.17 psi), respectively. Whereas the pressure corresponding to the Max. Day + Fire is 440.47 kPa (63.88 psi).

The maximum available fire flow is calculated as 95.57 L/s for a residual pressure of 140 kPa (20 psi). Therefore, the available fire flow is greater than the required fire flow. Refer to Appendix M (City of Ottawa Boundary Conditions) and Appendix K (Pipe Pressure Loss Calculations) for additional information.

7 SANITARY SERVICE

Based on the existing plans and City of Ottawa resources (geoOttawa), it was apparent that there was no existing municipal sanitary sewer located along Bank Street. Therefore, the development of the new assembly hall will necessitate the design & installation of a new septic system. The existing building is presently operating on two separate septic systems, both designed for 2000 L/day (total 4000 L/day).

As per the Ontario Building Code (OBC), the assembly halls serving food via catering services (no in-house food preparation) would generate a total daily sewage flow of 8 L/day per available seat. The projection of available seating for the new building is 500. Therefore, it is estimated that the proposed new development will generate 4000 L/day of sewage. Since the total estimated sewage flow for the entire property (8000 L/day) is less than 10 000L/day, an Environmental Compliance Approval (ECA) is not required.

The new septic system will be designed under Part 8 (Sewage System) of the OBC, which will be reviewed and approved by the Ottawa Septic System Office (OSSO). The new system will be a tertiary system. It will be composed of septic tank(s), aeration tanks and a properly designed disposal bed. The proposed septic system will be constructed on the South side of the proposed building, North of the proposed ditch. Refer to the Site Servicing Plan in Appendix H for the tentative location of the new septic system.

Once approved by the OSSO, a copy of the permit will be sent to the City of Ottawa as a condition of the Site Plan Control (SPC) agreement.

8 MAINTENANCE

Monitoring and maintenance are an important component for all types of stormwater management practices. It ensures performance efficiency of the facilities and prevents undesirable consequences such as flooding or contamination to the neighboring properties.

The maintenance of the proposed stormwater treatment unit (Jellyfish Filter) would consist of inspecting the structure (inlet, outlet, cover etc.) on a periodic basis and cleaning them as deemed necessary. The structure should be cleaned (pumped) of its sediments and hydrocarbons content at least once a year, as per the manufacturer recommendations. It is the responsibility of the owner to maintain and clean the treatment unit and keep a log of all the maintenance activities.

9 SEDIMENT AND EROSION CONTROL

Sediment and erosion control measures will be implemented before and during the construction of this project. Typical control measures such as silt fences and sediment straw bail fences are mandatory. For this project, a silt fence will be erected along the perimeter of the development area. A sediment straw bail fence will be constructed downstream of the proposed new ditch, upstream of the proposed detention area. In addition, a mud mat will be installed at the entrance of the proposed development unit. Refer to drawing C101 – Erosion and Sediment Control Plan (Appendix I) for additional details.

10 CONCLUSIONS

The analysis concluded that the 5 and 100-year post development runoff discharge can be controlled to the 5-year pre-development level. We also demonstrated that an enhanced water quality protection level (80% TSS removal) can be achieved with a hydrocarbon separator prior to discharging treated stormwater into the existing watercourse.

Furthermore, the proposed water distribution network will be adequate to service the new assembly hall building. The maximum hourly water demand is calculated at 8.18 L/s. The expected operating pressure at the new building connection, under maximum hourly demand, will be 453 kPa. (65.67 psi). The max hourly demand & fire flow required is 74.88 L/s resulting in a residual pressure of 253 kPa (36.7 psi), and the fire flow available at 140 kPa (20 psi) is 95.57 L/s.

The sanitary servicing will consist of the construction of a new septic system.

11 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.

Yours truly,
LRL Associates Ltd.

Prepared by	Checked by	Approved by
Philippe Paquette, C.E.T.	*M. Basnet, P. Eng.*	*Virginia Johnson, P. Eng.*

APPENDIX A

Key Plan

LRJ
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PROJECT

PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

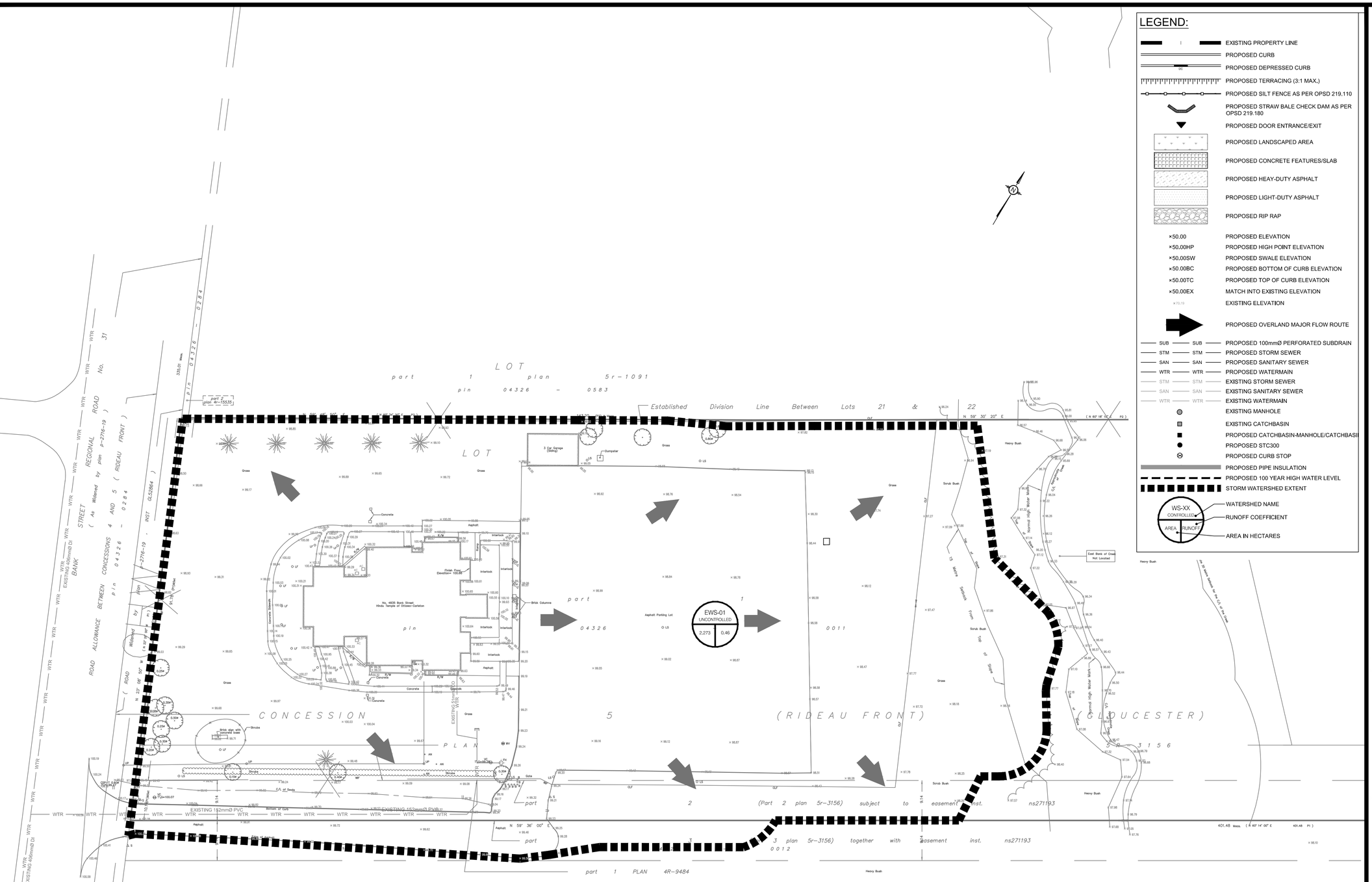
DRAWING TITLE

KEY PLAN

CLIENT	DATE	PROJECT	
THE HINDU HERITAGE CENTRE OF OTTAWA-CARLETON	20FEB2020	170132	KP

APPENDIX B

Pre & Post Watershed Plans



LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED STRAW BALE CHECK DAM AS PER OPSD 219.180
- PROPOSED DOOR ENTRANCE/EXIT
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- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- 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

10m 5 0 10 20m

SCALE: 1:500

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

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER — M. JOHNSON — 100510576 — March 11/2020 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

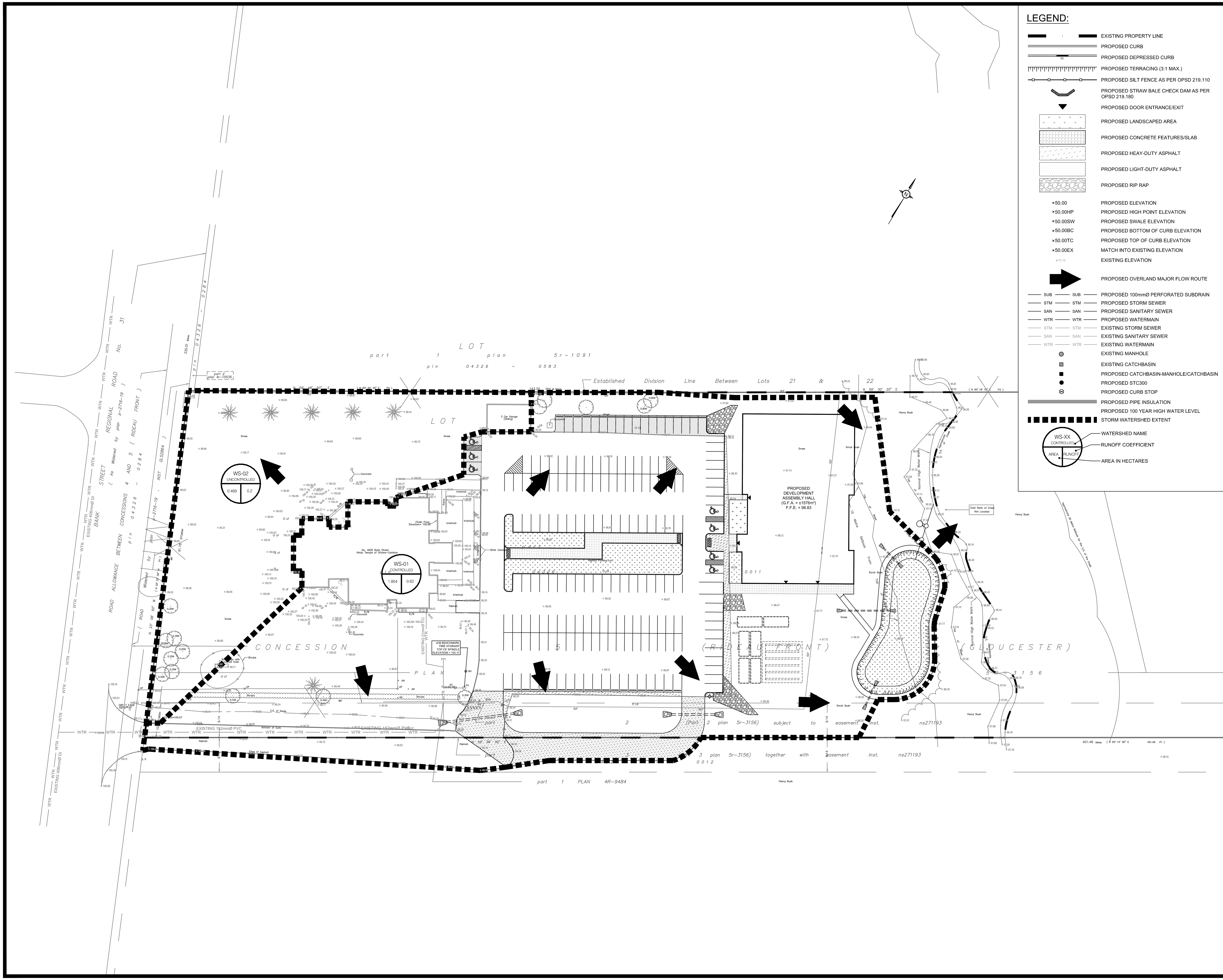
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
PRE-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
170132

DATE
JAN2020

C701



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- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED — WATERSHED NAME
- RUNOFF — RUNOFF COEFFICIENT
- AREA — AREA IN HECTARES

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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.

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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.

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SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
March 11/2020
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
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CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
170132

DATE
JAN2020

C702

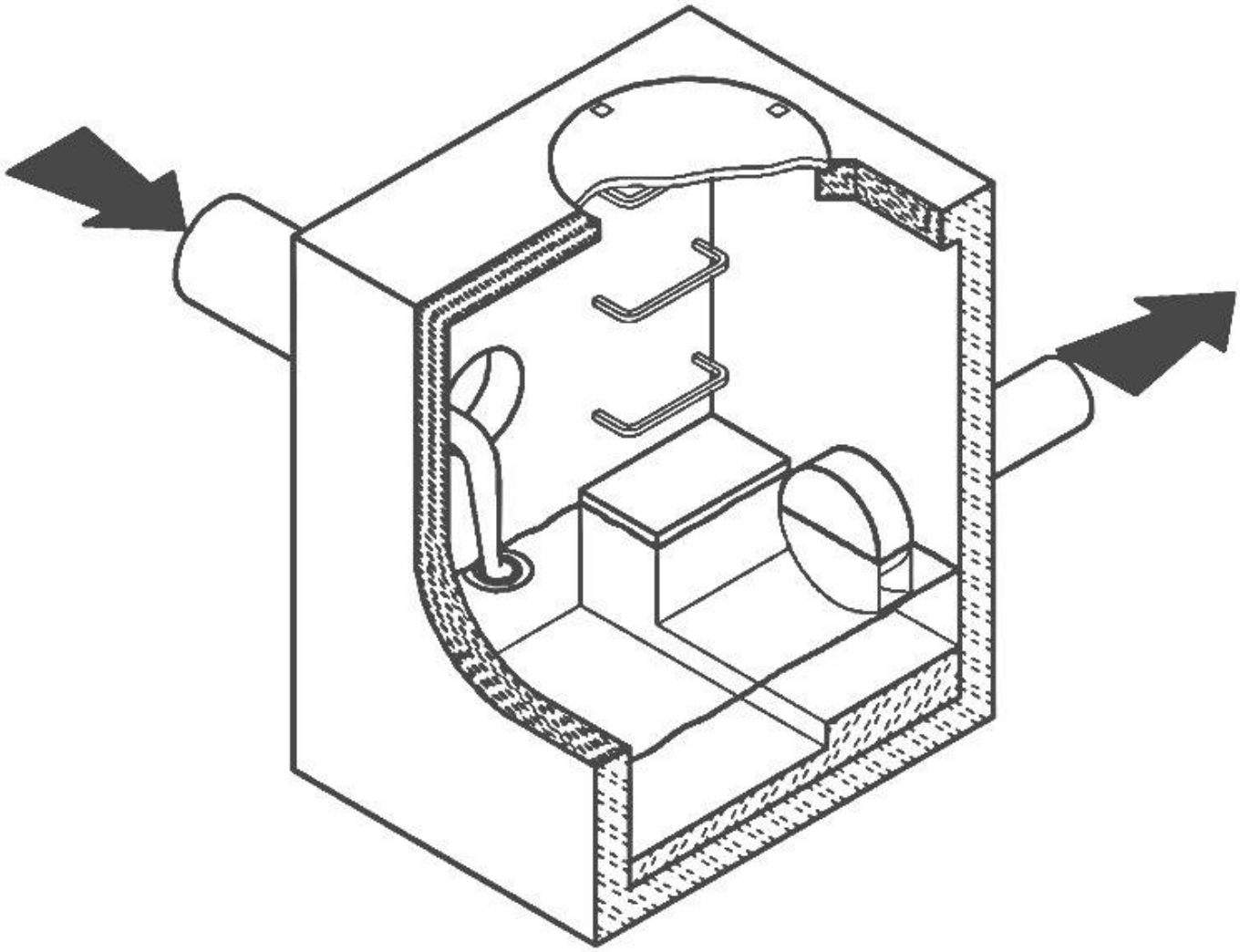
APPENDIX C

Flow Restrictor Information

CSO/STORMWATER MANAGEMENT

HYDROVEX® VHV / SVHV

Vertical Vortex Flow Regulator



JOHN MEUNIER

APPLICATIONS

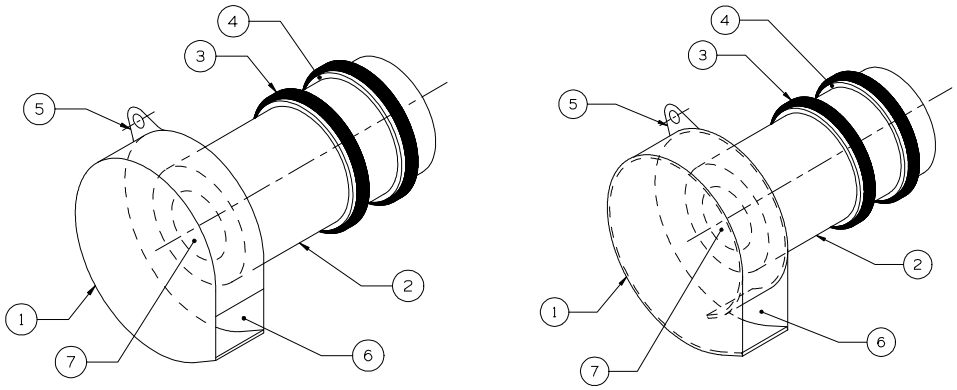
One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm, uncontrolled flows may overload the drainage system and cause flooding. Due to increased velocities, sewer pipe wear is increased dramatically and results in network deterioration. 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.

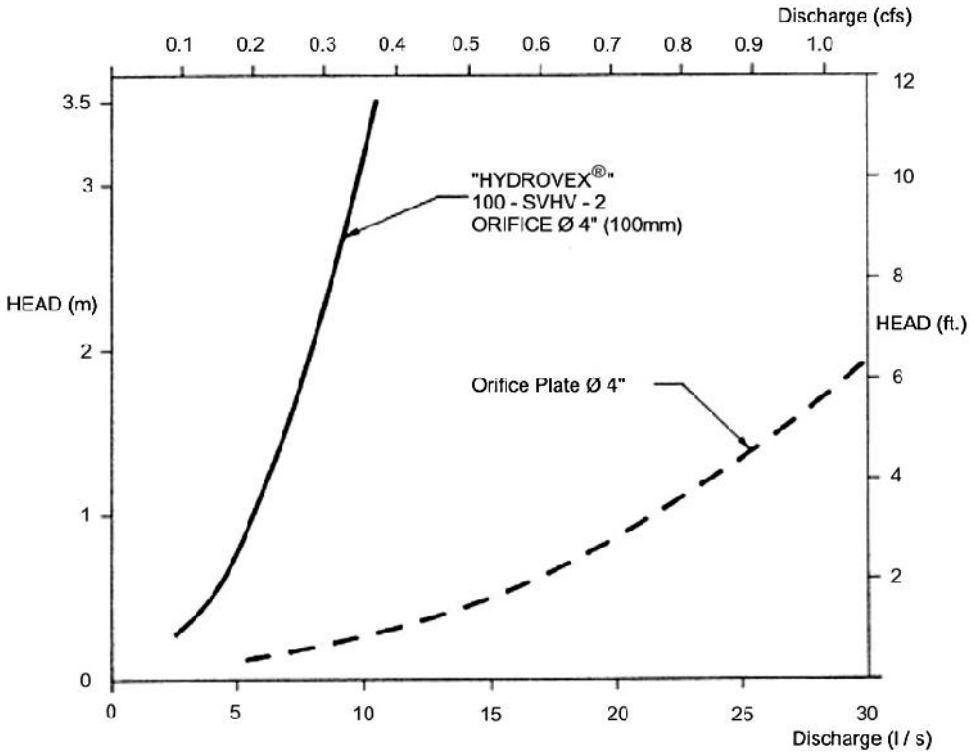


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

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:

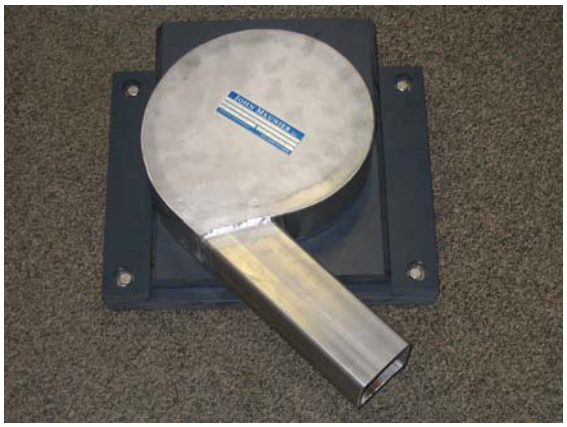
- ***project design flow rate***
- ***pressure head***
- ***chamber's outlet pipe diameter and type***

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

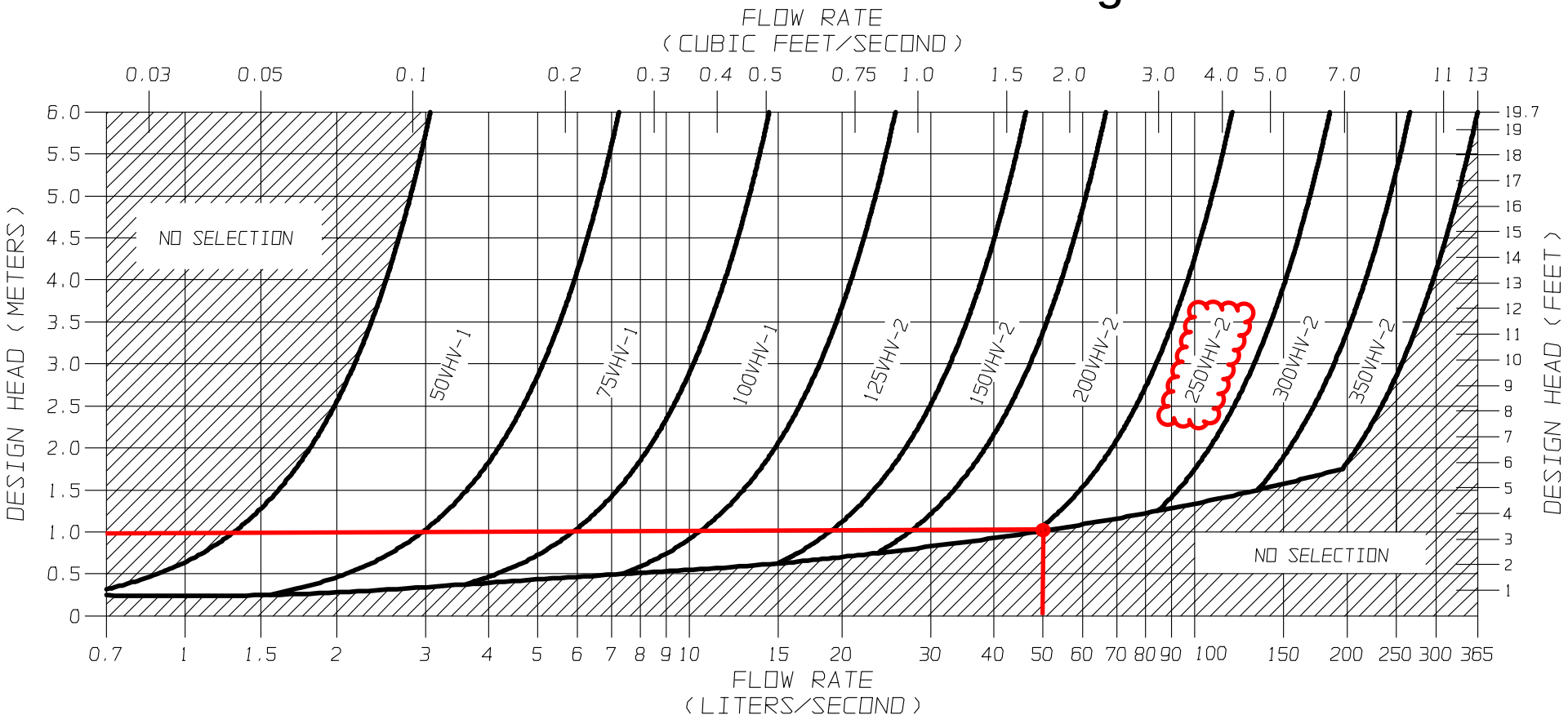
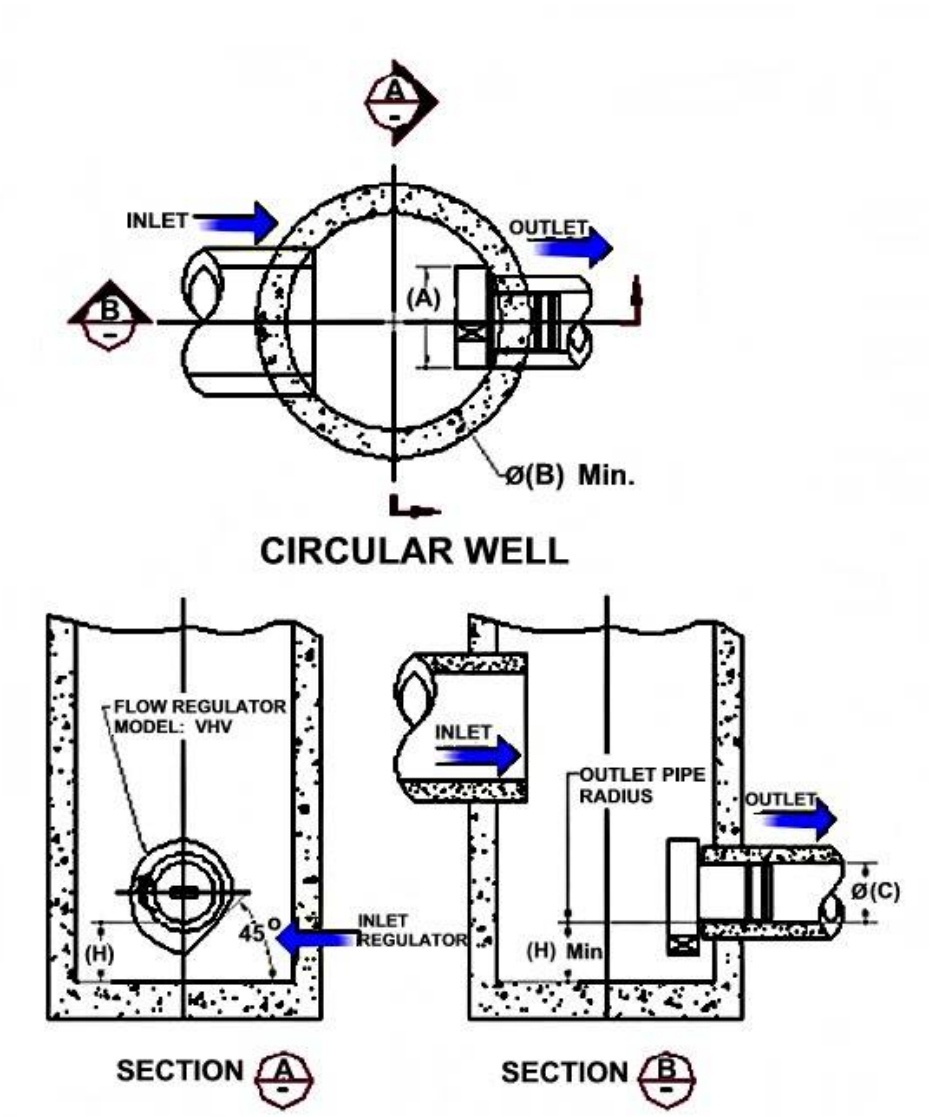


FIGURE 3 - VHV

JOHN MEUNIER

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



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

APPENDIX D

Volume Table Generated by AutoCAD Civil 3D

Cut/Fill Report

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Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (hectares)	Cut (Cu. M.)	Fill (Cu. M.)	Net (Cu. M.)
VOL SOUTH DITCH	full	1.00	1.00	0.07	163.56	50.98	112.57<Cut>
VOL SOUTH WEST DITCH	full	1.00	1.00	0.05	330.48	3.67	326.81<Cut>
VOL DETENTION AREA	full	1.00	1.00	0.07	6.08	464.17	458.09<Fill>
VOL NORTH SWALE	full	1.00	1.00	0.08	106.54	87.11	19.43<Cut>

Totals

	2d Area (hectares)	Cut (Cu. M.)	Fill (Cu. M.)	Net (Cu. M.)
Total	0.26	606.66	605.94	0.72<Cut>

* Value adjusted by cut or fill factor other than 1.0

APPENDIX E

Stormceptor Information

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Tuesday, February 04, 2020
Project Name	Hindu Heritage Centre Bank St.
Project Number	
Location	Ottawa

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.
Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 36 years of OTTAWA MACDONALD-CARTIER INT'L A rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF6-5-1	5	1	1.8	27.8	313

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

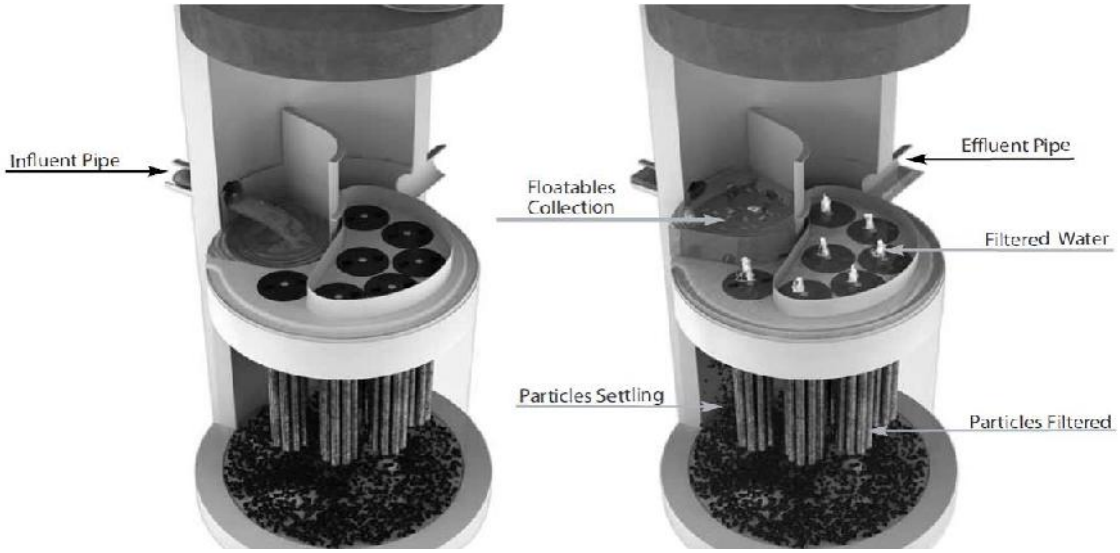
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Tuesday, February 04, 2020
Project Name:	Hindu Temple Bank St.
Project Number:	
Location:	Ottawa

Designer Information

Company:	LRL Associates Ltd.
Contact:	Philippe Paquette
Phone #:	

Notes

Rainfall

Name:	OTTAWA MACDONALD-CARTIER INT'L A
State:	ON
ID:	6000
Record:	1967 to 2003
Co-ords:	45°19'N, 75°40'W

Drainage Area

Total Area:	1.835 ha
Runoff Coefficient:	0.61

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 36 years of OTTAWA MACDONALD-CARTIER INT'L A rainfall	**24.7 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 5186 m³, with a suspended sediment concentration of 60 mg/L.	**311 kg**

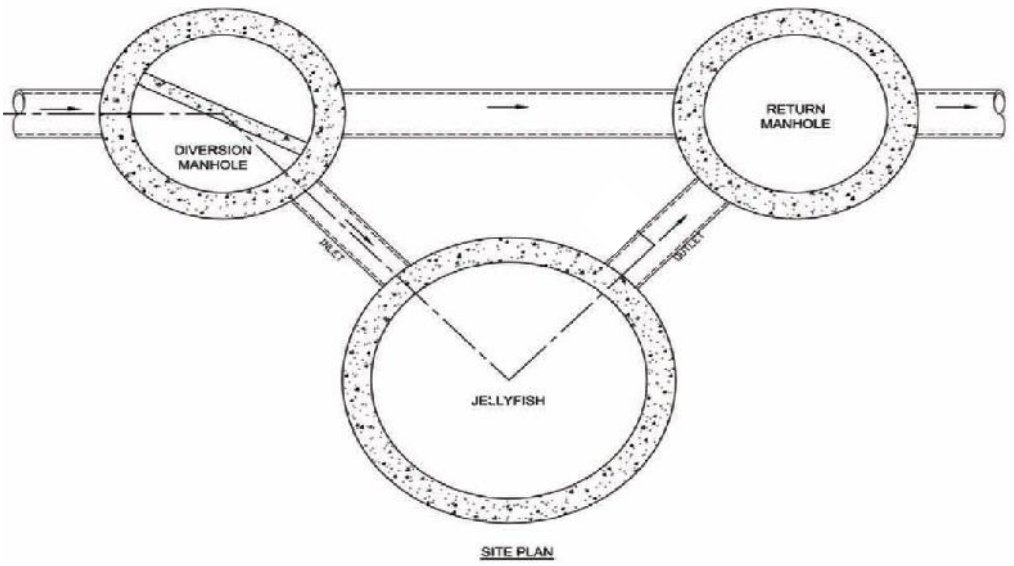
Recommendation

The Jellyfish Filter model JF6-5-1 is recommended to meet the water quality objective by treating a flow of 27.8 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 36 years of OTTAWA MACDONALD-CARTIER INT'L A rainfall data for this site. This model has a sediment capacity of 313 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	2313	0.34	379	7.6	85
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	**5**	**1**	**1.8**	**5205**	**0.79**	**848**	**27.8**	**313**
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	62º	150	200
1.8	**59º**	**200**	**250**
2.4	52º	250	300
3.0	48º	300	450
3.6	40º	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

DRAWING NOT TO BE USED FOR CONSTRUCTION

GENERAL NOTES:

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. JELLYFISH STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE JELLYFISH SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECTS BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

JELLYFISH STRUCTURE & DESIGN NOTES:

1. 762 MM Ø (30") MAINTENANCE ACCESS WALL TO BE USED FOR CLEANOUT AND ACCESS BELOW CARTRIDGE DECK.
2. CASTINGS OR DOORS OF THE JELLYFISH MANHOLE STRUCTURE TO EXTEND TO DESIGN FINISH GRADE. DEPTHS IN EXCESS OF 3.65 M (12') MAY REQUIRE THE DESIGN AND INSTALLATION OF INTERMEDIATE SAFETY GRATES OR OTHER STRUCTURAL ELEMENTS.
3. CASTINGS AND GRADE RINGS, OR DOORS AND DOOR RISERS, OR BOTH, SHALL BE GROUTED FOR WATERTIGHTNESS.
   STRUCTURE SHALL MEET AASHTO HS-20, ASSUMING EARTH COVER OF 0' - 3', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE IMBRIUM LOGO.
4. ALL STRUCTURAL SECTIONS AND PARTS TO MEET OR EXCEED ASTM C-478, ASTM C-443, AND ASTM D-4097 CORRESPONDING TO AASHTO SPECIFICATIONS, AND ANY OTHER SITE OR LOCAL STANDARDS.
5. CONCRETE RISER SECTIONS FROM BOTTOM TO TOP WILL BE ADDED AS REQUIRED INCLUDING TRANSITION PIECES TO SMALLER DIAMETER RISERS FOR SURFACE ACCESSES WHERE WARRANTED BY SERVICING DEPTH.
6. IF MINIMUM DEPTH FROM TOP OF CARTRIDGE DECK TO BOTTOM OF STRUCTURAL TOP SLAB CANNOT BE ACHIEVED DUE TO PIPING INVERT ELEVATIONS OR OTHER SITE CONSTRAINTS. ALTERNATIVE HATCH CONFIGURATIONS MAY BE AVAILABLE. HATCH DOORS SHOULD BE SIZED TO PROVIDE FULL ACCESS ABOVE THE CARTRIDGES TO ACCOMMODATE MAINTENANCE.
7. STEPS TO BE APPROXIMATELY 330 MM (13") APART AND DIMENSIONS MUST MEET LOCAL STANDARDS. STEPS MUST BE INSTALLED AFTER CARTRIDGE DECK IS IN PLACE.
8. CONFIGURATION OF INLET AND OUTLET PIPE CAN VARY TO MEET SITE'S NEEDS.
9. IT IS THE RESPONSIBILITY OF OTHERS TO PROPERLY PROTECT THE TREATMENT DEVICE, AND KEEP THE DEVICE OFFLINE DURING CONSTRUCTION. FILTER CARTRIDGES SHALL NOT BE INSTALLED UNTIL THE PROJECT SITE IS CLEAN AND FREE OF DEBRIS, BY OTHERS. THE PROJECT SITE INCLUDES ANY SURFACE THAT CONTRIBUTES STORM DRAINAGE TO THE TREATMENT DEVICE. CARTRIDGES SHALL BE FURNISHED NEW, AT THE TIME OF FINAL ACCEPTANCE.
10. THIS DRAWING MUST BE VIEWED IN CONJUNCTION WITH THE STANDARD JELLYFISH SPECIFICATION, AND STORMWATER QUALITY FILTER TREATMENT JELLYFISH DOCUMENTS.

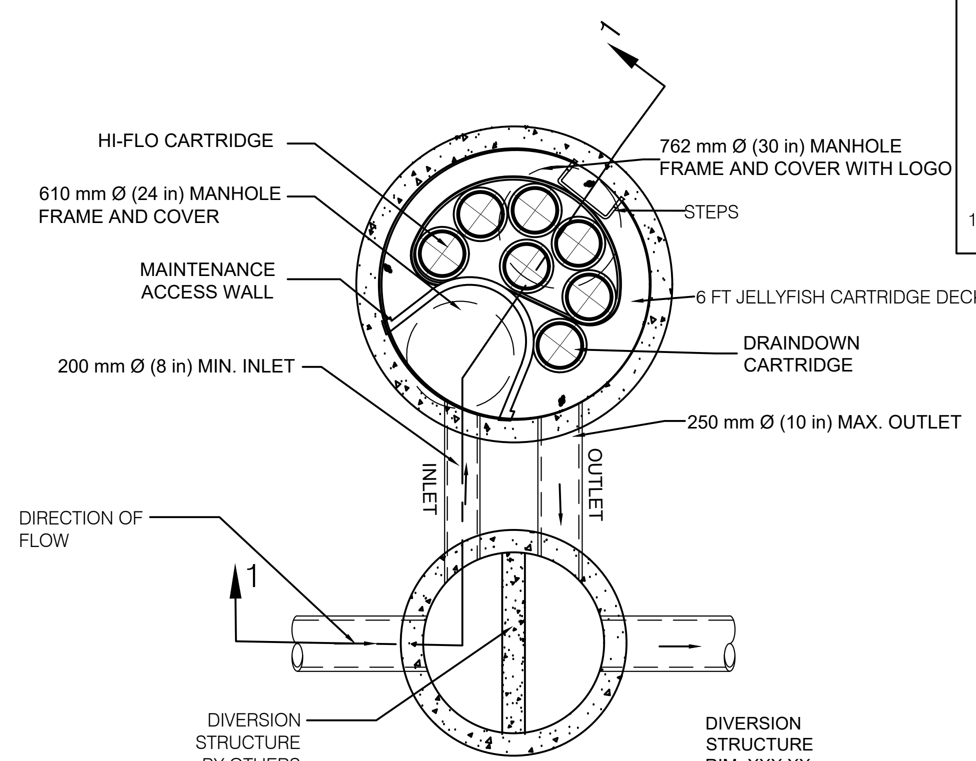
INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. CARTRIDGE INSTALLATION, BY IMBRIUM, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT IMBRIUM TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

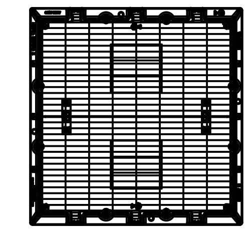
STANDARD OFFLINE JELLYFISH RECOMMENDED PIPE DIAMETERS			
MODEL DIAMETER (m)	MINIMUM ANGLE INLET/OUTLET PIPES	MINIMUM INLET PIPE DIAMETER (mm)	MINIMUM OULTET PIPE DIAMETER (mm)
1.2	62	150	200
1.8	59	200	250
2.4	52	250	300
3.0	48	300	450
3.6	40	300	450
CONTACT IMBRIUM SYSTEMS FOR ALTERNATE PIPE DIAMETERS			

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL JELLYFISH FILTER REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE.

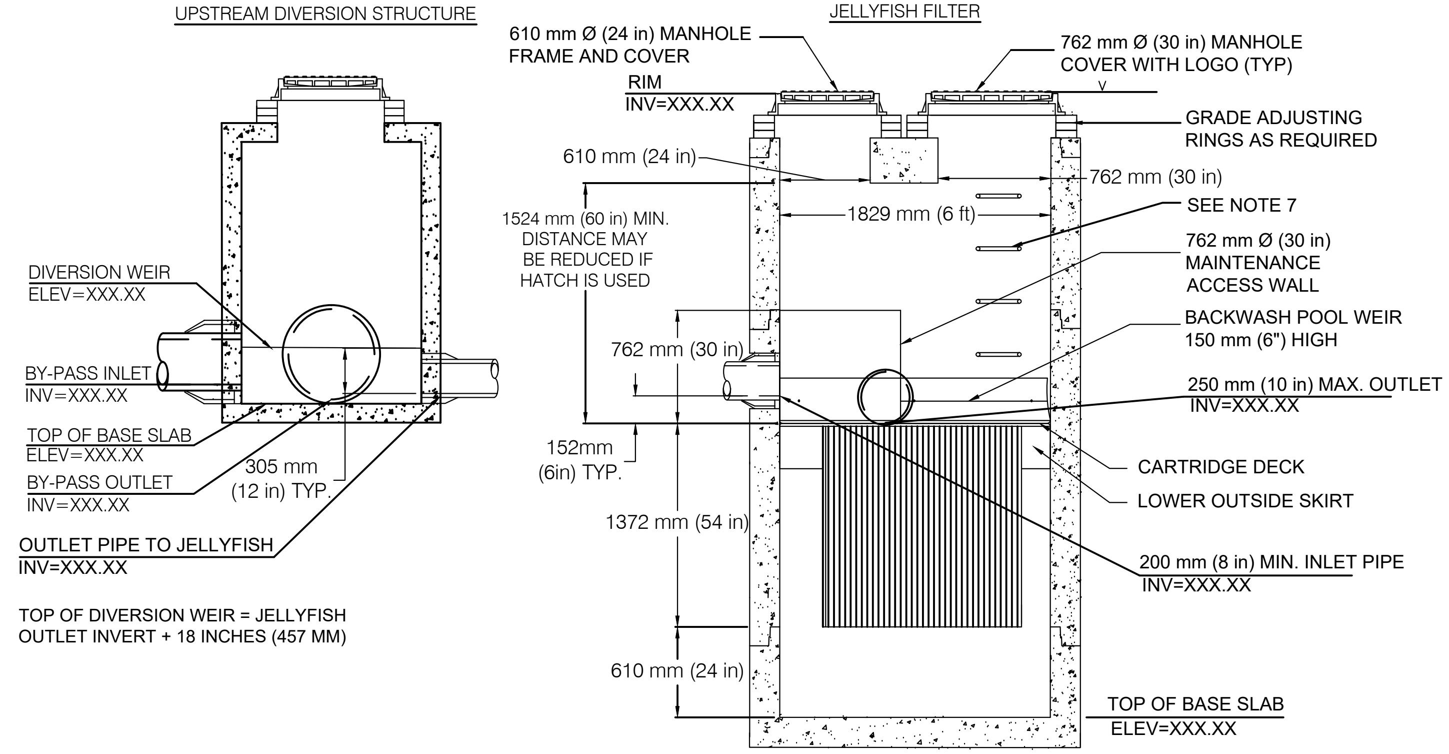
I:\IMBRIUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\STANDARD DETAILS\JELLYFISH FILTER - OFFLINE\JELLYFISH FILTER JF6 - OFFLINE DIVERSION MANHOLE.DWG 5/17/2017 1:49 PM



OFFLINE LAYOUT



1219 mm x 1219 mm (48 in x 48 in)
OPTIONAL HATCH



TOP OF DIVERSION WEIR = JELLYFISH OUTLET INVERT + 18 INCHES (457 MM)

CROSS SECTION 1-1

JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN. Ø1829 mm (72") MANHOLE JELLYFISH PEAK TREATMENT CAPACITY IS 32.8 L/s (1.16 CFS). TREATMENT FLOW RATE IS BASED ON 457 MM (18") OF HEAD PRESSURE.

CARTRIDGE SELECTION				
CARTRIDGE DEPTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE BASE SLAB	90"	76"	63"	51"
FLOW RATE HIGH-FLO / DRAINDOWN (L/s) (per cart)	5.09 / 2.55	3.68 / 1.84	2.55 / 1.27	1.41 / 0.71
SEDIMENT CAPACITY HIGH-FLO / DRAINDOWN (kg) (per cart)	57 / 28	42 / 21	28 / 14	16 / 8
MAX. CARTS HIGH-FLO/DRAINDOWN	6 / 1			
MAX. SEDIMENT CAPACITY (kg)	370	273	182	104
MAX. TREATMENT (L/s)	32.8	24.6	16.4	9.06

SITE SPECIFIC DATA REQUIREMENTS

JELLYFISH MODEL	*				
STRUCTURE ID	*				
WATER QUALITY FLOW RATE (L/s)	*				
PEAK FLOW RATE (L/s)	*				
RETURN PERIOD OF PEAK FLOW (yrs)	*				
# OF CARTRIDGES REQUIRED (HF / DD)	*				
CARTRIDGE SIZE (inches)	*				
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
#	#	#	#
#	#	#	#
#	#	#	#
1	08/01/2015	NOTES	BSF
0	10/01/2014	INTIAL RELEASE	BSF

Jellyfish®

JF6 STANDARD
Scale = 1:50

info@imbriumsystems.com

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imbrium®
7037 Ridge Road, Suite 350, Hanover, MD 21076
USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900

Jellyfish® Filter

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING AUS NO. 2008/286748, U.S.A. NO. US 8,287,726, US 8,221,618, US 8,123,935, CA 2,834,542,CA 2,696,482, CA 2,696,482, KR 10-1287539, NZ 583461, NZ 604227, ZA 2010/01068; OTHER INTERNATIONAL PATENTS PENDING

DATE: ########	
DESIGNED:	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####
SHEET: 1 OF 2	

JELLYFISH® FILTER - SPECIFICATIONS

GENERAL

A. WORK INCLUDED: SPECIFIES REQUIREMENTS FOR CONSTRUCTION AND PERFORMANCE OF AN UNDERGROUND STORMWATER QUALITY, MEMBRANE FILTRATION, AND TREATMENT DEVICE THAT REMOVES POLLUTANTS FROM STORMWATER RUNOFF THROUGH THE UNIT OPERATIONS OF SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.

B. REFERENCE STANDARDS:

ASTM C 891:	SPECIFICATION FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES
ASTM C 478:	SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
ASTM C 990:	SPECIFICATION FOR JOINTS FOR CONCRETE MANHOLES USING PREFORMED FLEXIBLE JOINT SEALANTS
ASTM D 4101:	SPECIFICATION FOR COPOLYMER STEPS CONSTRUCTION

C. SHOP DRAWINGS: SHOP DRAWINGS FOR THE STRUCTURE AND PERFORMANCE ARE TO BE SUBMITTED WITH EACH ORDER TO THE CONTRACTOR. CONTRACTOR SHALL FORWARD SHOP DRAWING SUBMITTAL TO THE CONSULTING ENGINEER FOR APPROVAL. SHOP DRAWINGS ARE TO DETAIL THE STRUCTURE PRECAST CONCRETE AND CALL OUT OR NOTE THE FIBERGLASS (FRP) INTERNALS/COMPONENTS.

D. PRODUCT SUBSTITUTIONS: NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD. SUBMISSIONS FOR SUBSTITUTIONS REQUIRE REVIEW AND APPROVAL BY THE ENGINEER OF RECORD, FOR HYDRAULIC PERFORMANCE, IMPACT TO PROJECT DESIGNS, EQUIVALENT TREATMENT PERFORMANCE, AND ANY REQUIRED PROJECT PLAN AND REPORT (HYDROLOGY/HYDRAULIC, WATER QUALITY, STORMWATER POLLUTION) MODIFICATIONS THAT WOULD BE REQUIRED BY THE APPROVING JURISDICTIONS/AGENCIES. CONTRACTOR TO COORDINATE WITH THE ENGINEER OF RECORD ANY APPLICABLE MODIFICATIONS TO THE PROJECT ESTIMATES OF COST, BONDING AMOUNT DETERMINATIONS, PLAN CHECK FEES FOR CHANGES TO APPROVED DOCUMENTS, AND/OR ANY OTHER REGULATORY REQUIREMENTS RESULTING FROM THE PRODUCT SUBSTITUTION.

E. HANDLING AND STORAGE: PREVENT DAMAGE TO MATERIALS DURING STORAGE AND HANDLING.

PRODUCTS

A. THE DEVICE SHALL BE A CYLINDRICAL OR RECTANGULAR, ALL CONCRETE STRUCTURE (INCLUDING RISERS), CONSTRUCTED FROM PRECAST CONCRETE RISER AND SLAB COMPONENTS OR MONOLITHIC PRECAST STRUCTURE(S), INSTALLED TO CONFORM TO ASTM C 891 AND TO ANY REQUIRED STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS; WHICHEVER IS MORE STRINGENT. THE DEVICE SHALL BE WATERTIGHT.

B. THE CYLINDRICAL CONCRETE DEVICE SHALL INCLUDE A FIBERGLASS CARTRIDGE DECK INSERT. THE RECTANGULAR CONCRETE DEVICE SHALL INCLUDE A COATED ALUMINUM INSERT. IN EITHER INSTANCE, THE INSERT SHALL BE BOLTED AND SEALED WATERTIGHT INSIDE THE PRECAST CONCRETE CHAMBER. THE INSERT SHALL SERVE AS: (A) A HORIZONTAL DIVIDER BETWEEN THE LOWER TREATMENT ZONE AND THE UPPER TREATED EFFLUENT ZONE; (B) A DECK FOR ATTACHMENT OF FILTER CARTRIDGES SUCH THAT THE MEMBRANE FILTER ELEMENTS OF EACH CARTRIDGE EXTEND INTO THE LOWER TREATMENT ZONE; (C) A PLATFORM FOR MAINTENANCE WORKERS TO SERVICE THE FILTER CARTRIDGES (MAXIMUM MANNED WEIGHT = 450 POUNDS); (D) A CONDUIT FOR CONVEYANCE OF TREATED WATER TO THE EFFLUENT PIPE.

C. MEMBRANE FILTER CARTRIDGES SHALL BE COMPRISED OF REUSABLE CYLINDRICAL MEMBRANE FILTER ELEMENTS CONNECTED TO A PERFORATED HEAD PLATE. THE NUMBER OF MEMBRANE FILTER ELEMENTS PER CARTRIDGE SHALL BE A MINIMUM OF ELEVEN 2.75-INCH (70-MM) OR GREATER DIAMETER ELEMENTS. THE LENGTH OF EACH FILTER ELEMENT SHALL BE A MINIMUM 15 INCHES (381 MM). EACH CARTRIDGE SHALL BE FITTED INTO THE CARTRIDGE DECK BY INSERTION INTO A CARTRIDGE RECEPTACLE THAT IS PERMANENTLY MOUNTED INTO THE CARTRIDGE DECK. EACH CARTRIDGE SHALL BE SECURED BY A CARTRIDGE LID THAT IS THREADED ONTO THE RECEPTACLE, OR SIMILAR MECHANISM TO SECURE THE CARTRIDGE INTO THE DECK. THE MAXIMUM TREATMENT FLOW RATE OF A FILTER CARTRIDGE SHALL BE CONTROLLED BY AN ORIFICE IN THE CARTRIDGE LID, OR ON THE INDIVIDUAL CARTRIDGE ITSELF, AND BASED ON A DESIGN FLUX RATE (SURFACE LOADING RATE) DETERMINED BY THE MAXIMUM TREATMENT FLOW RATE PER UNIT OF FILTRATION MEMBRANE SURFACE AREA. THE MAXIMUM FLUX RATE SHALL BE 0.21 GPM/FT2 (0.142 LPS/M2). EACH MEMBRANE FILTER CARTRIDGE SHALL ALLOW FOR MANUAL INSTALLATION AND REMOVAL.

D. ALL FILTER CARTRIDGES AND MEMBRANES SHALL BE REUSABLE AND ALLOW FOR THE USE OF FILTRATION MEMBRANE RINSING PROCEDURES TO RESTORE FLOW CAPACITY AND SEDIMENT CAPACITY; EXTENDING CARTRIDGE SERVICE LIFE.

E. ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.

F. THE DEVICE SHALL INCLUDE A MINIMUM 24 INCHES (610 MM) OF SUMP BELOW THE BOTTOM OF THE CARTRIDGES FOR SEDIMENT ACCUMULATION, UNLESS OTHERWISE SPECIFIED BY THE DESIGN ENGINEER. DEPTHS LESS THAN 24" MAY HAVE AN IMPACT ON THE TOTAL PERFORMANCE AND/OR LONGEVITY BETWEEN CARTRIDGE MAINTENANCE/REPLACEMENT OF THE DEVICE.

G. ALL PRECAST CONCRETE COMPONENTS SHALL BE MANUFACTURED TO A MINIMUM LIVE LOAD OF HS-20 TRUCK LOADING OR GREATER BASED ON LOCAL REGULATORY SPECIFICATIONS, UNLESS OTHERWISE MODIFIED OR SPECIFIED BY THE DESIGN ENGINEER, AND SHALL BE WATERTIGHT.

H. GASKETS AND/OR SEALANTS TO PROVIDE WATER TIGHT SEAL BETWEEN CONCRETE JOINTS. JOINTS SHALL BE SEALED WITH PREFORMED JOINT SEALING COMPOUND CONFORMING TO ASTM C 990.

I. FRAME AND COVERS MUST BE MANUFACTURED FROM CAST-IRON OR OTHER COMPOSITE MATERIAL TESTED TO WITHSTAND H-20 OR GREATER DESIGN LOADS, AND AS APPROVED BY THE LOCAL REGULATORY BODY. FRAMES AND COVERS MUST BE EMBOSSED WITH THE NAME OF THE DEVICE MANUFACTURER OR THE DEVICE BRAND NAME.

J. DOOR AND HATCHES, IF PROVIDED SHALL MEET DESIGNATED LOADING REQUIREMENTS OR AT A MINIMUM FOR INCIDENTAL VEHICULAR TRAFFIC.

K. ALL CONCRETE COMPONENTS SHALL BE MANUFACTURED ACCORDING TO LOCAL SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF ASTM C 478.

L. THE FIBERGLASS PORTION OF THE FILTER DEVICE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARD: ASTM D-4097: CONTACT MOLDED GLASS FIBER REINFORCED CHEMICAL RESISTANT TANKS.

M. STEPS SHALL BE CONSTRUCTED ACCORDING TO ASTM D4101 OF COPOLYMER POLYPROPYLENE, AND BE DRIVEN INTO PREFORMED OR PRE-DRILLED HOLES AFTER THE CONCRETE HAS CURED, INSTALLED TO CONFORM TO APPLICABLE SECTIONS OF STATE, PROVINCIAL AND MUNICIPAL BUILDING CODES, HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF SUCH DEVICES.

N. ALL PRECAST CONCRETE SECTIONS SHALL BE INSPECTED TO ENSURE THAT DIMENSIONS, APPEARANCE AND QUALITY OF THE PRODUCT MEET LOCAL MUNICIPAL SPECIFICATIONS AND ASTM C 478.

PERFORMANCE

A. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL FUNCTION TO REMOVE POLLUTANTS BY THE FOLLOWING UNIT TREATMENT PROCESSES; SEDIMENTATION, FLOATATION, AND MEMBRANE FILTRATION.

B. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL REMOVE OIL, DEBRIS, TRASH, COARSE AND FINE PARTICULATES, PARTICULATE-BOUND POLLUTANTS, METALS AND NUTRIENTS FROM STORMWATER DURING RUNOFF EVENTS.

C. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TYPICALLY UTILIZE AN EXTERNAL BYPASS TO DIVERT EXCESSIVE FLOWS. INTERNAL BYPASS SYSTEMS SHALL BE EQUIPPED WITH A FLOATABLES BAFFLE, AND MUST PASS WATER OVER THE CARTRIDGE DECK, AND AVOID PASSAGE THROUGH THE SUMP AND/OR CARTRIDGE FILTRATION ZONE.

D. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL TREAT 100% OF THE REQUIRED WATER QUALITY TREATMENT FLOW BASED ON A MAXIMUM TREATMENT FLUX RATE (SURFACE LOADING RATE) ACROSS THE MEMBRANE FILTER CARTRIDGES NOT TO EXCEED 0.21 GPM/FT2 (0.142 LPS/M2).

E. AT A MINIMUM, THE STORMWATER QUALITY FILTER DEVICE SHALL HAVE BEEN FIELD TESTED AND VERIFIED WITH A MINIMUM 25 QUALIFYING STORM EVENTS AND FIELD MONITORING CONDUCTED ACCORDING TO THE TARP TIER II OR TAPE FIELD TEST PROTOCOL, AND HAVE RECEIVED NJCAT VERIFICATION.

F. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TSS REMOVAL EFFICIENCY OF 85% AND A MINIMUM MEDIAN SSC REMOVAL EFFICIENCY OF 95%.

G. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED THE ABILITY TO CAPTURE FINE PARTICLES AS INDICATED BY A MINIMUM MEDIAN REMOVAL EFFICIENCY OF 75% FOR THE PARTICLE FRACTION LESS THAN 25 MICRONS, AN EFFLUENT D50 OF 15 MICRONS OR LOWER FOR ALL MONITORED STORM EVENTS, AND AN EFFLUENT TURBIDITY OF 15 NTUS OR LOWER.

H. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL PHOSPHORUS REMOVAL OF 55%, AND A MINIMUM MEDIAN TOTAL NITROGEN REMOVAL OF 50%.

I. THE STORMWATER QUALITY FILTER TREATMENT DEVICE SHALL HAVE DEMONSTRATED A MINIMUM MEDIAN TOTAL ZINC REMOVAL OF 50%, AND A MINIMUM MEDIAN TOTAL COPPER REMOVAL OF 75%.

INSPECTION AND MAINTENANCE

A. DURABILITY OF MEMBRANES ARE SUBJECT TO GOOD HANDLING PRACTICES DURING INSPECTION AND MAINTENANCE (REMOVAL, RINSING, AND REINSERTION) EVENTS, AND SITE SPECIFIC CONDITIONS THAT MAY HAVE HEAVIER OR LIGHTER LOADING ONTO THE CARTRIDGES, AND POLLUTANT VARIABILITY THAT MAY IMPACT THE MEMBRANE STRUCTURAL INTEGRITY. MEMBRANE MAINTENANCE AND REPLACEMENT SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

B. INSPECTION WHICH INCLUDES TRASH AND FLOATABLES COLLECTION, SEDIMENT DEPTH DETERMINATION, AND VISIBLE DETERMINATION OF BACKWASH POOL DEPTH SHALL BE EASILY CONDUCTED FROM GRADE (OUTSIDE THE STRUCTURE).

C. MANUAL RINSING OF THE REUSABLE FILTER CARTRIDGES SHALL PROMOTE RESTORATION OF THE FLOW CAPACITY AND SEDIMENT CAPACITY OF THE FILTER CARTRIDGES, EXTENDING CARTRIDGE SERVICE LIFE.

D. SEDIMENT REMOVAL FROM THE FILTER TREATMENT DEVICE SHALL BE ABLE TO BE CONDUCTED USING A STANDARD MAINTENANCE TRUCK AND VACUUM APPARATUS, AND A MINIMUM ONE POINT OF ENTRY TO THE SUMP THAT IS UNOBSTRUCTED BY FILTER CARTRIDGES.

E. MAINTENANCE ACCESS SHALL HAVE A MINIMUM CLEAR HEIGHT OF 60" OVER ALL OF THE FILTER CARTRIDGES, OR BE ACCESSIBLE BY A HATCH OR OTHER MECHANISM THAT PROVIDES MINIMUM 60" VERTICAL CLEAR SPACE OVER ALL OF THE FILTER CARTRIDGES. FILTER CARTRIDGES SHALL BE ABLE TO BE LIFTED STRAIGHT VERTICALLY OUT OF THE RECEPTACLES AND DECK FOR THE ENTIRE LENGTH OF THE CARTRIDGE.

F. FILTER CARTRIDGES SHALL BE ABLE TO BE MAINTAINED WITHOUT THE USE OF ADDITIONAL LIFTING EQUIPMENT.

EXECUTION

A. THE INSTALLATION OF A WATERTIGHT PRECAST CONCRETE DEVICE SHOULD CONFORM TO ASTM C 891 AND TO ANY STATE HIGHWAY, MUNICIPAL OR LOCAL SPECIFICATIONS FOR THE CONSTRUCTION OF MANHOLES, WHICHEVER IS MORE STRINGENT. SELECTED SECTIONS OF A GENERAL SPECIFICATION THAT ARE APPLICABLE ARE SUMMARIZED BELOW.

B. THE WATERTIGHT PRECAST CONCRETE DEVICE IS INSTALLED IN SECTIONS IN THE FOLLOWING SEQUENCE:
- AGGREGATE BASE
- BASE SLAB
- TREATMENT CHAMBER AND CARTRIDGE DECK RISER SECTION(S)
- BYPASS SECTION
- CONNECT INLET AND OUTLET PIPES
- CONCRETE RISER SECTION(S) AND/OR TRANSITION SLAB (IF REQUIRED)
- MAINTENANCE RISER SECTION(S) (IF REQUIRED)
- FRAME AND ACCESS COVER

C. INLET AND OUTLET PIPES SHOULD BE SECURELY SET INTO THE DEVICE USING APPROVED PIPE SEALS (FLEXIBLE BOOT CONNECTIONS, WHERE APPLICABLE) SO THAT THE STRUCTURE IS WATERTIGHT, AND SUCH THAT ANY PIPE INTRUSION INTO THE DEVICE DOES NOT IMPACT THE DEVICE FUNCTIONALITY.

D. ADJUSTMENT UNITS (E.G. GRADE RINGS) SHOULD BE INSTALLED TO SET THE FRAME AND COVER AT THE REQUIRED ELEVATION. THE ADJUSTMENT UNITS SHOULD BE LAID IN A FULL BED OF MORTAR WITH SUCCESSIVE UNITS BEING JOINED USING SEALANT RECOMMENDED BY THE MANUFACTURER. FRAMES FOR THE COVER SHOULD BE SET IN A FULL BED OF MORTAR AT THE ELEVATION SPECIFIED.

E. IN SOME INSTANCES THE MAINTENANCE ACCESS WALL, IF PROVIDED, SHALL REQUIRE AN EXTENSION ATTACHMENT AND SEALING TO THE PRECAST WALL AND CARTRIDGE DECK AT THE JOB SITE, RATHER THAN AT THE PRECAST FACILITY. IN THIS INSTANCE, INSTALLATION OF THESE COMPONENTS SHALL BE PERFORMED ACCORDING TO INSTRUCTIONS PROVIDED BY THE MANUFACTURER.

F. FILTER CARTRIDGES SHALL BE INSTALLED IN THE CARTRIDGE DECK AFTER THE CONSTRUCTION SITE IS FULLY STABILIZED AND IN ACCORDANCE WITH THE MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONTRACTOR TO CONTACT THE MANUFACTURER TO SCHEDULE CARTRIDGE DELIVERY AND REVIEW PROCEDURES/REQUIREMENTS TO BE COMPLETED TO THE DEVICE PRIOR TO INSTALLATION OF THE CARTRIDGES AND ACTIVATION OF THE SYSTEM.

G. MANUFACTURER SHALL COORDINATE DELIVERY OF FILTER CARTRIDGES AND OTHER INTERNAL COMPONENTS WITH CONTRACTOR. FILTER CARTRIDGES SHALL BE DELIVERED AND INSTALLED COMPLETE AFTER SITE IS STABILIZED AND UNIT IS READY TO ACCEPT CARTRIDGES. UNIT IS READY TO ACCEPT CARTRIDGES AFTER IS HAS BEEN CLEANED OUT AND ANY STANDING WATER, DEBRIS, AND OTHER MATERIALS HAVE BEEN REMOVED. CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO PROTECT THE FILTER CARTRIDGE RECEPTACLES AND FILTER CARTRIDGES FROM DAMAGE DURING CONSTRUCTION, AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND GUIDANCE. FOR SYSTEMS WITH CARTRIDGES INSTALLED PRIOR TO FULL SITE STABILIZATION AND PRIOR TO SYSTEM ACTIVATION, THE CONTRACTOR CAN PLUG INLET AND OUTLET PIPES TO PREVENT STORMWATER AND OTHER INFLUENT FROM ENTERING THE DEVICE. PLUGS MUST BE REMOVED DURING THE ACTIVATION PROCESS.

H. THE MANUFACTURER SHALL PROVIDE AN OWNER'S MANUAL UPON REQUEST.

I. AFTER CONSTRUCTION AND INSTALLATION, AND DURING OPERATION, THE DEVICE SHALL BE INSPECTED AND CLEANED AS NECESSARY BASED ON THE MANUFACTURER'S RECOMMENDED INSPECTION AND MAINTENANCE GUIDELINES AND THE LOCAL REGULATORY AGENCY/BODY.

J. WHEN REPLACEMENT MEMBRANE FILTER ELEMENTS AND/OR OTHER PARTS ARE REQUIRED, ONLY MEMBRANE FILTER ELEMENTS AND PARTS APPROVED BY THE MANUFACTURER FOR USE WITH THE STORMWATER QUALITY FILTER DEVICE SHALL BE INSTALLED.

END OF SECTION

MARK	DATE	REVISION DESCRIPTION	BY
#	#	#	#
#	#	#	#
#	#	#	#
#	#	#	#
0	10/01/2014	INTIAL RELEASE	BSF

JELLYFISH FILTER SPECIFICATIONS

Jellyfish®

JF6 STANDARD

Scale = 1:50

www.imbriumsystems.com info@imbriumsystems.com

imbrium®
7037 Ridge Road, Suite 350, Hanover, MD 21076
USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900

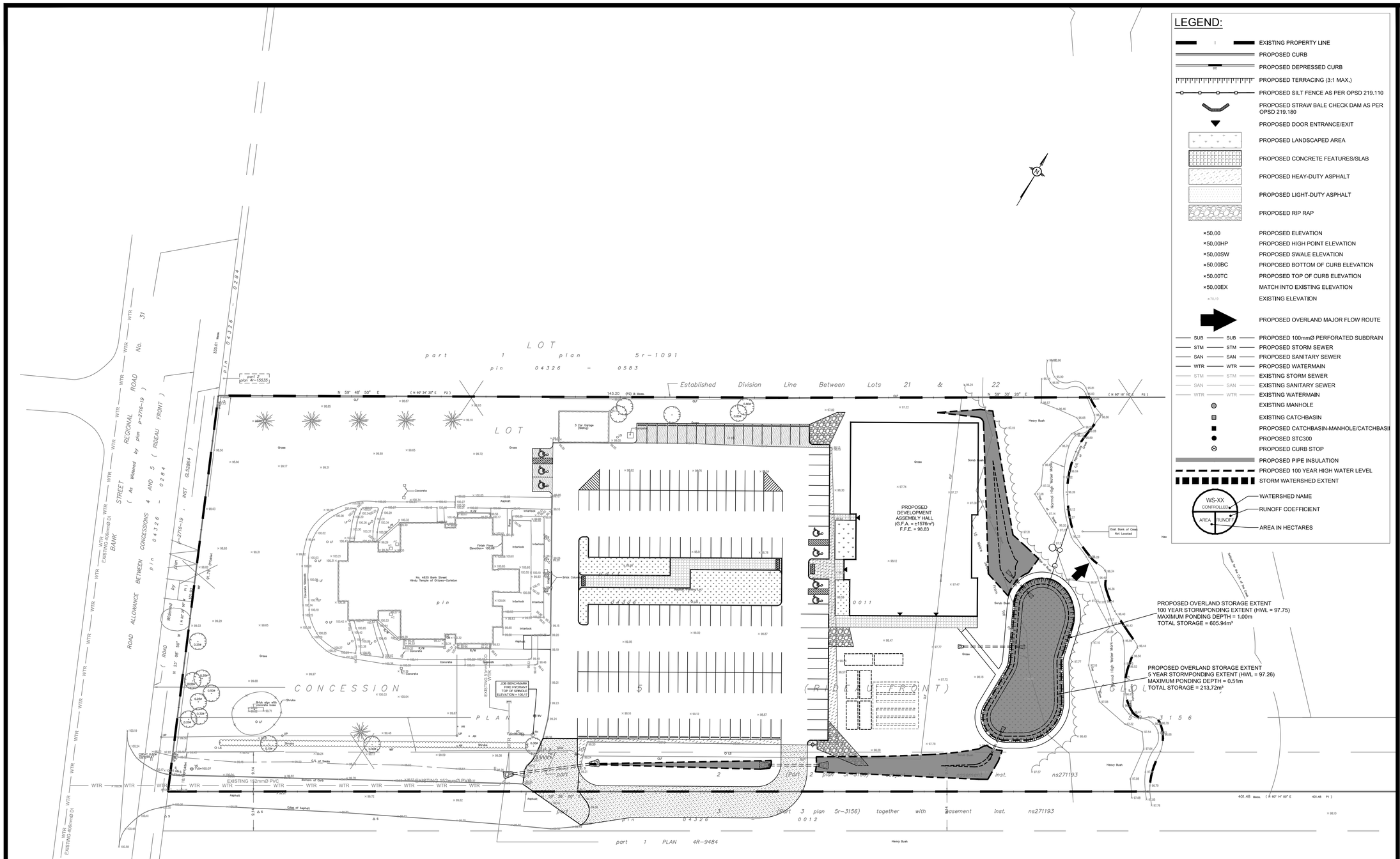
Jellyfish® Filter

DATE: ########	
DESIGNED:	DRAWN: BSF
CHECKED: BSF	APPROVED: SP
PROJECT #: #####	PROJECT NAME: #####
SHEET: 2 OF 2	

I:\IMBRIUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\STANDARD DETAILS\JELLYFISH FILTER - OFFLINE\JELLYFISH FILTER JF6 - OFFLINE DIVERSION MANHOLE.DWG 5/17/2017 1:49 PM

APPENDIX F

Stormwater Management Plan



LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED STRAW BALE CHECK DAM AS PER OPSD 219.180
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00SW PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- 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

10m 5 0 10 20m

SCALE: 1:500

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 AVAILABE 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.

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER — P. JOHNSON — 100510576 — March 11/2020 — 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
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

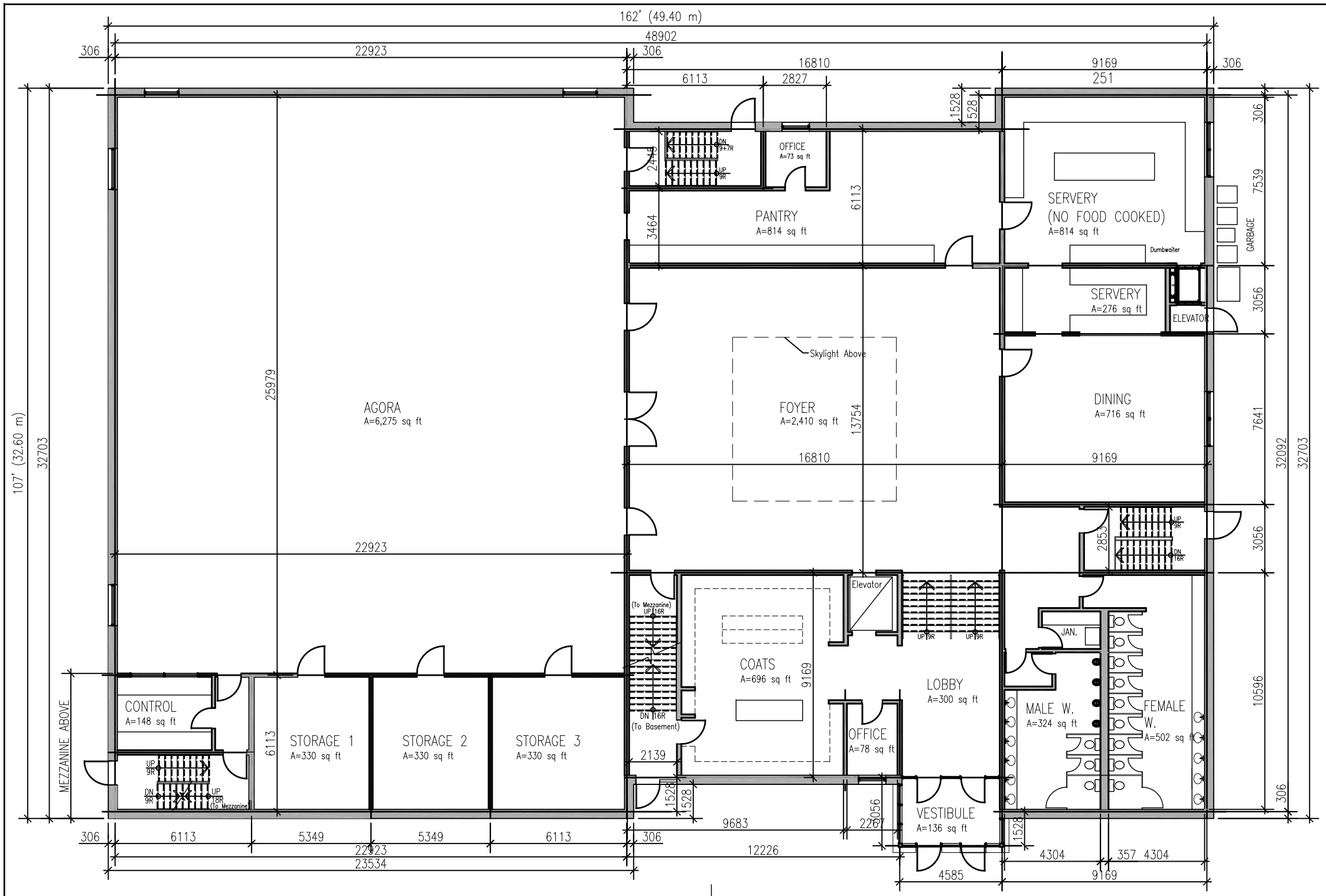
PROJECT NO.
170132

DATE
JAN2020

C601

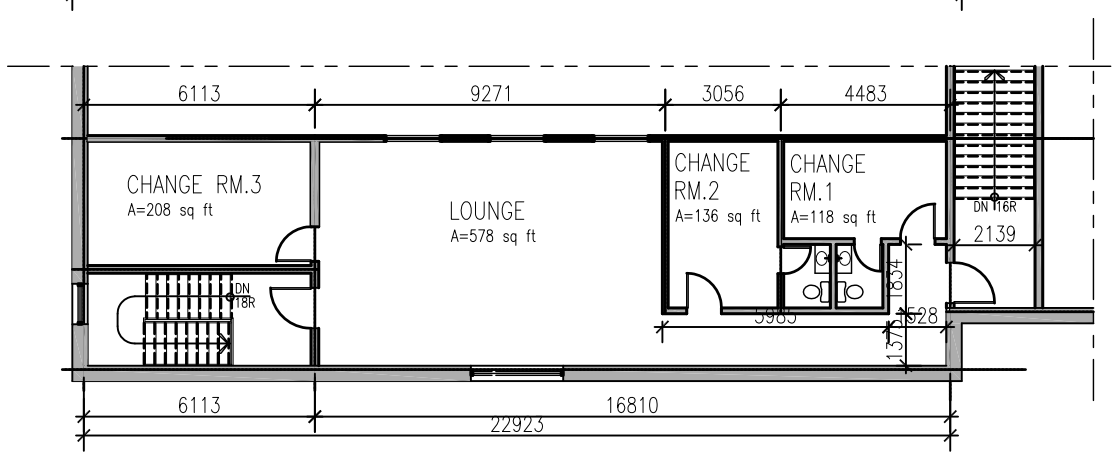
APPENDIX G

Architectural Drawings



1 / A100 GROUND FLOOR PLAN

SCALE 1:200



2 / A100 MEZZANINE FLOOR PLAN

SCALE 1:200

ONTARIO ASSOCIATION OF ARCHITECTS
SWAPAN JEET KAUR
LICENCE 7839

NO.	REMARKS	DATE
1	ISSUED FOR SITE PLAN	FEB 25

REVISIONS

PROJECT TITLE
PROPOSED ASSEMBLY HALL - HINDU TEMPLE,
4835 BANK STREET, OTTAWA, ONTARIO

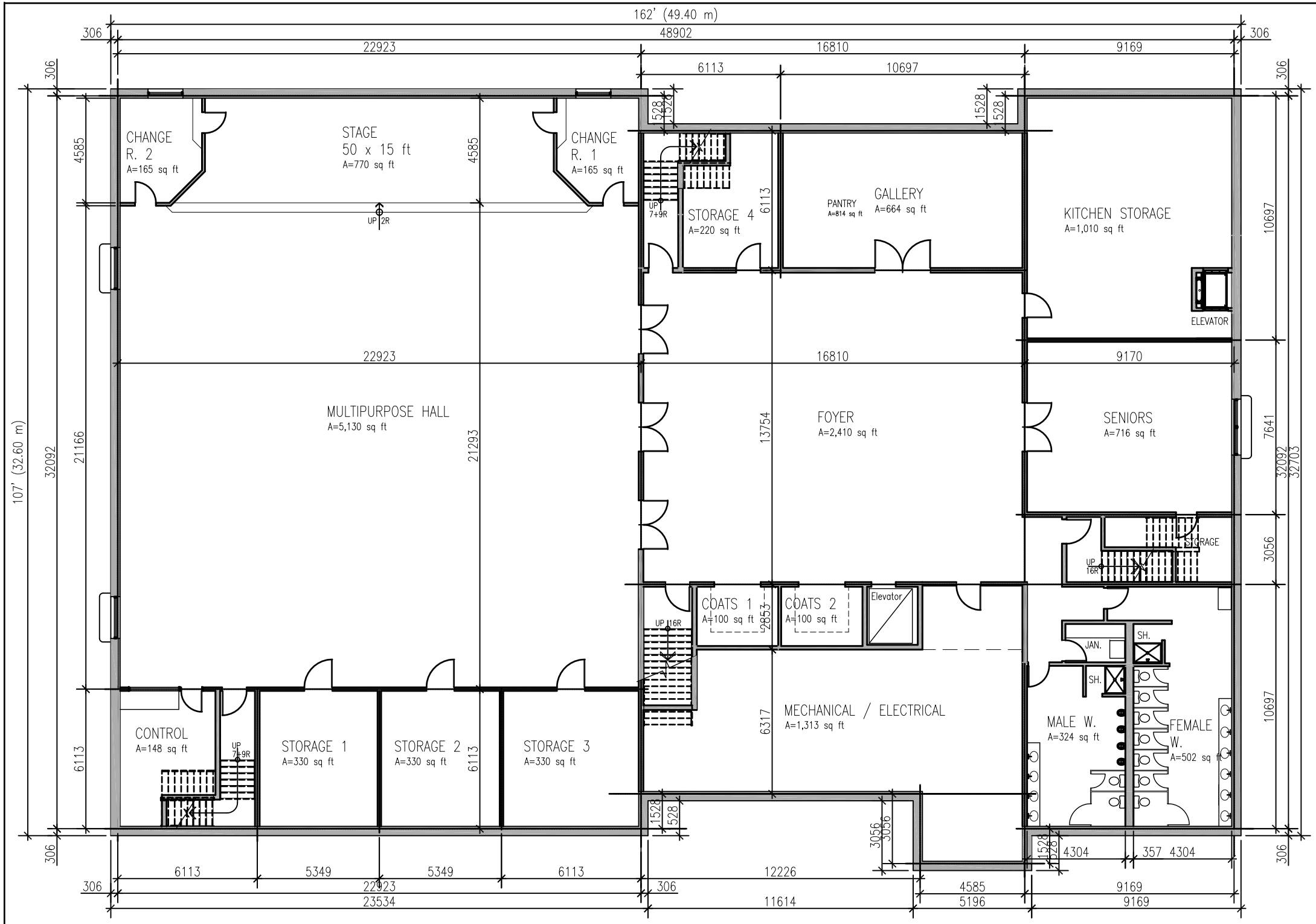
DRAWING TITLE
GROUND FLOOR PLAN &
MEZZANINE FLOOR PLAN

JOB NO. 17033 | SCALE 1:200

DATE 2017-12 | CHKD. BY SJK

VECTOR DESIGN ARCHITECTS
14 STRATHBURY STREET,
OTTAWA, ONTARIO K2G 5N8
TELEPHONE: (613) 421-9806
EMAIL: vecarch@gmail.com

DRAWING NO.
A100



1 / A101 BASEMENT FLOOR PLAN

SCALE 1:200

ONTARIO ASSOCIATION OF ARCHITECTS
SWAPAN JEET KAUR
LICENCE 7839

NO.	REMARKS	DATE
1	ISSUED FOR SITE PLAN	FEB 25

REVISIONS

PROJECT TITLE
PROPOSED ASSEMBLY HALL - HINDU TEMPLE,
4835 BANK STREET, OTTAWA, ONTARIO

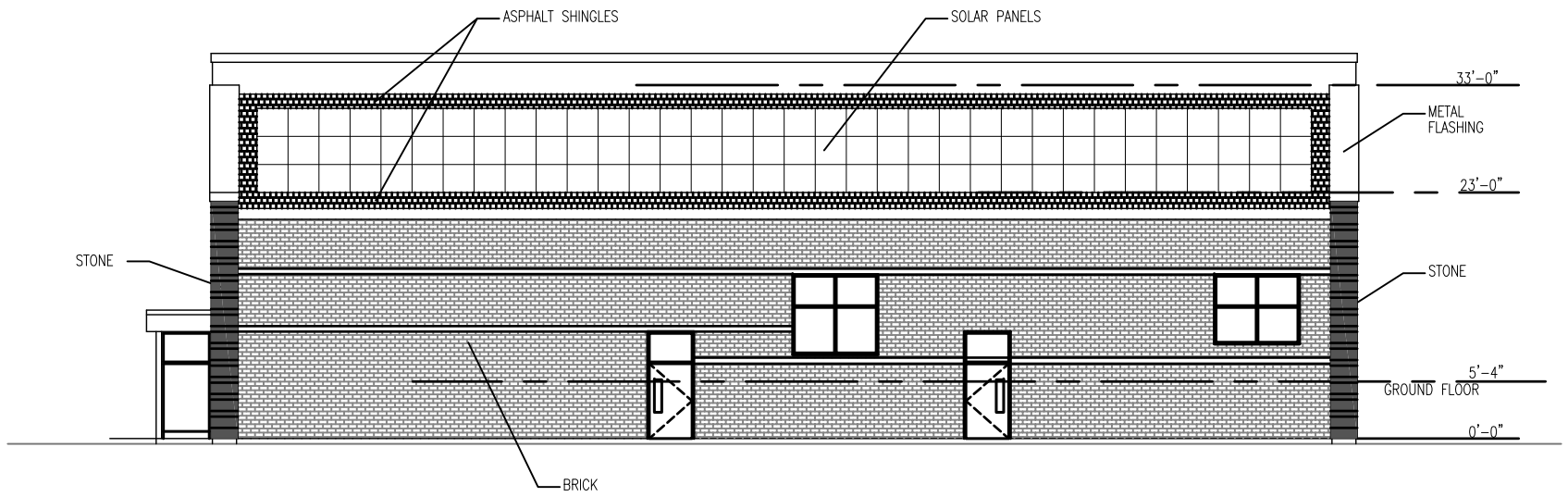
DRAWING TITLE
BASEMENT FLOOR PLAN

JOB NO. 17033 | SCALE 1:200

DATE 2017-12 | CHKD. BY SJK

VECTOR DESIGN ARCHITECTS
14 STRATHBURY STREET,
OTTAWA, ONTARIO K2G 5N8
TELEPHONE: (613) 421-9806
EMAIL: vecarch@gmail.com

DRAWING NO.
A101



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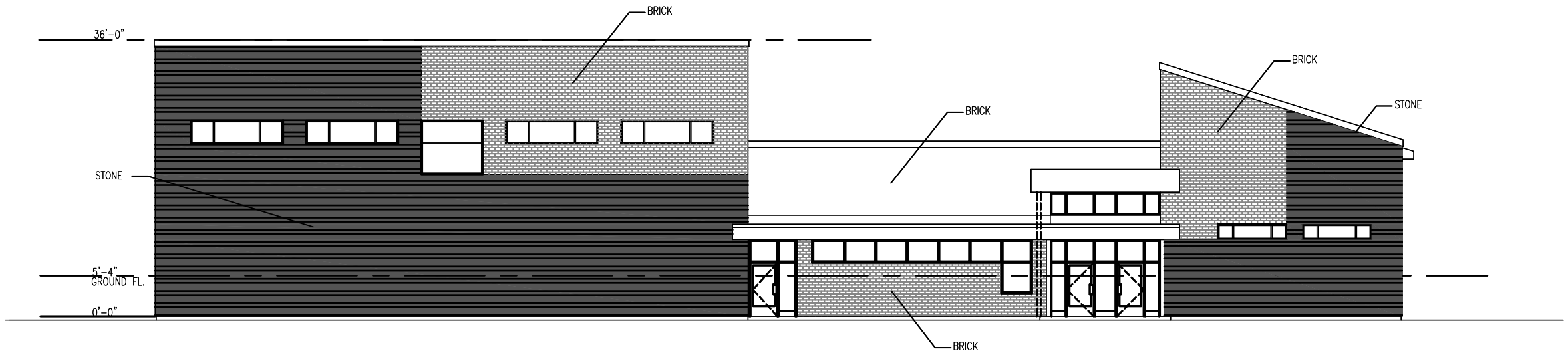
A200

SOUTH ELEVATION

SCALE 1:200



2
A200

WEST ELEVATION

SCALE 1:200

ONTARIO ASSOCIATION OF ARCHITECTS
SWAPAN JEET KAUR
LICENCE
7839

NO.	REMARKS	DATE
1	ISSUED FOR SITE PLAN	FEB 25

REVISIONS

PROJECT TITLE
PROPOSED ASSEMBLY HALL - HINDU TEMPLE,
4835 BANK STREET, OTTAWA, ONTARIO

DRAWING TITLE
ELEVATIONS

JOB NO. 17033 | SCALE 1:200
DATE 2017-12 | CHKD. BY SJK

VECTOR DESIGN ARCHITECTS
14 STRATHBURY STREET,
OTTAWA, ONTARIO K2G 5N8
TELEPHONE: (613) 421-9806
EMAIL: vecarch@gmail.com

DRAWING NO.
A200

Site Information
Address: 4835 Bank Street-Ottawa

Legal Description: Part of Lot 22,
Con 5 (Rideau Front),
Ottawa, ON
Owner: Hindu Temple of Ottawa-Carleton

Zoning: RI5[865r] within the Area of Development & RI5[866r] on the remainder of the property east of the watercourse centreline

Property Area: 40,480 m2 (4.048 ha)
- Existing Temple Footprint: 1,168 m2
- Existing Temple Place of Assembly GFA: 630 m2
- Existing Lot Coverage: 1,168 m2 (2.89 %)

- Proposed Hall Footprint: 1,593 m2
- Proposed Hall GFA: 1,400 m2
- Proposed Lot Coverage: 2,761 m2 (6.82 %)

Area of Development (same as RI5[865r] Zone Boundary): 23,598m2 (2.359 ha)
- Existing Lot Coverage within Area of Development: 1,168 m2 (4.95 %)
- Existing Landscaped Area within Area of Development:15,603 m2 (66.12%)
- Existing Paved Area within Area of Development: 6,827 m2 (28.93 %)

- Proposed Lot Coverage within Area of Development: 2,761 m2 (11.70 %)
- Proposed Landscaped Area within Area of Development: 14,084 m2 (59.68 %)
- Proposed Paved Area within Area of Development: 6,753 m2 (28.61 %)

Proposed Stormwater Management
- Rooftop stormwater retention
- Underground detention tanks beneath parking lot

Dotted line delineates area of development (same as RI5[865r] Zone Boundary)

Hatched area shows extent of existing paving

Hatched area shows extent of new building

Hatched area shows extent of asphalt removal

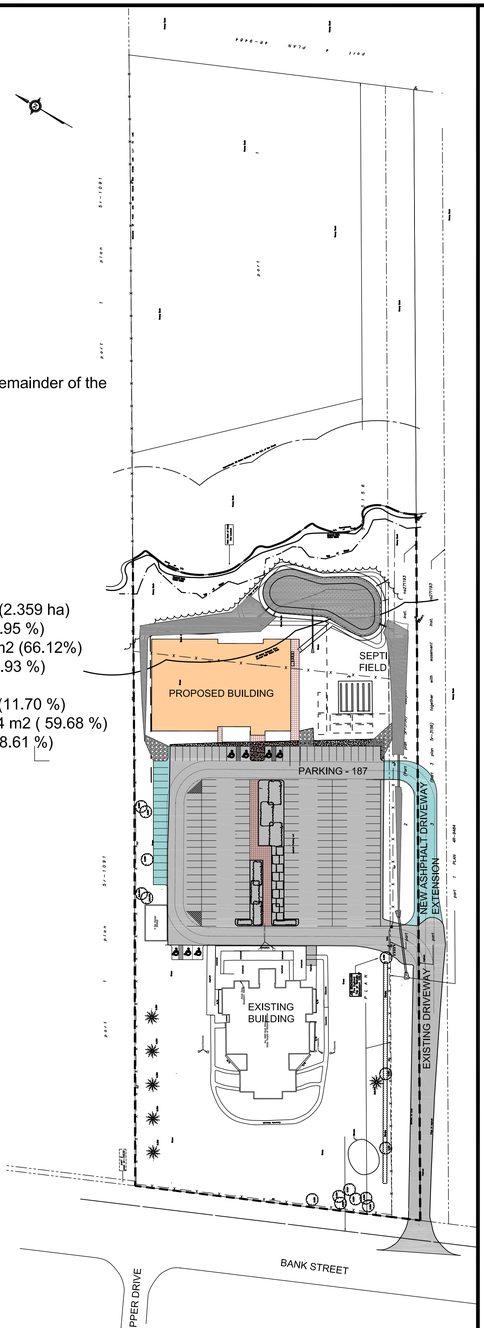
Hatched area shows extent of new asphalt

Hatched area shows extent of brick paving

Required Parking
(8.4 spaces /100 m2 of GFA)
- 171 vehicles
- 2 loading spaces
- 7 barrier-free (3 Type "A" {3400 wide} & 4 Type "B" {2400 wide})
- 0 bicycle

Proposed Parking
- 183 vehicles (including barrier free spots)
  - o 110 spots regular size
  - o 66 spots reduced size
  - o reduced spots allowed = 40% of required spots = 68
- 2 loading spaces
- 7 barrier-free (3 Type "A" {3400 wide} & 4 Type "B" {2400 wide})
- 0 bicycle

2 SP-1 SITE PLAN
SCALE 1:300



1 SP-1 KEY PLAN
SCALE 1:1000

GENERAL NOTES

1. Contractor must verify all job dimensions, all drawings, details, specifications and report any discrepancies to owners before proceeding with work.
2. All drawings and specifications are instruments of service and the property of the architects which must be returned at the completion of the work, and may not be reproduced without their written permission.

No.	Revision/Issue	Date
5	ISSUED FOR SITE PLAN	FEB 26
4	ISSUED FOR SITE PLAN	SEP 20
3	ISSUED FOR SITE PLAN	AUG 19
2	ISSUED FOR SITE PLAN	AUG 08
1	ISSUED FOR SITE PLAN	MAY 16

NOTE:
FOR LANDSCAPE REFER TO LANDSCAPE DRAWING

ONTARIO ASSOCIATION OF ARCHITECTS
SWAPAN JEET KAUR
LICENCE 7839

OWNER

ARCHITECT
VECTOR DESIGN ARCHITECTS
14 STRATHBURY STREET,
OTTAWA, ONTARIO K2G 5N8
TELEPHONE: (613) 421-9806
EMAIL: vecarch@gmail.com

PROJECT AND LOCATION
PROPOSED ASSEMBLY HALL -
HINDU TEMPLE,
4835 BANK STREET,
OTTAWA, ONTARIO

TITLE OF DRAWING
SITE PLAN

JOB NUMBER
17033

DATE 2019 05
SCALE AS NOTED
DRAWN BY SJK
DWG NUMBER SP-1

APPENDIX H

Servicing Plan

NOTES: GENERAL

1. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
2. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
3. JOB BENCH MARK - CONFIRM WITH LRL PRIOR TO UTILIZATION.
4. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE, CATCH BASIN OUTLETS AND/OR STORM DETENTION AREAS ARE PROVIDED.
5. STRIP AND REMOVE ALL TOPSOIL FROM IMPROVED AREAS.
6. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
7. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A CLEAN STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT. PAVEMENT REINSTATEMENT SHALL BE WITH STEP JOINTS OF 500mm WIDTH MINIMUM.
8. CURBS TO BE BARRIER, CONSTRUCTED AS PER OPSD 600.110.
9. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSS 206, 310 & 314. MATERIALS TO OPSS 1001, 1003 & 1010.
10. ABUTTING PROPERTY GRADE TO BE MATCHED.
11. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
12. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
13. FILTER FABRIC TO BE INSTALLED AND MAINTAINED BETWEEN THE FRAME AND COVER OF ALL CATCHBASINS, CATCHBASIN MANHOLES AND MANHOLES DURING THE CONSTRUCTION PERIOD TO MINIMIZE SEDIMENTS ENTERING THE STORM SEWER SYSTEM. ALL GRASSED AREAS MUST BE COMPLETED PRIOR TO THE REMOVAL OF THE FILTER FABRIC IN THE DRAINAGE STRUCTURES.
14. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS, IF ANY, LOCATED WITHIN THE PROPOSED BUILDING, PARKING AND ROADWAY LOCATIONS.
15. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS BUT NOT LIMITED TO; ROAD CUT PERMITS, SEWER PERMITS, WATER PERMIT, ETC.
16. AT PROPOSED UTILITY CONNECTION POINTS AND CROSSINGS (I.E. STORM SEWER, SANITARY SEWER, WATER, ETC.) THE CONTRACTOR SHALL DETERMINE THE PRECISE LOCATION AND DEPTH OF EXISTING UTILITIES AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
17. ALL SIDEWALK CONSTRUCTION TO BE AS PER OPSD 310.010 & OPSD 310.050.

NOTES: SEWERS

1. SEWER BEDDING AS PER PIPE TRENCH DETAIL WITH GRANULAR 'A' BEDDING COMPACTED TO 95% OF ITS SPMDD.
2. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH OPSS 407, AND 410.
3. CONTRACTOR TO CONFIRM ELEVATION OF EXISTING SEWERS AT PROPOSED CONNECTION POINTS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE COMMENCING ANY WORK.
4. ALL SEWERS WITH LESS THAN 2.0m OF COVER ARE SUBJECT TO INSULATION DETAIL.

NOTES: WATER SERVICE

1. PROPOSED WATER SERVICE TO BE INSULATED WHEN COVER IS LESS THAN 2.4m

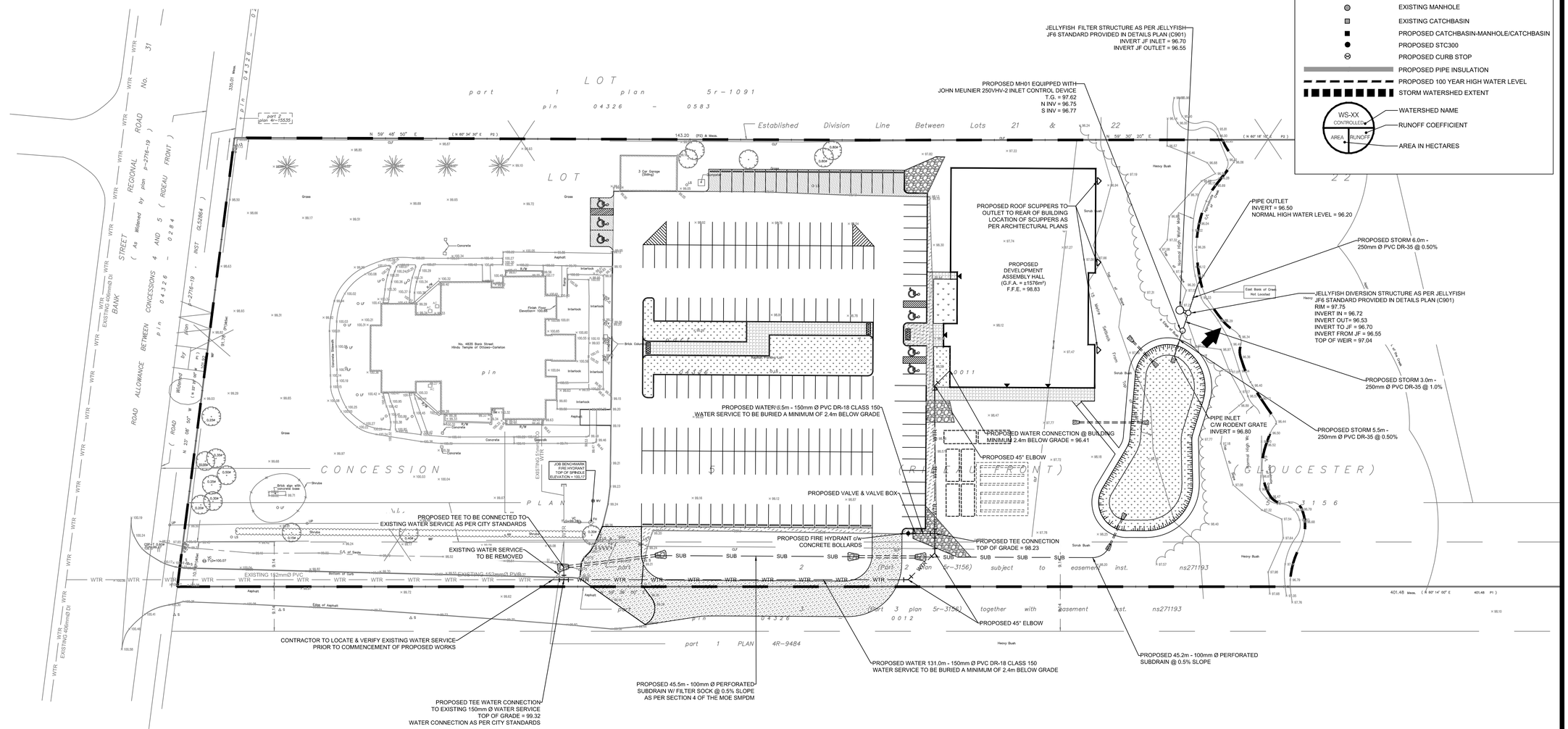
WATERMAIN TABLE

DESCRIPTION	CHAINAGE	INVERT ELEVATION	FINISHED GRADE
CONNECTION TO EXISTING	0+000.0	TO MATCH EXISTING	99.32
TEE CONNECT. #1	0+002.5	96.86	99.32
45° BEND #1	0+080.1	95.16	98.66
45° BEND #2	0+088.6	94.99	97.39
TEE CONNECT. #2	0+093.0	95.14	98.23
FIRE HYDRANT	0+100.1*	95.32	98.56
45° BEND #3	0+126.2	96.19	98.78
PROPOSED DEVELOPMENT	0+131.0	96.41	98.81

NOTES: *DIVERGES AT TEE CONNECTION #2

LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED STRAW BALE CHECK DAM AS PER OPSD 219.180
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00SW PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLER — WATERSHED NAME
- AREA / RUNOFF — RUNOFF COEFFICIENT / AREA IN HECTARES



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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.

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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.

10m 5 0 10 20m

SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER — W. JOHNSON — 100510576 — March 11/2020 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
170132

DATE
JAN2020

C401

APPENDIX I

Erosion and Sediment Control Plan

EROSION AND SEDIMENT CONTROL MEASURES:

** CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES **

THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY

1. PRIOR TO START OF CONSTRUCTION:

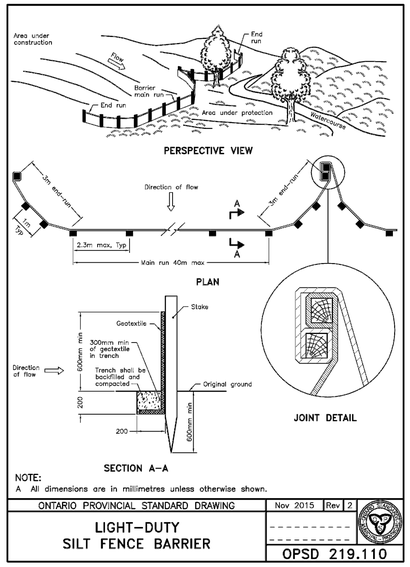
- PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF SOIL AND CONSTRUCTION:
- INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
- INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCHBASINS AND MANHOLES
- INSTALL SILTSACK FILTERS IN ALL CONCRETE CATCH BASINS STRUCTURES
- INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.

2. DURING CONSTRUCTION:

- WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
- MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
- PROTECT DISTURBED AREAS FROM RUNOFF.
- PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
- INSPECT SILT FENCES, FILTER CLOTHS AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
- CONSTRUCT SWALES AS PER DETAIL.
- PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION
- EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
- DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (LONGER THAN 30 DAYS).
- CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
- ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS.
- CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC. AT THE END OF EACH WORK DAY.
- PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4M WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHERT-RUN LIMESTONE) MATERIAL. MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPED.
- ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ABUTTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

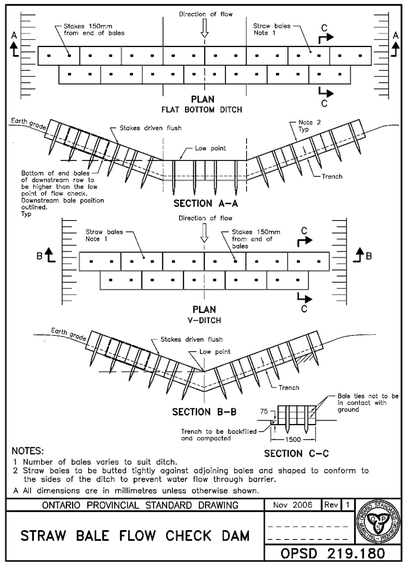
3. AFTER CONSTRUCTION:

- PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREAS.
- REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
- INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.



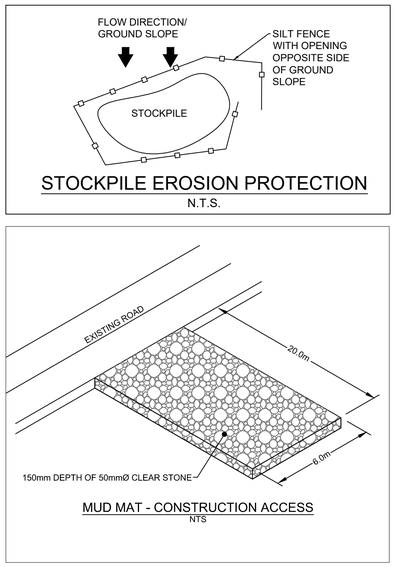
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER		OPSD 219.110



NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
STRAW BALE FLOW CHECK DAM		OPSD 219.180



STOCKPILE EROSION PROTECTION
N.T.S.

MUD MAT - CONSTRUCTION ACCESS
NTS

LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
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- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.10 EXISTING ELEVATION
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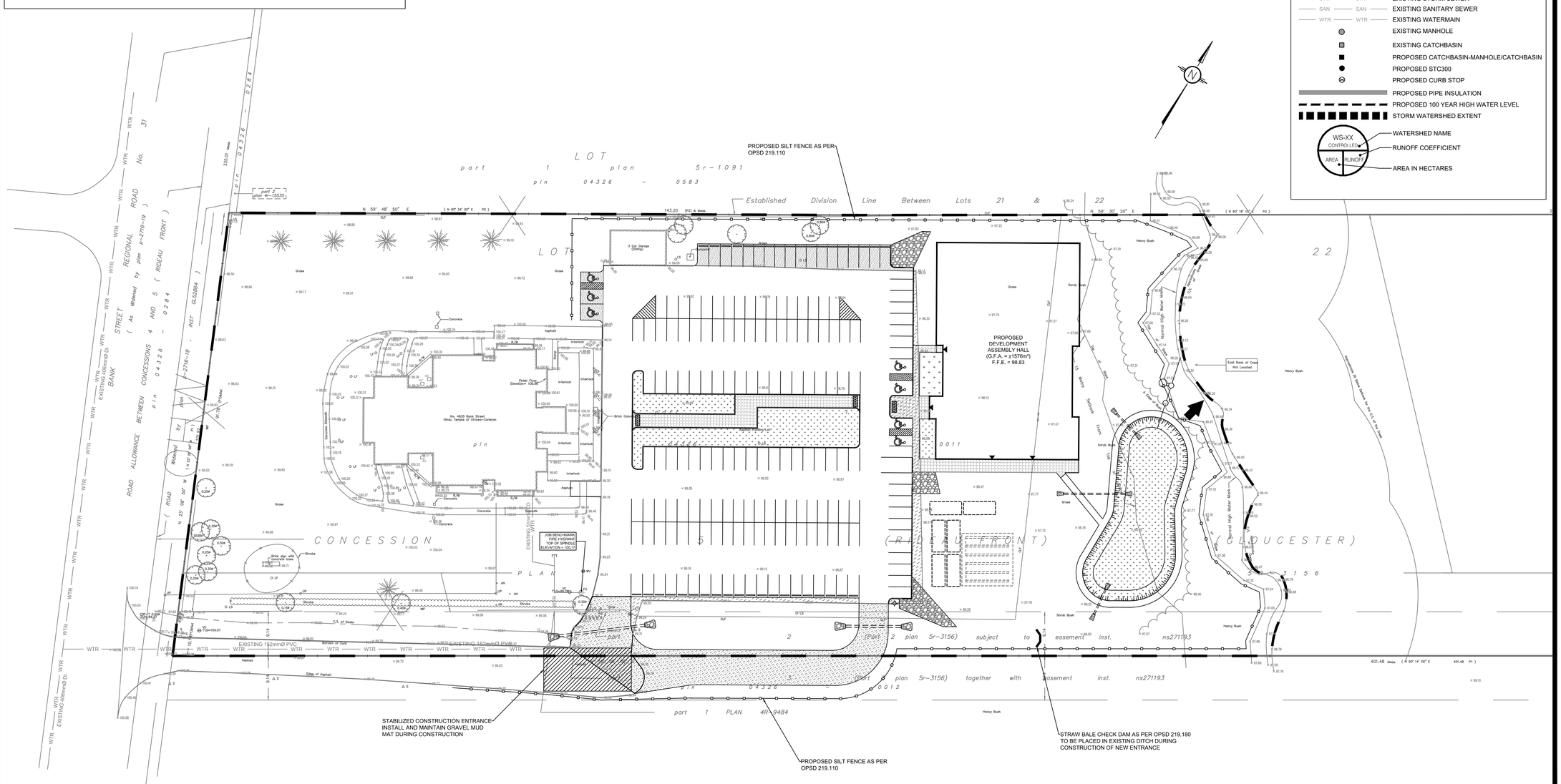
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED AREA | RUNOFF — WATERSHED NAME / RUNOFF COEFFICIENT / AREA IN HECTARES



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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.

10m 5 0 10 20m
SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER
K JOHNSON
100510576
March 11/2020
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
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.
170132

DATE
JAN2020

C101

APPENDIX J

Domestic Water Demand Calculations

Water Service Calculations

LRL File No. : 170132
Project : Hindu Heritage Centre
Date : January 24, 2020
Designed by : Philippe Paquette

Water Demand

Total fixture units: 120 (as per OBC Table 7.6.3.2.A)
Conversion of fixture units to equivalent gpm: 48 gpm (as per PS&D)

Average water demand = 261647.52 L / day
= 3.03 L/s

Maximum daily peak factor: 1.5
Maximum daily demand = 392471 L / day
= 4.54 L / s

Maximum hour peak factor: 1.8
Maximum hour demand = 706448 L / day
= 8.18 L / s

If applicable, add car wash flow rate:
Maximum Car Washes per Hour = 0
Car Wash Hours of Operation = 0 hrs (6am to 10pm)
Car Washes per day = 0
Amount of Water per Car Wash = 0 L
Maximum car wash demand = 0 L/day
= 0.00 L/s

Adjusted total maximum water demand = 706448 L / day
= 8.18 L / s

Water Service Pipe Sizing

$Q = VA$

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

By deriving the above formula, we can obtain the diameter of the pipe:

Minimum pipe diameter:

$d = (4Q/\pi V)^{1/2}$

$d =$ 0.072 m

$d =$ 72 mm

Proposed pipe diameter: **75*** mm

*for the final design, a 150mm diameter water service was chosen to account for the Mechanical design elements (sprinklers)

APPENDIX K

Pipe Pressure Loss Calculations Details

Pipe Pressure Losses Calculations

LRL File No.	170132
Project	Hindu Heritage Centre Ottawa
Date	February 13, 2020
Designed:	Philippe Paquette

Piezometric Head Equation (Derived from Bernoulli's Equation)

$$h = \frac{p}{\gamma} + z$$

Where:

h = HGL (m)

p = Pressure (Pa)

γ = Specific weight (N/m3) = 9810

z = Elevation of centreline of pipe (m) = 97.8

Water Pressure on Bank Street			
HGL (m)		Pressure	
		kPa	psi
Minimum =	142.9	442.43	64.17
Maximum =	147	482.65	70.00
Max. Day + Fire =	142.7	440.47	63.88

Hazen Williams Equation

$$h_f = \frac{10.67 \times Q^{1.85} \times L}{C^{1.85} \times d^{4.87}}$$

Where:

h_f = Head loss over the length of pipe (m)

Q = Volumetric flow rate (m^3/s)

L = Length of pipe (m)

C = Pipe roughness coefficient

d = Pipe diameter (m)

Scenario 1: maximum daily demand

Q (L/s)	4.54	
C	150	
L (m.)	240	
I.D. (mm)	150	
V (m/s)	0.26	
h_f (m)	0.11	
Head Loss (psi)	0.16	
Min. Pressure (psi)	64.01	
Max. Pressure (psi)	69.84	
Service Obv. @ Street Connection (m)	97.80	
Service Obv. @ Building Connection (m)	96.40	
Pressure Adjustment (psi)	1.99	(due to service elevation difference from street to building)
Adjusted Min. Pressure (psi)	66.00	(must not be less than 50psi)
Adjusted Max. Pressure (psi)	71.83	(must not be more than 80psi)

Scenario 2: maximum hourly demand

Q (L/s)	8.18	
C	150	
L (m.)	240	
I.D. (mm)	150	
V (m/s)	0.46	
h_f (m)	0.34	
Head Loss (psi)	0.49	
Min. Pressure (psi)	63.68	
Max. Pressure (psi)	69.52	
Service Obv. @ Street Connection (m)	97.80	
Service Obv. @ Building Connection (m)	96.40	
Pressure Adjustment (psi)	1.99	(due to service elevation difference from street to building)
Adjusted Min. Pressure (psi)	65.67	(must not be less than 40psi)
Adjusted Max. Pressure (psi)	71.51	(must not be more than 80psi)

Scenario 3: maximum hourly demand + fire flow

Q (L/s)	74.88	
C	150	
L (m.)	240	
I.D. (mm)	150	
V (m/s)	4.24	
h_f (m)	20.54	
Head Loss (psi)	29.21	
Pressure (psi)	34.68	
Service Obv. @ Street Connection (m)	97.80	
Service Obv. @ Building Connection (m)	96.40	
Pressure Adjustment (psi)	1.99	(due to service elevation difference from street to building)
Adjusted Pressure (psi)	36.67	(must not be less than 20psi)

Scenario 4: maximum fire flow at 140 kPa (20 psi)

Q (L/s)	95.57	
C	150	
L (m.)	240	
I.D. (mm)	150	
V (m/s)	5.41	
h_f (m)	32.26	
Head Loss (psi)	45.87	
Pressure (psi)	18.01	
Service Obv. @ Street Connection (m)	97.80	
Service Obv. @ Building Connection (m)	96.40	
Pressure Adjustment (psi)	1.99	(due to service elevation difference from street to building)
Adjusted Pressure (psi)	20.01	(must not be less than 20psi)

APPENDIX L

FUS Fire Flow Calculations

Fire Flow Calculations

LRL File No.	170132
Project	Hindu Heritage Centre
Date	January 23, 2020
Method	Fire Underwriters Survey (FUS)
Designed by	Philippe Paquette, C.E.T.

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	Non-combustible construction	0.8		
			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								
2	Choose type of housing	Type of housing	Single family dwelling	0	Building - no. of units per floor	1	unit(s)	
			Townhouse - no. of units	0				
			Building - no. of units per floor	1				
3	Enter area of a unit	Enter floor space area of one unit (excluding basement)		1	1560.0		sq.m.	
4	Obtain fire flow before reductions	Required fire flow	**Fire Flow = 220 x C x Area$^{0.5}$**				L/min	**7,000**
							L/s	116.7
Reductions or surcharge due to factors affecting burning								
5	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0		
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15			L/min	**7,000**
			Rapid burning	0.25			L/s	116.7
6	Choose reduction for sprinklers	Sprinkler reduction	Sprinklers (NFPA13)	-0.30	True	-0.3		
			Water supply is standard for both the system and fire department hose lines	-0.10	True	-0.1	L/min	**3,500**
			Fully supervised system	-0.10	True	-0.1	L/s	58.3
7	Choose separation	Exposure distance between units	North side	Over 45m	0			
			East side	Over 45m	0			
			South side	Over 45m	0		L/min	**4,000**
			West side	Over 45m	0	0	L/s	66.7
Net required fire flow								
8	Obtain fire flow, duration, and volume	Minimum required fire flow rate (rounded to nearest 1000)					L/min	**4,000**
		Minimum required fire flow rate					L/s	**66.7**
		Required duration of fire flow					hr	**2.25**

APPENDIX M

City of Ottawa Boundary Calculations

Boundary Conditions
4385 Bank Street

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	276	4.6
Maximum Daily Demand	414.6	6.91
Peak Hour	746.4	12.44
Fire Flow Demand	4002	66.7

Location

Results – Existing Conditions

Connection 1 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	155.8	81.1
Peak Hour	150.5	73.5
Max Day plus Fire (12,000 l/min)	150.2	73.1

[1] Ground Elevation = 98.8 m

Results – SUC Zone Reconfiguration

Connection 1 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.0	68.6
Peak Hour	142.9	62.7
Max Day plus Fire (12,000 l/min)	142.7	62.5

[1] Ground Elevation = 98.8 m

Notes:

1. Internal looping of the watermain is required to decrease vulnerability of the water system in case of breaks.
2. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
    a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
    b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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.

APPENDIX N

1/5 Year & 1/100 Year SWM Storage Tables

LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: January 10th, 2020
Designed: K. Herold
Checked: V. Johnson
Drawing Ref.: C.401

Stormwater Management Design Sheet

STORM - 5 YEAR

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 Catchments within Development Area

	Total Area =	**2.273**	ha	**∑R=**	**0.46**
Un-Controlled	EWS-01	2.273	ha	R=	0.46
	Total Uncontrolled =	**2.273**	**ha**	**∑R=**	**0.46**

Allowable Release Rate (Max C=0.5, 5-year Pre-Dev FR)

5 Year Pre-Development Flow Rate

$I_5 = 998.071 / (Td + 6.053)^{0.814}$ **a = 998.071** **b = 0.814** **C = 6.053**

C =	0.50	max of 0.5 as per City of Ottawa
I =	104.2	mm/hr
Tc =	10	min
Total =	2.273	ha
Allowable Release Rate=	**329.19**	L/s
Controlled Release Rate=	**50.00**	L/s

Post-Development Stormwater Management

					$\sum R_5$	$\sum R_{100}$
	Total Site Area =	**2.273**	ha	**∑R=**	**0.53**	**0.67**
Controlled	**Total Controlled =**	**1.804**	**ha**	**∑R=**	**0.62**	**0.78**
Un-controlled	**Total Un-Controlled =**	**0.469**	**ha**	**∑R=**	**0.20**	**0.25**

Post-development Stormwater Management

$I_5 = 998.071 / (Td + 6.053)^{0.814}$ **a = 998.071** **b = 0.814** **C = 6.053**

Time (min)	Intensity (mm/hr)	Controlled Runoff** (L/s)	Storage Volume (m^3)	Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
5	141.2	438.98	116.69	50.00	46.02	96.02
10	104.2	323.98	164.39	50.00	33.96	83.96
20	70.3	218.44	202.12	50.00	22.90	72.90
30	53.9	167.68	211.83	50.00	17.58	67.58
35	48.5	150.86	211.80	50.00	15.81	65.81
40	44.2	137.39	209.73	50.00	14.40	64.40
45	40.6	126.33	206.09	50.00	13.24	63.24
50	37.7	117.08	201.23	50.00	12.27	62.27
60	32.9	102.43	188.76	50.00	10.74	60.74
70	29.4	91.33	173.58	50.00	9.57	59.57
80	26.6	82.59	156.44	50.00	8.66	58.66
90	24.3	75.52	137.82	50.00	7.92	57.92

LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: January 10th, 2020
Designed: K. Herold
Checked: V. Johnson
Drawing Ref.: C.401

Stormwater Management Design Sheet

STORM - 5 YEAR

Onsite Stormwater Retention

Total Storage Required =	**211.83**	**m^3**	
Pipe Storage =	0.00	m^3	
CB/MH Storage =	0.00	m^3	
Underground Storage =	0.00	m^3	
Surface/Detention Area Storage =	213.72	m^3	refer to LRL Plans C301 & C601
Total Available Storage =	**213.72**	**m^3**	

LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: March 4th, 2020
Designed: K. Herold
Checked:
Drawing Ref.: C.401

Stormwater Management Design Sheet

STORM - 100 YEAR

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 Catchments within Development Area

	Total Area =	**2.273**	ha	**∑R=**	**0.46**
Un-Controlled	EWS-01	2.273	ha	R=	0.46
	Total Uncontrolled =	**2.273**	**ha**	**∑R=**	**0.46**

Allowable Release Rate (Max C=0.5, 5-year Pre-Dev FR)

5 Year Pre-Development Flow Rate

I_5 = 998.071 / (Td + 6.053)$^{0.814}$ **a = 998.071** **b = 0.814** **C = 6.053**

C =	0.50	max of 0.5 as per City of Ottawa
I =	104.2	mm/hr
Tc =	10	min
Total =	2.273	ha
Allowable Release Rate=	**329.19**	**L/s**
Controlled Release Rate=	**50.00**	**L/s**

Post-development Stormwater Management

					∑R_5	**∑R_{100}**
	Total Site Area =	**2.273**	ha	**∑R=**	**0.53**	**0.67**
Controlled	**Total Controlled =**	**1.804**	**ha**	**∑R=**	**0.62**	**0.78**
Un-controlled	**Total Un-Controlled =**	**0.469**	**ha**	**∑R=**	**0.20**	**0.25**

Post-development Stormwater Management

I_{100} = 1735.688 / (Td + 6.014)$^{0.820}$ **a = 1735.688** **b = 0.82** **C = 6.014**

Time (min)	Intensity (mm/hr)	Controlled Runoff** (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)		
10	178.6	694.01	386.41	50.00	58.20	108.20		
15	142.9	555.39	454.85	50.00	46.58	96.58		
20	120.0	466.21	499.46	50.00	39.10	89.10		
25	103.8	403.62	530.44	50.00	33.85	83.85		
30	91.9	357.07	552.72	50.00	29.94	79.94		
35	82.6	320.96	569.02	50.00	26.92	76.92		
40	75.1	292.07	580.96	50.00	24.49	74.49		
45	69.1	268.38	589.62	50.00	22.51	72.51		
50	64.0	248.57	595.71	50.00	20.85	70.85		
55	59.6	231.74	599.74	50.00	19.43	69.43		
60	55.9	217.25	602.09	50.00	18.22	68.22		
65	52.6	204.62	603.03	50.00	17.16	67.16		
70	49.8	193.52	602.78	50.00	16.23	66.23		
75	47.3	183.67	601.51	50.00	15.40	65.40		
80	45.0	174.87	599.36	50.00	14.67	64.67		
160	26.2	101.98	499.06	50.00	8.55	58.55	0.048	0.048

LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: March 4th, 2020
Designed: K. Herold
Checked:
Drawing Ref.: C.401

Stormwater Management Design Sheet

STORM - 100 YEAR

Onsite Stormwater Retention

Total Storage Required =	**603.03**	**m^3**	
Pipe Storage =	0.00	m^3	
CB/MH Storage =	0.00	m^3	
Underground Storage =	0.00	m^3	
Surface/Detention Area Storage =	605.94	m^3	refer to LRL Plans C301 & C601
Total Available Storage =	**605.94**	**m^3**	

LRL Associates Ltd.
Storm Watershed Summary

LRL File No.	170132
Project:	Hindu Heritage Centre
Location:	4835 Bank Street, Ottawa
Date:	March 4th, 2020
Designed:	K. Herold
Checked:	
Drawing Reference:	C.701, C.702

Pre-Development Catchments

WATERSHED	C = 0.20	C = 0.8	C = 0.90	Total Area (ha)	Combined C
EWS-01	1.427	0.000	0.846	2.273	0.46
TOTAL	**1.427**	**0.000**	**0.846**	**2.273**	**0.46**

Post-Development Catchments

WATERSHED	C = 0.20	C = 0.8	C = 0.90	Total Area (ha)	Combined C
CONTROLLED WS-01	0.725	0.023	1.056	1.804	0.62
UNCONTROLLED WS-02	0.469	0.000	0.000	0.469	0.20
TOTAL	**1.194**	**0.023**	**1.056**	**2.273**	**0.53**

APPENDIX O

Civil Engineering Plans

EROSION AND SEDIMENT CONTROL MEASURES:

** CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES **

THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY

1. PRIOR TO START OF CONSTRUCTION:

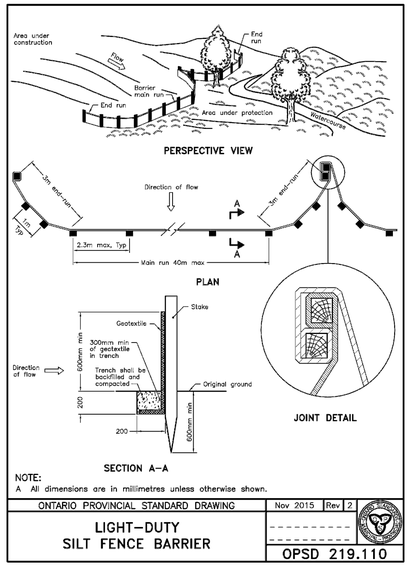
- PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF SOIL AND CONSTRUCTION:
- INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
- INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCHBASINS AND MANHOLES
- INSTALL SILTSACK FILTERS IN ALL CONCRETE CATCH BASINS STRUCTURES
- INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.

2. DURING CONSTRUCTION:

- WORK TO BE DONE IN THE VICINITY OF MAJOR WATERWAYS TO BE CARRIED OUT FROM JULY TO SEPTEMBER ONLY.
- MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE.
- PROTECT DISTURBED AREAS FROM RUNOFF.
- PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
- INSPECT SILT FENCES, FILTER CLOTHS AND CATCH BASIN SUMPS WEEKLY AND AFTER EVERY MAJOR STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
- CONSTRUCT SWALES AS PER DETAIL.
- PLAN TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION
- EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
- DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (LONGER THAN 30 DAYS).
- CONTROL WIND-BLOWN DUST OFF SITE TO ACCEPTABLE LEVELS BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED).
- ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THIS CONSULTING ENGINEER AND THE CITY DEPARTMENT OF PUBLIC WORKS.
- CONTRACTOR RESPONSIBLE FOR CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING ETC. AT THE END OF EACH WORK DAY.
- PROVIDE GRAVEL ENTRANCE WHEREVER EQUIPMENT LEAVES THE SITE TO PREVENT MUD TRACKING ONTO PAVED SURFACES. GRAVEL BED SHALL BE A MINIMUM OF 15m LONG, 4M WIDE AND 0.3m DEEP AND SHALL CONSIST OF COARSE (50mm CRUSHERT-RUN LIMESTONE) MATERIAL. MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPED.
- ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
- TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ABUTTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.

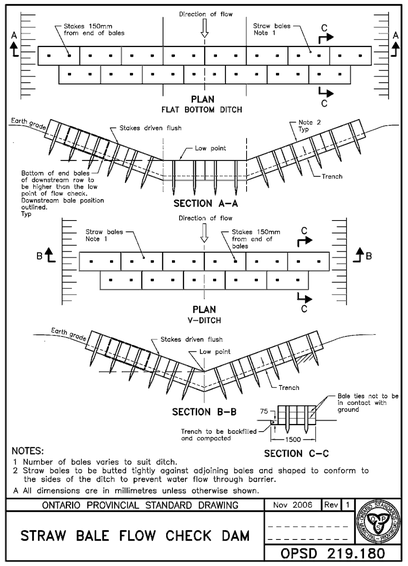
3. AFTER CONSTRUCTION:

- PROVIDE PERMANENT COVER CONSISTING OF TOPSOIL AND SEED TO DISTURBED AREAS.
- REMOVE STRAW BALE FLOW CHECK DAMS, SILT FENCES AND FILTER CLOTHS ON CATCH BASINS AND MANHOLE COVERS AFTER DISTURBED AREAS HAVE BEEN REHABILITATED AND STABILIZED.
- INSPECT AND CLEAN CATCH BASIN SUMPS AND STORM SEWERS.



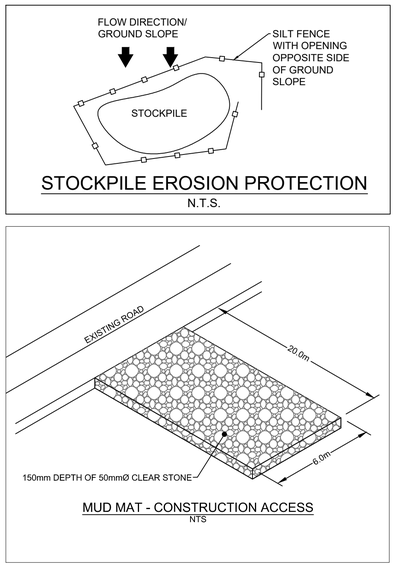
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER		OPSD 219.110



NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
STRAW BALE FLOW CHECK DAM		OPSD 219.180



STOCKPILE EROSION PROTECTION
N.T.S.

MUD MAT - CONSTRUCTION ACCESS
NTS

LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
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- PROPOSED SILT FENCE AS PER OPSD 219.110
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- PROPOSED HEAY-DUTY ASPHALT
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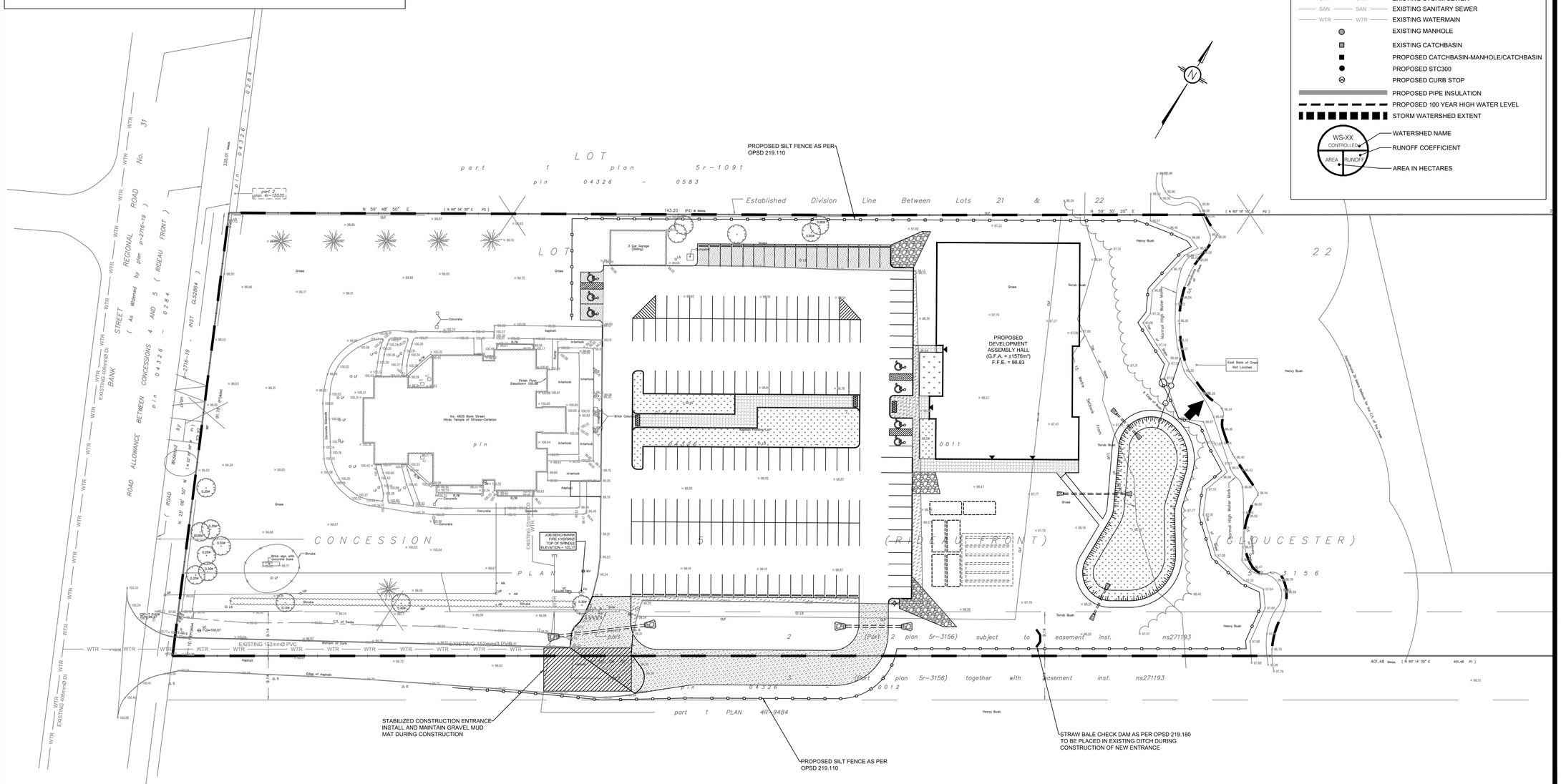

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SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER
K JOHNSON
100510576
March 11/2020
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

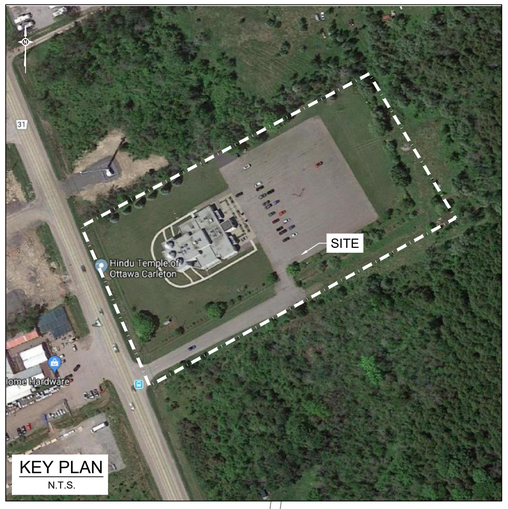
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

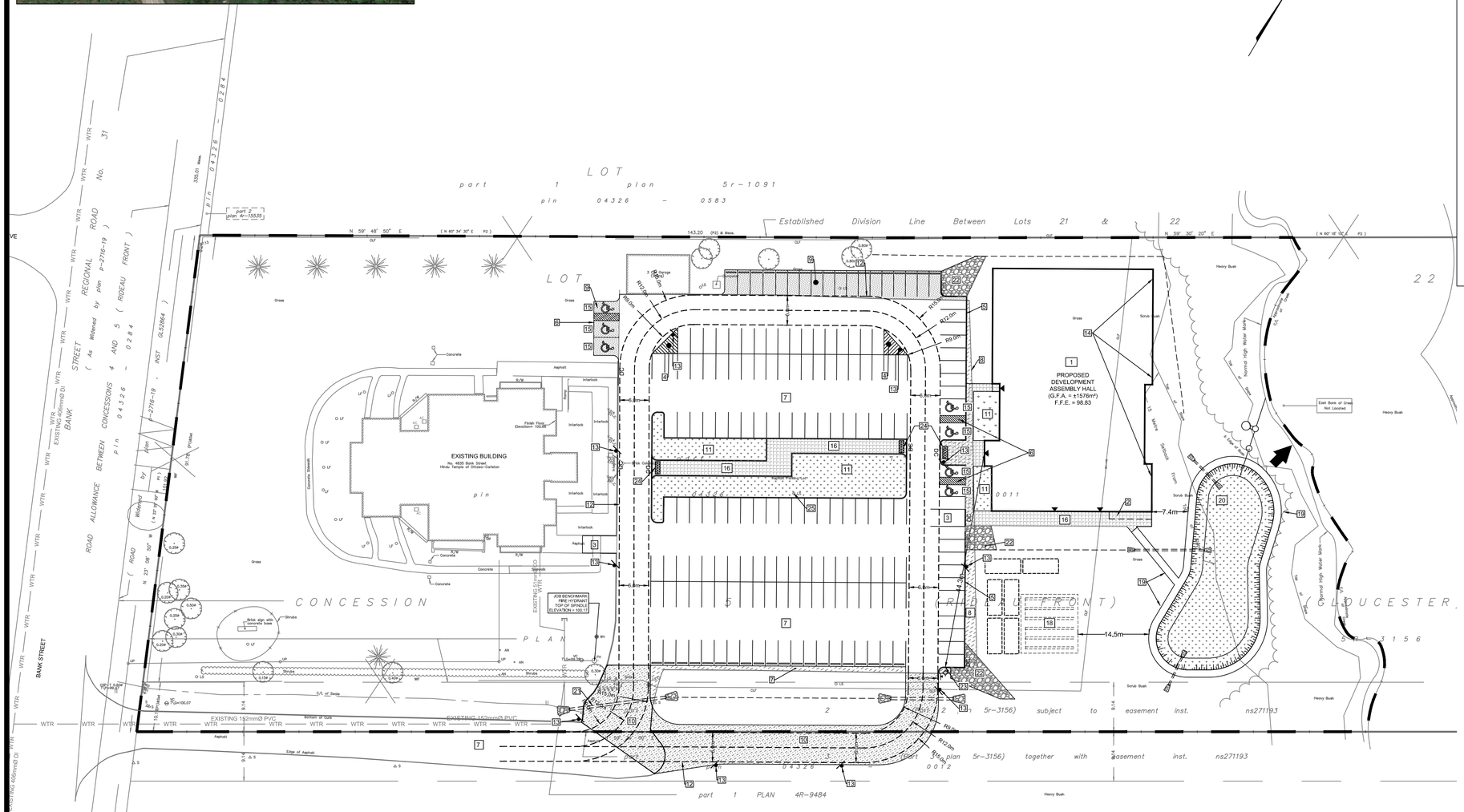
PROJECT NO.
170132

DATE
JAN2020

C101



KEY PLAN
N.T.S.



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- WS-XX CONTROLLED AREA RUNOFF — WATERSHED NAME / RUNOFF COEFFICIENT / AREA IN HECTARES

SITE PLAN NOTES:

1. PROPOSED DEVELOPMENT
2. PROPOSED GARBAGE / WASTE CONTAINERS LOCATION
3. PROPOSED NO PARKING AREA FOR GARBAGE & LOADING AREA (WITH NO PARKING SIGNS/PAVEMENT MARKINGS)
4. PROPOSED PAVEMENT MARKINGS FOR FIRE ROUTE
5. PROPOSED CONCRETE BARRIER CURB AS PER OPSD 600.110
6. PROPOSED ACCESSIBLE SPACES C/W LINE PAINTING
7. EXISTING ASPHALT TO REMAIN
8. EXISTING ASPHALT PARKING LOT TO BE REMOVED & REPLACED WITH 100mm TOPSOIL & SOD
9. PROPOSED LIGHT DUTY PAVEMENT STRUCTURE
10. PROPOSED HEAVY TRAFFIC PAVEMENT STRUCTURE
11. PROPOSED LANDSCAPING (AS PER LANDSCAPING PLAN)
12. PROPOSED FIRE ROUTE
13. PROPOSED FIRE ROUTE SIGNAGE
14. PROPOSED ROOF DRAINAGE DOWNSPOUT LOCATION
15. 30 x 45 cm "DISABLED PARKING PERMIT" SIGN (Rb-93) AS PER MTO BOOK 5 AND AS PER SECTION 11 OF THE ONTARIO REGULATION 581/90, SIGN TO BE MOUNTED ON BUILDING WALL OR POST
16. PROPOSED CONCRETE FEATURES & WALKWAYS
17. PROPOSED PRECAST CONCRETE BUMPER CURBS
18. PROPOSED SEPTIC BED AREA
19. PROPOSED GRAVEL PATHWAY
20. PROPOSED STORMWATER DETENTION AREA
21. EXISTING CULVERT TO BE REMOVED AND REPLACED
22. PROPOSED RIP-RAP FOR DEPRESSED CURBS/OUTLETS
23. PROPOSED FIRE HYDRANT
24. PROPOSED TACTILE WALKING SURFACE INDICATOR AS PER CITY OF OTTAWA ACCESSIBILITY DESIGN STANDARDS SECTIONS 2.7 & 3.4.6.
25. EXISTING LIGHT STANDARD TO REMAIN

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SCALE: 1:500

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01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER G. JOHNSON 100510576 March 11/2020 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
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CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

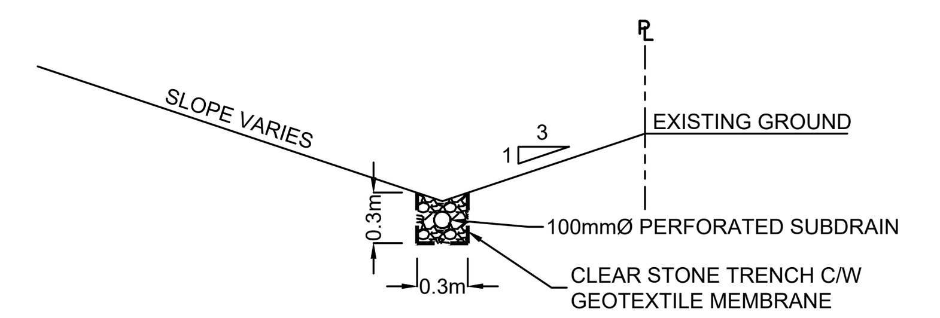
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
SITE DEVELOPMENT PLAN

PROJECT NO.
170132

DATE
JAN2020

C201



SWALE & SUBDRAIN - TYPICAL SECTION
(N.T.S.)

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	GRANULAR "A"	150	150
SUBBASE	GRANULAR "B" TYPE II	350	450

NOTE:
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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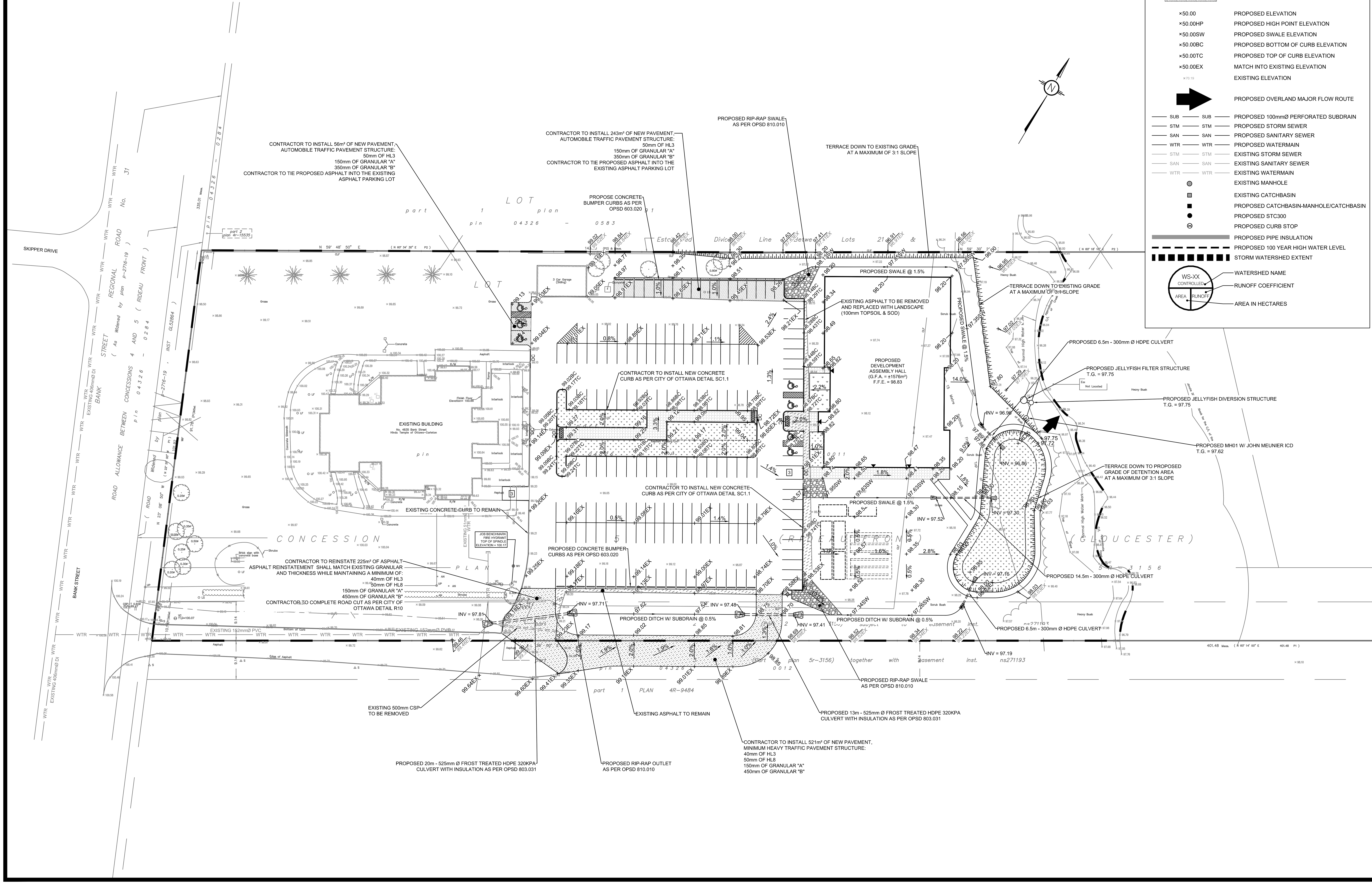

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V. JOHNSON
100510576
March 11/2020
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
170132

DATE
JAN2020

C301

NOTES: GENERAL

1. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
2. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
3. JOB BENCH MARK - CONFIRM WITH LRL PRIOR TO UTILIZATION.
4. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE, CATCH BASIN OUTLETS AND/OR STORM DETENTION AREAS ARE PROVIDED.
5. STRIP AND REMOVE ALL TOPSOIL FROM IMPROVED AREAS.
6. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
7. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A CLEAN STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT. PAVEMENT REINSTATEMENT SHALL BE WITH STEP JOINTS OF 500mm WIDTH MINIMUM.
8. CURBS TO BE BARRIER, CONSTRUCTED AS PER OPSD 600.110.
9. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSS 206, 310 & 314. MATERIALS TO OPSS 1001, 1003 & 1010.
10. ABUTTING PROPERTY GRADE TO BE MATCHED.
11. OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
12. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
13. FILTER FABRIC TO BE INSTALLED AND MAINTAINED BETWEEN THE FRAME AND COVER OF ALL CATCHBASINS, CATCHBASIN MANHOLES AND MANHOLES DURING THE CONSTRUCTION PERIOD TO MINIMIZE SEDIMENTS ENTERING THE STORM SEWER SYSTEM. ALL GRASSED AREAS MUST BE COMPLETED PRIOR TO THE REMOVAL OF THE FILTER FABRIC IN THE DRAINAGE STRUCTURES.
14. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS, IF ANY, LOCATED WITHIN THE PROPOSED BUILDING, PARKING AND ROADWAY LOCATIONS.
15. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS BUT NOT LIMITED TO; ROAD CUT PERMITS, SEWER PERMITS, WATER PERMIT, ETC.
16. AT PROPOSED UTILITY CONNECTION POINTS AND CROSSINGS (I.E. STORM SEWER, SANITARY SEWER, WATER, ETC.) THE CONTRACTOR SHALL DETERMINE THE PRECISE LOCATION AND DEPTH OF EXISTING UTILITIES AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
17. ALL SIDEWALK CONSTRUCTION TO BE AS PER OPSD 310.010 & OPSD 310.050.

NOTES: SEWERS

1. SEWER BEDDING AS PER PIPE TRENCH DETAIL WITH GRANULAR 'A' BEDDING COMPACTED TO 95% OF ITS SPMDD.
2. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH OPSS 407, AND 410.
3. CONTRACTOR TO CONFIRM ELEVATION OF EXISTING SEWERS AT PROPOSED CONNECTION POINTS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE COMMENCING ANY WORK.
4. ALL SEWERS WITH LESS THAN 2.0m OF COVER ARE SUBJECT TO INSULATION DETAIL.

NOTES: WATER SERVICE

1. PROPOSED WATER SERVICE TO BE INSULATED WHEN COVER IS LESS THAN 2.4m

WATERMAIN TABLE

DESCRIPTION	CHAINAGE	INVERT ELEVATION	FINISHED GRADE
CONNECTION TO EXISTING	0+000.0	TO MATCH EXISTING	99.32
TEE CONNECT. #1	0+002.5	96.86	99.32
45° BEND #1	0+080.1	95.16	98.66
45° BEND #2	0+088.6	94.99	97.39
TEE CONNECT. #2	0+093.0	95.14	98.23
FIRE HYDRANT	0+100.1*	95.32	98.56
45° BEND #3	0+126.2	96.19	98.78
PROPOSED DEVELOPMENT	0+131.0	96.41	98.81

NOTES: *DIVERGES AT TEE CONNECTION #2

LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED STRAW BALE CHECK DAM AS PER OPSD 219.180
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
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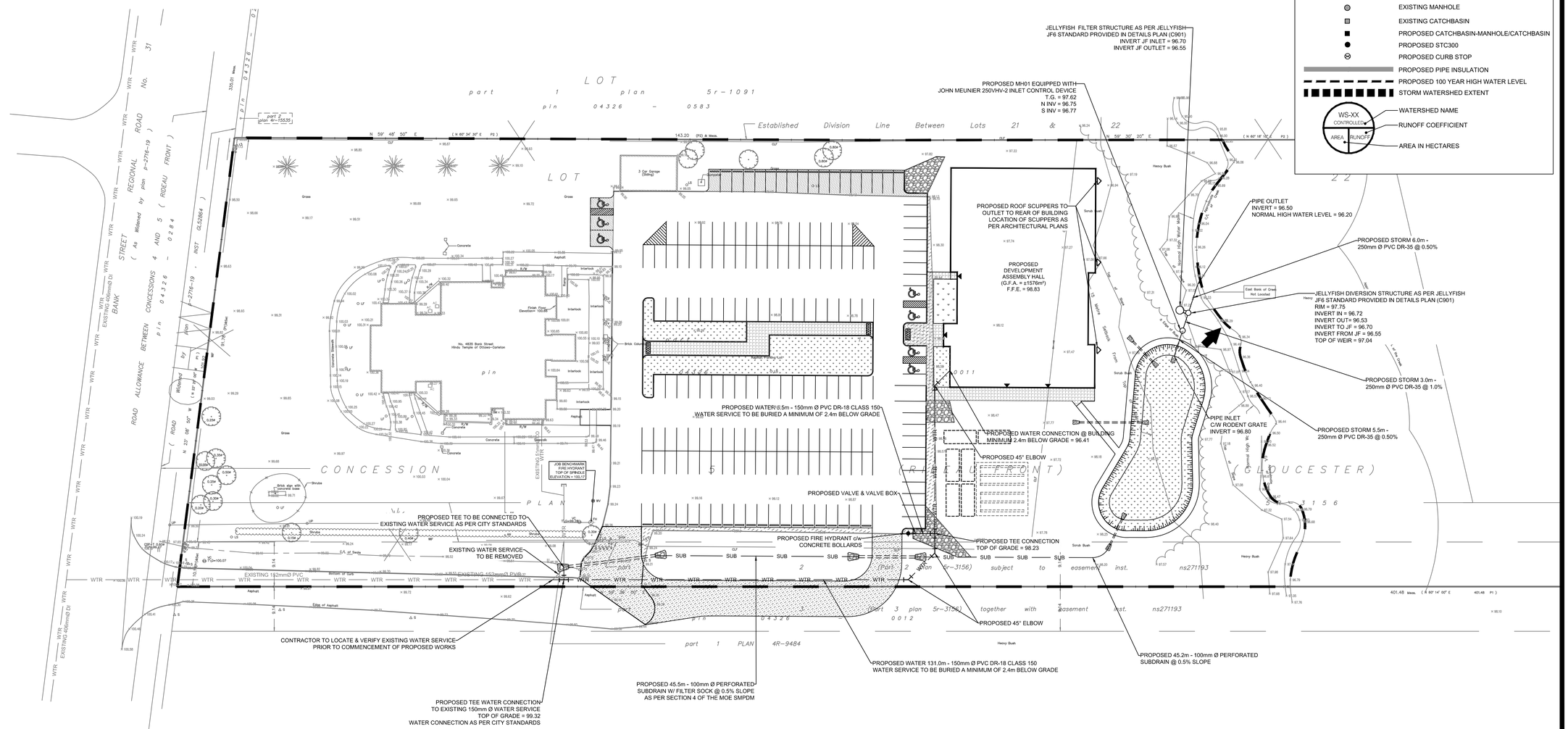
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLER — WATERSHED NAME
- AREA / RUNOFF — RUNOFF COEFFICIENT / AREA IN HECTARES



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10m 5 0 10 20m

SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER — W. JOHNSON — 100510576 — March 11/2020 — PROVINCE OF ONTARIO

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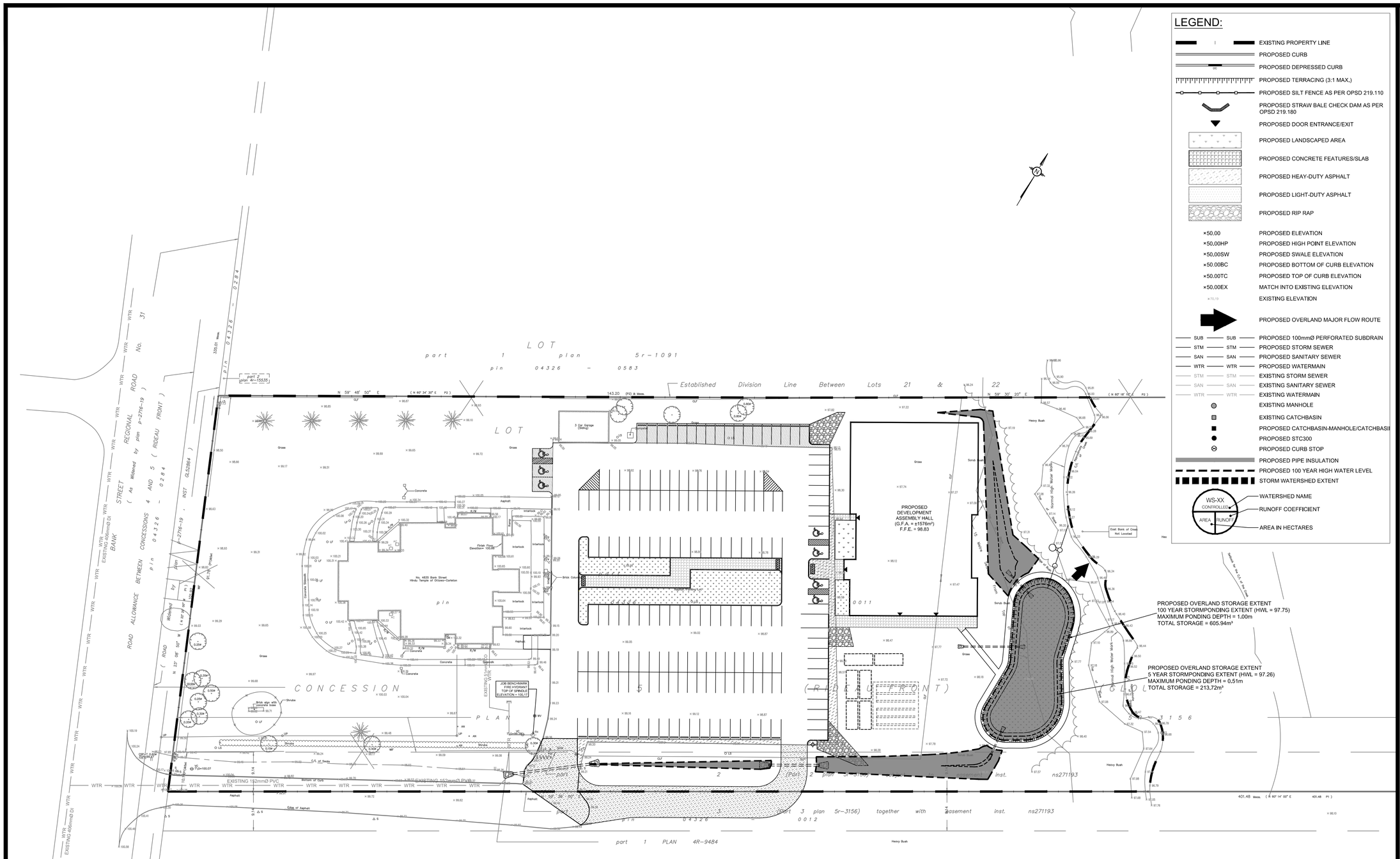
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
170132

DATE
JAN2020

C401



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01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER — P. JOHNSON — 100510576 — March 11/2020 — PROVINCE OF ONTARIO

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P.P.	K.H.	M.B.

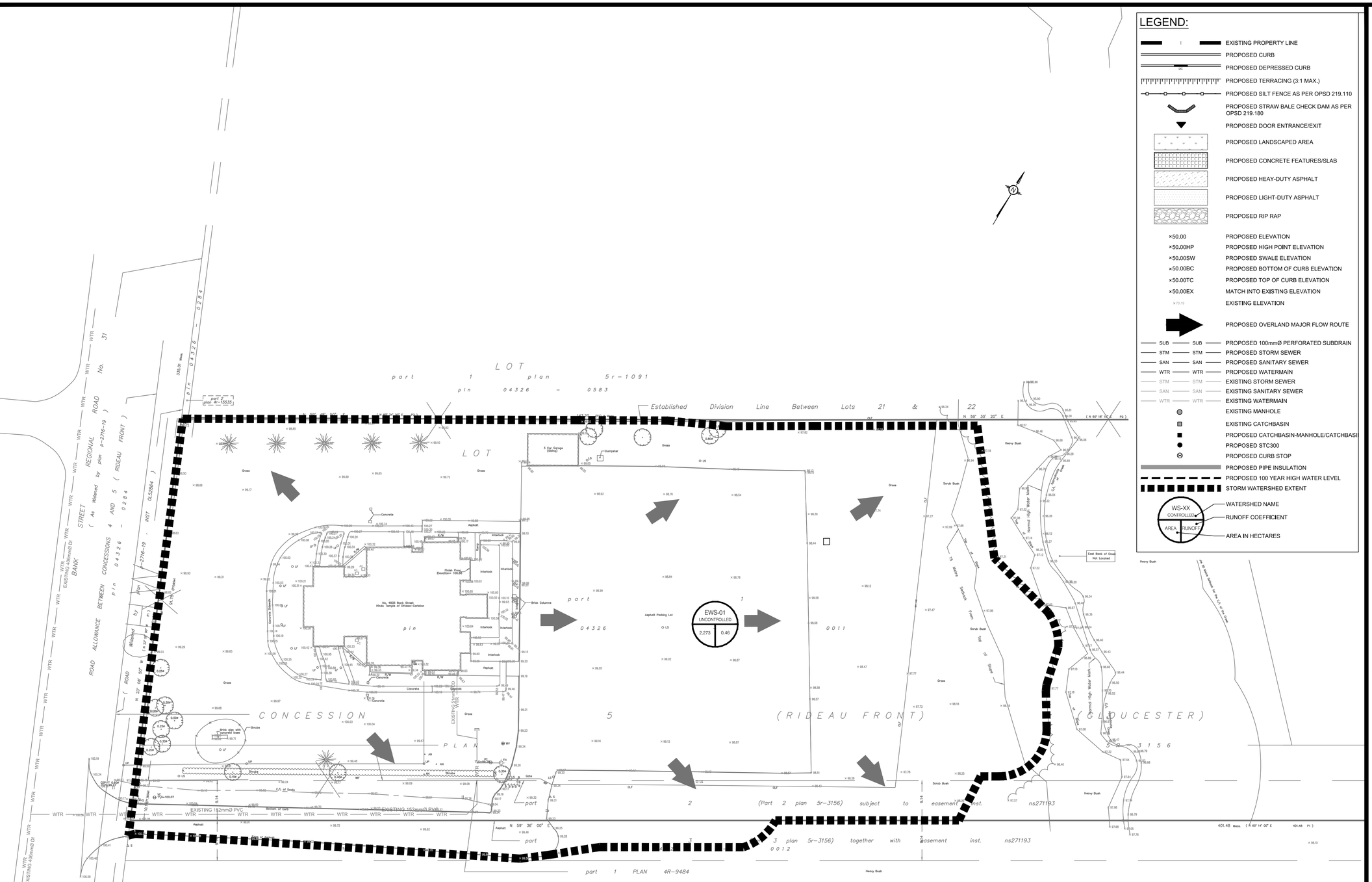
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

PROJECT NO.
170132

DATE
JAN2020

C601



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

CLIENT
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

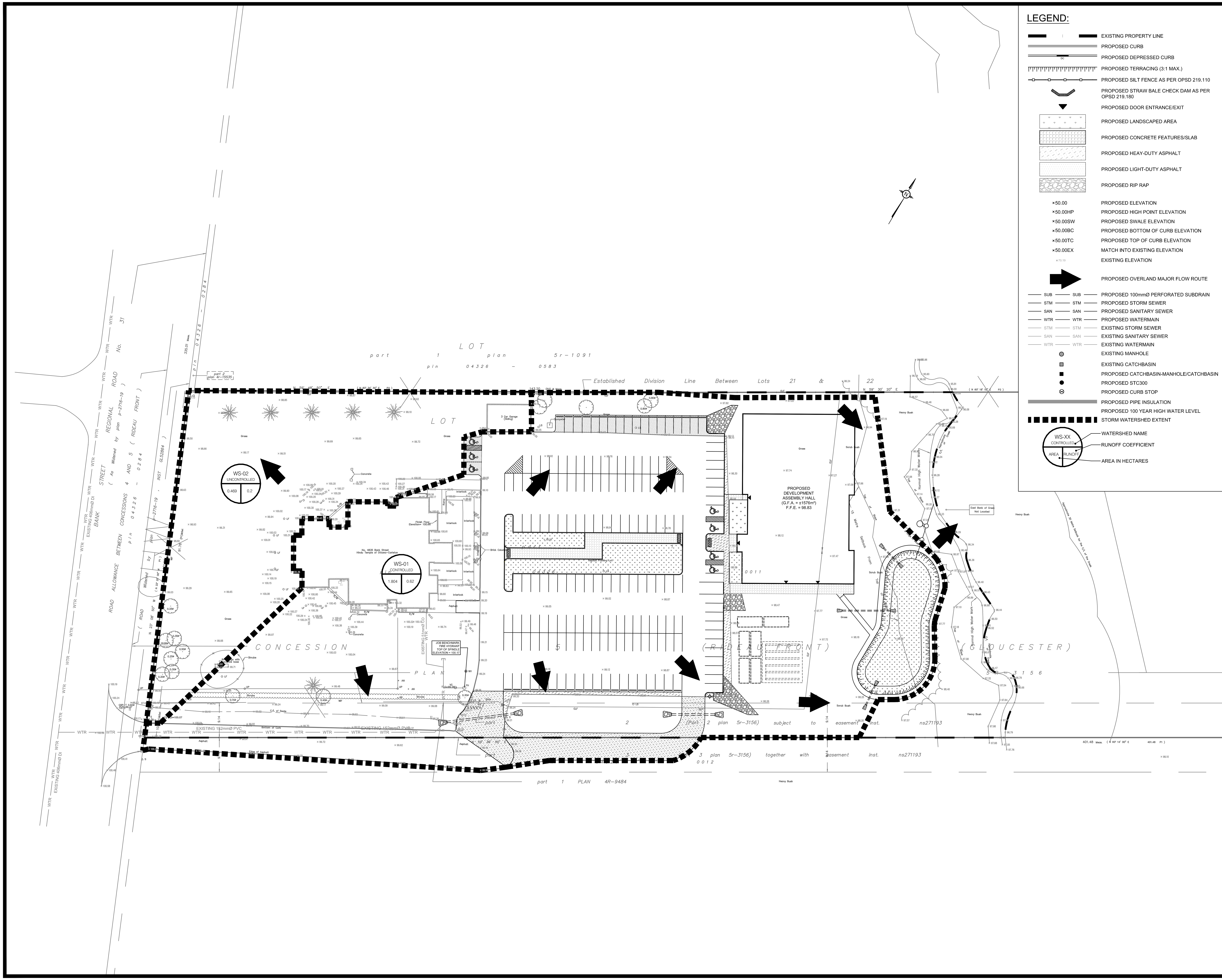
PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
PRE-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
170132

DATE
JAN2020

C701



LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED STRAW BALE CHECK DAM AS PER OPSD 219.180
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00SW PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00EX MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM PROPOSED STORM SEWER
- SAN PROPOSED SANITARY SEWER
- WTR PROPOSED WATERMAIN
- STM EXISTING STORM SEWER
- SAN EXISTING SANITARY SEWER
- WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED — WATERSHED NAME
- RUNOFF — RUNOFF COEFFICIENT
- AREA — AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

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

10m 5 0 10 20m

SCALE: 1:500

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER J. JOHNSON 100510576 March 11/2020 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL ENGINEERING | INGÉNIERIE
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DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
170132

DATE
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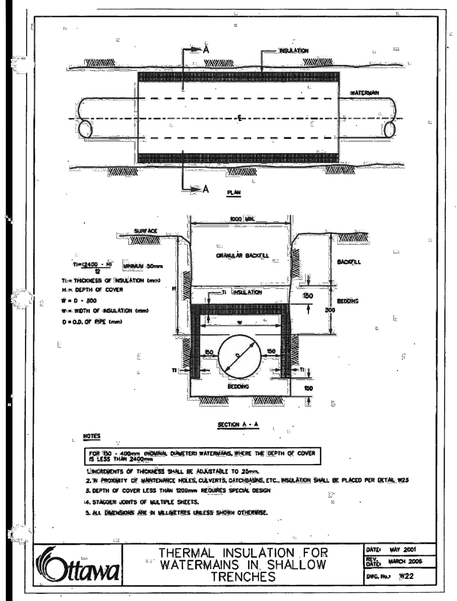
C702



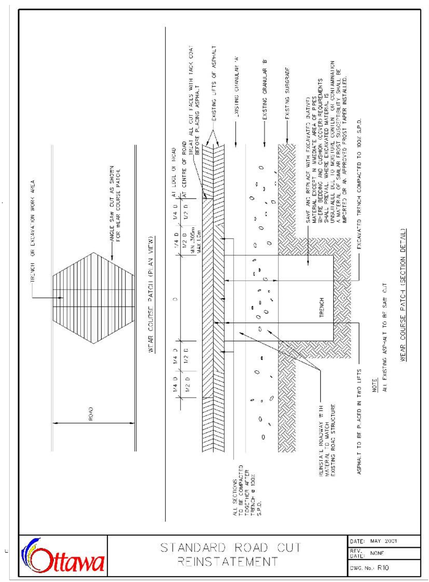
NOTES

FOR 150 - 400mm NOMINAL DIAMETER WATERMAINS, WHERE THE DEPTH OF COVER IS LESS THAN 2400mm

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 25mm.
2. IN PROXIMITY OF WATERSERVICE HOLES, CLEANOUTS, DISCHARGING, ETC., INSULATION SHALL BE PLACED PER DETAIL W23
3. DEPTH OF COVER LESS THAN 2000mm REQUIRES SPECIAL DESIGN
4. STAGGER JOINTS OF MULTIPLE SHEETS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

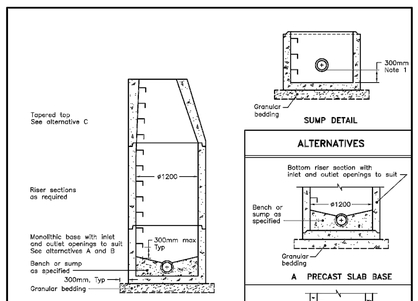
THERMAL INSULATION FOR WATERMAINS IN SHALLOW TRENCHES

DATE: MAY 2001
REV. DATE: MARCH 2006
DWG. No.: W22



STANDARD ROAD CUT REINSTATEMENT

DATE: MAY 2001
REV. DATE: NONE
DWG. No.: R10

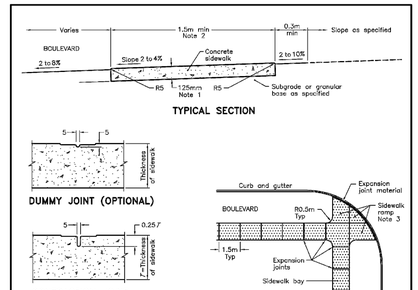


NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform 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

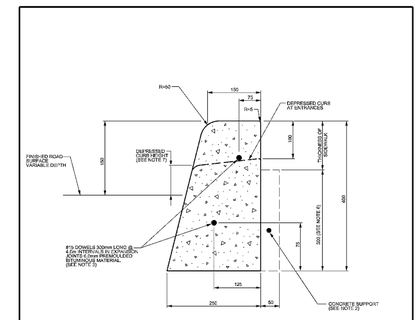


NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.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

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2

CONCRETE SIDEWALK

OPSD 310.010



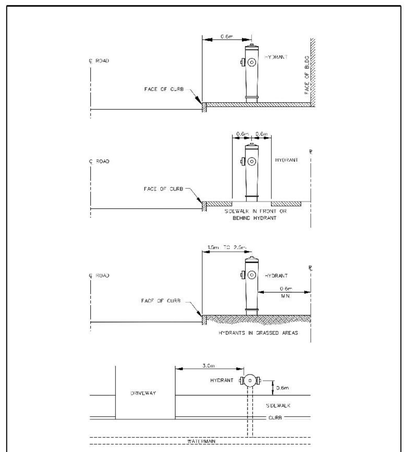
CONCRETE BARRIER CURB

NOTES:
1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSED ACCESS CROSSING.
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK.
3. IF AN EXTRUSION CURBING MACHINE IS USED, THE EXPANSION JOINT MATERIAL MATERIAL AND THE #15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
5. DUMMY JOINTS SHALL BE 25mm DEEP, FRONT, BACK AND TOP OF SECTION. AT 2m SPACING.
6. FOR DEPRESSED CURB AT ENTRANCES USE 210.
7. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 25mm.

N.T.S.

CONCRETE BARRIER CURB FOR GRANULAR BASE PAVEMENT (MODIFIED OPSD-600.110)

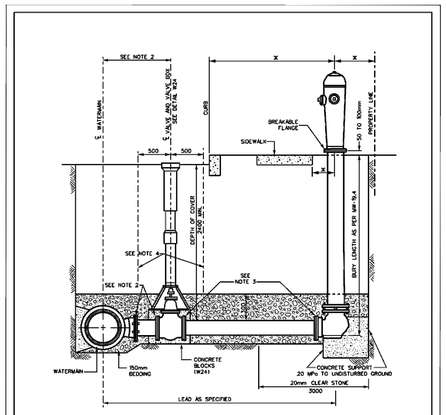
DATE: JANUARY 2003
REV. DATE: MARCH 2014
DWG. No.: SC1.1



NOTE:
1. REFER TO CONSTRUCTION SPECIFICATION F-7013.

HYDRANT LOCATION

DATE: MAY 2001
REV. DATE: NONE
DWG. No.: W18



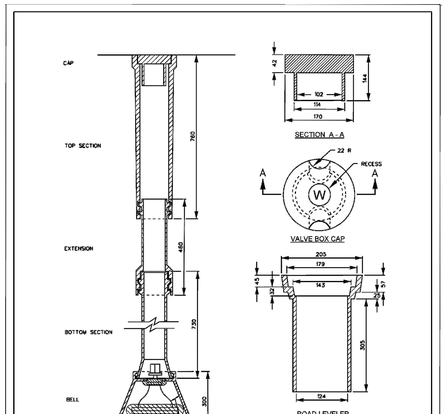
NOTES

FOR ALL WATERMAINS

1. SEE DETAIL W20 FOR HYDRANTS IN DITCH AREAS.
2. FOR WATERMAINS 400mm AND UNDER, LOCATE VALVE WITHIN 1.0m OF CENTRELINE. RETAINING/RESTRAINING DEVICES TO BE UTILIZED. FOR WATERMAINS 600mm AND OVER, BOLT VALVE WITH FLANGED END DIRECTLY TO FLANGED TEE.
3. RETAINING/RESTRAINING DEVICES TO BE UTILIZED.
4. HYDRANT BREAKABLE FLANGE ELEVATION TO BE ESTABLISHED PRIOR TO INSTALLATION. REFER TO MM-19.4 AND F-7013.
5. SEE MM-10.1 FOR BACKFILL REQUIREMENTS IN THIS AREA.
6. • SEE W18 FOR HYDRANT LOCATION REQUIREMENTS.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

HYDRANT INSTALLATION

DATE: MAY 2001
REV. DATE: MARCH 2006
DWG. No.: W19

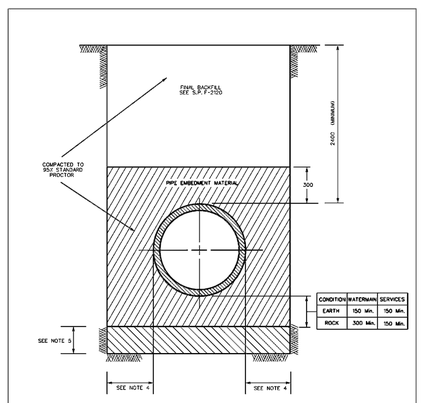


NOTES:
FOR AUXILIARY SERVICES AND ISOLATION VALVES.

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
2. FOR 200 AND 250mm VALVES ADD BEDDING BELOW THE CONCRETE BLOCKS AS REQUIRED TO RAISE BELL HIGH ENOUGH TO PREVENT CONTACT WITH THE VALVE BONNET.

VALVE BOX ASSEMBLY

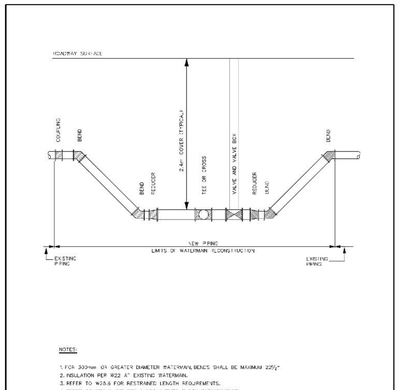
DATE: MAY 2001
REV. DATE: MARCH 2007
DWG. No.: W24



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. | CLEARANCE (mm)
   900 or LESS | 300
   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

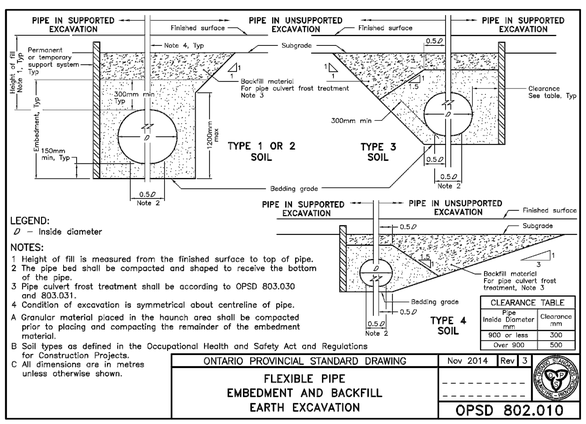
DATE: MAY 2001
REV. DATE: MARCH 2009
DWG. No.: W17



NOTES:
1. FOR 300mm OR GREATER DIAMETER WATERMAIN, BENDS SHALL BE MAXIMUM 22½°.
2. INSULATION PER W22.1 AT EXISTING WATERMAIN.
3. REFER TO W10.8 FOR RESTRAINED LENGTH REQUIREMENTS.
4. REFER TO W25.3 AND W25.4 FOR THRUST BLOCK REQUIREMENTS
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

TYPICAL CONNECTION DETAIL FROM NEW TO EXISTING WATERMAIN

DATE: MAY 2001
REV. DATE: NONE
DWG. No.: W25.1



LEGEND:
D – Inside diameter

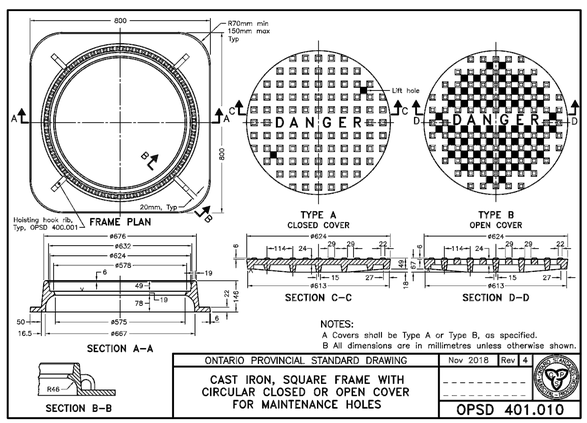
NOTES:
1 Height of fill is measured from the finished surface to top of pipe.
2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
4 Condition of excavation is symmetrical about centreline of pipe.
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.

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

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2014 | Rev 3

FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION

OPSD 802.010

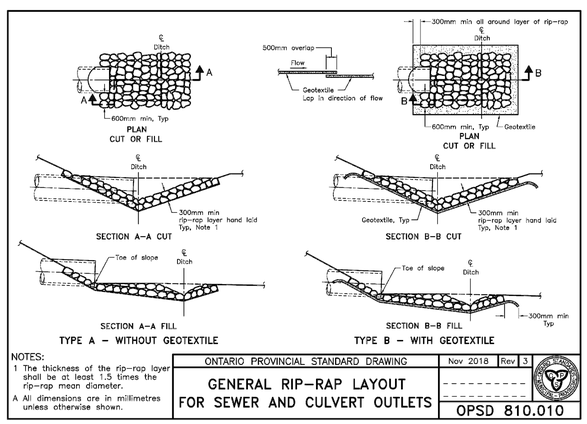


NOTES:
A Covers shall be Type A or Type B, as specified.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 4

CAST IRON, SQUARE FRAME WITH CIRCULAR CLOSED OR OPEN COVER FOR MAINTENANCE HOLES

OPSD 401.010



NOTES:
1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
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ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 3

GENERAL RIP-RAP LAYOUT FOR SEWER AND CULVERT OUTLETS

OPSD 810.010

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LICENSED PROFESSIONAL ENGINEER
K. JOHNSON
100510576
March 11, 2020
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4835 BANK STREET, OTTAWA

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CONSTRUCTION DETAIL PLAN

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DATE
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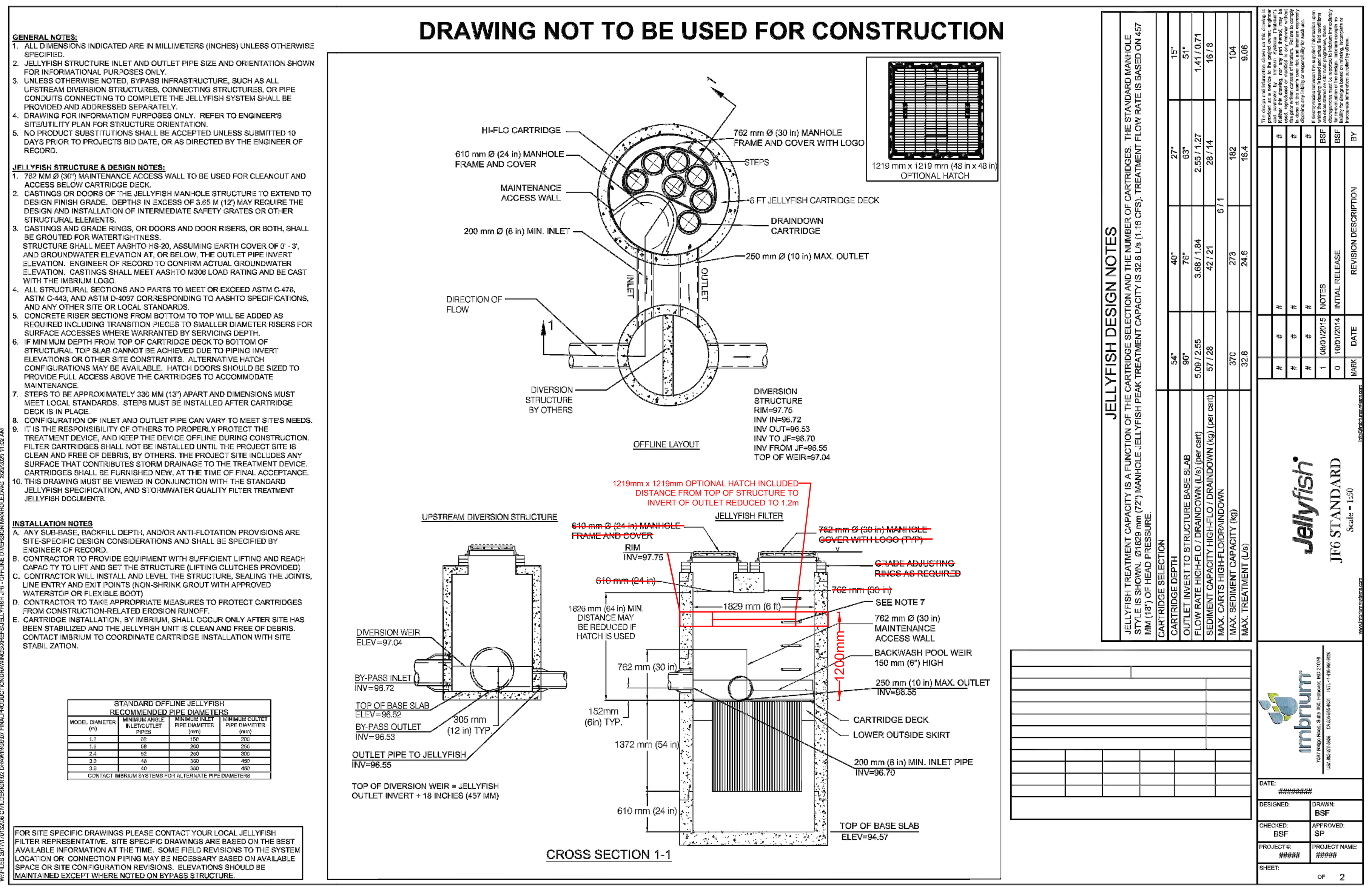
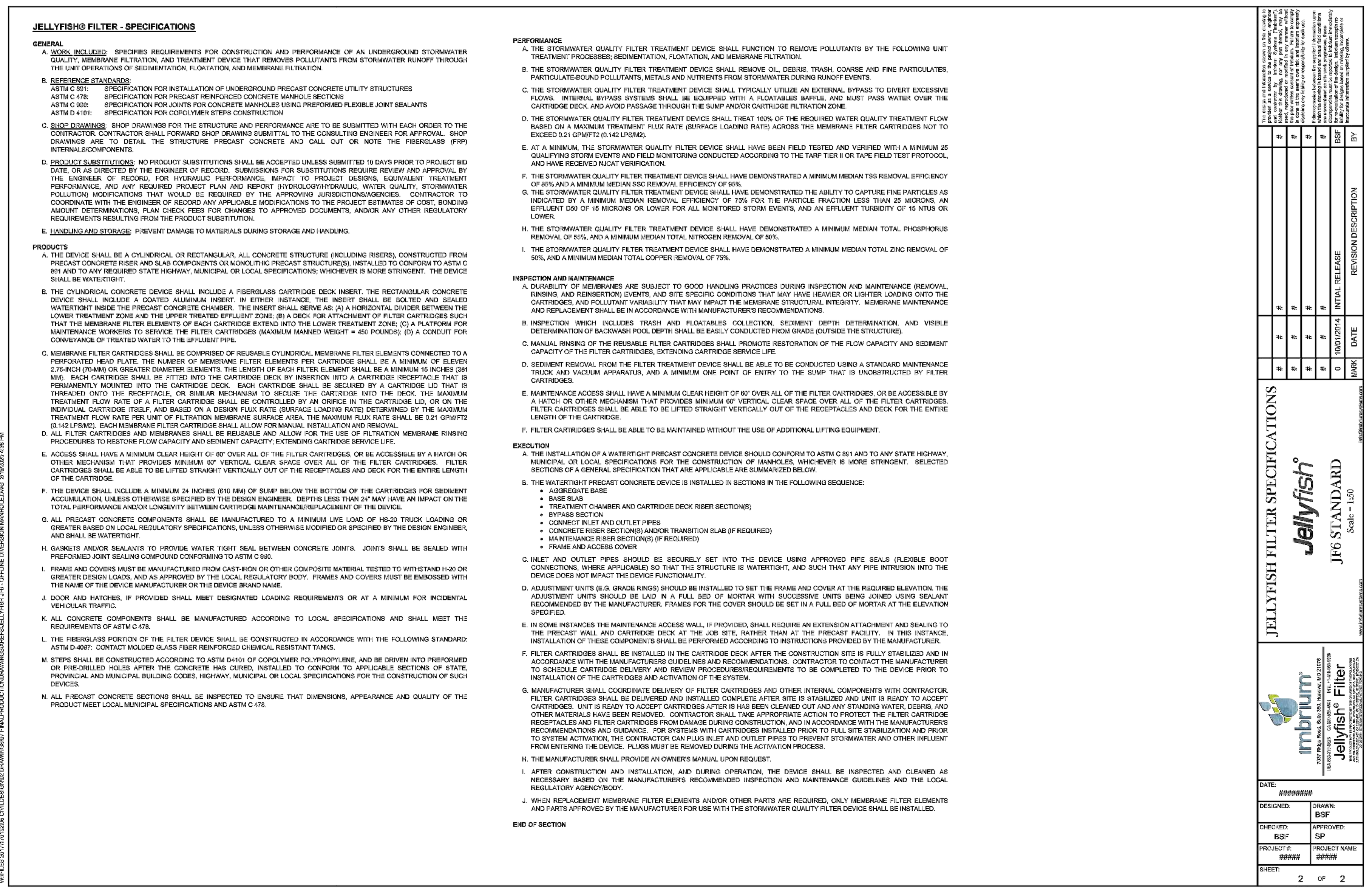
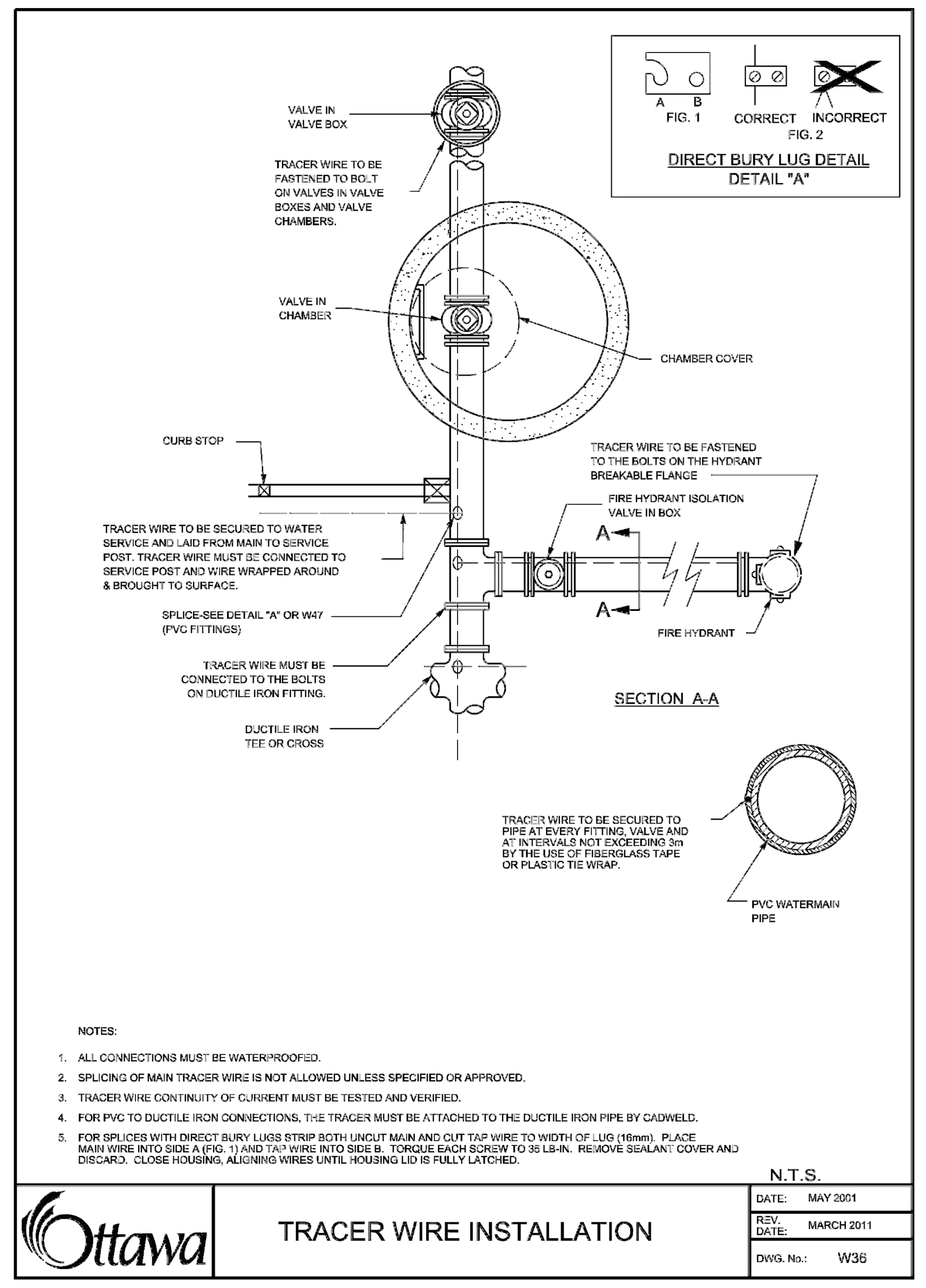
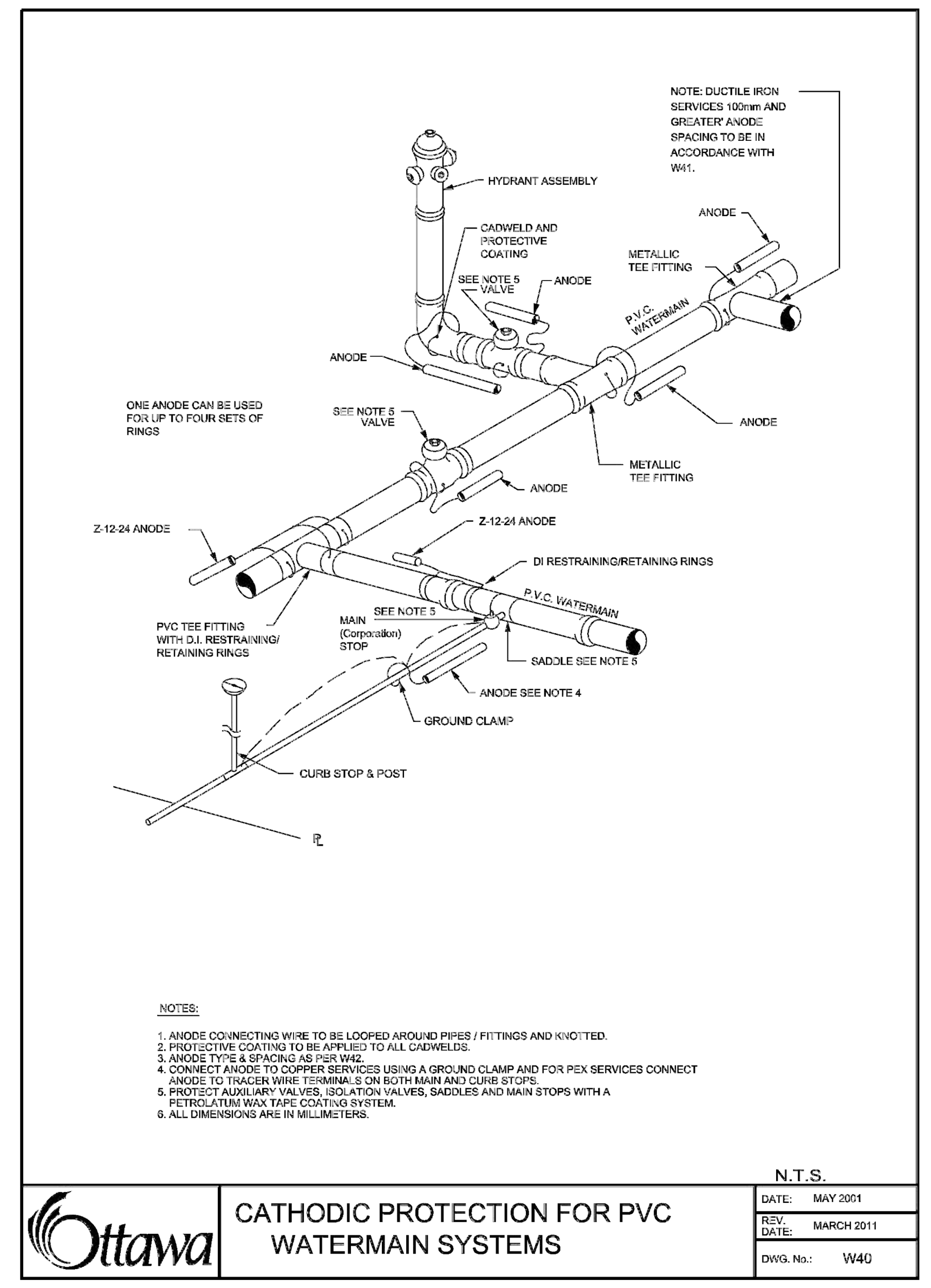
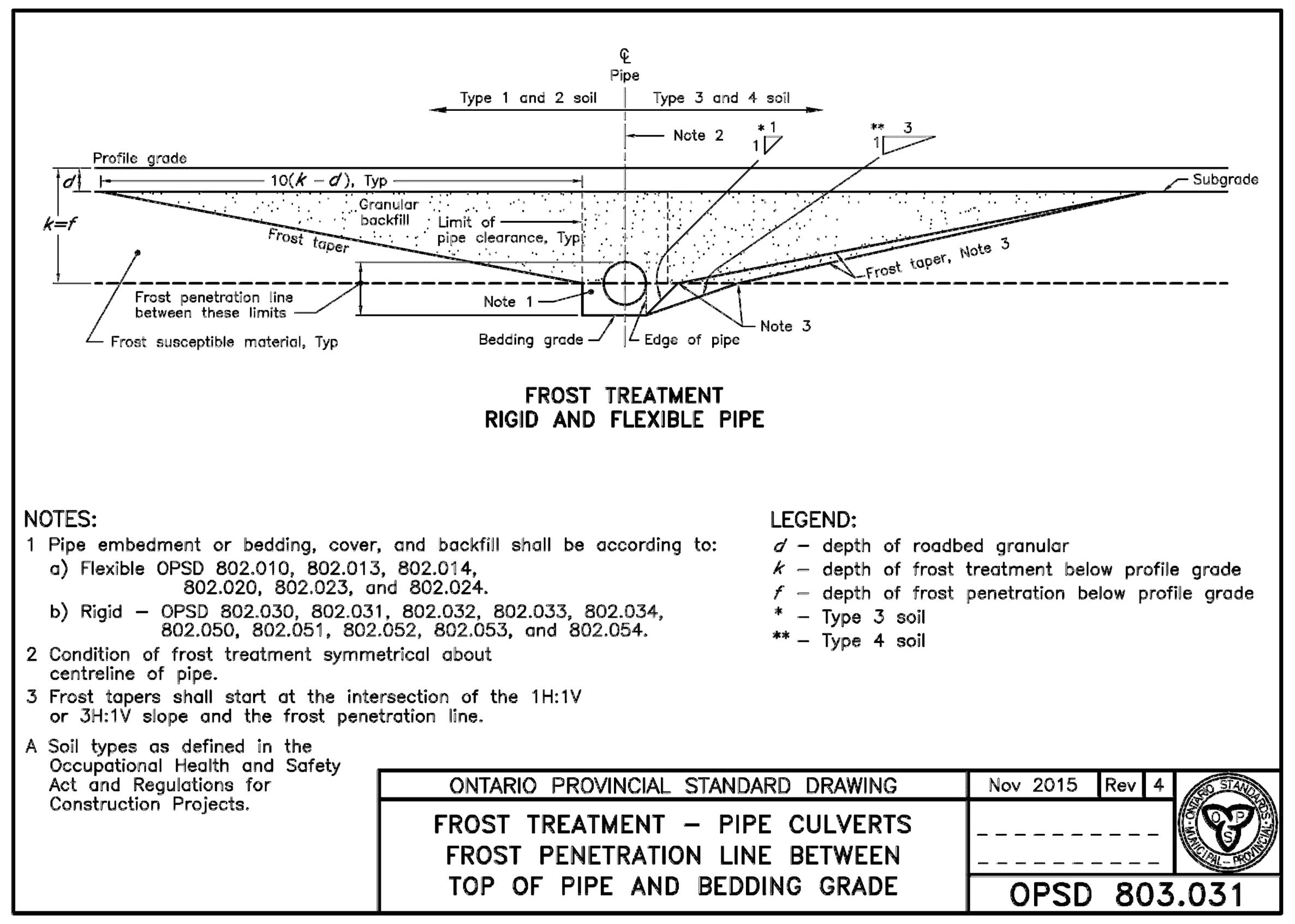
C901

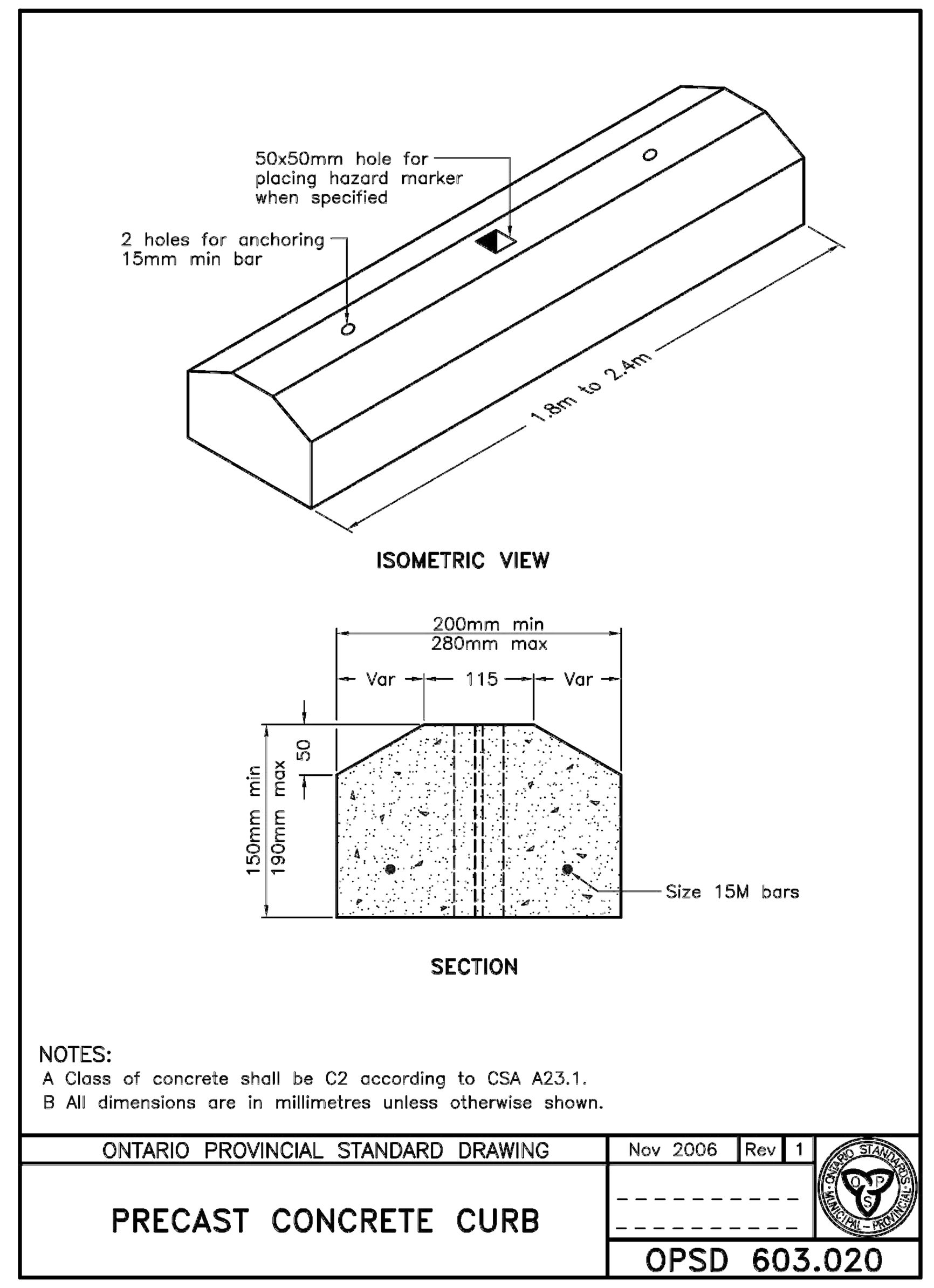












USE AND INTERPRETATION OF DRAWINGS

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.

No.	REVISIONS	BY	DATE
01	ISSUED FOR CLIENT APPROVAL	K.H.	11 MAR 2020

LICENSED PROFESSIONAL ENGINEER
JOHNSON
100510576
March 11/2020
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
THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.P.	K.H.	M.B.

PROJECT
PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

PROJECT NO.
170132

DATE
JAN2020

C902