



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

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 for the controlled runoff 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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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 m², with basement) with landscaped area bordering its 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 approximately 1400 m². 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 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 Authority (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 STORMWATER MANAGEMENT

3.1 Existing Stormwater Conditions

In pre-development conditions, all stormwater flows off-site uncontrolled.

The site follows a few overland flow patterns, which will be broken down below.

First, there is the front (West) section of the property, which encompasses the existing Hindu Temple, and surrounding North, West and South landscape. The site was graded down from the Temple building, so naturally, stormwater will flow from the temple to the nearest property line. Stormwater in the North and West landscape areas will flow North / North-West / West to the respective property lines. Stormwater south of the building will flow to the South, and captured & conveyed East by the existing ditch (running along the North end of the existing asphalt driveway)

The second section of the property, the rear (East) end, encompasses the existing parking lot, and surrounding North, East and South landscape. The existing parking lot was developed with a high point running along the center (West to East), with a slight slope towards the East. All stormwater on the North end of the parking lot is conveyed North-West to the North property line. All stormwater on the South end of the parking lot is conveyed South / South-West to the South property line. All stormwater accumulated at the rear end of the property would continue to flow East, until ultimately should reach the existing creek.

The final section of the property is the driveway running along the South property line. All stormwater from this asphalt surface will be conveyed North / North-east to the ditch running along the driveways North end.

Please refer to civil plan C701 – Pre-Development Watershed Plan for greater detail.

3.2 Proposed Post-development Watersheds

For stormwater management design purposes, the site was divided into four watershed areas;

WS-01 – Existing building, grass area, ditch & driveway South of the existing building, South existing parking lot & proposed ditch, proposed building and grass area & detention area South of the proposed building

WS-02 – North section of the existing parking lot, including North grass area

WS-03 – Grass area North and South of the existing Temple

WS-04 – Grass area at the South-East corner of the property

The watershed delineations can be seen in Civil Plan C702 – Post-development Watershed Plan.

As per the EIS (Environmental Impact Statement) developed for this site, we could not perform any works, or include any stormwater management structures, within a 20m setback from the existing creek. This 20m setback was delineated as the East boundary of our scope of work.

Watershed 01 is proposed as a control area, where stormwater will be controlled and treated prior to being released at the 20m setback line (and ultimately flowing overland to the existing creek).

Watershed 02 is proposed as an uncontrolled area, where stormwater will flow off the site uncontrolled, as it did in previous conditions. Though no means of flow control will be implemented here, the stormwater in this area will be collected and treated prior to being released.

Watersheds 03 and 04 are proposed as uncontrolled areas. No flow control or treatment are proposed for these areas, stormwater will flow off the site uncontrolled, as it did in previous conditions. As large majority of these watersheds are landscaped/grassed areas, additional treatment isn't an absolute necessity.

3.3 Design Criteria

The stormwater management criteria for this development are based on pre-consultation with City of Ottawa officials (which occurred on 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 Management Planning and Design Manual, 2003 (SWMPD Manual).

As discussed during the pre-consultation meeting, all storm events up to and including the 100-year event would be controlled to the 5-year pre-development level, using a smaller runoff coefficient (C) of 0.5 or the actual site C, 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* = 0.49)

I = the rainfall intensity (mm/hr) (*I*₅ = 104.2 mm/hr at a *T*_c = 10 min)

A = Area (2.223 ha)

$$Q_{\text{allowable 1/5yr (pre-dev)}} = 2.78 \times 0.49 \times 104.2 \text{ mm/hr} \times 2.223 \text{ ha} = 316.44 \text{ L/s}$$

As per the watershed delineation provided in section 3.2, in the 100-year storm event, the maximum uncontrolled runoff was calculated to be 249.38 L/s. With an allowable release rate of 316.44 L/s, this would leave us to have to control the balance of the site to a controlled release rate of 67.06 L/s.

4 QUANTITY CONTROL

The area at the South of proposed building is large enough to accommodate a substantial detention area. This proposed detention area, equipped with an inlet control device (ICD) at the outlet, would serve as a primary means of flow control for all controlled stormwater on-site.

To achieve the aforementioned, it was determined that the release rate would have to be controlled to ~67 L/s. The release rate will be controlled by installing an 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 **171.10 m³** and **427.85 m³**, respectively. For storage volume calculations, the controlled release rate was taken as half of the discharge rate.

The detailed storage calculations can be found in Appendix N.

All controlled overland flow will be conveyed to the proposed detention area, located near the South-East corner of the proposed assembly hall, by means of the existing grading, as well as 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. 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 ditch South-West of the detention area, due to the proposed grading of these elements. The Stormwater Management plan (Civil Plan 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 (428.14 m³) was found to be greater than the required storage previously calculated (427.85 m³). Therefore, the detention area & ditch will be enough 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 developed so that the post-development controlled runoff will ultimately be discharged at the 20m setback line. As discussed in the pre-consultation meeting with the City of Ottawa, in order to meet the water quality objective, it is required to achieve an enhanced level of protection of 80% total suspended solid (TSS) removal. This can be achieved using a water quality treatment unit.

Considering the post-development watershed area that requires water quality treatment (1.316 ha), (as seen in Appendix B – Post-Development Watershed Plan), it is proposed to install a Jellyfish JF6-4-1 stormwater treatment unit (or approved equivalent). The Jellyfish JF6-4-1 will serve to remove a minimum 80% 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.

Stormwater treatment has also been proposed in Watershed WS-02 (consisting of the North half of the existing parking lot). Stormwater in this area will be conveyed to a catchbasin proposed at the North-East corner of the parking lot. The catchbasin will be equipped with a FlexStorm Pure inlet filter. The inlet filter will not provide the full 80% TSS removal, however, it will provide substantial treatment of runoff from the North parking lot. The treated flow from the catchbasin and inlet filter will then be conveyed to a proposed infiltration gallery.

Greater details for the inlet filter can be found in Appendix E and infiltration gallery can be found on Civil Plan C902.

6 LOW IMPACT DEVELOPMENT

As per the EIS performed for this site, the proposed development should occur with large focus towards Low Impact Development (LID).

At the rear of the property is located an existing creek. A 20m setback was proposed from the creek as a means of protecting the sensitive resource. This setback was respected in the stormwater management design for the site.

The initial design focused on maintaining as much of the existing grass area and landscape elements (trees) as possible. Any addition to the parking lot was offset by incorporating landscape within the parking lot. The roof drains will also lead flows to either the ditch or detention area, in order to maximize the potential for captured water infiltration.

All controlled runoff is ultimately being treated by the Jellyfish stormwater treatment unit (or approved equivalent). Prior to this, the stormwater will succumb to other means of stormwater treatment. The ditches are low-sloping, and equipped with a subdrain & clear stone, to promote filtration and infiltration. Ditch culvert inverts have been slightly raised at the inlets in order to promote additional ponding and infiltration. The proposed detention area spans a large area; this works increases ground infiltration and treatment of the detained stormwater. The detention area is low sloping, encouraging additional infiltration and decreasing sediment conveyance.

The uncontrolled runoff, specifically the runoff from the North half of the parking lot, will progress through two forms of treatment prior to being released. The stormwater will be captured by a catchbasin installed at the North-East end of the parking lot. The captured runoff will first be treated with a Flexstorm Pure inlet filter. This inlet filter will not provide the full 80% TSS removal, however, it will provide substantial treatment of runoff from the North parking lot, targeting contaminants such as trash, litter, leaves, smaller particles, oil and grease. This treated stormwater will then be conveyed to a proposed infiltration gallery. The infiltration gallery, equipped with a perforated subdrain and clear stone trench, will provide further treatment, and greatly encourage infiltration. The infiltration gallery was designed to retain a volume of stormwater from the first 5mm rainfall over the watershed WS-02. This translates to a storage volume of 20.55 m³.

In addition, additional landscaping elements will be incorporated to the site to improve site aesthetic. The detention area will serve to improve the open land use and site development aesthetic.

7 WATER SERVICE

7.1 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.

7.2 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 (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 40 psi (280 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.

7.3 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 m³/s

a = orifice area of 100 mm dia. pumper truck nozzle in m²

g = acceleration due to gravity (9.81 m/s²)

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

Therefore,

$$Q = 0.88 \times (0.05 \text{ m} \times 0.05 \text{ m} \times 3.1416) \times \sqrt{(2 \times 9.81 \text{ m/s}^2 \times 43.9 \text{ m})}$$
$$= 0.203 \text{ m}^3/\text{s}$$

= 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.

7.4 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.

8 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). However, due to the removal of the kitchen from the existing building, only 2000 L/day will be required to service the existing building, and the North septic system will be decommissioned.

Greater detail can be found in with reference to the LRL Terrain Analysis and Private Sewage Disposal System Impact Assessment (dated June 2021).

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 (6000 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 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. Refer to Appendix P for the preliminary septic design.

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.

9 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.

10 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.

11 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 stormwater treatment unit prior to discharging controlled 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.

12 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:

Kyle Herold



Approved by:

M. Basnet, P. Eng.

APPENDIX A
Key Plan



LRJ

ENGINEERING | INGÉNIERIE

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PROJECT

PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA

DRAWING TITLE

KEY PLAN

CLIENT

THE HINDU HERITAGE CENTRE OF OTTAWA-CARLETON

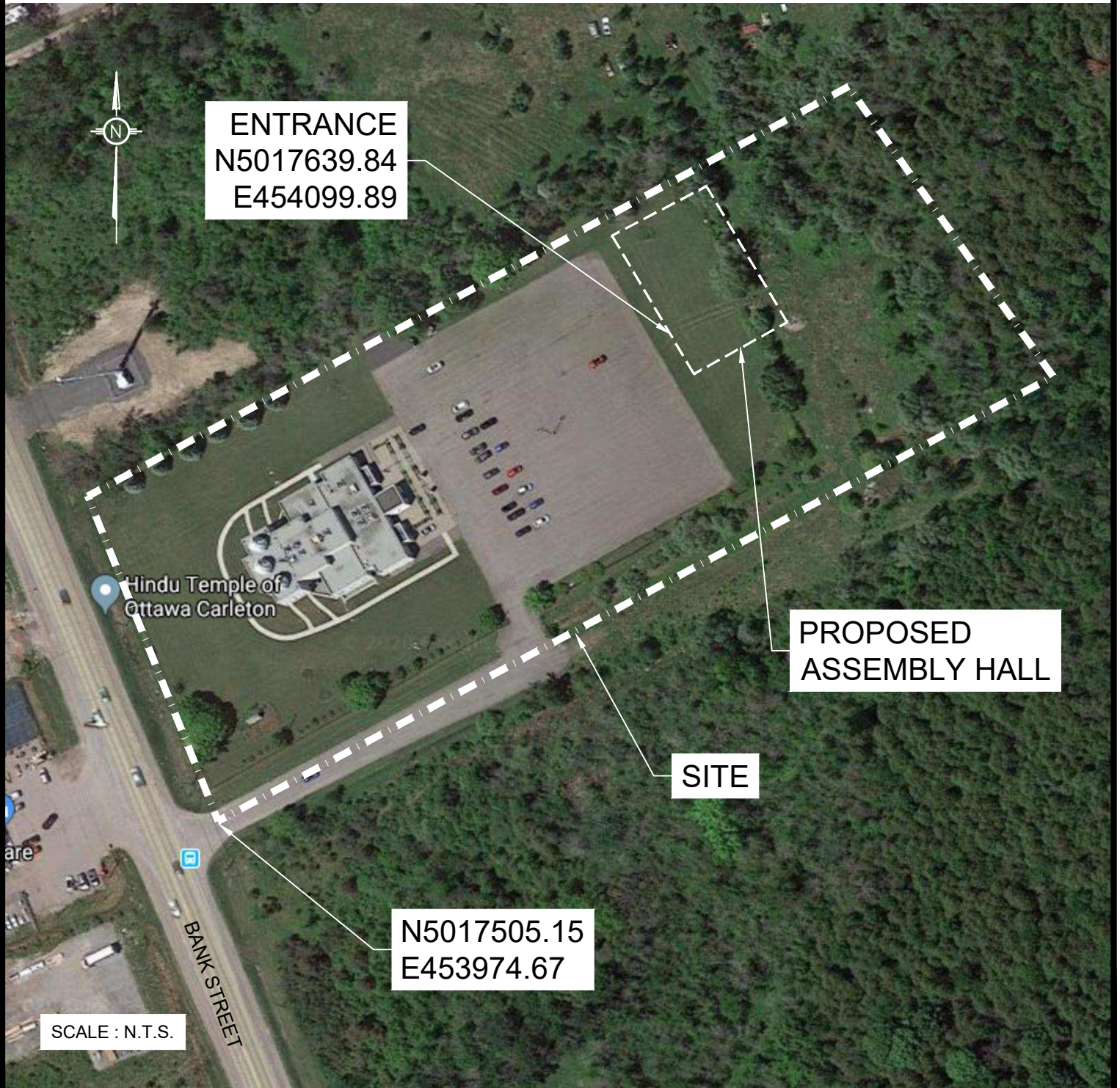
DATE

20FEB2020

PROJECT

170132

KP



ENTRANCE
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PROPOSED
ASSEMBLY HALL

SITE

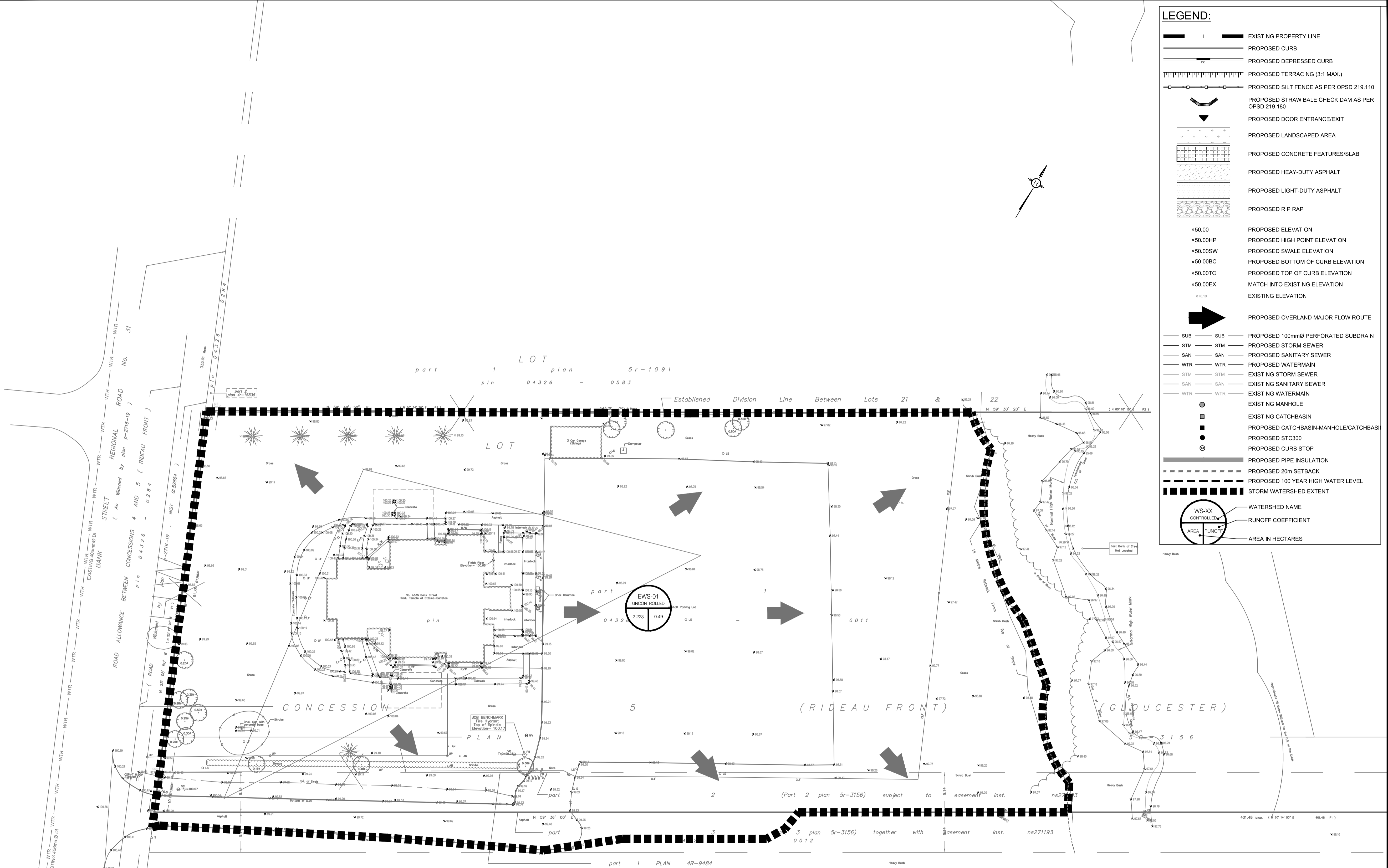
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SCALE : N.T.S.

Hindu Temple of
Ottawa Carleton

BANK STREET

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
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- *50.00 PROPOSED ELEVATION
- *50.00HP PROPOSED HIGH POINT ELEVATION
- *50.00SW PROPOSED SWALE ELEVATION
- *50.00BC PROPOSED BOTTOM OF CURB ELEVATION
- *50.00TC PROPOSED TOP OF CURB ELEVATION
- *50.00EX MATCH INTO EXISTING ELEVATION
- *70.10 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB PROPOSED 100mm 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 20m SETBACK
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX WATERSHED NAME
- AREA RUNOFF RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS 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, CAD FILES OR OTHER ELECTRONIC MEDIA AND COPIES 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 ILLUSTRATE 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 CONTRACT 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.

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



| No. | REVISIONS | BY | DATE |
|-----|-------------------------------------|------|--------------|
| 04 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 22 SEPT 2021 |
| 03 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 23 DEC 2020 |
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NOT AUTHENTIC UNLESS SIGNED AND DATED

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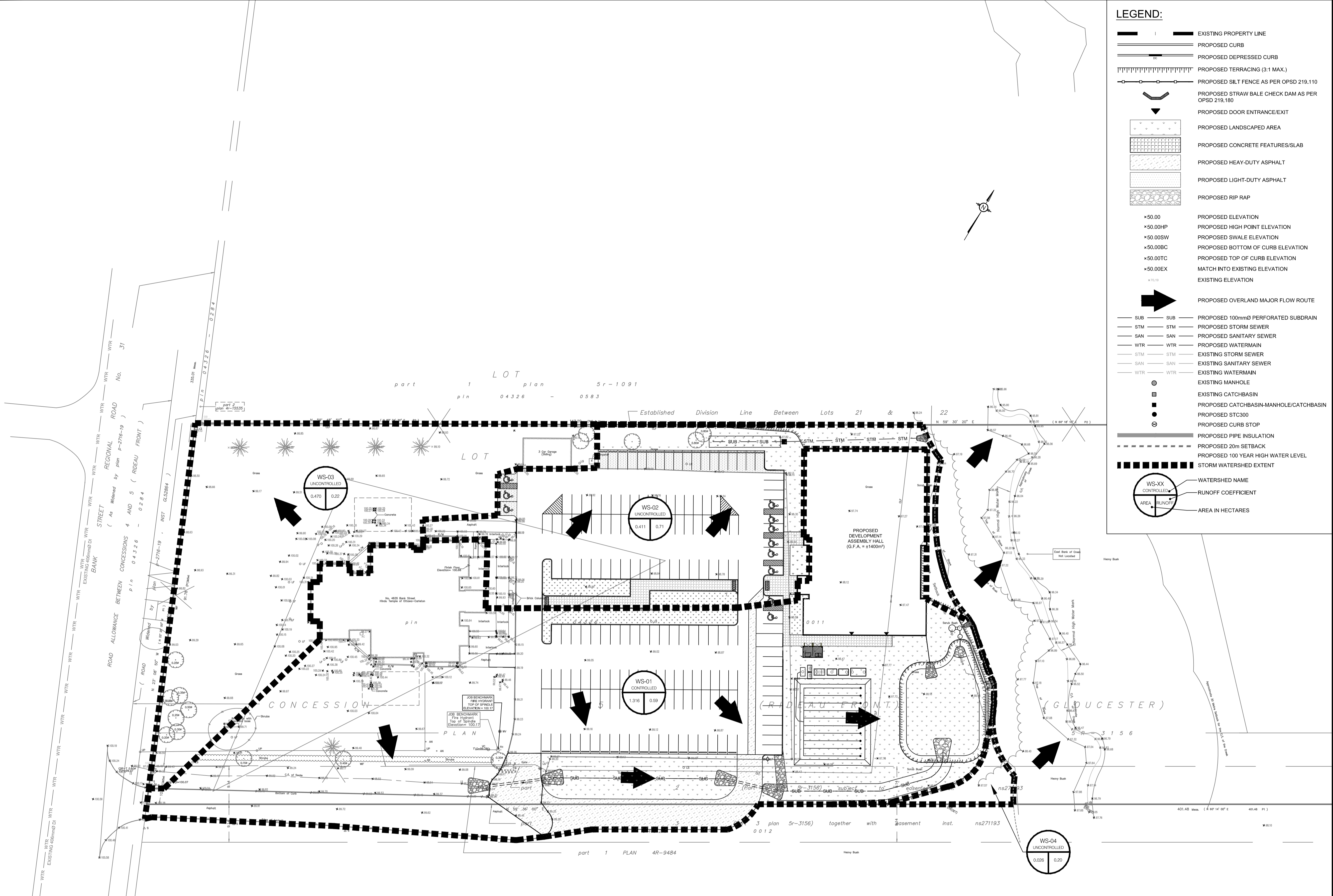
| DESIGNED BY: | DRAWN BY: | APPROVED BY: |
|--------------|-----------|--------------|
| P.P. | K.H. | M.B. |

PROJECT
**PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA**

DRAWING TITLE
**PRE-DEVELOPMENT
WATERSHED PLAN**

PROJECT NO.
170132
DATE
JAN2020





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 HEAVY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- PROPOSED ELEVATION
- PROPOSED HIGH POINT ELEVATION
- PROPOSED SLOPE ELEVATION
- PROPOSED BOTTOM OF CURB ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- PROPOSED 100mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED STC300
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 20m SETBACK
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

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

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

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIES THEREOF 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 ILLUSTRATE 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.

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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.

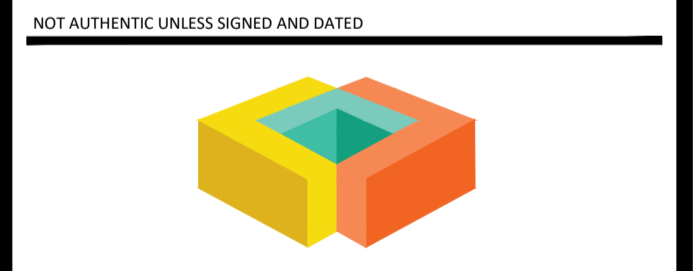
CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

GENERAL NOTES:

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

CLIENT: **THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON**

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

PROJECT: **PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA**

DRAWING TITLE: **POST-DEVELOPMENT WATERSHED PLAN**

PROJECT NO: 170132
 DATE: JAN2020



APPENDIX C
Flow Restrictor Information



LRL File No. 170132
Project: Hindu Heritage Center
Location: 4835 Bank Street, Ottawa
Date: 20-Sep-21
Designed: K. Herold
Checked: M. Basnet
Drawing Ref.: C.401

**Stormwater Management
Design Sheet**

Orifice Equation

$$Q = 0.61 * A * \text{sqrt} (2 * g * H)$$

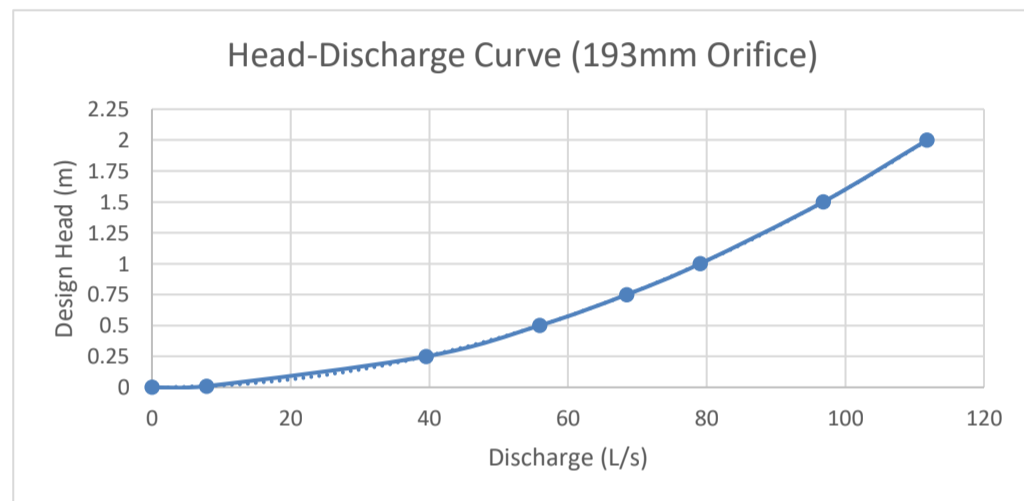
Where; Q = release rate (in m3/s)
 0.61 = coefficient
 A = area of the orifice (m2)
 g = gravitational constant (9.81 m/s2)
 H = head above CL of orifice (m)

ICD Diameter (based on 5yr design reqt's)

Q (m3/s) = 0.05
 g (9.81m/s2) = 9.81
 H (m) = 0.40

| | |
|----------|---------|
| A (m2) = | 0.02926 |
| D (m) = | 0.193 |

Orifice Diameter Required = 193 mm



Storm - 100 year

Allowable Release Rate = 316.44L/s
 Controlled Release Rate = 67.00L/s
 Q (m3/s) = 0.067
 g (9.81m/s2) = 9.81
 A (m2) = 0.02926

| | |
|---------|------|
| H (m) = | 0.72 |
|---------|------|

100yr STM Design Head = 0.72 m

Storm - 5 year

Allowable Release Rate = 316.44L/s
 Controlled Release Rate = 50.00L/s
 Q (m3/s) = 0.05
 g (9.81m/s2) = 9.81
 A (m2) = 0.02926

| | |
|---------|------|
| H (m) = | 0.40 |
|---------|------|

5yr STM Design Head = 0.40 m

Inlet Control Device Parameters
ICD at CB-3

Product Orifice Plate
 Design Head = 0.72m
 Max. Pond Depth = 0.82m (100y)
 High Water Level = 98.47
 Struct + Grate Elev = 98.60 MH-01
 Outlet Pipe Dia = 450mm MH-01 North Branch
 Outlet Pipe Inv = 97.72
 ICD Dia = 193mm
 ICD Inv = 97.75

APPENDIX D

Volume Table Generated by AutoCAD Civil 3D

Cut/Fill Report

Generated: 2021-08-19 09:56:42

By user: KHerold

Drawing: W:\FILES 2017\170132\06 CivilDesign\02 Drawings\07
FinalProductionDrawings\W:\FILES 2017\170132\06 CivilDesign\02
Drawings\07 FinalProductionDrawings\170132-04.dwg

| Volume Summary 100y Storm | | | | | | | |
|---------------------------|------|------------|-------------|--------------------|--------------|---------------|--------------|
| Name | Type | Cut Factor | Fill Factor | 2d Area (hectares) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
| VOL DET AREA | full | 0.00 | 1.00 | 0.06 | 0.00* | 396.35 | 396.35* |
| VOL DITCH EAST | full | 0.00 | 1.00 | 0.02 | 0.00* | 23.94 | 23.94* |
| VOL DITCH WEST | full | 0.00 | 1.00 | 0.05 | 0.00* | 7.85 | 7.85* |

| Totals | | | | | | |
|--------|--|--|--------------------|--------------|---------------|--------------|
| | | | 2d Area (hectares) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
| Total | | | 0.14 | 0.00* | 428.14 | 428.14* |

* Value adjusted by cut or fill factor other than 1.0

Cut/Fill Report

Generated: 2021-08-19 09:57:53

By user: KHerold

Drawing: W:\FILES 2017\170132\06 CivilDesign\02 Drawings\07
FinalProductionDrawings\W:\FILES 2017\170132\06 CivilDesign\02
Drawings\07 FinalProductionDrawings\170132-04.dwg

| Volume Summary 5y Storm | | | | | | | |
|---|------|------------|-------------|--------------------|--------------|---------------|--------------|
| Name | Type | Cut Factor | Fill Factor | 2d Area (hectares) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
| VOL DET AREA | full | 0.00 | 1.00 | 0.06 | 0.00* | 210.79 | 210.79* |
| VOL DITCH EAST | full | 0.00 | 1.00 | 0.02 | 0.00* | 0.13 | 0.13* |
| VOL DITCH WEST | full | 0.00 | 1.00 | 0.05 | 0.00* | 0.00 | 0.00* |

| Totals | | | | | |
|--------|--|--------------------|--------------|---------------|--------------|
| | | 2d Area (hectares) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
| Total | | 0.14 | 0.00* | 210.92 | 210.92* |

* Value adjusted by cut or fill factor other than 1.0

APPENDIX E
Stormwater Treatment Devices

I:\MBRUM\PRODUCTS\JELLYFISH FILTER\40 DRAWINGS & DETAILS\STANDARD DETAILS\JELLYFISH FILTER.JF6 - OFFLINE DIVERSION MANHOLE.DWG 9/17/2017 1:49 PM

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

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| 0 | 10/01/2014 | INITIAL RELEASE | BSF | BY |
| MARK | DATE | REVISION DESCRIPTION | | |

JELLYFISH FILTER SPECIFICATIONS



JF6 STANDARD
Scale = 1:50

www.imbrum.com



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Jellyfish® Filter
A DIVISION OF IMBRUM, INC. 10000 S. DEER CREEK DRIVE, SUITE 100, DENVER, CO 80231
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DATE: #####

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



STANDARD OFFLINE Jellyfish Filter Sizing Report

Project Information

| | |
|----------------|----------------------------|
| Date | Tuesday, November 24, 2020 |
| Project Name | Hindu Heritage Center |
| 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 JF6-4-1 is recommended to meet the water quality objective by treating a flow of 22.7 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 256 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) |
|-----------------|-------------------------------|--------------------------------|----------------------|---------------------------|------------------------|
| JF6-4-1 | 4 | 1 | 1.8 | 22.7 | 256 |

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:

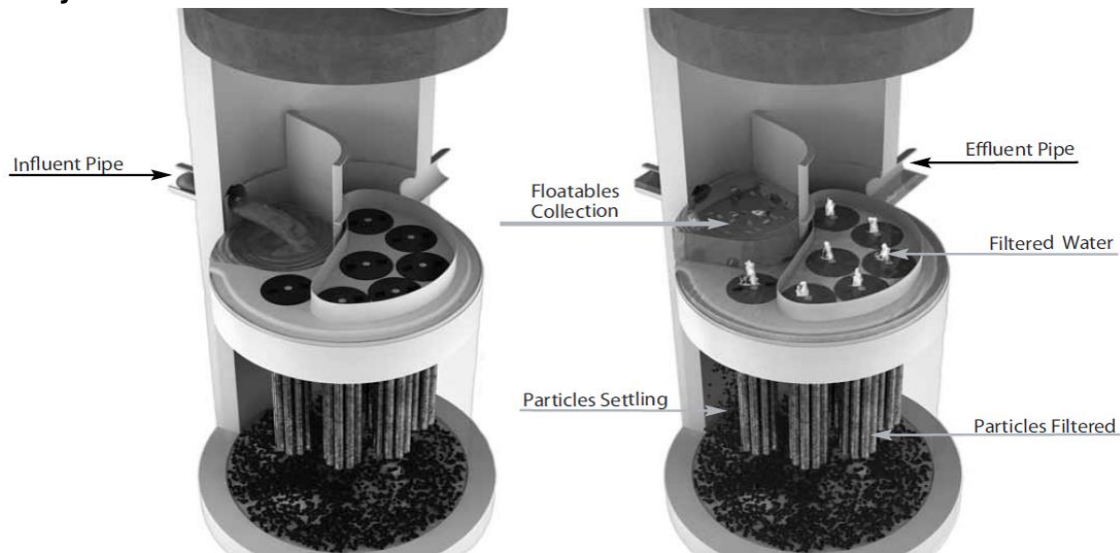
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash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

Field Proven Performance

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 monitored 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

Project Information

| | |
|-----------------|----------------------------|
| Date: | Tuesday, November 24, 2020 |
| Project Name: | Hindu Heritage Center |
| Project Number: | |
| Location: | Ottawa |

Designer Information

| | |
|----------|---------------------|
| Company: | LRL Associates Ltd. |
| Contact: | Kyle Herold |
| Phone #: | |

Notes

| |
|--|
| |
|--|

Design System Requirements

| | | |
|-------------------------|---|-----------------|
| Flow Loading | 90% of the Average Annual Runoff based on 36 years of OTTAWA MACDONALD-CARTIER INT'L A rainfall | 17.5 L/s |
| Sediment Loading | Treating 90% of the average annual runoff volume, 3541 m ³ , with a suspended sediment concentration of 60 mg/L. | 212 kg* |

* Indicates that sediment loading is the limiting parameter in the sizing of this Jellyfish system

Recommendation

The Jellyfish Filter model JF6-4-1 is recommended to meet the water quality objective by treating a flow of 22.7 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 256 kg, which meets or exceeds the estimated average annual sediment load.

| Jellyfish Model | Number of High-Flow Cartridges | Number of Draindown Cartridges | Manhole Diameter (m) | Wet Vol Below Deck (L) | Sump Storage (m ³) | 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 |

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

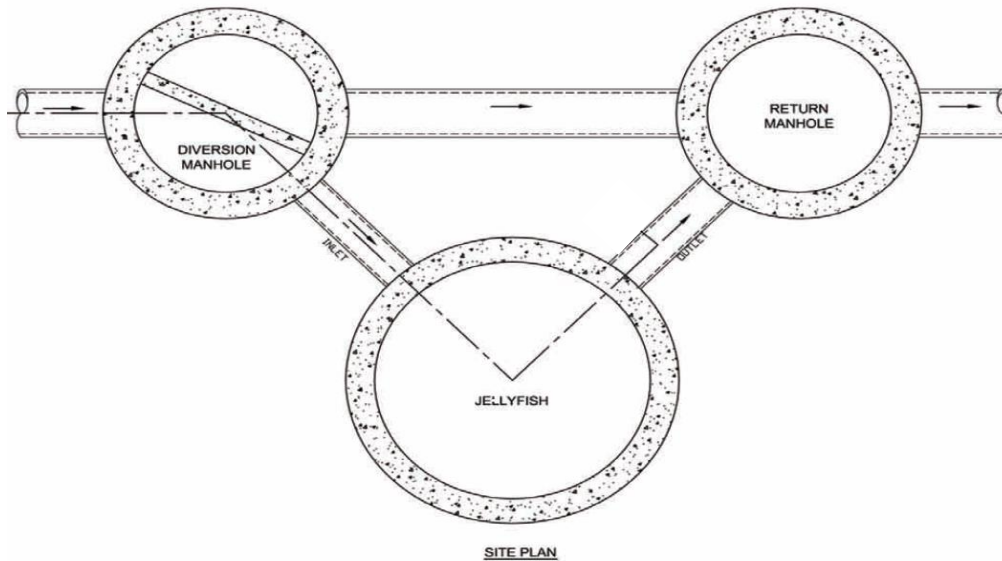
| | |
|---------------------|----------|
| Total Area: | 1.316 ha |
| Runoff Coefficient: | 0.59 |

Upstream Detention

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

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 | 62° | 150 | 200 |
| 1.8 | 59° | 200 | 250 |
| 2.4 | 52° | 250 | 300 |
| 3.0 | 48° | 300 | 450 |
| 3.6 | 40° | 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 calculations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged conditions.
- 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 (ft ² / m ²) | 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 it 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

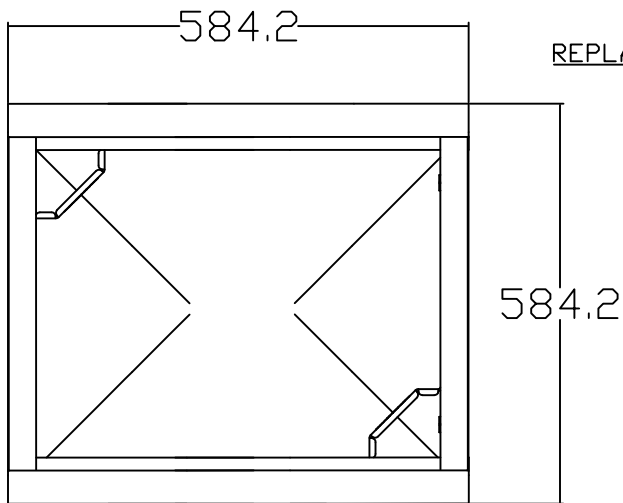
5.2.1 The manufacturer shall provide an Owner's Manual upon request.

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.

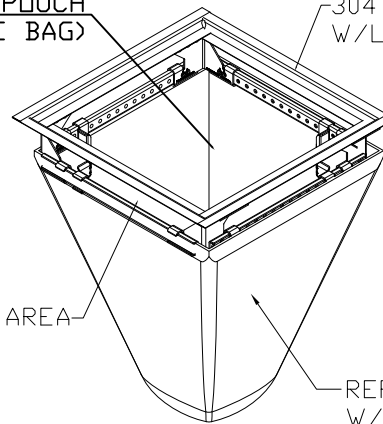
END OF SECTION

FLEXSTORM INLET FILTER: 62MHDFX FOR ODSPD 400. __ Std.



REPLACEABLE ACTIVATED CARBON POUCH
(CLIPPED TO BOTTOM OF THE BAG)

304 STAINLESS STEEL FRAMING
W/LIFT HANDLES



ULTIMATE BYPASS AREA

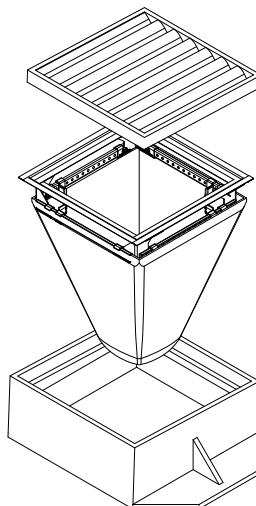
REPLACEABLE FILTER BAG
W/STAINLESS CLAMPING BAND

FLEXSTORM PURE INLET FILTERS FOR
RECTANGULAR OPENINGS WITH GRATES

Product selection for FLEXSTORM PURE Filters (Permanent Inlet Protection)

| Standard | Inlet Type | Grate Size | Opening Size | Bag Cap (liters ³) | Flow Ratings (liters/second) | | | FX | FX+ | PC | PC+ |
|--------------|----------------------------------|------------|--------------|-----------------------------------|------------------------------|--------|--------|------------|-------------|------------|-------------|
| | | | | | FX/FX+ | PC/PC+ | Bypass | | | | |
| ODSP 400. __ | Square/Rect (SQ) tab supports | 604 X 604 | 508 x 508 | 67.8 | 53.8 | 33.9 | 124.6 | 62MHDONTFX | 62MHDONTFXP | 62MHDONTFX | 62MHDONTPCP |

*Ratings shown at 50% capacity to accommodate filter bag midway through service life.



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FLEXSTORM
A DIVISION OF ADS, INC.
WWW.INLETFILTERS.COM
(866) 287-8655 PH
(630) 355-3477 FX
INFO@INLETFILTERS.COM

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| | | | |
|-----------|------------|--------------|----------|
| SIZE C | FRAME TYPE | DWG NO | REV A |
| SCALE | Drawn | SHEET 1 OF 1 | |



FLEXSTORM™ Inlet Filter Specifications and Work Instructions

Product: FLEXSTORM Inlet Filters

Manufacturer: Inlet & Pipe Protection, Inc www.inletfilters.com

A subsidiary of Advanced Drainage Systems (ADS) www.ads-pipe.com

1.0 Description of Work:

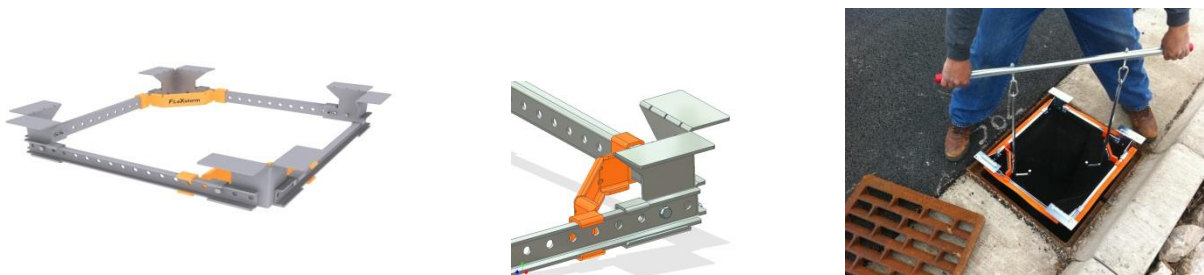
- 1.1 The work covered shall consist of supplying, installing, and maintaining/cleaning of the FLEXSTORM Inlet Filter assembly. The purpose of the FLEXSTORM Inlet Filter system is to collect silt and sediment from surface storm water runoff at drainage locations shown on the plans or as directed by the Engineer. FLEXSTORM PURE, permanent filters, are capable of removing small particles, hydrocarbons, and other contaminants from drainage “hot spots”.

2.0 Material:

- 2.1 The FLEXSTORM Inlet Filter system is comprised of a corrosion resistant steel frame and a replaceable geotextile sediment bag attached to the frame with a stainless steel locking band. The sediment bag hangs suspended from the rigid frame at a distance below the grate that shall allow full water flow into the drainage structure if the bag is completely filled with sediment.



- 2.2 The FLEXSTORM Inlet Filter frame includes lifting handles in addition to the standard overflow feature. A FLEXSTORM Removal Tool engages the lifting bars or handles to allow manual removal of the assembly without machine assistance. The frame suspension system on most rectangular designs is adjustable in 1/2” increments up to 5” per side should the casting or drainage structure have imperfections.

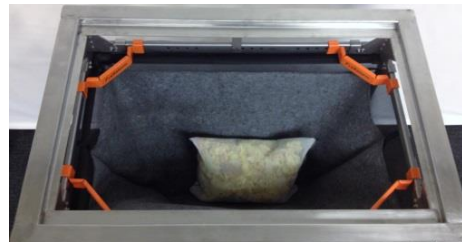




2.3 **FLEXSTORM CATCH-IT** Inlet Filters for temporary inlet protection: The FLEXSTORM CATCH-IT framing is galvanized or zinc plated for corrosion resistance. The “FX” Woven Polypropylene filter bag is the design standard, although the “IL” Nonwoven geotextile is also available if preferred by the engineer. These products are typically used for temporary inlet protection lasting 3 months (short term road work) to 5 years (residential developments).



2.4 **FLEXSTORM PURE** Inlet Filters for permanent inlet protection: The FLEXSTORM PURE framing is comprised of 304 stainless steel with a 25 year life rating. Multiple filter bags are available: **FX, FX+, PC, PC+, LL** and others. The Post Construction “PC+” is the design standard consisting of the “FX” Woven Polypropylene sediment bag lined with Adsorb-it filter fabric, which is made from recycled polyester fibers. The “PC+” includes a replaceable hydrocarbon skimmer pouch strapped to the bottom of the bag for advanced TPH removal.



3.0 Filter Bag Specifications and Capabilities:

3.1 Material Properties (taken from manufacturers average roll value):

| FLEXSTORM FILTER BAGS | (22" depth) | (12" depth) | Clean Water Flow Rate (GPM/SqFt) | Min A.O.S. (US Sieve) |
|----------------------------------|-------------|---------------|----------------------------------|-----------------------|
| | STD Bag P/N | Short Bag P/N | | |
| FX: Standard Woven Bag | FX | FX-S | 200 | 40 |
| FX+: Woven w/ Oil Skimmer | FXP | FXP-S | 200 | 40 |
| FXO: Woven w/ Oil Boom | FXO | FXO-S | 200 | 40 |
| PC: Post Construction Bag | PC | PC-S | 137 | 140 |
| PC+: PC w/ Oil Skimmer | PCP | PCP-S | 137 | 140 |
| LL: Litter and Leaf Bag | LL | LL-S | High | 3.5 |
| IL: IDOT Non-Woven Bag | IL | IL-S | 145 | 70 |



3.2 Standard Bag Sizes and Capabilities: Bag Sizes are determined by clear opening dimensions of the drainage structure. Once frame design size is confirmed, Small - XL bag ratings can be confirmed to meet design criteria. Ratings below are for standard 22” deep bags.

| Standard Bag Size ⁶ | Solids Storage Capacity (CuFt) | Filtered Flow Rate at 50% Max (CFS) | | | Oil Retention (Oz) | |
|--------------------------------|--------------------------------|-------------------------------------|-----|-----|--------------------|-------|
| | | FX | PC | IL | PC* | PCP** |
| Small | 1.6 | 1.2 | 0.8 | 0.9 | 66 | 155 |
| Medium | 2.1 | 1.8 | 1.2 | 1.3 | 96 | 185 |
| Large | 3.8 | 2.2 | 1.5 | 1.6 | 120 | 209 |
| XL | 4.2 | 3.6 | 2.4 | 2.6 | 192 | 370 |

4.0 **Tested Filtration Efficiency and Removal Rates:** Filtration Efficiency, TSS, and TPH testing performed under large scale, real world conditions at accredited third party erosion and sediment control testing laboratory. (See Full Test Reports at www.inletfilters.com)



Inside View of Hopper Agitator

Hopper With Outlet Pipe Leading To Area Inlet

Area Inlet Simulated Showing Influent Discharge From Pipe

4.1 **FLEXSTORM “FX” Filtration Efficiency Test Results:** All testing performed in general accordance with the ASTM D 7351, *Standard Test Method For Determination of Sediment Retention Device Effectiveness in Sheet Flow Application*, with flow diverted into an area inlet. Test Soil used as sediment had the following characteristics with a nominal 7% sediment to water concentration mix. This is representative of a heavy sediment load running off of a construction site.

| Soil Characteristics | Test Method | Value | Filtration Efficiency of “FX” FLEXSTORM Bag 82% |
|----------------------|-------------|-----------------|---|
| % Gravel | ASTM D 422 | 2 | |
| % Sand | | 60 | |
| % Silt | | 24 | |
| % Clay | | 14 | |
| Liquid Limit, % | ASTM D 4318 | 34 | |
| Plasticity Index, % | | 9 | |
| Soil Classification | USDA | Sandy Loam | |
| Soil Classification | USCS | Silty Sand (SM) | |



4.2 FLEXSTORM “PC” and “PC+” Test Results: TSS measured on effluent samples in accordance with SM 2540D and TPH in accordance with EPA 1664A.

| Product Tested | 110 micron Sediment Load | Ave Flow Rate GPM | % TSS Removal | Soil Retention Efficiency |
|---------------------------|--|-------------------|---------------|---------------------------|
| FLEXSTORM PC Sediment Bag | 1750 mg/L using OK-110 Silica Sand and Clean Water | 23 | 99.28% | 98.96% |
| | | 48 | 99.32% | 99.25% |
| | | 70 | 98.89% | 98.80% |

| Product Tested | Street Sweep Sediment Load | Particle Size of Sediment Load | % TSS Removal | Soil Retention Efficiency |
|---------------------------|-------------------------------------|---------------------------------------|---------------|---------------------------|
| FLEXSTORM PC Sediment Bag | 2.5% = 100 lbs Sed / 4000 lbs water | .001 mm – 10.0 mm (median 200 micron) | 99.68% | 95.61% |

| Product Tested | Hydrocarbon Load | Ave Flow Rate GPM | % TPH Removal | Oil Retention Efficiency |
|----------------|---|-------------------|---------------|--------------------------|
| FLEXSTORM PC+ | 243 mg/L using 750 mL (1.45 lb) used motor oil + lube oil and clean water | 19 | 99.04% | 97.22% |
| FLEXSTORM PC | | 20 | 97.67% | 91.61% |
| FLEXSTORM PC+ | | 92 | 96.88% | 99.11% |

5.0 Identification of Drainage Structures to Determine FLEXSTORM Item Codes:

5.1 The Installer (Contractor) shall inspect the plans and/or worksite to determine the quantity of each drainage structure casting type. The foundry casting number or the exact grate size and clear opening size will provide the information necessary to identify the required FLEXSTORM Inlet Filter part number. Inlet Filters are supplied to the field pre-configured to fit the specified drainage structure. Item Codes can be built using the FLEXSTORM Product Configurator at www.inletfilters.com. Detailed Submittal / Specification drawings are linked to each Item Code and available for download by engineers and contractors to include on plans and/or verify field inlet requirements. An example of a typical drawing is shown below.

FLEXSTORM P/Ns 62SHDFX & 62SHDFXP
HD4 INLET TYPE: SQUARE/RECT PRECAST OPENING WITH 4 SEAT GRATE SUPPORT

A: GRATE SIZE (LEFT TO RIGHT)
B: CLEAR OPENING (FRONT TO BACK)
C: GRATE SIZE (LEFT TO RIGHT)
D: CLEAR OPENING (FRONT TO BACK)

| Pure Frame with FX Bag | | Field Inlet Dimensions | | Flexstorm Framing Dims | | | | Flexstorm Ratings (Flow at 50% Max) | | | Pure Frame with FX Bag | |
|------------------------|-------------------------|------------------------|-----------------------|------------------------|------|------|------|-------------------------------------|------------------------|--------------|------------------------|--------------------------|
| ADS P/N | Flexstorm Item Code | Grate Size (A x C) | Clear Opening (B x D) | B1 | D1 | A1 | C1 | Bag Capacity (ft³) | PC/PC+ Flow Rate (CFS) | Bypass (CFS) | ADS P/N | Flexstorm Item Code |
| 62SHDFX | PHD4-95-95-90-90-FX | 9 1/2 X 9 1/2 | 8 X 8 | 6.0 | 5.0 | 9.5 | 9.3 | 0.2 | 0.5 | 1.2 | 62SHDFXP | PHD4-95-95-90-90-FXP |
| 62SHDFX | PHD4-115-115-105-105-FX | 11.5 x 11.5 | 10.6 x 10.6 | 8.0 | 7.5 | 11.5 | 11.3 | 0.4 | 0.7 | 1.7 | 62SHDFXP | PHD4-115-115-105-105-FXP |
| 62SHDFX | PHD4-118-118-105-105-FX | 11.75 x 11.75 | 10.6 x 10.6 | 8.0 | 7.5 | 11.5 | 11.5 | 0.4 | 0.7 | 1.7 | 62SHDFXP | PHD4-118-118-105-105-FXP |
| 62SHDFX | PHD4-120-120-105-105-FX | 12 X 12 | 10.5 X 10.5 | 8.5 | 7.5 | 12.0 | 11.9 | 0.4 | 0.7 | 1.7 | 62SHDFXP | PHD4-120-120-105-105-FXP |
| 62SHDFX | PHD4-134-134-110-110-FX | 13.375 X 13.375 | 11.59 X 11.59 | 9.5 | 8.5 | 13.0 | 13.1 | 0.5 | 0.8 | 1.9 | 62SHDFXP | PHD4-134-134-110-110-FXP |
| 62SHDFX | PHD4-130-130-120-120-FX | 13 x 13 | 12 x 12 | 9.5 | 9.0 | 13.0 | 12.9 | 0.5 | 0.8 | 2.0 | 62SHDFXP | PHD4-130-130-120-120-FXP |
| 62SHDFX | PHD4-144-144-133-133-FX | 14.375 x 14.375 | 13.25 x 13.25 | 10.5 | 10.5 | 14.0 | 14.1 | 0.7 | 0.9 | 2.3 | 62SHDFXP | PHD4-144-144-133-133-FXP |
| 62SHDFX | PHD4-145-145-133-133-FX | 14.5 X 14.5 | 13.25 X 13.25 | 11.0 | 10.5 | 14.5 | 14.3 | 0.7 | 0.9 | 2.3 | 62SHDFXP | PHD4-145-145-133-133-FXP |
| 62SHDFX | PHD4-159-159-143-143-FX | 15.87 X 15.87 | 14.25 X 14.25 | 12.0 | 11.5 | 15.5 | 15.6 | 0.9 | 1.0 | 2.5 | 62SHDFXP | PHD4-159-159-143-143-FXP |
| 62SHDFX | PHD4-176-176-160-160-FX | 17.75 x 17.75 | 16 x 16 | 14.0 | 13.0 | 17.5 | 17.5 | 1.2 | 1.1 | 2.9 | 62SHDFXP | PHD4-176-176-160-160-FXP |

NOTES:

- RATINGS SHOWN ARE FOR STANDARD 22" BAG DEPTH; "SHORT" 12" DEPTH BAGS ARE AVAILABLE WITH -S SUFFIX; RATINGS REDUCED BY ~50%.
- THE FOLLOWING REQUIRES ADDITIONAL REVIEW
 - GRATES WITH EXTENDED BOTTOMS
 - ANY OBSTRUCTED INLET OPENINGS

FLEXSTORM INLET FILTERS PURE

ALL PRODUCTS MANUFACTURED BY INLET & PIPE PROTECTION, INC. A DIVISION OF ADS, INC. WWW.INLETFILTERS.COM (866) 287-8655 PH (630) 355-3477 FX INFO@INLETFILTERS.COM

DATE: 07/20/2016 10:00 AM
SCALE: C HD4 HD4-62SHD-FX
SHEET 1 OF 1

6.0 Installation Into Standard Grated Drainage Structures:

- 6.1 Remove the grate from the casting or concrete drainage structure. Clean the ledge (lip) of the casting frame or drainage structure to ensure it is free of stone and dirt. Drop in the FLEXSTORM Inlet Filter through the clear opening and be sure the suspension hangers rest firmly on the inside ledge (lip) of the casting. Replace the grate and confirm it is elevated no more than 1/8", which is the thickness of the steel hangers. For Curb Box Inlet Filters: Insert FLEXSTORM CATCH IT Inlet Filter as described above, pull the rear curb guard flap up and over the open curb box until tight, align magnets to ensure firm attachment to the top portion of the curb box casting. If the curb back opening is not magnetic, slide a typical rock sack or 2 x 4 through the 2-ply rear curb box flap to create a dam which will direct runoff into the sediment bag.





7.0 Maintenance Guidelines: The frequency of maintenance will vary depending on the application (during construction, post construction, or industrial use), the area of installation (relative to grade and runoff exposure), and the time of year relative to the geographic location (infrequent rain, year round rain, rain and snow conditions). The FLEXSTORM Operation & Maintenance Plan (as shown in 7.5) or other maintenance log should be kept on file.

- 7.1 Frequency of Inspections: Construction site inspection should occur following each ½” or more rain event. Post Construction inspections should occur three times per year (every four months) in areas with year round rainfall and three times per year (every three months) in areas with rainy seasons before and after snowfall season. Industrial application site inspections (loading ramps, wash racks, maintenance facilities) should occur on a regularly scheduled basis no less than three times per year.
- 7.2 General Maintenance for standard sediment bags: Upon inspection, the FLEXSTORM Inlet Filter should be emptied if the sediment bag is more than half filled with sediment and debris, or as directed by the Engineer. Remove the grate, engage the lifting bars or handles with the FLEXSTORM Removal Tool, and lift the FLEXSTORM Inlet Filter from the drainage structure. Machine assistance is not required. Dispose of the sediment or debris as directed by the Engineer. As an alternative, an industrial vacuum may be used to collect the accumulated sediment if available. Remove any caked on silt from the sediment bag and reverse flush the bag for optimal filtration. Replace the bag if the geotextile is torn or punctured to ½” diameter or greater on the lower half of the bag. If properly maintained, the Woven sediment bag will last a minimum of 4 years in the field.
- 7.3 Inspection and Handling of the FLEXSTORM PC / PC+ post construction sediment bag: The PC+ sediment bags will collect oil until saturated. Both the Adsorb-it filter liner and the skimmer pouch will retain oil. The volume of oils retained will depend on sediment bag size. Unlike other passive oil sorbent products, Adsorb-it filter fabric has the ability to remove hydrocarbons at high flow rates while retaining 10- 20 times its weight in oil (weight of fabric is 12.8 oz / sq yd). The average 2’ x 2’ PC Bag contains approx .8 sq yds, or 10 oz of fabric. At 50% saturation, the average Adsorb-it lined PC filter will retain approximately 75 oz (4.2 lbs) of oil. Once the bag has become saturated with oils, it can be centrifuged or passed through a wringer to recover the oils, and the fabric reused with 85% to 90% efficacy. If it is determined, per Maintenance Contracts or Engineering Instructions, that the saturated PC sediment bags will be completely replaced, it is the responsibility of the service technician to place the filter medium and associated debris in an approved container and dispose of in accordance with EPA regulations. Spent Adsorb-it can be recycled for its fuel value through waste to energy incineration with a higher BTU per pound value than coal. The oil skimmers start white in color and will gradually turn brown/black as they become saturated, indicating time for replacement. The average skimmer pouch will absorb approximately 62 oz (4 lbs) of oil before requiring replacement. To remove the pouch simply unclip it from the swivel strap sewn to the bottom of the bag. Dispose of all oil contaminated products in accordance to EPA guidelines. The ClearTec Rubberizer media used in the pouch, since a solidifier, will not leach under pressure and can be disposed of in most landfills, recycled for industrial applications, or burned as fuel.



- 7.4 Sediment Bag Replacement: When replacing a Sediment Bag, remove the bag by loosening or cutting off the clamping band. Take the new sediment bag, which is equipped with a stainless steel worm drive clamping band, and use a drill or screw driver to tighten the bag around the frame channel. Ensure the bag is secure and that there is no slack around the perimeter of the band. For Oil absorbent boom bags, simply replace the oil boom or pouch when saturated by sliding it through the mesh support sleeve.





FLEXSTORM® PURE PERMANENT INLET PROTECTION

SPECIFY WITH CONFIDENCE

State DOTs and municipalities across the country now have a universal structural BMP to address the issue of storm sewer inlet protection: FLEXSTORM PURE Inlet Filters.

The FLEXSTORM PURE system is the preferred choice for permanent inlet protection and storm water runoff control. Constructed of versatile stainless steel, FLEXSTORM PURE Inlet Filters will fit any drainage structure and are available with site-specific filter bags providing various levels of filtration. Whether you're the specifier or the user, it's clear to see how FLEXSTORM PURE Inlet Filters outperform the competition.

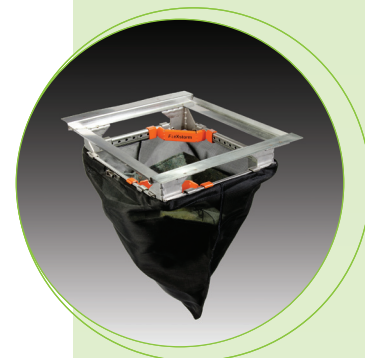
APPLICATIONS:

| | |
|---------------|--------------|
| Car Washes | Gas Stations |
| Commercial | Parking Lots |
| Loading Ramps | Dock Drains |
| Industrial | Maintenance |

FEATURES:

- Stainless Steel filter framing is custom configured to fit perfectly into any drainage structure, whether a standard design or obstructed inlet opening
- Filtered Flow Rates and Ultimate Bypass Rates are designed to meet your specific inlet requirements
- Multiple Filter Bags are available targeting site specific removal of trash, litter, leaves, or small particles, oil and grease
- Filters work below grade with an ultimate bypass allowing inlet area to drain with a full bag
- Units install in seconds and are easily maintained with the FLEXSTORM Universal Removal Tool (no heavy machinery required)

ADS Service: ADS representatives are committed to providing you with the answers to all your questions, including selecting the proper filter, specifications, installation and more. Also try the **ADS FLEXSTORM Online Product Configurator** at www.inletfilters.com



FEATURES:

- Receive payback on your investment: durable stainless steel framing provides extended service life while replaceable filter bags handle loads with a safety factor of 5
- Meets stringent removal requirements:
 - FX filter bags are rated for >80% removal efficiency of street sweep-size particles
 - PC/PC+ filter bags have been tested to 99% TSS removal of OK-110 US Silica Sand and 97% TPH (total petroleum hydrocarbon) removal
- Help prevent fines: FLEXSTORM Inlet Filters comply with EPA NPDES initiatives as a temporary or permanent BMP
- If not in stock, orders up to 100 pieces can ship within 48 hours



FLEXSTORM PURE INLET FILTERS SPECIFICATION

IDENTIFICATION

The installer shall inspect the plans and/or worksite to determine the quantity of each drainage structure casting type. The foundry casting number, exact grate size and clear opening size, or other information will be necessary to finalize the FLEXSTORM part number and dimensions. The units are shipped to the field configured precisely to fit the identified drainage structure.

MATERIAL AND PERFORMANCE

The FLEXSTORM Inlet Filter system is comprised of a corrosion resistant steel frame and a replaceable geotextile filter bag attached to the frame with a stainless steel locking band. The filter bag hangs suspended at a distance below the grate that shall allow full water flow into the drainage structure if the bag is completely filled with sediment. The standard Woven Polypropylene FX filter bags are rated for 200 gpm/sqft with a removal efficiency of 82% when filtering a USDA Sandy Loam sediment load. The Post Construction PC filter bags are rated for 137 gpm/sqft and have been 3rd party tested at 99% TSS removal to 110 micron and 97% TPH removal of used motor oil hydrocarbon mix.

INSTALLATION

Remove the grate from the casting or concrete drainage structure. Clean the ledge (lip) of the casting frame or drainage structure to ensure it is free of stone and dirt. Drop in the FLEXSTORM Inlet Filter through the clear opening and be sure the suspension hangers rest firmly on the inside ledge (lip) of the casting. Replace the grate and confirm it is elevated no more than 1/8", which is the thickness of the steel hangers. For wall mount units, follow instructions for attaching the stainless steel mounting brackets using the provided concrete fasteners.

INSPECTION FREQUENCY

Construction site inspection should occur following each 1/2" or more rain event. Post Construction inspections should occur three times per year (every four months) in areas with mild year round rainfall and four times per year (every three months Feb–Nov) in areas with summer rains and before and after the winter snowfall season. Industrial application site inspections (loading ramps, wash racks, maintenance facilities) should occur on a regularly scheduled basis no less than three times per year.

MAINTENANCE GUIDELINES

Empty the filter bag if more than half filled with sediment and debris, or as directed by the engineer. Remove the grate, engage the lifting bars or handles with the FLEXSTORM Removal Tool, and lift from the drainage structure. Dispose of the sediment or debris as directed by the engineer or maintenance contract in accordance with EPA guidelines.

As an alternative, an industrial vacuum may be used to collect the accumulated sediment. Remove any caked-on silt from the sediment bag and reverse flush the bag with medium spray for optimal filtration. Replace the bag if torn or punctured to 1/2" diameter or greater on the lower half of the bag. Post Construction PC/PC+ Bags should be maintained prior to 50% oil saturation. The average 2' x 2' PC filter bag will retain approx. 96 oz (5.4 lbs) of oil at which time it should be serviced or replaced. It can be centrifuged or passed through a wringer to recover the oils, and the fabric reused with 85% to 90% efficacy. It may also be recycled for its fuel value through waste to energy incineration. When utilizing the Cleartec Rubberizer Pouches in the + bags, note that these oil skimmers will gradually turn brown and solidify as they become saturated, indicating time for replacement. Each pouch will absorb approximately 62 oz (4 lbs) of oil before requiring replacement. The spent media may also be recycled for its fuel value through waste to energy incineration. Dispose of all oil contaminated products in accordance with EPA guidelines.

FILTER BAG REPLACEMENT

Remove the bag by loosening or cutting off the clamping band. Take the new filter bag, which is equipped with a stainless steel worm drive clamping band, and use a screw driver to tighten the bag around the frame channel. Ensure the bag is secure and that there is no slack around the perimeter of the band.

For more information on FLEXSTORM Inlet Filters and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710 Try the **ADS FLEXSTORM Online Product Configurator** at www.inletfilters.com.

ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com

The ADS logo and the Green Stripe are registered trademarks of Advanced Drainage Systems, Inc. FLEXSTORM is a registered trademark of Inlet & Pipe Protection, Inc. © 2019 Advanced Drainage Systems, Inc. BRO 10892 06/19 MH

Lift Handles ease installation and maintenance

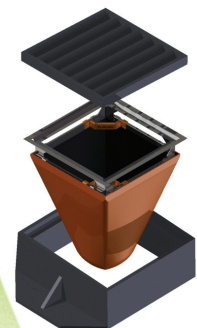


Replaceable Sediment Bag

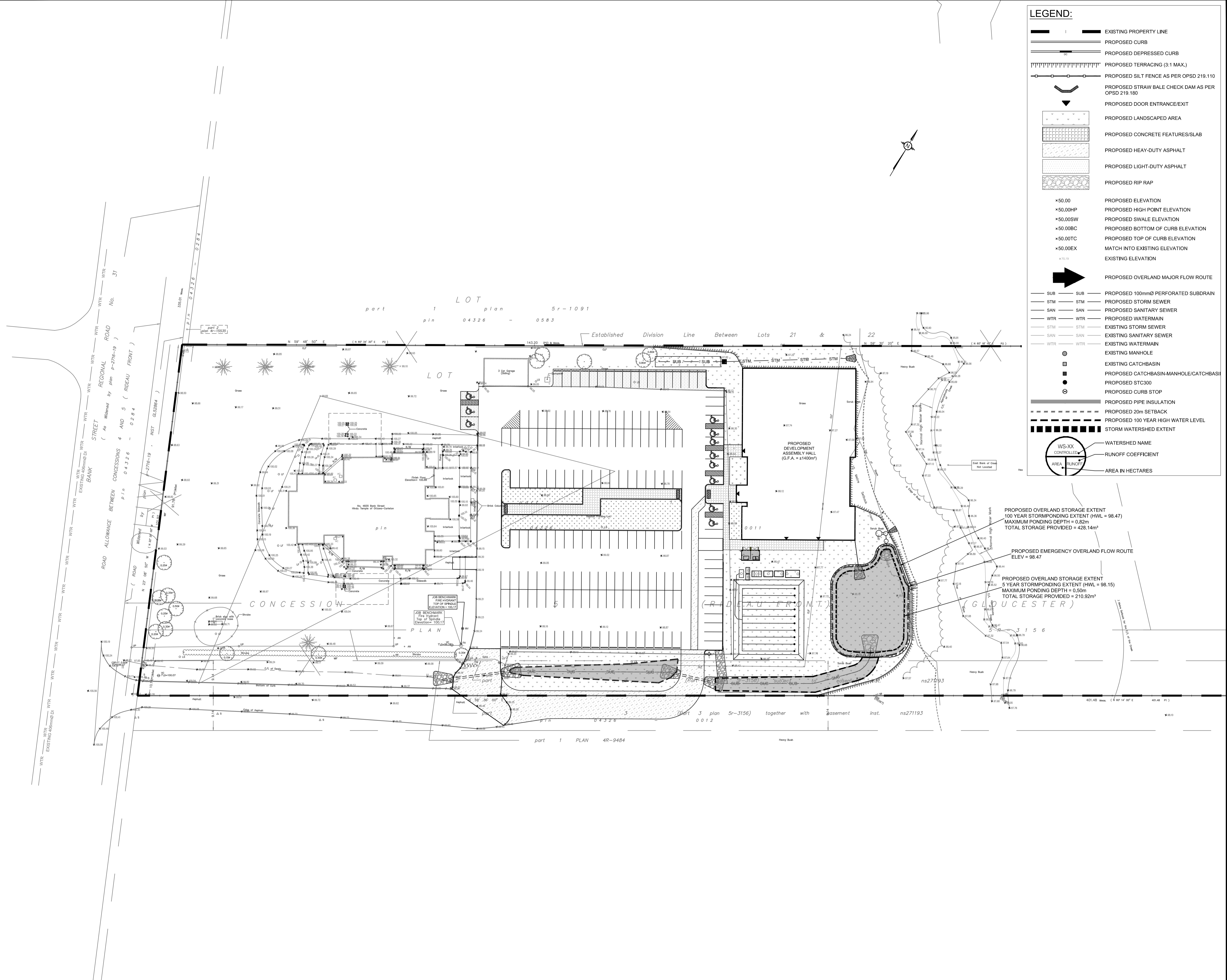
1/8" thick steel hangers & channels; precision stampings **configured to fit each individual casting**



CAD drawings, work instructions and test reports on website: www.inletfilters.com



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 HEAVY-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
- *70.10 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 CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 20m SETBACK
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS 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 COPIES 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 ILLUSTRATE 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 LRI ASSOCIATES LTD. (LRI) WITHOUT OBTAINING LRI'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 LRI AND TO RELEASE LRI 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 LRI 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 LRI'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRI AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRI 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 |
|-----|-------------------------------------|------|--------------|
| 04 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 22 SEPT 2021 |
| 03 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 23 DEC 2020 |
| 02 | ISSUED FOR CLIENT REVIEW | K.H. | 11 DEC 2020 |
| 01 | ISSUED FOR CLIENT APPROVAL | K.H. | 11 MAR 2020 |

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

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

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

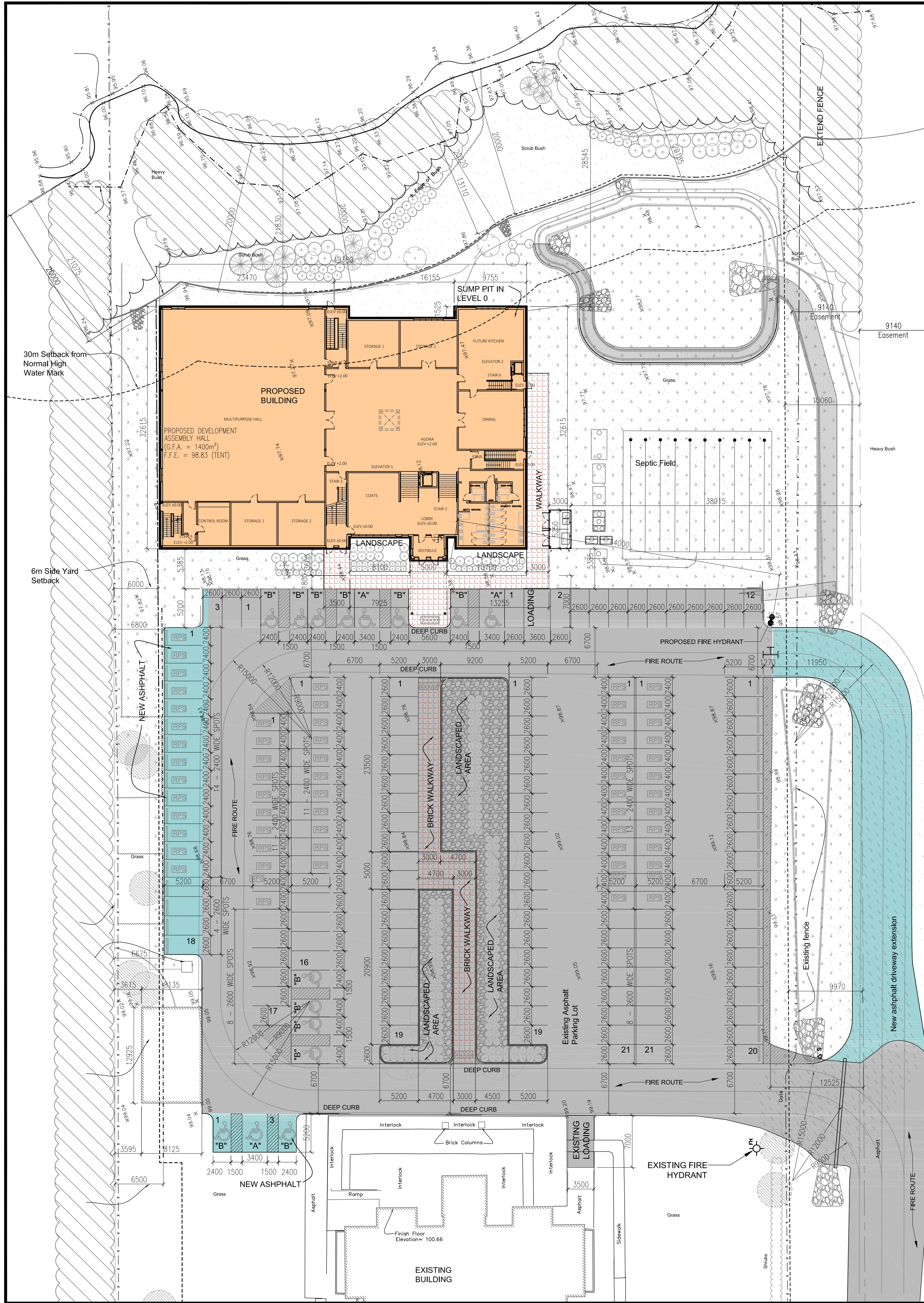
DRAWING TITLE: STORMWATER MANAGEMENT PLAN

PROJECT NO: 170132

DATE: JAN2020

C601

APPENDIX G
Architectural Drawings



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
 Existing Zoning: R15 Rural Institutional
 Amended Zoning: R15[865r] within the Area of Development & R15[866r] on the remainder of the property east of the watercourse centreline

| Zoning Mechanisms Provisions - R15 | Required | Provided |
|---|----------------------|----------------------------------|
| (a) Minimum lot area | 10,000m ² | 40,480 m ² (4.048 ha) |
| (b) Minimum lot width | 75m | 101.095m |
| (c) Minimum front yard setback | 9m | 27.975m (Existing Building) |
| (d) Minimum rear yard setback | | |
| (i) abutting a residential use or zone | 10m | Not Applicable |
| (ii) all other cases | 10m | Not Applicable |
| (iii) from normal high water mark | 20m | 21m |
| (e) Minimum interior side yard setback | 9m | Not Applicable |
| (f) Approved side yard setback | 6m | 6m |
| per application ACS2018-PIE-TS-0060 Approved on July 12, 2018 | | |
| (f) Minimum corner side yard setback | 9m | Not Applicable |
| (g) Maximum principal building height | 12m | 12m |
| (h) Maximum lot coverage | 30% | 11.70% |
| (i) Minimum landscaped area | 20% | 65.50% |

AREA OF DEVELOPMENT (Same as R15[865R] zone boundary): 23,598m² (2.359 ha)
 Existing Temple Place of Assembly GFA: 630 m²
 Proposed Hall GFA: 1,400 m²

| Within Area of Development | Existing (Temple) | Proposed (Temple + Hall) |
|----------------------------|--------------------------------|---------------------------------|
| Lot Coverage | 1,168 m ² (4.95 %) | 2,761 m ² (11.70 %) |
| Landscaped Area | 17,353 m ² (73.53%) | 15,457 m ² (65.50 %) |
| Parking Lot (Paved Area) | 5,077 m ² (21.52%) | 5,380 m ² (22.80 %) |

LANDSCAPING BUFFER AT PARKING LOT:

| Perimeter or interior landscaped area | Required | Provided |
|---|---------------------------------|--|
| Minimum of 15% of the area of any parking lot | 15% of 5380 = 805m ² | Total landscape Area = 2839.28m ² (52.57%) (> required 15%) Interior landscape area = 2197.65m ² Perimeter landscape area = 641.63m ² |
| Minimum Required Width and Location of a Landscaped Buffer of a Parking Lot | | |
| Abutting a street | 3 metres | Not applicable |
| Not abutting a street | 3 metres | 6.5 metre in location closest to property Line |

OUTDOOR REFUSE COLLECTION AND REFUSE LOADING AREAS:

- are accessed via the parking lot and
 - do not abut a public street;
 - are located at least 3.0 metres from any other lot line; and
 - are screened from view by an opaque screen with a minimum height of 2.0 metres.
- Refuse collecting area is Located at >38m away from the side property line
- Size will be determined by private collector based on needs, building will typically be used 2 or 3 times a week

PARKING

| Parking type | Required | Provided |
|--|---------------------------|-----------------------------------|
| Spaces (8.4 spaces /100 m ² of GFA) | 171 spots | 181 spots |
| Regular size spots | - 93 spots | - 104 spots |
| Reduced size - 40% of 167 spaces | - 67 spots | - 62 spots |
| Barrier-Free Type "A" 3400 wide | - 3 spots | - 3 spots |
| Barrier-Free Type "B" 2400 wide | - 4 spots | - 12 spots |
| Loading spaces | 2 spots (1 Existing spot) | 2 spots (1 Existing + 1 new spot) |
| Bicycle | 0 spots | 0 spots |
| TOTAL SPACES | 171 spots | 181 spots |

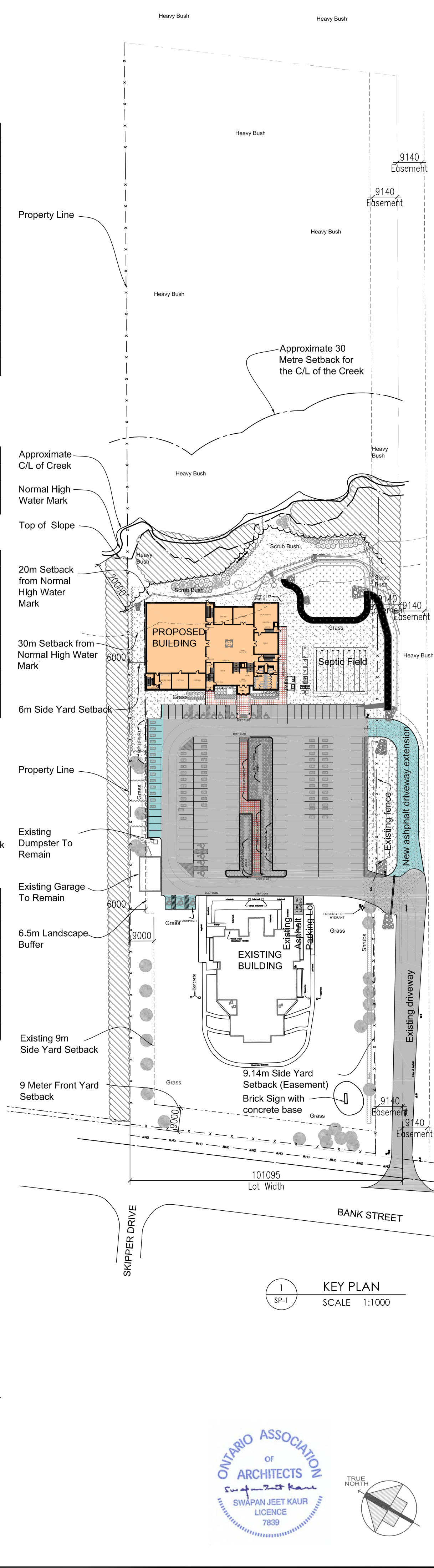
PROPOSED STORMWATER MANAGEMENT:
 (a) Ponding volume achieved via stormwater detention area
 (b) Flow control provided via inlet control device installed at detention area outlet
 (Refer to civil documents)

SNOW CLEARING: Snow will be cleared by private contractor and taken away to be dumped off the site

- DOTTED LINE DELINEATES AREA OF DEVELOPMENT (SAME AS R15[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 NEW PAVING
- PROPOSED RIP RAP (Refer to civil drawing)
- REDUCED PARKING SPOT
- GROUP OF EXISTING TREES TO REMAIN (Refer to landscape drawing)
- EXISTING TREE TO REMAIN (Refer to landscape drawing)
- PROPOSED DECIDUOUS TREE (Refer to landscape drawing)
- PROPOSED CONIFEROUS TREE (Refer to landscape drawing)
- PROPOSED SHRUBS/ PERENNIALS/ ORNAMENTAL GRASSES (Refer to landscape drawing)
- PROPOSED NON-IRRIGATED SPORTS FIELD SEED MIXTURE (Refer to landscape drawing)
- PROPOSED ONTARIO SEED COMPANY LTD. GREEK BANK SEED MIXTURE (Refer to landscape drawing)
- PROPOSED RIVERSTONE MULCH (Refer to landscape drawing)

NOTE: The property boundary information was derived from documents prepared by ANNIS, O'SULLIVAN, VOLLEBEKK LTD

2 SITE PLAN
SCALE 1:300



GENERAL NOTES
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| 7 | ISSUED FOR SITE PLAN | 2021SEPT14 |
| 6 | ISSUED FOR SITE PLAN | MAR 16 |

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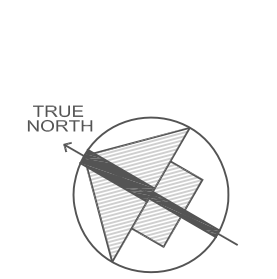
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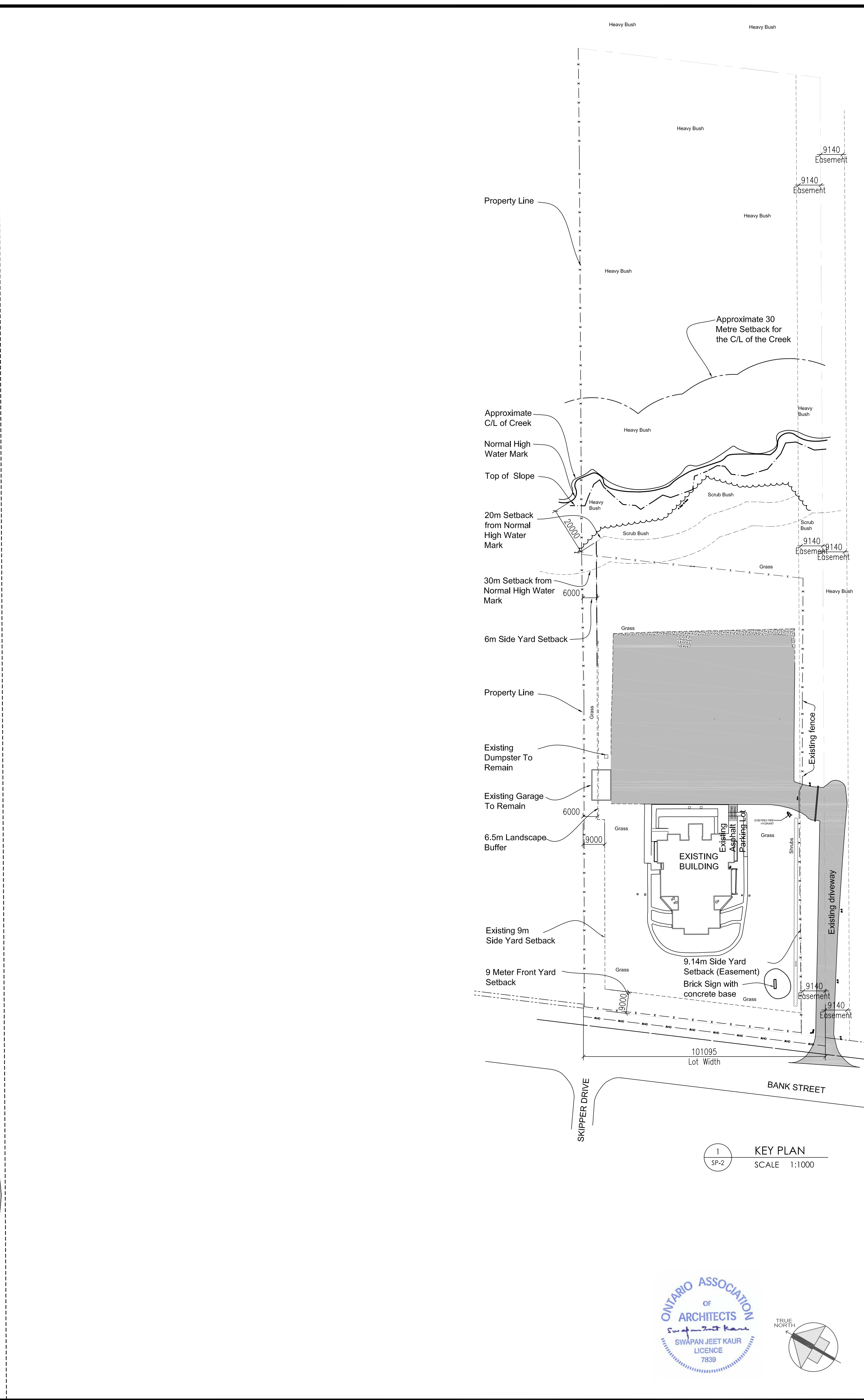
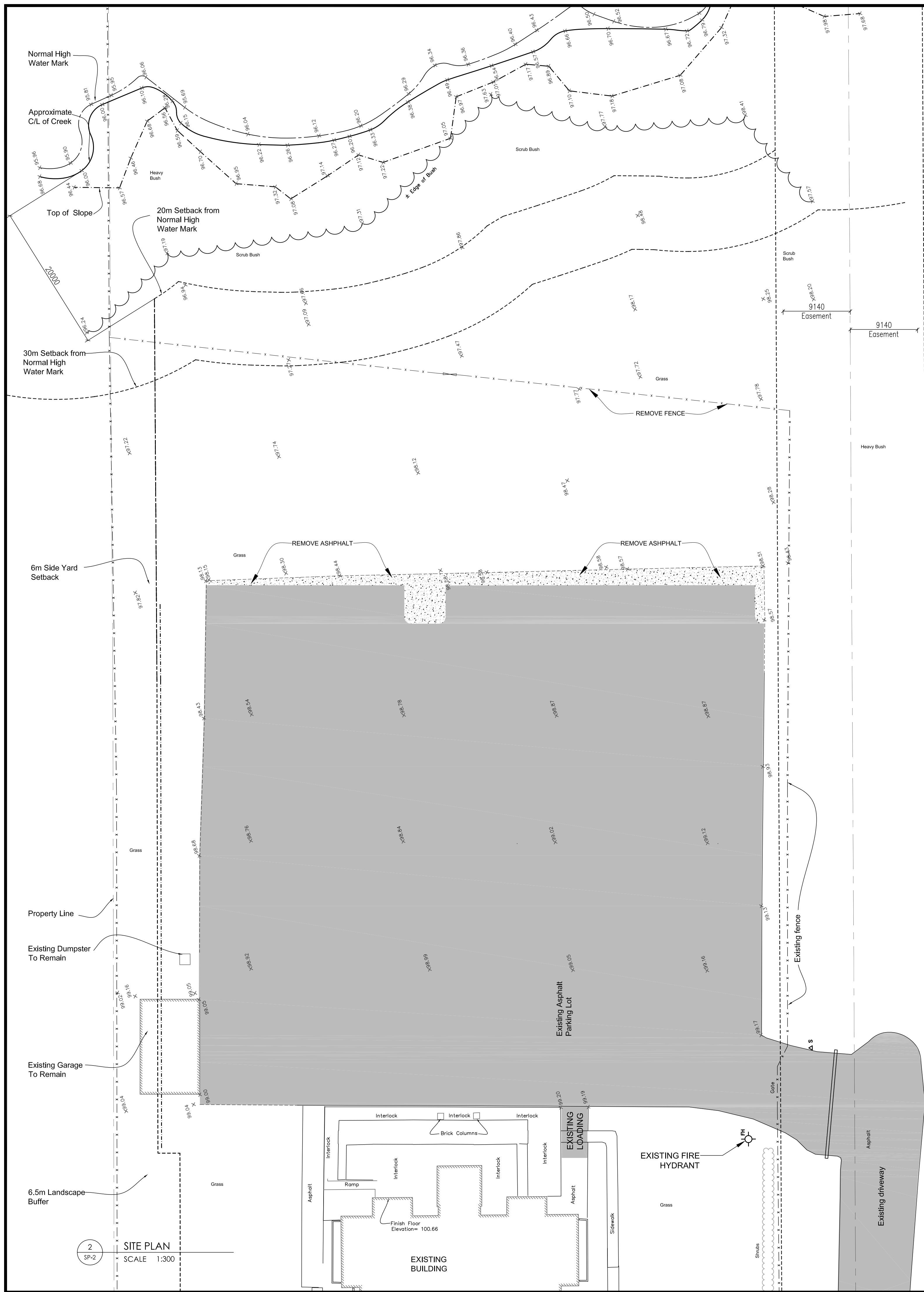
PROJECT AND LOCATION
HERITAGE CENTRE - HINDU TEMPLE - PHASE 2,
4835 BANK ST., OTTAWA, ON
P I N 0 4 3 2 6 - 0 0 1 1

TITLE OF DRAWING
SITE PLAN

JOB NUMBER
17033

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





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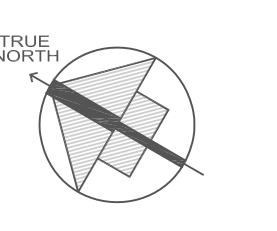
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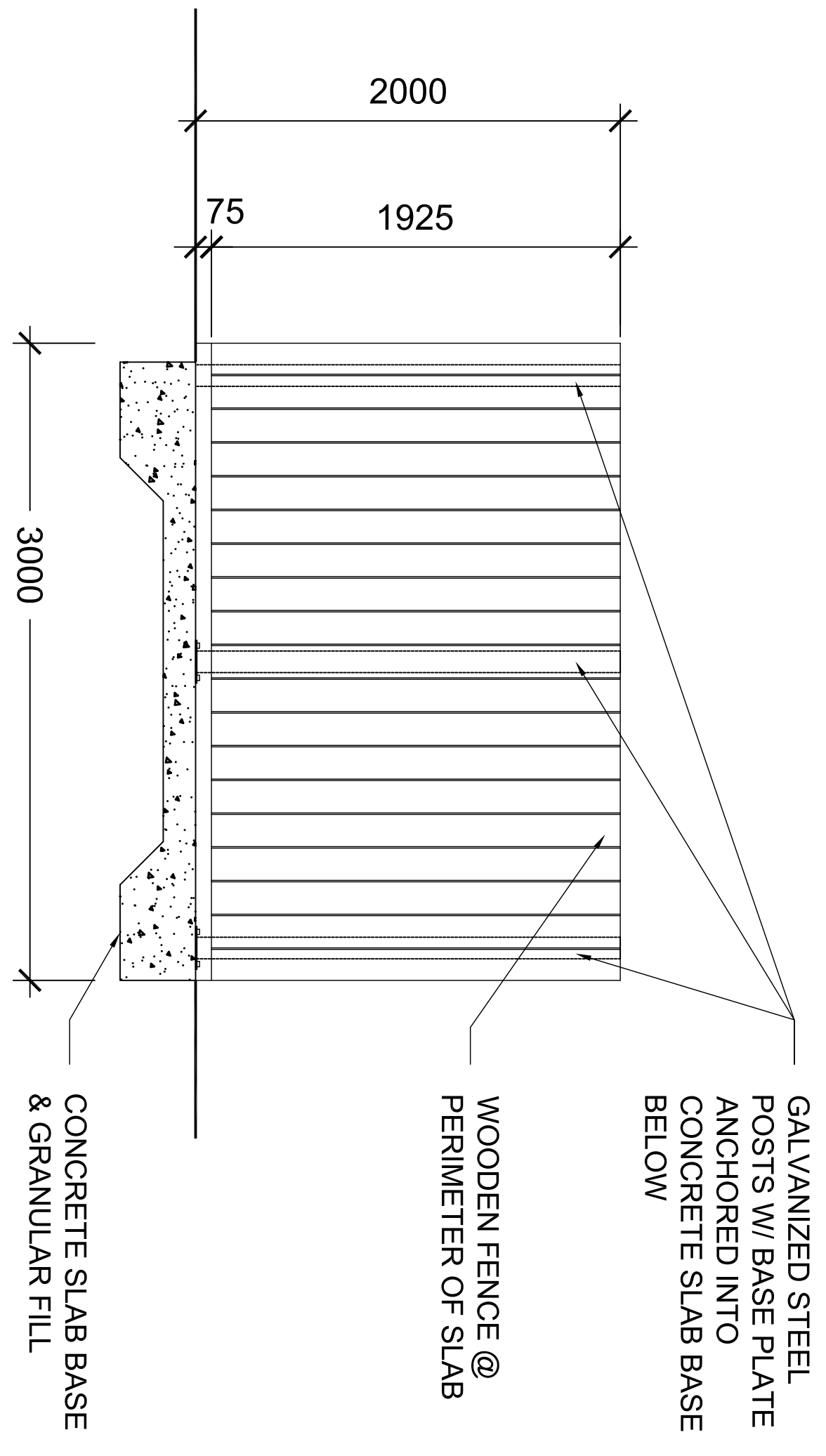
PROJECT AND LOCATION
HERITAGE CENTRE -
HINDU TEMPLE - PHASE 2,
4835 BANK ST., OTTAWA, ON
P I N 0 4 3 2 6 - 0 0 1 1

TITLE OF DRAWING
EXISTING
SITE PLAN

JOB NUMBER
 17033

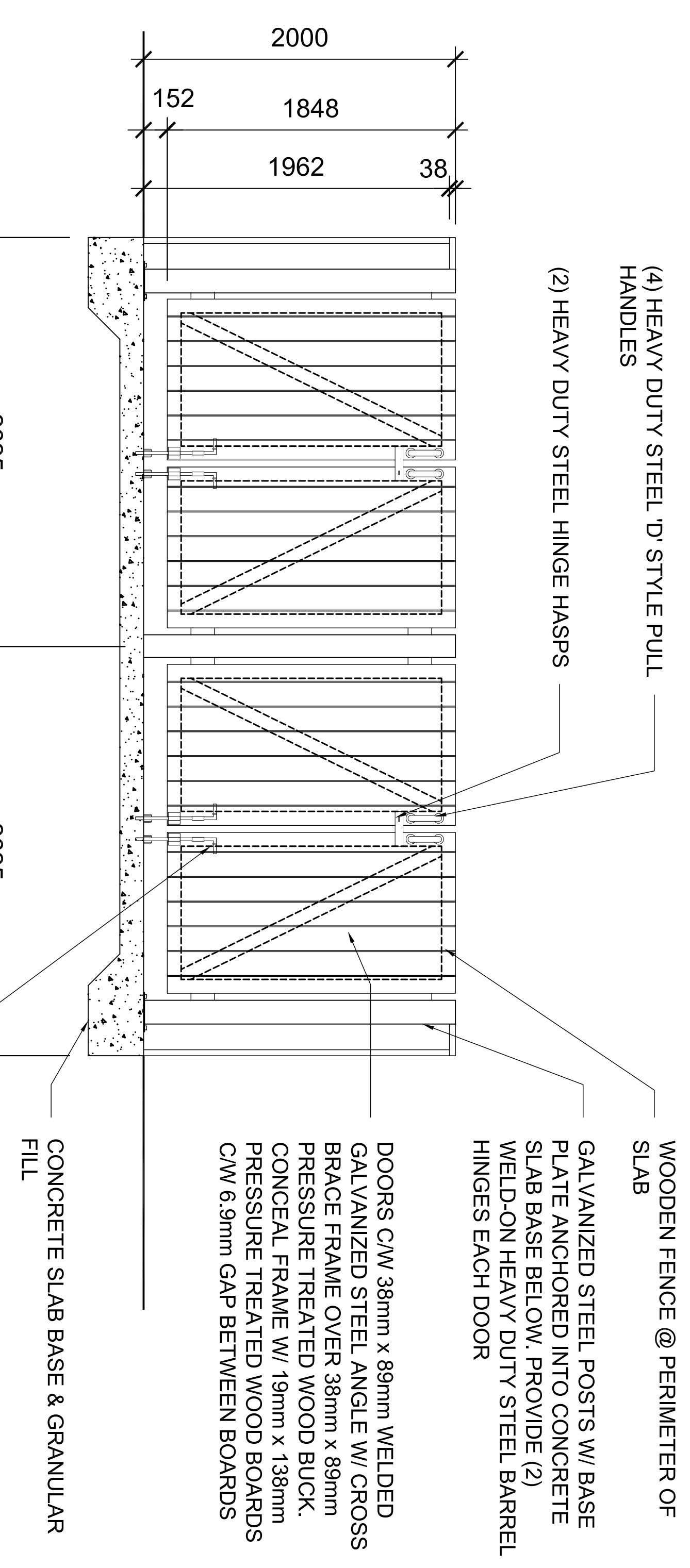
DATE 2019 05 **DWG NUMBER**
SCALE AS NOTED **SP-2**
DRAWN BY SJK





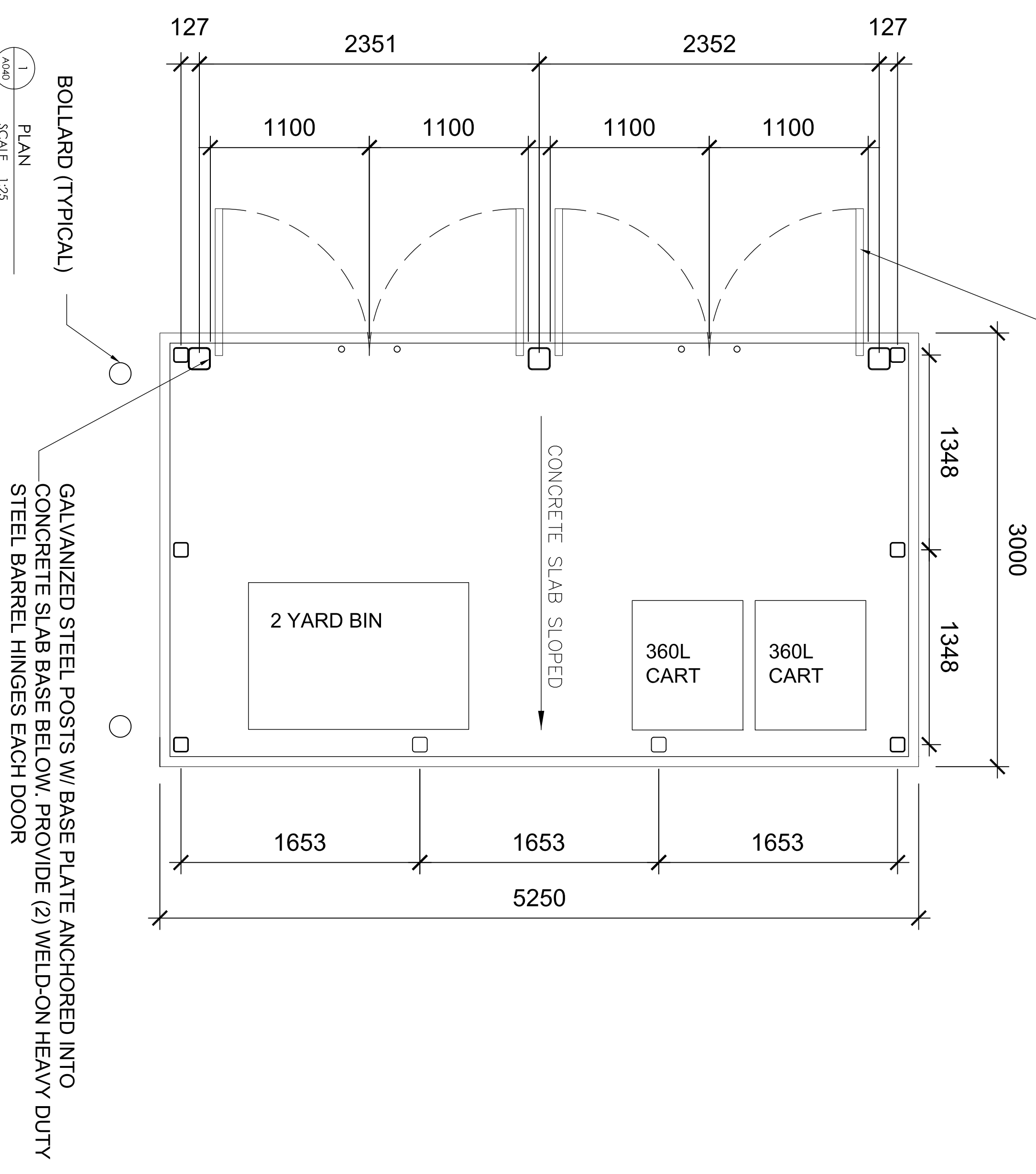
DOORS CW 38mm x 89mm WELDED GALVANIZED STEEL ANGLE W/ CROSS BRACE FRAME OVER 38mm x 89mm PRESSURE TREATED WOOD BUCK. CONCEAL FRAME W/ 19mm x 138mm PRESSURE TREATED WOOD BOARDS C/W 6.9mm GAP BETWEEN BOARDS

2 ELEVATION SCALE 1:25



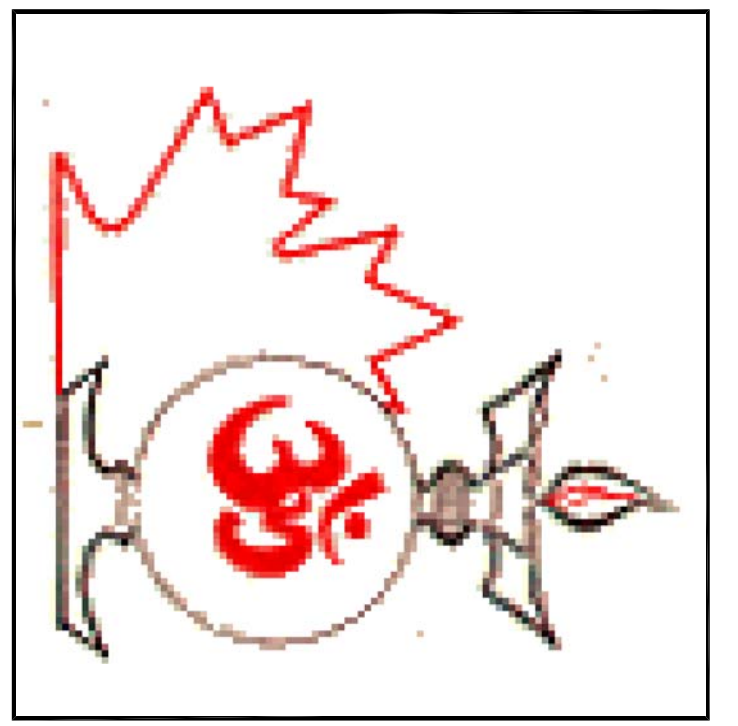
(4) HEAVY DUTY CASTORS C/W 63mm WIDE STEEL SADDLE & 450mm HIGH HEAVY DUTY STEEL CANE BOLTS

3 ELEVATION SCALE 1:25



1 PLAN SCALE 1:25

GALVANIZED STEEL POSTS W/ BASE PLATE ANCHORED INTO CONCRETE SLAB BASE BELOW. PROVIDE (2) WELD-ON HEAVY DUTY STEEL BARREL HINGES EACH DOOR



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HERITAGE CENTRE -
HINDU TEMPLE - PHASE 2,
4835 BANK ST., OTTAWA, ON
P1N 043 26-0011

TITLE OF DRAWING
GARBAGE
ENCLOSURE
DETAILS

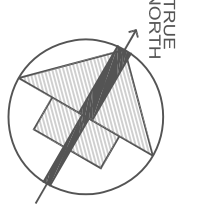
JOB NUMBER
17033

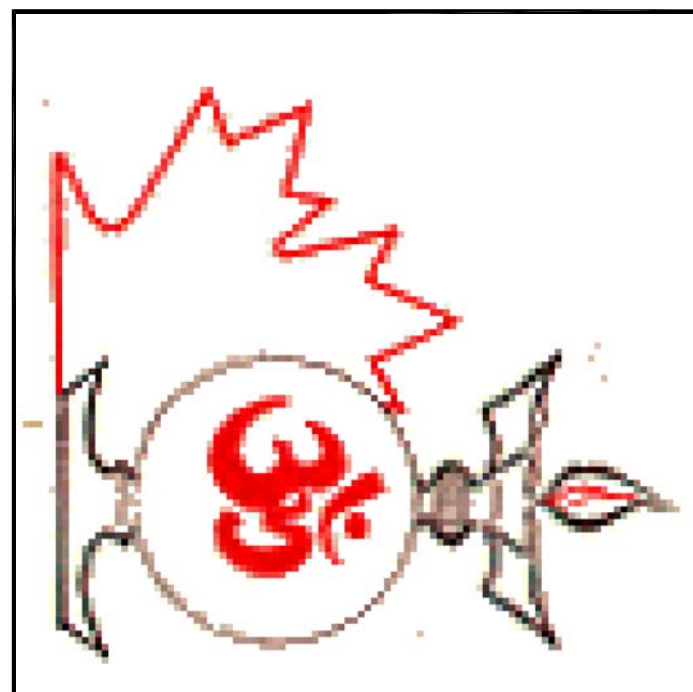
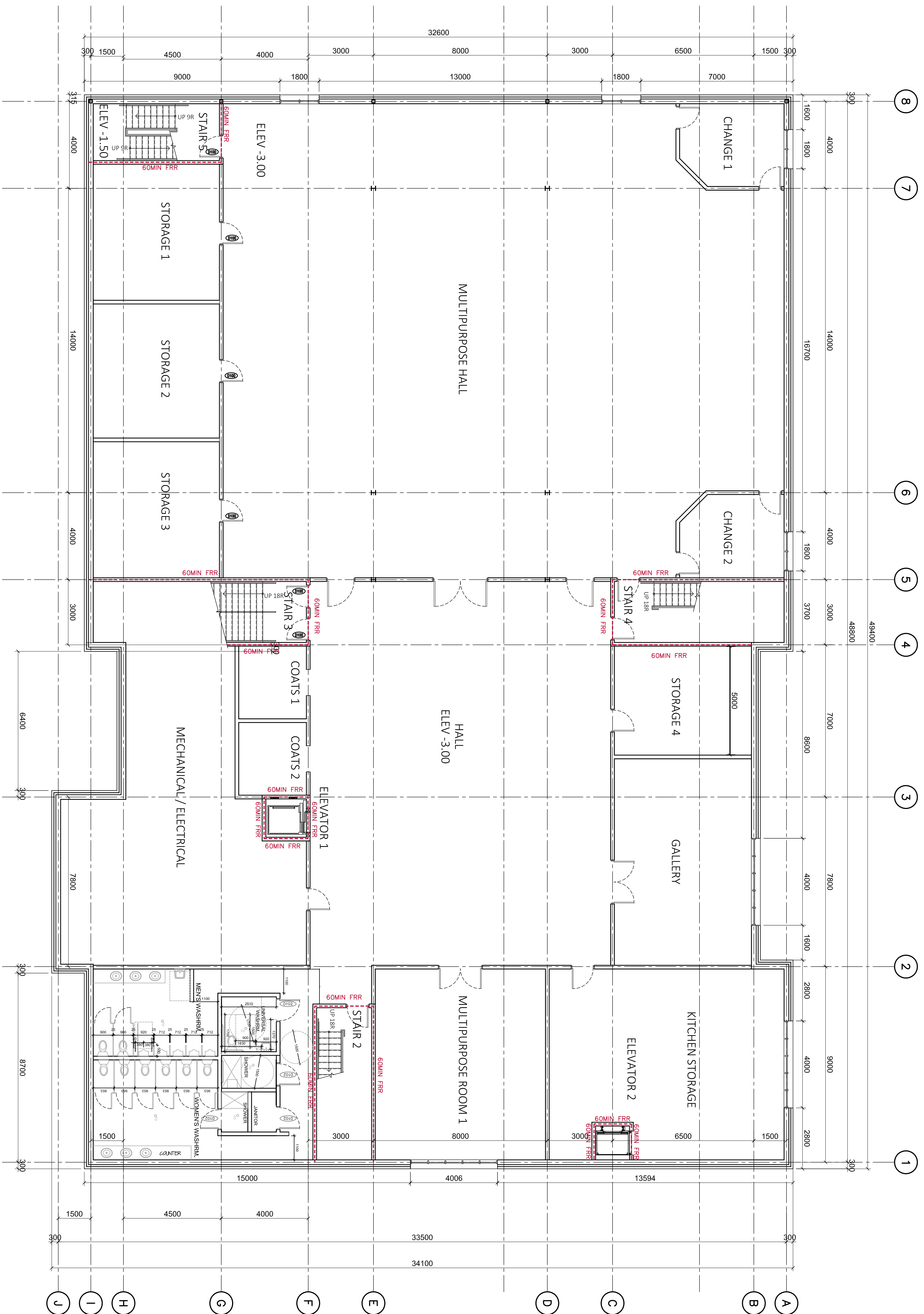
DATE
2019 05

SCALE
1:25

DWG NUMBER
A040

DESIGNED BY
SJK





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| No. | Revision/Issue | Date |
|-----|----------------------|-----------|
| 7 | ISSUED FOR SITE PLAN | 2021SEP14 |
| 6 | ISSUED FOR SITE PLAN | MAR 16 |

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P1N 0A3 26-0011

TITLE OF DRAWING
FLOOR PLAN -
LEVEL 0

JOB NUMBER
17033

DATE
2019 05

SCALE
AS SHOWN

DATE
2019 05

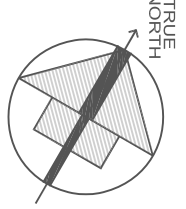
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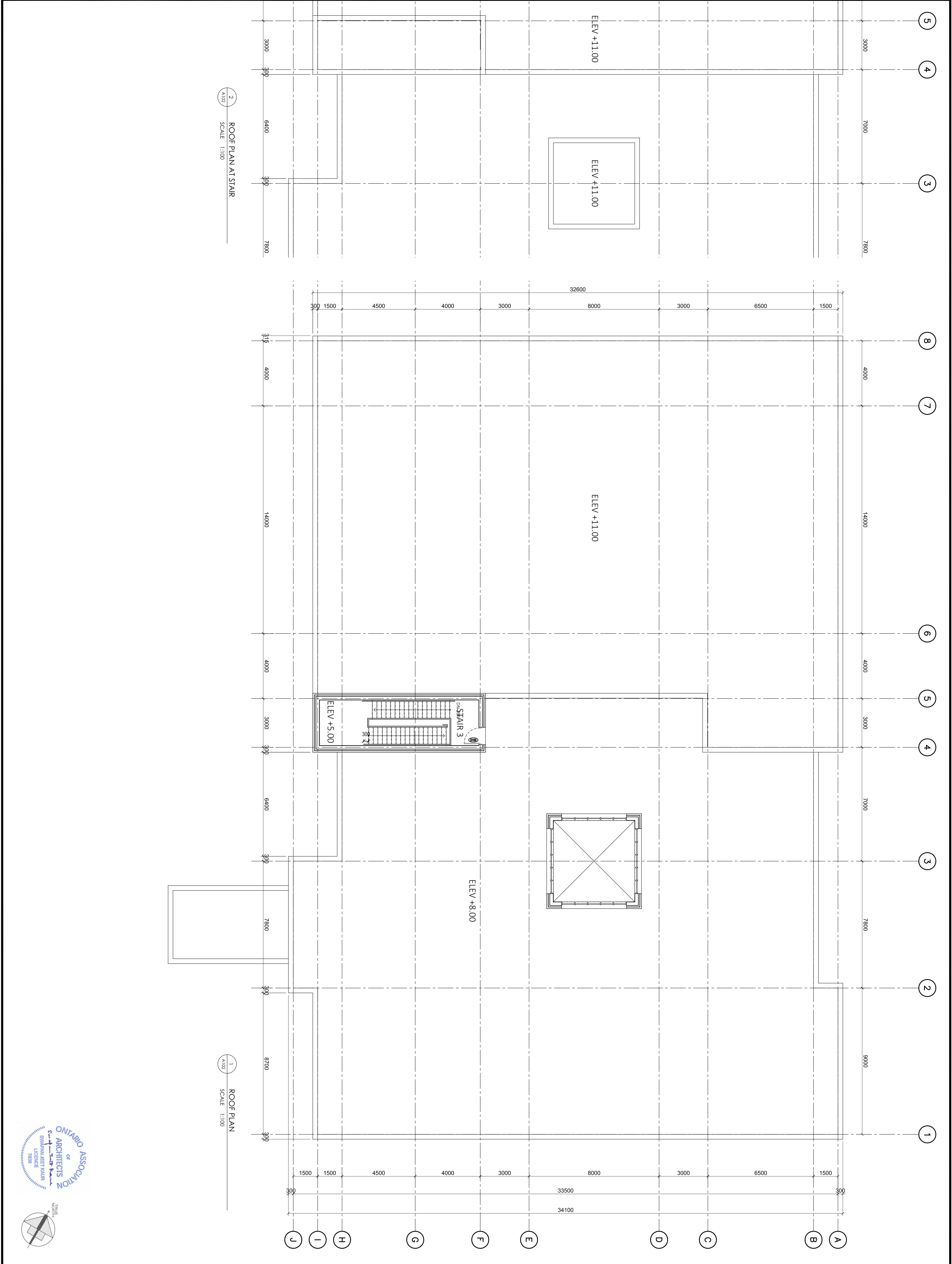
DATE
2019 05

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AS SHOWN

DATE
2019 05

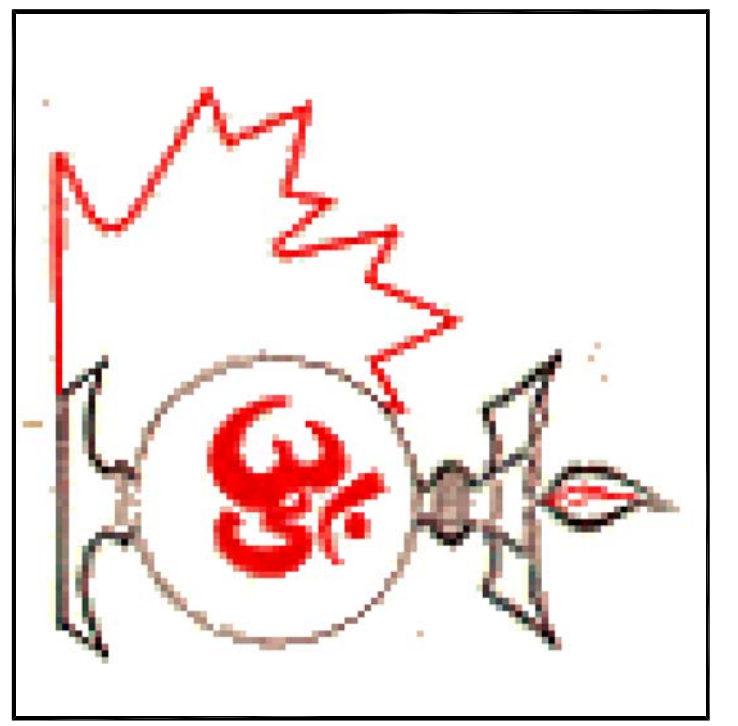
SCALE
AS SHOWN





2 ROOF PLAN AT STAIR
SCALE 1:100

1 ROOF PLAN
SCALE 1:100



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| 6 | ISSUED FOR SITE PLAN | MAR 16 |

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PROJECT AND LOCATION
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4835 BANK ST., OTTAWA, ON
P1N 04326-0011

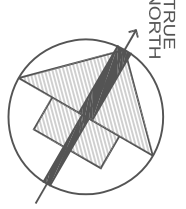
TITLE OF DRAWING
FLOOR PLAN -
ROOF

JOB NUMBER
17033

DATE
2019 05

SCALE
AS SHOWN BY SJK

DWG NUMBER
A102





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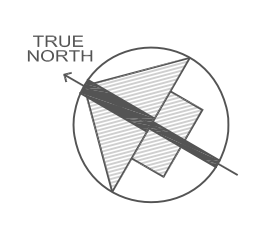
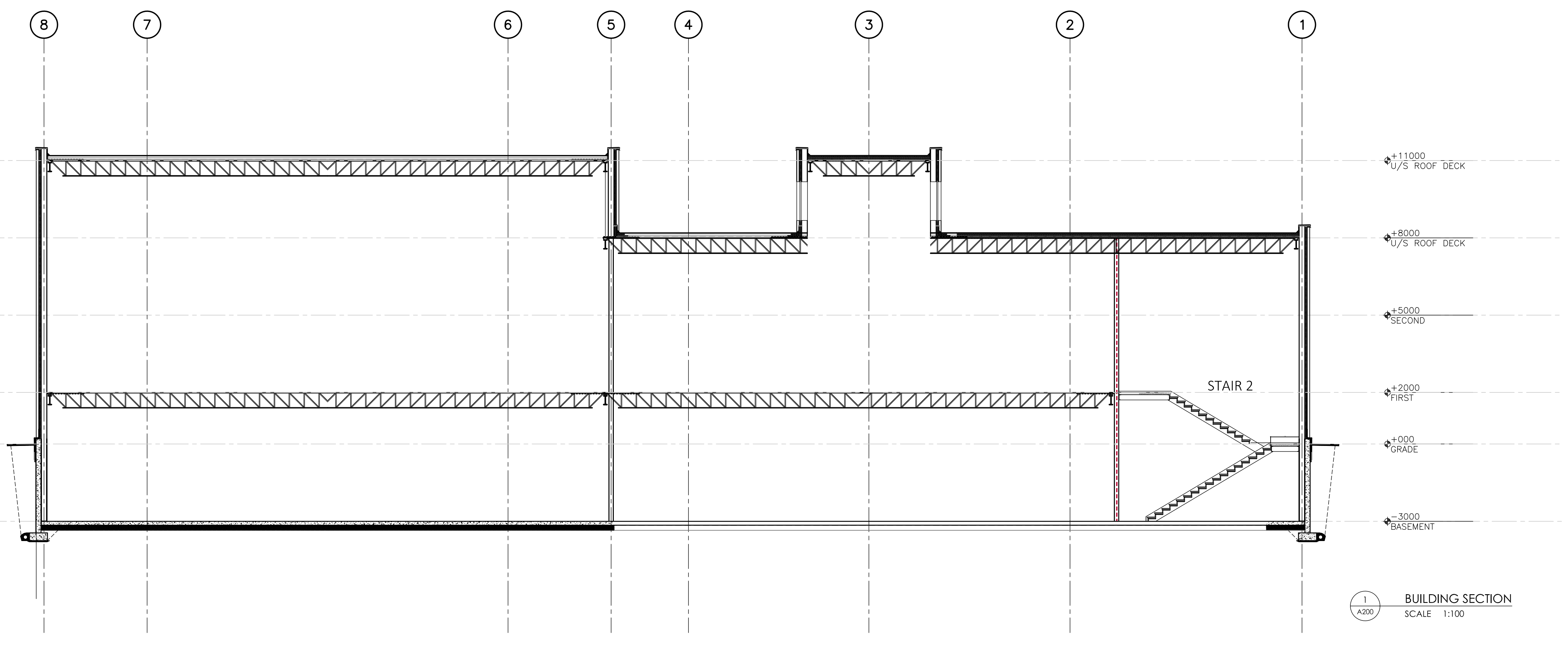
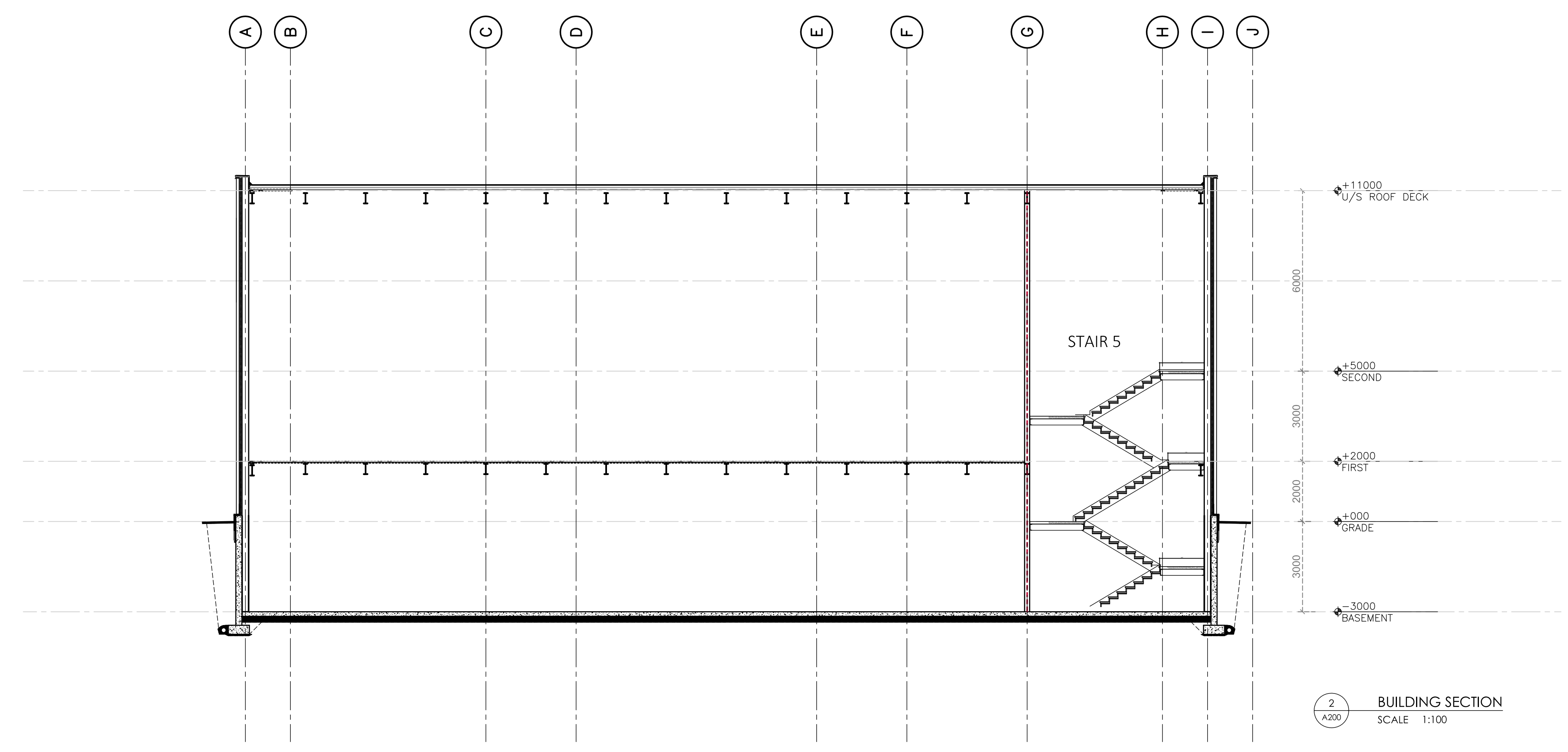
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PROJECT AND LOCATION
HERITAGE CENTRE -
HINDU TEMPLE - PHASE 2,
4835 BANK ST., OTTAWA, ON
P I N 0 4 3 2 6 - 0 0 1 1

TITLE OF DRAWING
BUILDING SECTION

JOB NUMBER
 17033

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|------------------------|-------------------|
| DATE 2019 05 | DWG NUMBER |
| SCALE | A200 |
| DRAWN BY SJK | |





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PROJECT AND LOCATION

**HERITAGE CENTRE -
 HINDU TEMPLE - PHASE 2,**
 4835 BANK ST., OTTAWA, ON
 P I N 0 4 3 2 6 - 0 0 1 1

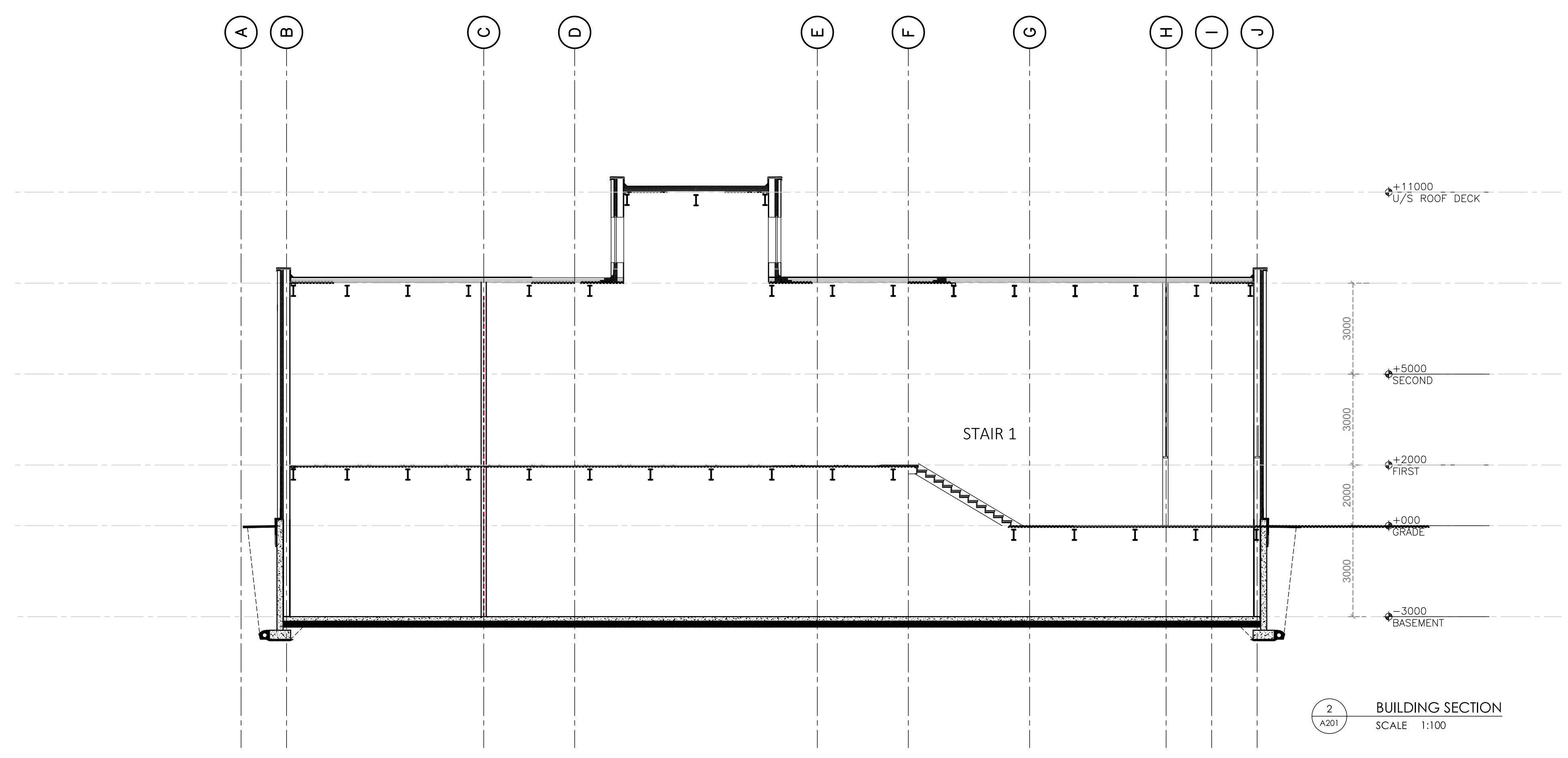
TITLE OF DRAWING

BUILDING SECTION

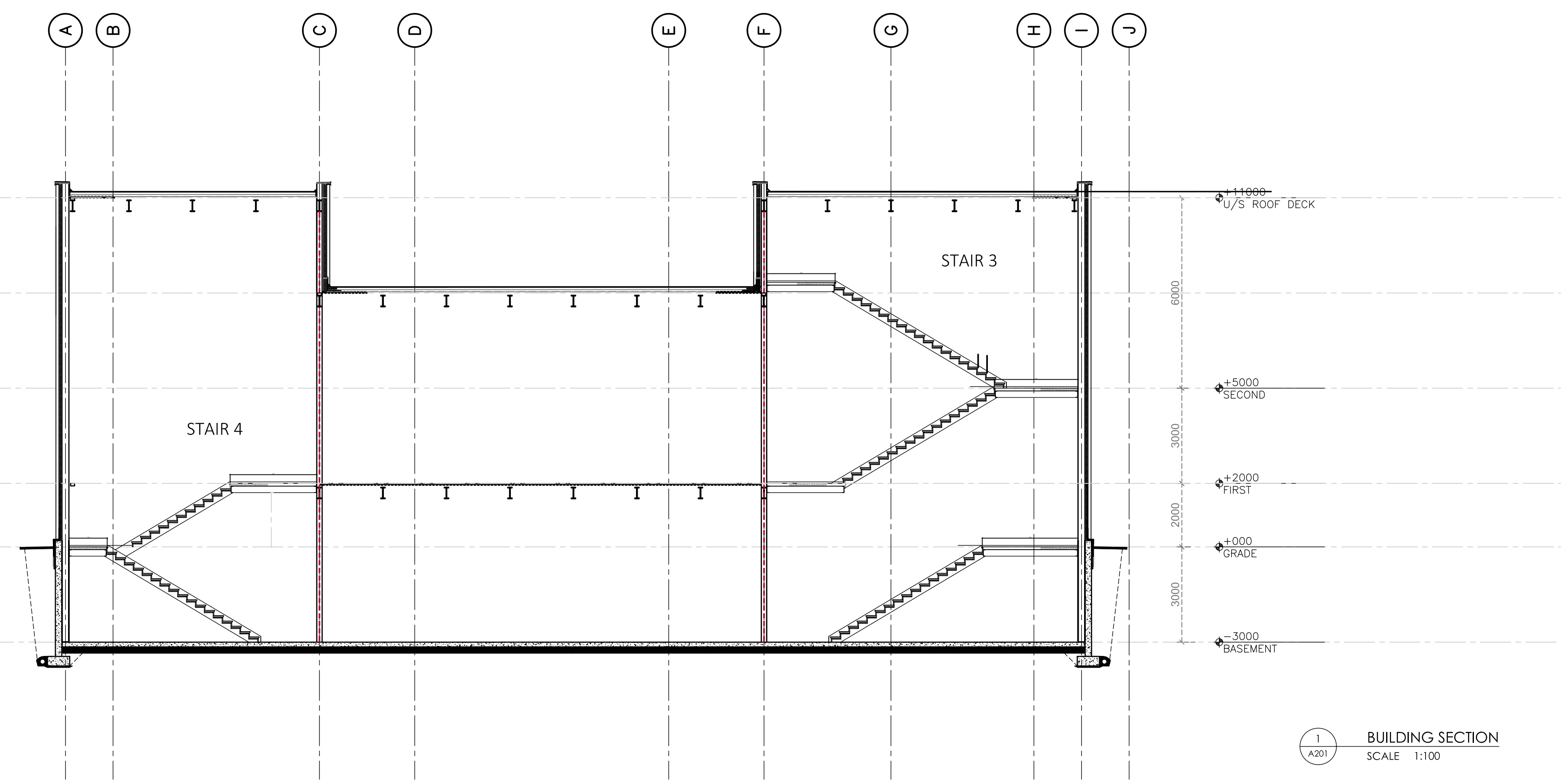
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17033

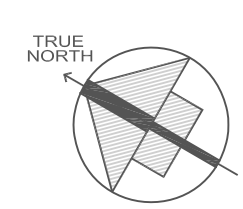
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| DATE | 2019 05 | DWG NUMBER | A201 |
| SCALE | | DRAWN BY | SJK |



2
 A201
BUILDING SECTION
 SCALE 1:100



1
 A201
BUILDING SECTION
 SCALE 1:100





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PROJECT AND LOCATION
HERITAGE CENTRE -
HINDU TEMPLE - PHASE 2,
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P1N 043 26-0011

TITLE OF DRAWING
ELEVATIONS

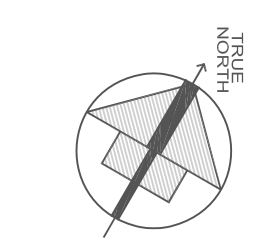
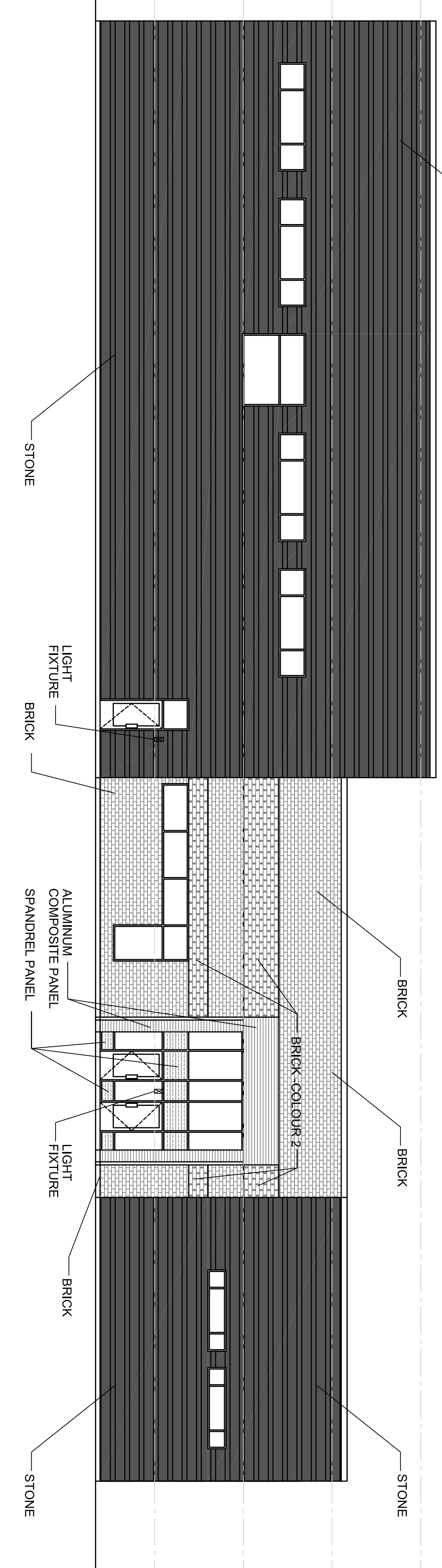
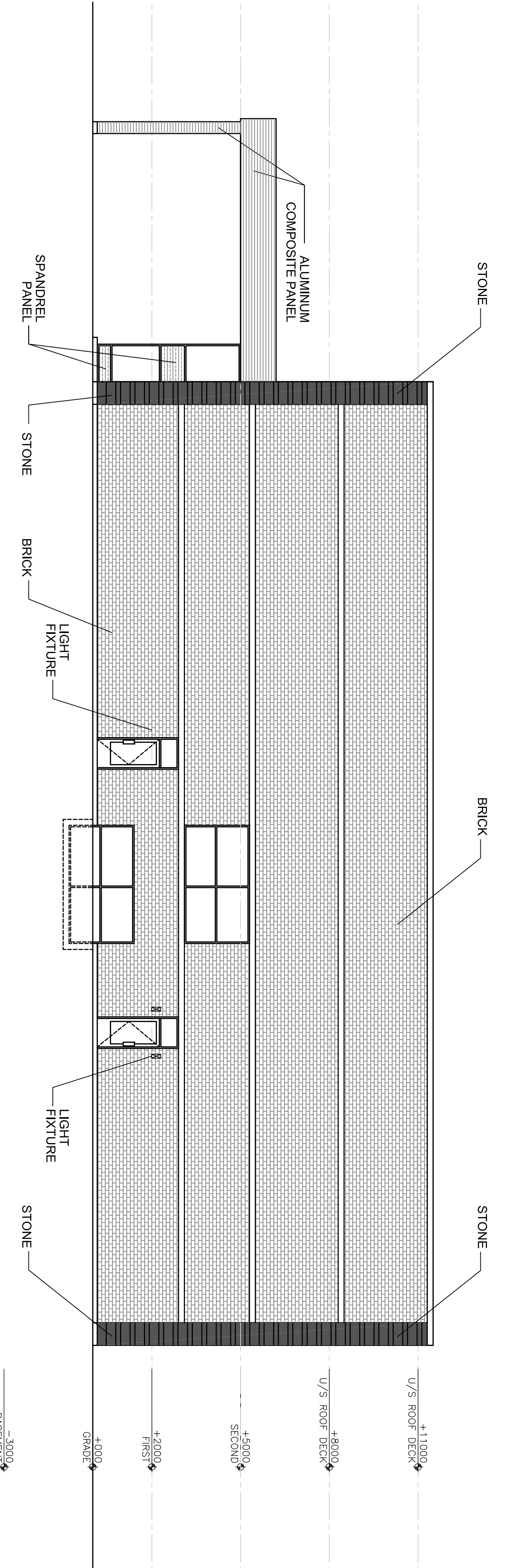
JOB NUMBER
17033

DATE
2019 05

SCALE
1:100

DWG NUMBER
A301

DESIGNED BY
SJK



APPENDIX H
Servicing Plan

NOTES: GENERAL

- CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
- ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
- JOB BENCH MARK - CONFIRM WITH LRL PRIOR TO UTILIZATION.
- 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.
- STRIP AND REMOVE ALL TOPSOIL FROM IMPROVED AREAS.
- COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
- 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.
- CURBS TO BE BARRIER, CONSTRUCTED AS PER OPSD 600.110.
- ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSD STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSD 206, 310 & 314. MATERIALS TO OPSD 1001, 1003 & 1010.
- ABUTTING PROPERTY GRADE TO BE MATCHED.
- OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
- MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
- 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.
- 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.
- 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.
- 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.
- ALL SIDEWALK CONSTRUCTION TO BE AS PER OPSD 310.010 & OPSD 310.050.

NOTES: SEWERS

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

NOTES: WATER SERVICE

- PROPOSED WATER SERVICE TO BE INSULATED WHEN COVER IS LESS THAN 2.4m AS PER DETAIL PROVIDED IN C901.

WATERMAIN TABLE

| DESCRIPTION | CHAINAGE | OBVERT ELEVATION TO MATCH EXISTING | FINISHED GRADE |
|--|-----------|------------------------------------|----------------|
| CONNECTION TO EXISTING TEE CONNECT. #1 | 0+000.0 | 96.92 | 99.32 |
| 45° BEND #1 | 0+071.5 | 96.60 | 99.00 |
| 45° BEND #2 | 0+077.5 | 96.75 | 99.15 |
| TEE CONNECT. #2 | 0+083.7 | 96.40 | 98.80 |
| FIRE HYDRANT | 0+088.0** | 96.16 | 98.56 |
| 45° BEND #3 | 0+131.1 | 96.30 | 98.70 |
| 45° BEND #4 | 0+136.0 | 96.25 | 98.65 |
| PROPOSED DEVELOPMENT | 0+144.6 | 96.42 | 98.82 |

NOTES:
 **2.4m BELOW BASE OF DITCH TRENCH
 *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/EXIST
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY-DUTY ASPHALT
- PROPOSED LIGHT-DUTY ASPHALT
- PROPOSED RIP RAP
- *50.00 PROPOSED ELEVATION
- *50.00HP PROPOSED HIGH POINT ELEVATION
- *50.00SW PROPOSED SEWAGE 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 20m SETBACK
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE THE SCOPE 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 REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAIL SHOWN 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.

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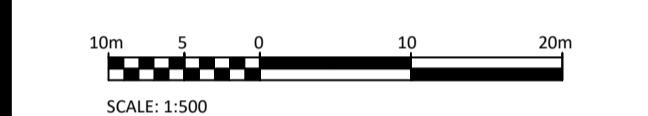
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GENERAL NOTES:
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CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

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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 |
|-----|-------------------------------------|------|--------------|
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LRJ
 ENGINEERING | INGENIERIE

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

CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

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

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE

SERVICING PLAN

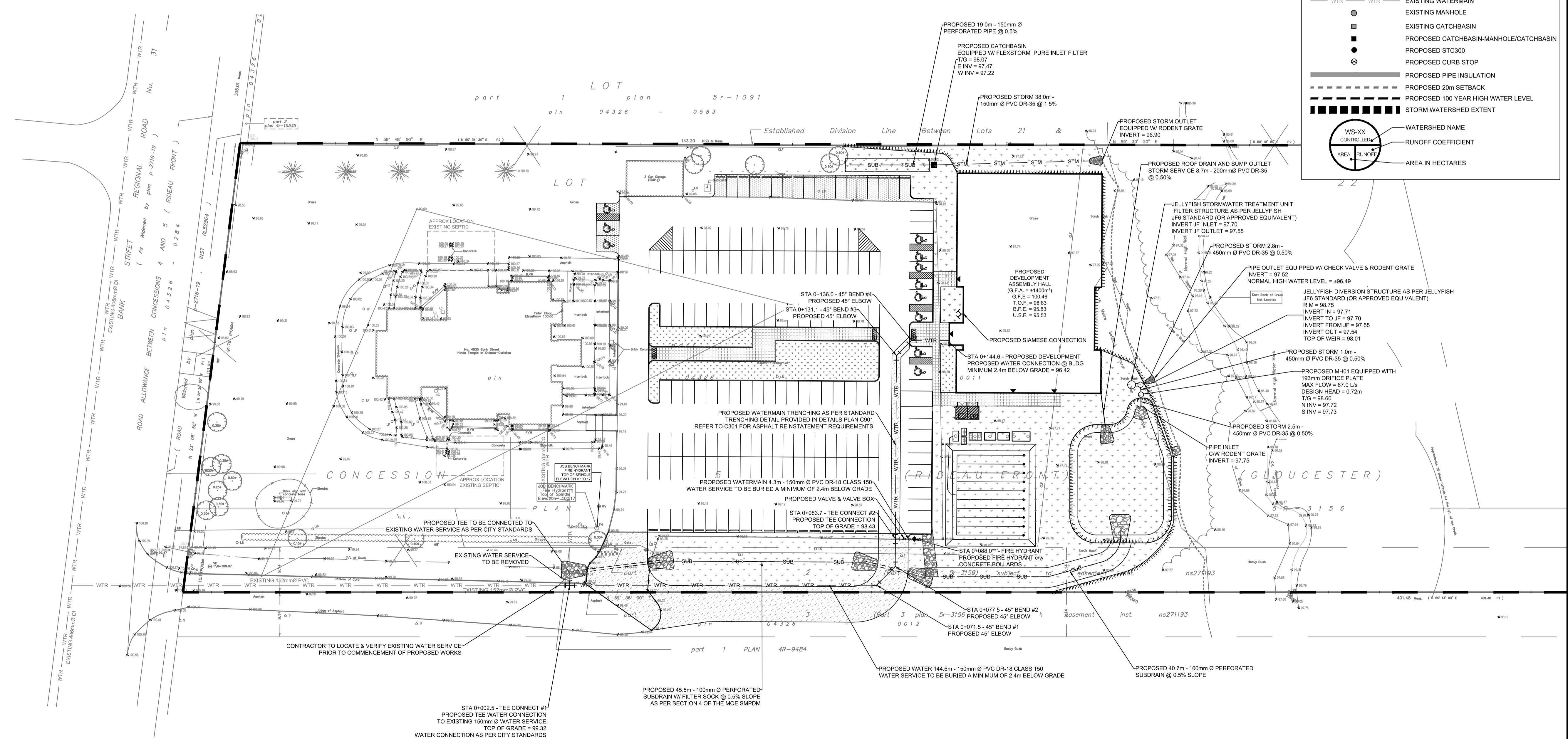
PROJECT NO.

170132

DATE

JAN2020

C401



CONTRACTOR TO LOCATE & VERIFY EXISTING WATER SERVICE PRIOR TO COMMENCEMENT OF PROPOSED WORKS

STA 0+002.5 - TEE CONNECT #1
 PROPOSED TEE WATER CONNECTION
 TO EXISTING 150mm Ø WATER SERVICE
 TOP OF GRADE = 99.32
 WATER CONNECTION AS PER CITY STANDARDS

PROPOSED 45.5m - 100mm Ø PERFORATED
 SUBDRAIN W/ FILTER SOCK @ 0.5% SLOPE
 AS PER SECTION 4 OF THE MOE SMDPM

PROPOSED WATER 144.6m - 150mm Ø PVC DR-18 CLASS 150
 WATER SERVICE TO BE BURIED A MINIMUM OF 2.4m BELOW GRADE

PROPOSED 40.7m - 100mm Ø PERFORATED
 SUBDRAIN @ 0.5% SLOPE

STA 0+088.0** - FIRE HYDRANT
 PROPOSED FIRE HYDRANT ON
 CONCRETE BOLLARDS

STA 0+071.5 - 45° BEND #1
 PROPOSED 45° BEND

STA 0+077.5 - 45° BEND #2
 PROPOSED 45° BEND

STA 0+083.7 - TEE CONNECT #2
 PROPOSED TEE CONNECTION
 TOP OF GRADE = 98.43

PROPOSED WATERMAIN 4.3m - 150mm Ø PVC DR-18 CLASS 150
 WATER SERVICE TO BE BURIED A MINIMUM OF 2.4m BELOW GRADE

STA 0+144.6 - PROPOSED DEVELOPMENT
 PROPOSED WATER CONNECTION @ BLDG
 MINIMUM 2.4m BELOW GRADE = 96.42

PROPOSED SIAMESE CONNECTION

PROPOSED WATERMAIN TRENCHING AS PER STANDARD
 TRENCHING DETAIL PROVIDED IN DETAILS PLAN C901.
 REFER TO C301 FOR ASPHALT REINSTATEMENT REQUIREMENTS.

PROPOSED VALVE & VALVE BOX

PROPOSED CATCH-BASIN
 EQUIPPED W/ FLEXSTORM PURE INLET FILTER
 T/G = 98.07
 E. INV = 97.47
 W. INV = 97.22

PROPOSED STORM 38.0m -
 150mm Ø PVC DR-35 @ 1.0%

PROPOSED STORM 2.8m -
 450mm Ø PVC DR-35 @ 0.50%

PROPOSED STORM 1.0m -
 450mm Ø PVC DR-35 @ 0.50%

PROPOSED STORM 2.5m -
 450mm Ø PVC DR-35 @ 0.50%

PROPOSED 40.7m - 100mm Ø PERFORATED
 SUBDRAIN @ 0.5% SLOPE

PROPOSED 45.5m - 100mm Ø PERFORATED
 SUBDRAIN W/ FILTER SOCK @ 0.5% SLOPE
 AS PER SECTION 4 OF THE MOE SMDPM

PROPOSED 40.7m - 100mm Ø PERFORATED
 SUBDRAIN @ 0.5% SLOPE

PROPOSED 40.7m - 100mm Ø PERFORATED
 SUBDRAIN @ 0.5% SLOPE

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 SUBDRAIN @ 0.5% SLOPE

PROPOSED 40.7m - 100mm Ø PERFORATED
 SUBDRAIN @ 0.5% SLOPE

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:

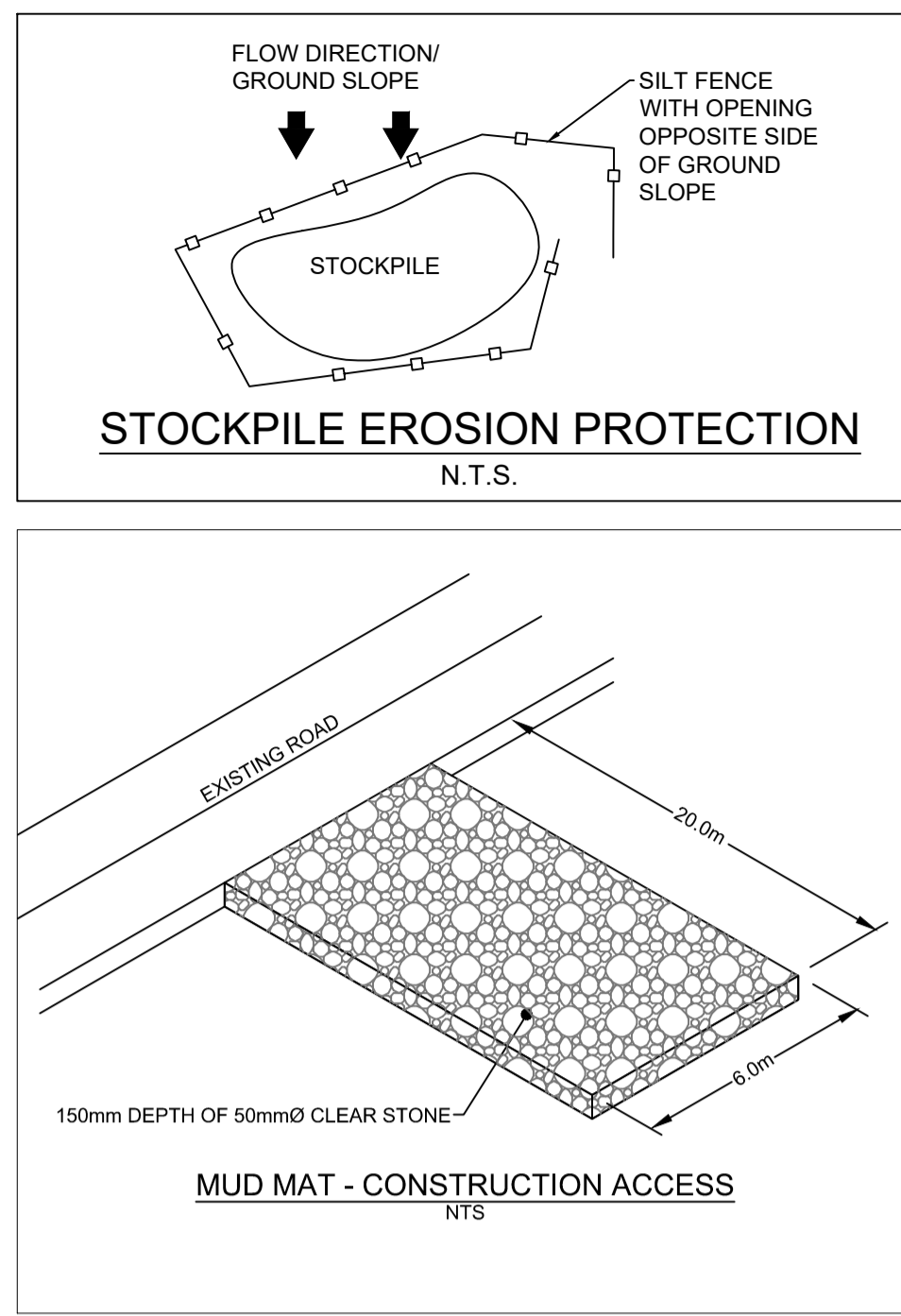
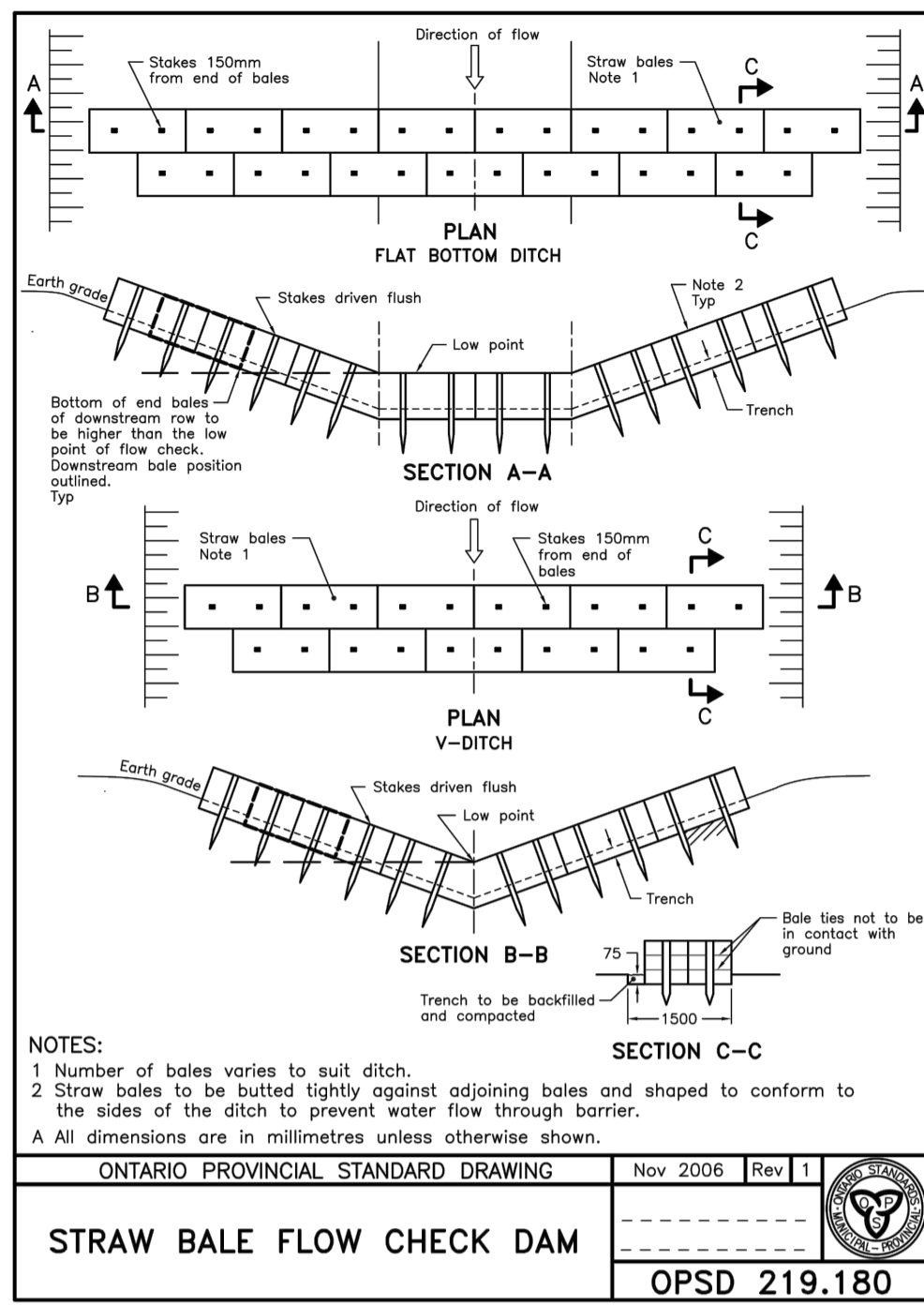
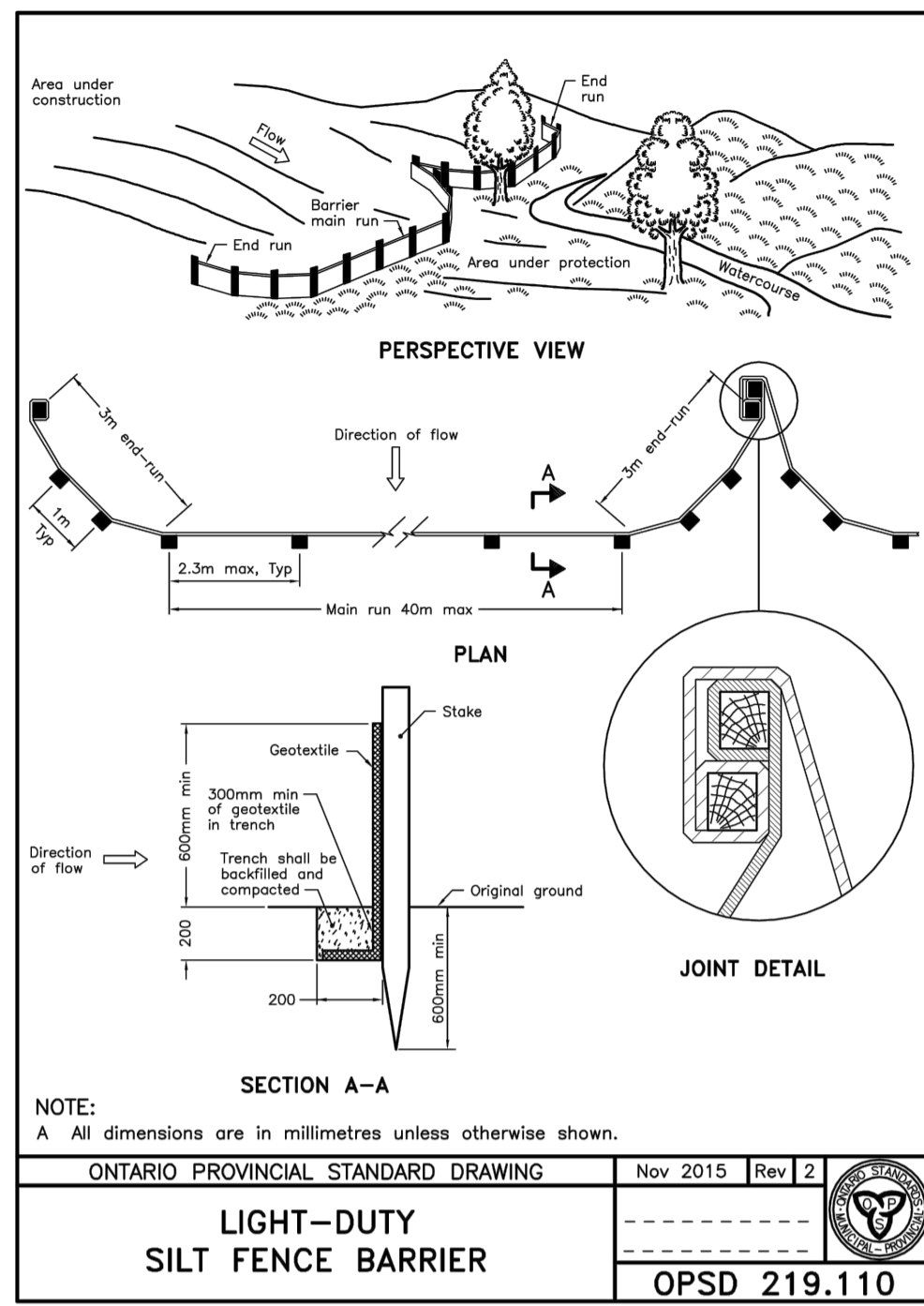
- PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF SOIL AND CONSTRUCTION:
- INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
- INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCHBASINS AND MANHOLES
- INSTALL SILT TRAP FILTERS IN ALL CONCRETE CATCH BASIN 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 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE FENCE 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 STRUCTURES 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 CRUSHER-RUN LIMESTONE) MATERIAL. MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
- 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 ADJUTING 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.



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 HEAVY-DUTY ASPHALT |
| | PROPOSED LIGHT-DUTY ASPHALT |
| | PROPOSED RIP RAP |
| | PROPOSED ELEVATION |
| | PROPOSED STORM SEWER |
| | PROPOSED SANITARY SEWER |
| | PROPOSED WATERMAIN |
| | EXISTING STORM SEWER |
| | EXISTING SANITARY SEWER |
| | EXISTING WATERMAIN |
| | EXISTING MANHOLE |
| | EXISTING CATCHBASIN |
| | PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN |
| | PROPOSED S3TC30 |
| | PROPOSED CURB STOP |
| | PROPOSED PIPE INSULATION |
| | PROPOSED 20m SETBACK |
| | PROPOSED 100 YEAR HIGH WATER LEVEL |
| | STORM WATERSHED EXTENT |
| | WATERSHED NAME |
| | RUNOFF COEFFICIENT |
| | AREA IN HECTARES |

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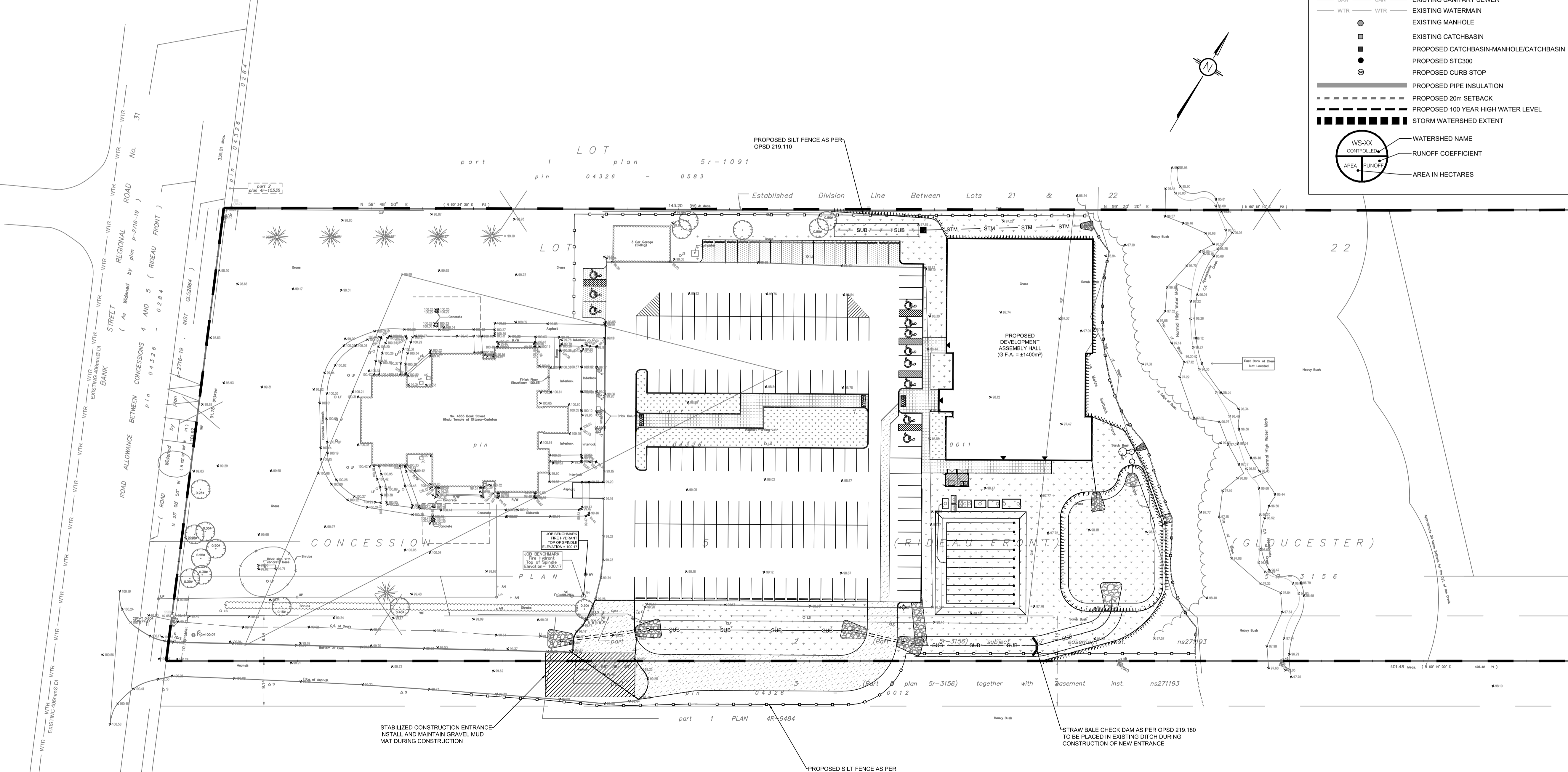
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NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT: **THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON**

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

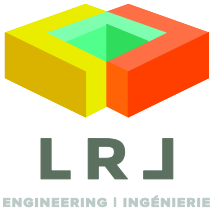
PROJECT: **PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA**

DRAWING TITLE: **EROSION AND SEDIMENT CONTROL PLAN**

PROJECT NO: 170132
DATE: JAN2020



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: (as per OBC Table 7.6.3.2.A)
Conversion of fixture units to equivalent gpm: 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 =
 Car Wash Hours of Operation = 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:

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

$$d = 0.072 \text{ m}$$

$$d = 72 \text{ mm}$$

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 (m³/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 Obs. @ Street Connection (m) | 97.80 | |
| Service Obs. @ 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 Obs. @ Street Connection (m) | 97.80 | |
| Service Obs. @ 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 Obs. @ Street Connection (m) | 97.80 | |
| Service Obs. @ 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 | | | | | |
| | | | Rapid burning | 0.25 | | | | | |
| 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 | |

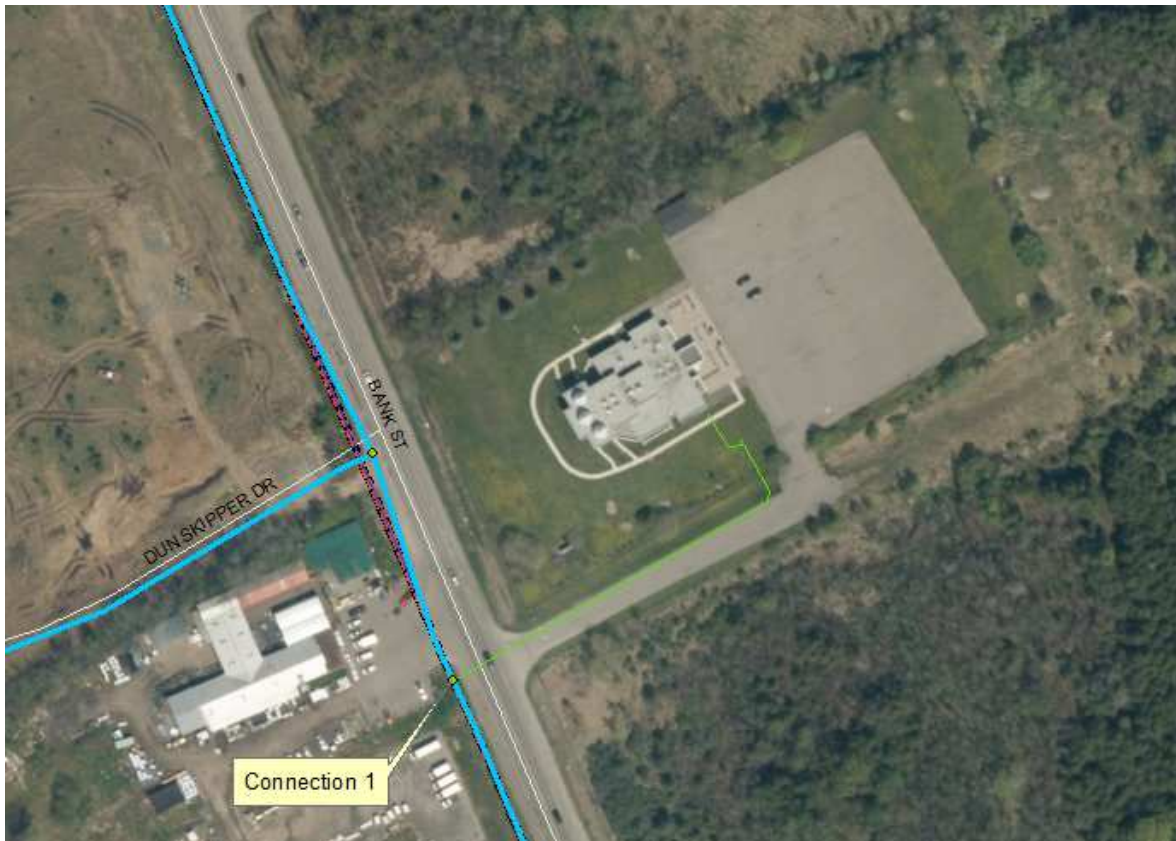
APPENDIX M
City of Ottawa Boundary Calculations

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) | Pressure¹ (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 Associates Ltd.
Storm Watershed Summary



LRL

ENGINEERING | INGÉNIÉRIE

| | |
|---------------------------|--------------------------|
| LRL File No. | 170132 |
| Project: | Hindu Heritage Centre |
| Location: | 4835 Bank Street, Ottawa |
| Date: | Sept 20th, 2021 |
| Designed: | K. Herold |
| Checked: | M. Basnet |
| 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 | 1.298 | 0.000 | 0.926 | 2.223 | 0.49 |
| TOTAL | 1.298 | 0.000 | 0.926 | 2.223 | 0.49 |

Post-Development Catchments

| WATERSHED | C = 0.20 | C = 0.8 | C = 0.90 | Total Area (ha) | Combined C |
|---------------------------|--------------|--------------|--------------|-----------------|-------------|
| WS-01 (CONTROLLED) | 0.571 | 0.023 | 0.722 | 1.316 | 0.59 |
| TOTAL CONTROL | 0.571 | 0.023 | 0.722 | 1.316 | 0.59 |
| WS-02 (UNCONTROLLED) | 0.112 | 0.000 | 0.299 | 0.411 | 0.71 |
| WS-03 (UNCONTROLLED) | 0.454 | 0.000 | 0.016 | 0.470 | 0.22 |
| WS-04 (UNCONTROLLED) | 0.026 | 0.000 | 0.000 | 0.026 | 0.20 |
| TOTAL UNCONTROLLED | 0.592 | 0.000 | 0.315 | 0.907 | 0.44 |
| TOTAL | 1.163 | 0.023 | 1.037 | 2.223 | 0.53 |



LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: Sept 20th, 2021
Designed: K. Herold
Checked: M. Basnet
Drawing Ref.: C.401

**Stormwater Management
Design Sheet**

STORM - 100 YEAR

Runoff Equation

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

Pre-Development Catchments within Development Area

| | | | | | |
|---------------|----------------------|-------|----|--------------|------|
| | Total Area = | 2.223 | ha | $\Sigma R =$ | 0.49 |
| Un-Controlled | EWS-01 | 2.223 | ha | R = | 0.49 |
| | Total Uncontrolled = | 2.223 | ha | $\Sigma R =$ | 0.49 |

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

5 Year Pre-Development Flow Rate

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

C = 0.49 the smaller of 0.5 or the actual existing as per the City of Ottawa
 I = 104.2 mm/hr
 $T_c = 10$ min
 Total = 2.223 ha
Allowable Release Rate = 316.44 L/s
Controlled Release Rate = 67.00 L/s

Post-development Stormwater Management

| | | | | | | |
|---------------|-----------------------|-------|----|--------------|--------------|------------------|
| | Total Site Area = | 2.223 | ha | $\Sigma R =$ | ΣR_5 | ΣR_{100} |
| | | | | | 0.53 | 0.67 |
| Controlled | Total Controlled = | 1.316 | ha | $\Sigma R =$ | 0.59 | 0.74 |
| Un-controlled | Total Un-Controlled = | 0.907 | ha | $\Sigma R =$ | 0.44 | 0.55 |

Post-development Stormwater Management

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

* for volume calculation, controlled release rate taken as half of the discharge rate

| 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 | 485.47 | 271.18 | 33.50 | 249.38 | 282.88 |
| 15 | 142.9 | 388.51 | 319.51 | 33.50 | 199.57 | 233.07 |
| 20 | 120.0 | 326.13 | 351.15 | 33.50 | 167.52 | 201.02 |
| 25 | 103.8 | 282.34 | 373.27 | 33.50 | 145.03 | 178.53 |
| 30 | 91.9 | 249.77 | 389.29 | 33.50 | 128.30 | 161.80 |
| 35 | 82.6 | 224.52 | 401.14 | 33.50 | 115.33 | 148.83 |
| 40 | 75.1 | 204.31 | 409.94 | 33.50 | 104.95 | 138.45 |
| 45 | 69.1 | 187.74 | 416.44 | 33.50 | 96.44 | 129.94 |
| 50 | 64.0 | 173.88 | 421.14 | 33.50 | 89.32 | 122.82 |
| 55 | 59.6 | 162.11 | 424.40 | 33.50 | 83.27 | 116.77 |
| 60 | 55.9 | 151.97 | 426.49 | 33.50 | 78.06 | 111.56 |
| 65 | 52.6 | 143.14 | 427.59 | 33.50 | 73.53 | 107.03 |
| 70 | 49.8 | 135.37 | 427.85 | 33.50 | 69.54 | 103.04 |
| 75 | 47.3 | 128.48 | 427.41 | 33.50 | 66.00 | 99.50 |
| 80 | 45.0 | 122.32 | 426.35 | 33.50 | 62.83 | 96.33 |
| 160 | 26.2 | 71.34 | 363.27 | 33.50 | 36.65 | 70.15 |



LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: Sept 20th, 2021
Designed: K. Herold
Checked: M. Basnet
Drawing Ref.: C.401

Stormwater Management
Design Sheet

STORM - 100 YEAR

Onsite Stormwater Retention

| | | |
|----------------------------------|-----------------------------|--------------------------------|
| Total Storage Required = | 427.85 m³ | |
| Pipe Storage = | 0.00 m ³ | |
| CB/MH Storage = | 0.00 m ³ | |
| Underground Storage = | 0.00 m ³ | |
| Surface/Detention Area Storage = | 428.14 m ³ | refer to LRL Plans C301 & C601 |
| Total Available Storage = | 428.14 m³ | |



LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: Aug 27th, 2021
Designed: K. Herold
Checked: M. Basnet
Drawing Ref.: C.401

**Stormwater Management
Design Sheet**

STORM - 5 YEAR

Runoff Equation

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

Pre-Development Catchments within Development Area

| | | | | | |
|---------------|----------------------|-------|----|-----|------|
| | Total Area = | 2.223 | ha | ΣR= | 0.49 |
| Un-Controlled | EWS-01 | 2.223 | ha | R= | 0.49 |
| | Total Uncontrolled = | 2.223 | ha | ΣR= | 0.49 |

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

5 Year Pre-Development Flow Rate

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

C = 0.49 the smaller of 0.5 or the actual existing as per the City of Ottawa
 I = 104.2 mm/hr
 T_c = 10 min
 Total = 2.223 ha
Allowable Release Rate= 316.44 L/s
Controlled Release Rate= 50.00 L/s

Post-Development Stormwater Management

| | | | | | | | |
|---------------|-----------------------|-------|----|-----|------|-------------------|------|
| | Total Site Area = | 2.223 | ha | ΣR= | 0.53 | ΣR ₁₀₀ | 0.67 |
| Controlled | Total Controlled = | 1.316 | ha | ΣR= | 0.59 | 0.74 | |
| Un-controlled | Total Un-Controlled = | 0.907 | ha | ΣR= | 0.44 | 0.55 | |

Post-development Stormwater Management

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

* for volume calculation, controlled release rate taken as half of the discharge rate

| 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 | 307.07 | 84.62 | 25.00 | 157.74 | 182.74 |
| 10 | 104.2 | 226.63 | 120.98 | 25.00 | 116.41 | 141.41 |
| 15 | 83.6 | 181.74 | 141.07 | 25.00 | 93.36 | 118.36 |
| 20 | 70.3 | 152.80 | 153.36 | 25.00 | 78.49 | 103.49 |
| 30 | 53.9 | 117.30 | 166.13 | 25.00 | 60.25 | 85.25 |
| 35 | 48.5 | 105.53 | 169.11 | 25.00 | 54.21 | 79.21 |
| 40 | 44.2 | 96.10 | 170.65 | 25.00 | 49.37 | 74.37 |
| 45 | 40.6 | 88.37 | 171.10 | 25.00 | 45.39 | 70.39 |
| 50 | 37.7 | 81.90 | 170.70 | 25.00 | 42.07 | 67.07 |
| 60 | 32.9 | 71.65 | 167.96 | 25.00 | 36.81 | 61.81 |
| 70 | 29.4 | 63.89 | 163.32 | 25.00 | 32.82 | 57.82 |
| 80 | 26.6 | 57.77 | 157.32 | 25.00 | 29.68 | 54.68 |
| 90 | 24.3 | 52.83 | 150.28 | 25.00 | 27.14 | 52.14 |



LRL File No. 170132
Project: Hindu Heritage Centre
Location: 4835 Bank Street, Ottawa
Date: Aug 27th, 2021
Designed: K. Herold
Checked: M. Basnet
Drawing Ref.: C.401


Stormwater Management
Design Sheet

STORM - 5 YEAR

Onsite Stormwater Retention

| | | |
|----------------------------------|-----------------------------|--------------------------------|
| Total Storage Required = | 171.10 m³ | |
| Pipe Storage = | 0.00 m ³ | |
| CB/MH Storage = | 0.00 m ³ | |
| Underground Storage = | 0.00 m ³ | |
| Surface/Detention Area Storage = | 210.92 m ³ | refer to LRL Plans C301 & C601 |
| Total Available Storage = | 210.92 m³ | |

LRL Associates Ltd.
Storm Design Sheet

| | | | | |
|---|---|--|--|--|
|  | <p>LRL File No. 170132 Project: Hindu Heritage Centre Location: 4835 Bank Street, Ottawa Date: Sept 20th, 2021 Designed: K. Herold Checked: M. Basnet Drawing Reference: C.401</p> | <p>Rational Method $Q = 2.78CIA$</p> <p>Q = Peak flow in litres per second (L/s) A = Drainage area in hectares (ha) C = Runoff coefficient I = Rainfall intensity (mm/hr)</p> | <p style="text-align: center;">Storm Design Parameters</p> <p>Runoff Coefficient (C) Grass 0.20 Gravel 0.80 Asphalt / rooftop 0.90</p> | <p>Ottawa Macdonald-Cartier International Airport IDF curve equation (5 year event, intensity in mm/hr) $I = 998.071 / (T_c + 6.053)^{0.814}$ Min. velocity = 0.80 m/s Manning's "n" = 0.013</p> |
|---|---|--|--|--|

| LOCATION | | | AREA (ha) | | | FLOW | | | | | STORM SEWER | | | | | | | MANHOLE | | | | | | | | |
|--|---------|----------|-----------|----------|----------|---------------|---------------|----------------------|----------------------------|-------------------|--------------------|------|-----------|------------|---------------------|---------------------|---------------------|------------------------------|---------------|-----------------|-------------------|-----------------|------------------|--------------------|------------------|--|
| WATERSHED / STREET | From MH | To MH | C = 0.20 | C = 0.80 | C = 0.90 | Indiv. 2.78AC | Accum. 2.78AC | Time of Conc. (min.) | Rainfall Intensity (mm/hr) | Peak Flow Q (l/s) | Pipe Diameter (mm) | Type | Slope (%) | Length (m) | Capacity Full (L/s) | Velocity Full (m/s) | Time of Flow (min.) | Ratio (Q/Q _{FULL}) | Up Invert (m) | Down Invert (m) | T/G Up Stream (m) | T/G Down Stream | Up Depth obv (m) | Down Depth obv (m) | Up Depth inv (m) | |
| STORMWATER DETENTION AREA OUTLET | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS-01 | / | CB02 | 0.571 | 0.023 | 0.722 | 2.18 | 2.18 | 15.00 | 83.56 | 181.74 | 450 | PVC | 0.60% | 2.6 | 220.84 | 1.39 | 0.03 | 0.82 | | | | | | | | |
| UPSTREAM CULVERT, SW ENT. TO PARKING LOT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS-01 (PARTIAL)* | | DET.AREA | 0.301 | 0.003 | 0.226 | 0.74 | 0.74 | 15.00 | 83.56 | 61.79 | 500 | CSP | 0.50% | 20.0 | 267.00 | 1.36 | 0.25 | 0.23 | | | | | | | | |
| DOWNSTREAM CULVERT, SE ENT. TO PARKING LOT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS-01 (PARTIAL)** | | DET.AREA | 0.370 | 0.011 | 0.577 | 1.67 | 1.67 | 15.00 | 83.56 | 139.86 | 500 | CSP | 0.50% | 14.0 | 267.00 | 1.36 | 0.17 | 0.52 | | | | | | | | |

Note: The Peak flow controlled by the orifice plates are shown in this design sheet.

*REFER TO CIVIL PLAN C301 & C401

*design takes into consideration existing building, existing asphalt entrance and grass area south of existing building

**design takes into consideration existing building, existing asphalt entrance, grass area south of existing building, south half of existing parking lot, proposed entrances and existing ditch

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:

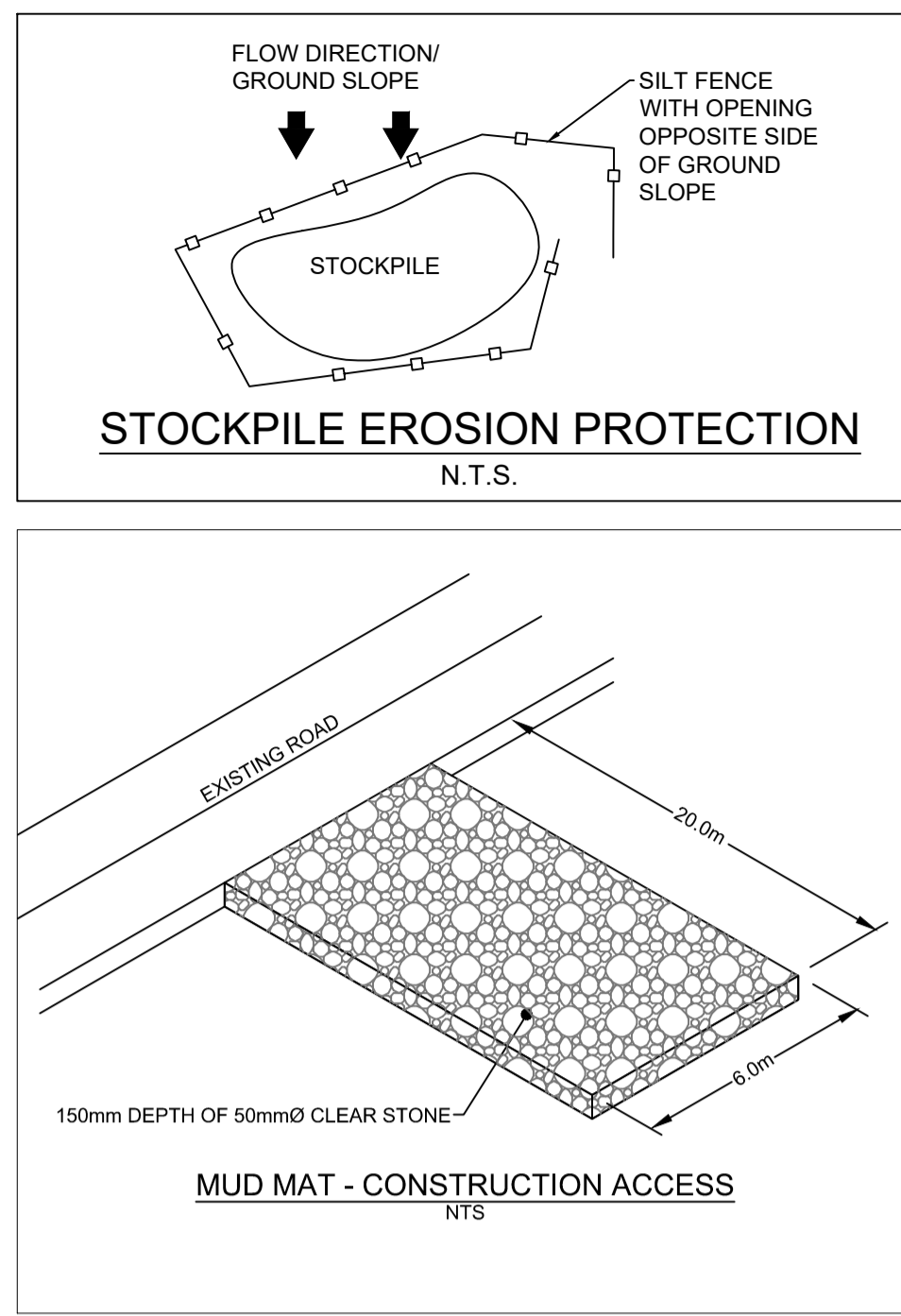
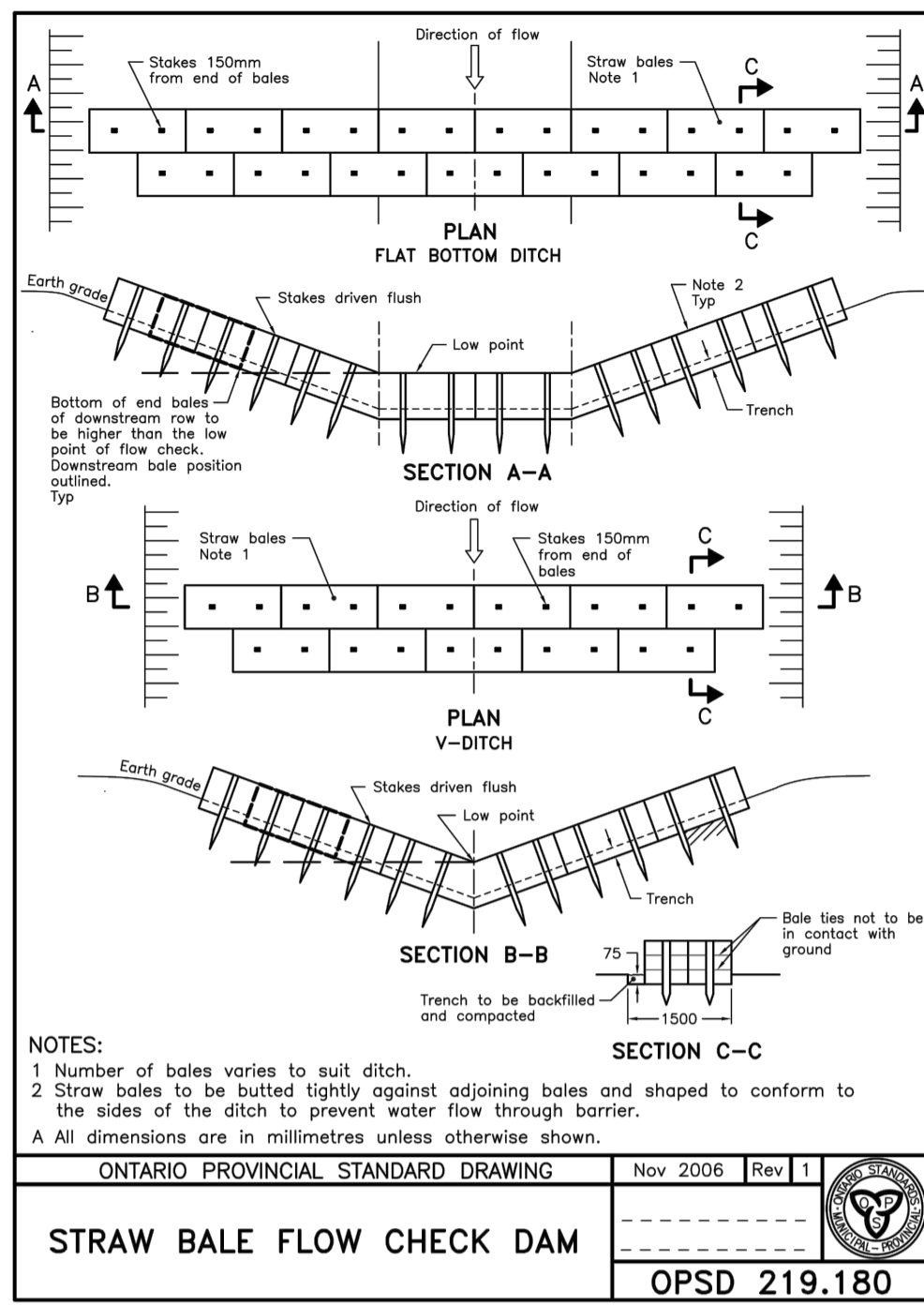
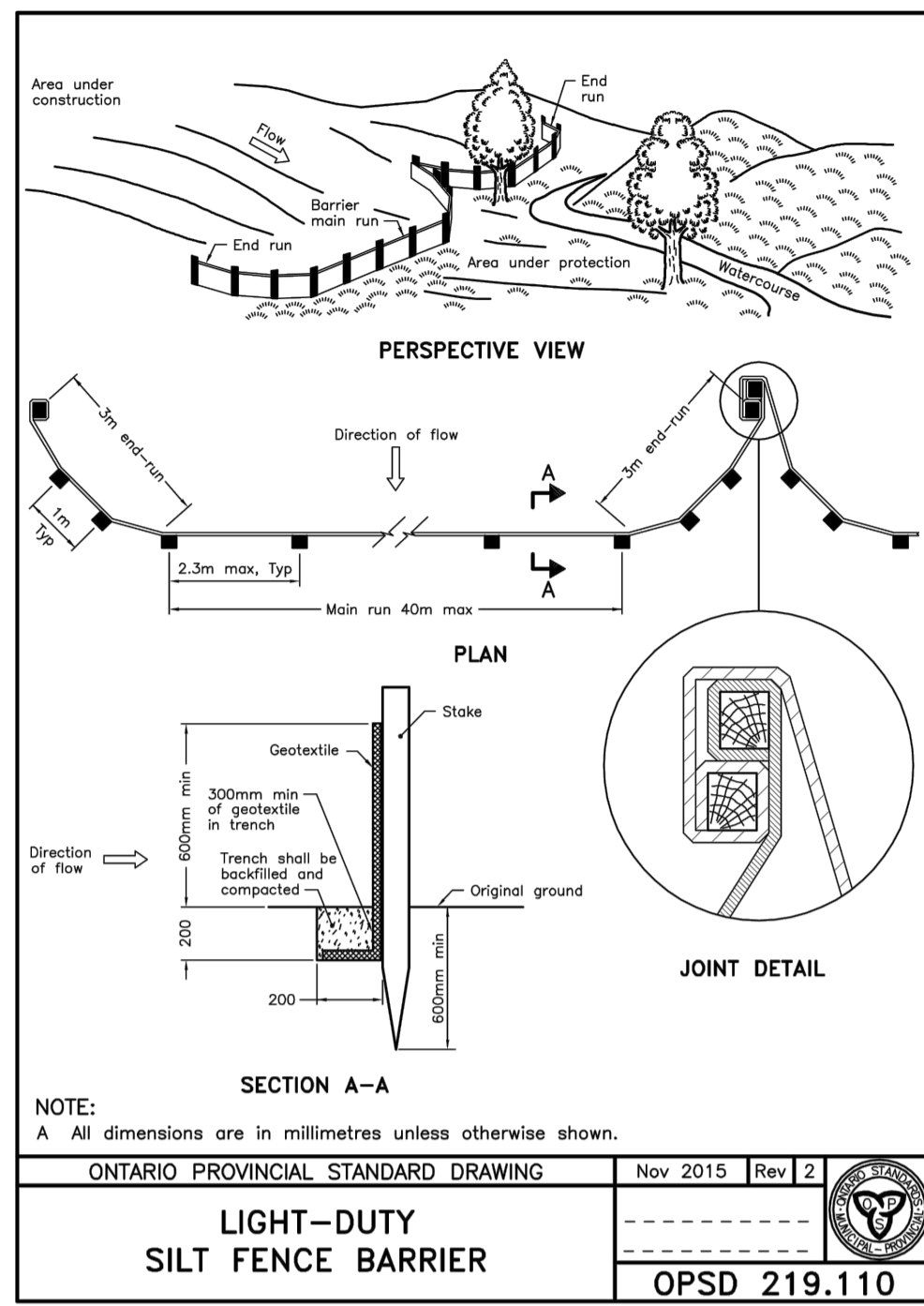
- PRIOR TO THE REMOVAL OF ANY VEGETATIVE COVER, MOVING OF SOIL AND CONSTRUCTION:
- INSTALL SILT FENCE IMMEDIATELY DOWNSTREAM FROM AREAS TO BE DISTURBED (SEE PLAN FOR LOCATION).
- INSTALL GEOSOCK INSERTS WITH AN OVERFLOW IN ALL THE DOWNSTREAM CATCHBASINS AND MANHOLES
- INSTALL SILT TRAP FILTERS IN ALL CONCRETE CATCH BASIN 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 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE FENCE 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 STRUCTURES 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 CRUSHER-RUN LIMESTONE) MATERIAL. MAINTAIN GRAVEL ENTRANCE IN CLEAN CONDITION.
- DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPPED.
- 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 ADJUTING 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.



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 HEAVY-DUTY ASPHALT |
| | PROPOSED LIGHT-DUTY ASPHALT |
| | PROPOSED RIP RAP |
| | PROPOSED ELEVATION |
| | PROPOSED STORM SEWER |
| | PROPOSED SANITARY SEWER |
| | PROPOSED WATERMAIN |
| | EXISTING STORM SEWER |
| | EXISTING SANITARY SEWER |
| | EXISTING WATERMAIN |
| | EXISTING MANHOLE |
| | EXISTING CATCHBASIN |
| | PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN |
| | PROPOSED S3C300 |
| | PROPOSED CURB STOP |
| | PROPOSED PIPE INSULATION |
| | PROPOSED 20m SETBACK |
| | PROPOSED 100 YEAR HIGH WATER LEVEL |
| | STORM WATERSHED EXTENT |
| | WATERSHED NAME |
| | RUNOFF COEFFICIENT |
| | AREA IN HECTARES |

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE THE SCOPE AND INTENT OF THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND REVIEWING THE CONTRACT DOCUMENTS AND UNDERSTANDING THE REQUIREMENTS OF 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, CAD FILES OR OTHER ELECTRONIC MEDIA AND COPIES THEREOF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THE PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY 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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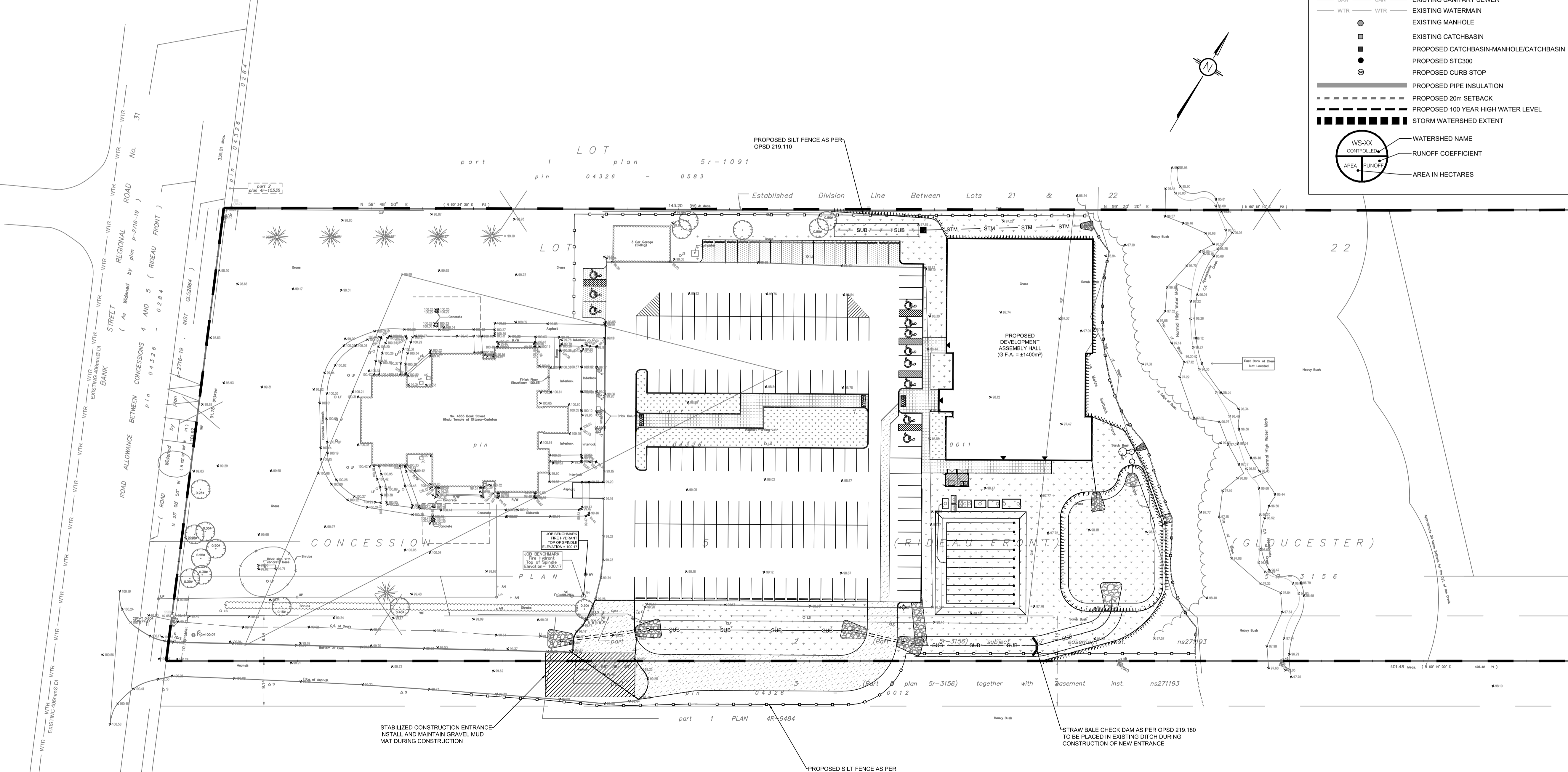
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CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

SCALE: 1:500

| | | | |
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| 04 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 22 SEPT 2021 |
| 03 | RE-ISSUED FOR SITE PLAN APPLICATION | K.H. | 23 DEC 2020 |
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NOT AUTHENTIC UNLESS SIGNED AND DATED

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

CLIENT: **THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON**

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

PROJECT: **PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA**

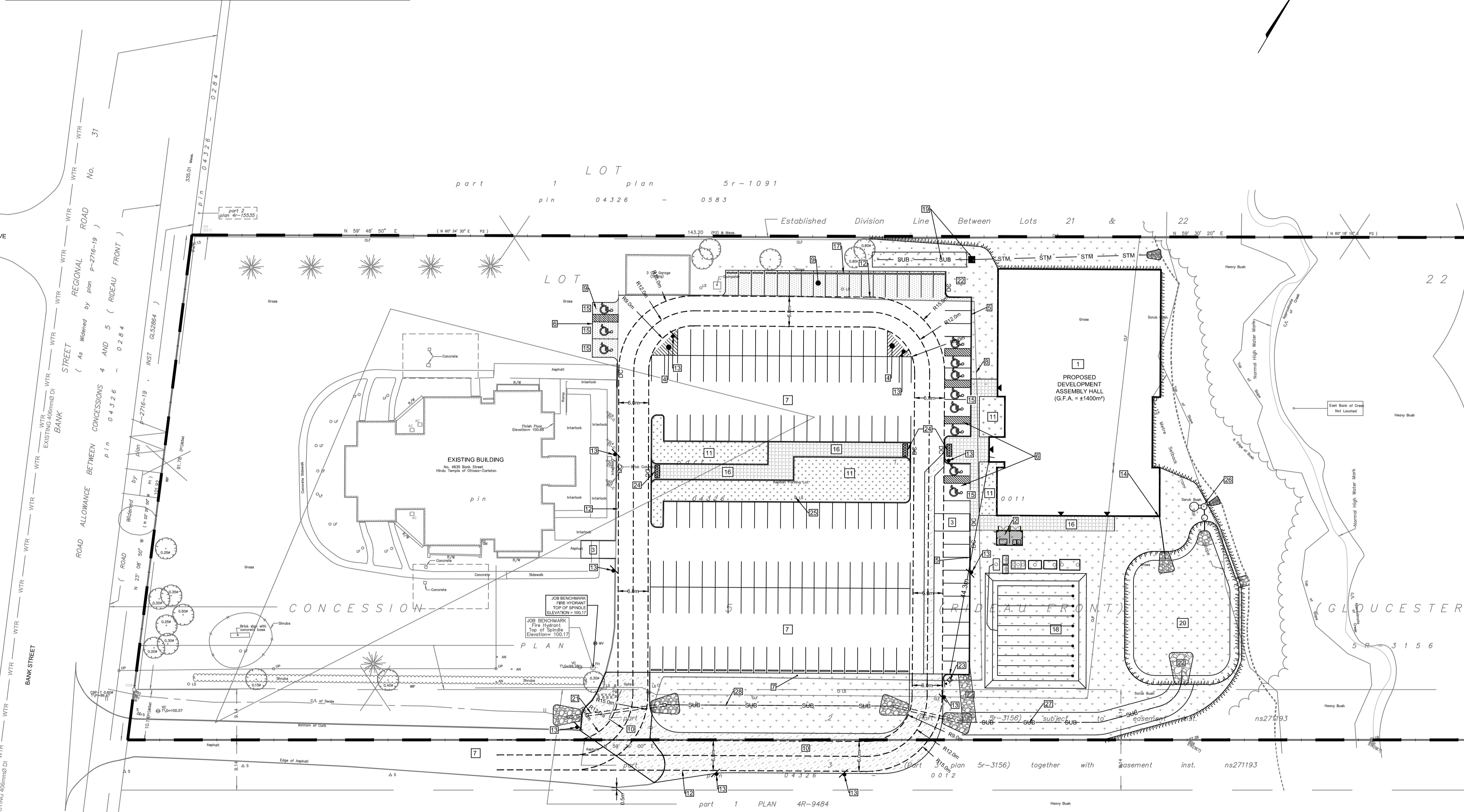
DRAWING TITLE: **EROSION AND SEDIMENT CONTROL PLAN**

PROJECT NO: 170132
DATE: JAN2020

C101



KEY PLAN
N.T.S.



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
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- PROPOSED TOP OF CURB ELEVATION
- MATCH INTO EXISTING ELEVATION
- 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 20m SETBACK
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WATERSHED NAME
- RUNOFF COEFFICIENT
- AREA IN HECTARES

- SITE PLAN NOTES:**
- PROPOSED DEVELOPMENT
 - PROPOSED GARBAGE / WASTE CONTAINERS LOCATION (REFER TO ARCH SITE PLAN)
 - PROPOSED NO PARKING AREA FOR GARBAGE & LOADING AREA (WITH NO PARKING SIGNS/PAVEMENT MARKINGS)
 - PROPOSED PAVEMENT MARKINGS FOR FIRE ROUTE
 - PROPOSED CONCRETE BARRIER CURB AS PER OPSD 600.110
 - PROPOSED ACCESSIBLE SPACES C/W LINE PAINTING
 - EXISTING ASPHALT TO REMAIN
 - EXISTING ASPHALT PARKING LOT TO BE REMOVED & REPLACED WITH 100mm TOPSOIL & SOD
 - PROPOSED LIGHT DUTY PAVEMENT STRUCTURE
 - PROPOSED HEAVY TRAFFIC PAVEMENT STRUCTURE
 - PROPOSED LANDSCAPING (AS PER LANDSCAPING PLAN)
 - PROPOSED FIRE ROUTE
 - PROPOSED FIRE ROUTE SIGNAGE
 - PROPOSED ROOF DRAINAGE OUTLET
 - 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
 - PROPOSED CONCRETE WALKWAY, AND VEHICULAR ACCESS ROUTE TO REAR SITE
 - PROPOSED PRECAST CONCRETE BUMPER CURBS
 - PROPOSED SEPTIC TANKS & LEACHING BED (REFER TO SEPTIC DESIGN BY GREEN VALLEY ENVIRONMENTAL)
 - PROPOSED CATCHBASIN & INFILTRATION GALLERY
 - PROPOSED STORMWATER DETENTION AREA
 - EXISTING CULVERT TO BE REMOVED AND REPLACED
 - PROP RIP-RAP FOR DEPRESSED CURBS & PIPE OUTLET
 - PROPOSED FIRE HYDRANT
 - PROPOSED TACTILE WALKING SURFACE INDICATOR AS PER CITY OF OTTAWA ACCESSIBILITY DESIGN STANDARDS SECTIONS 2.7 & 3.4.6.
 - EXISTING LIGHT STANDARD TO REMAIN
 - PROPOSED STORMWATER QUANTITY CONTROL AND TREATMENT UNITS
 - PROPOSED DITCH W/ SUBDRAIN

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE THE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENT, 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.

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CLIENT: **THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON**

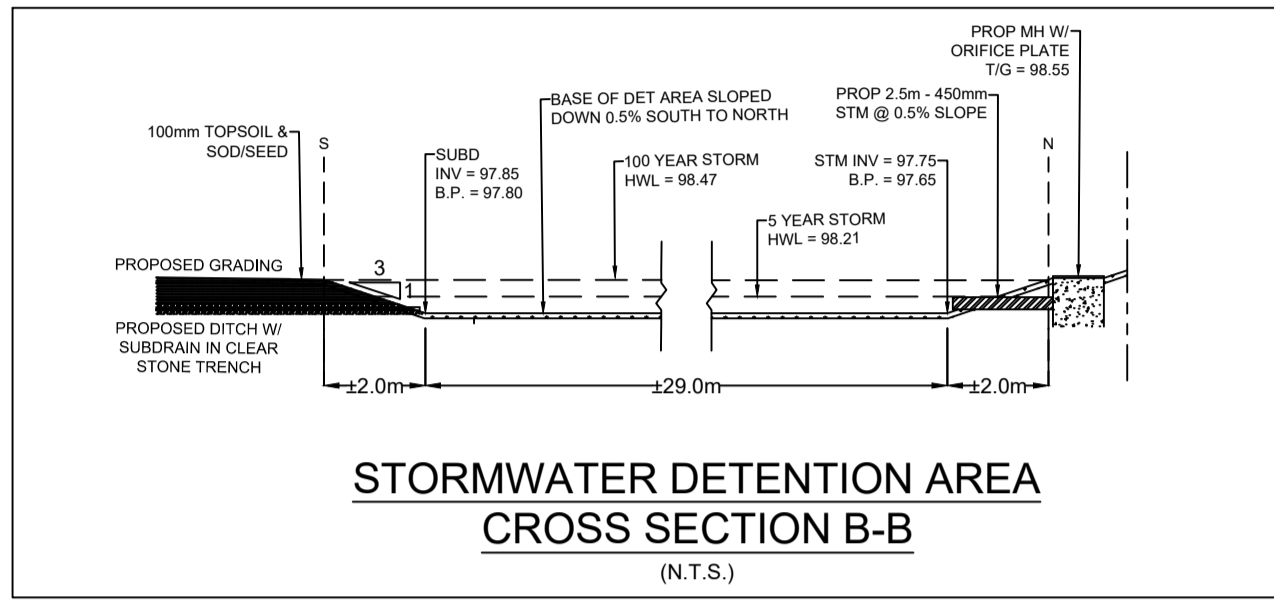
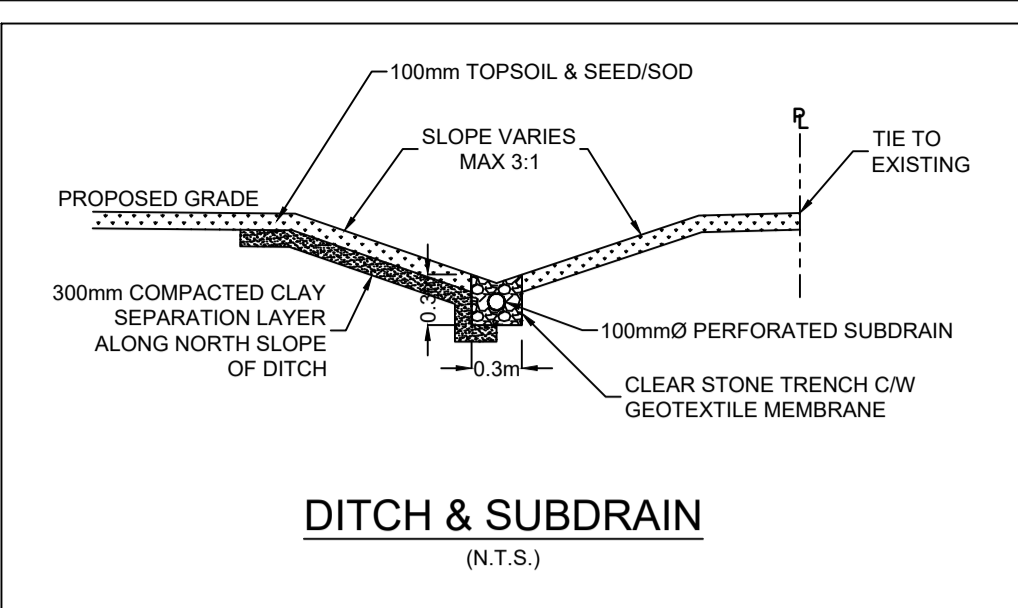
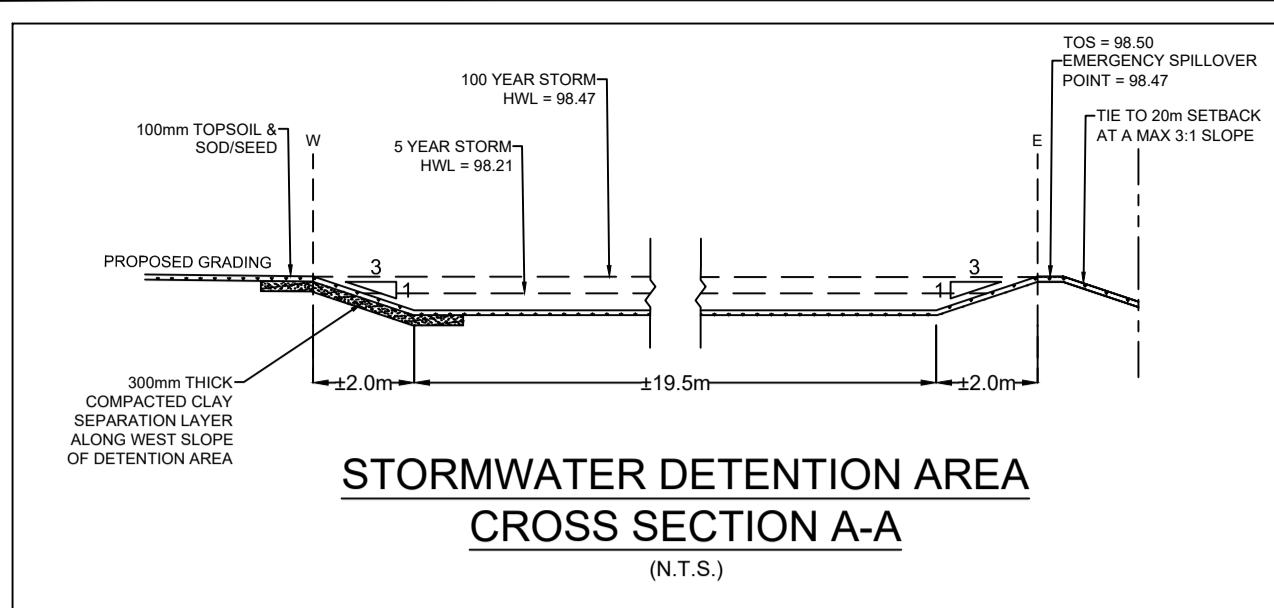
DESIGNED BY: P.P. DRAWN BY: K.H. APPROVED BY: M.B.

PROJECT: **PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA**

DRAWING TITLE: **SITE DEVELOPMENT PLAN**

PROJECT NO: 170132
DATE: JAN 2020





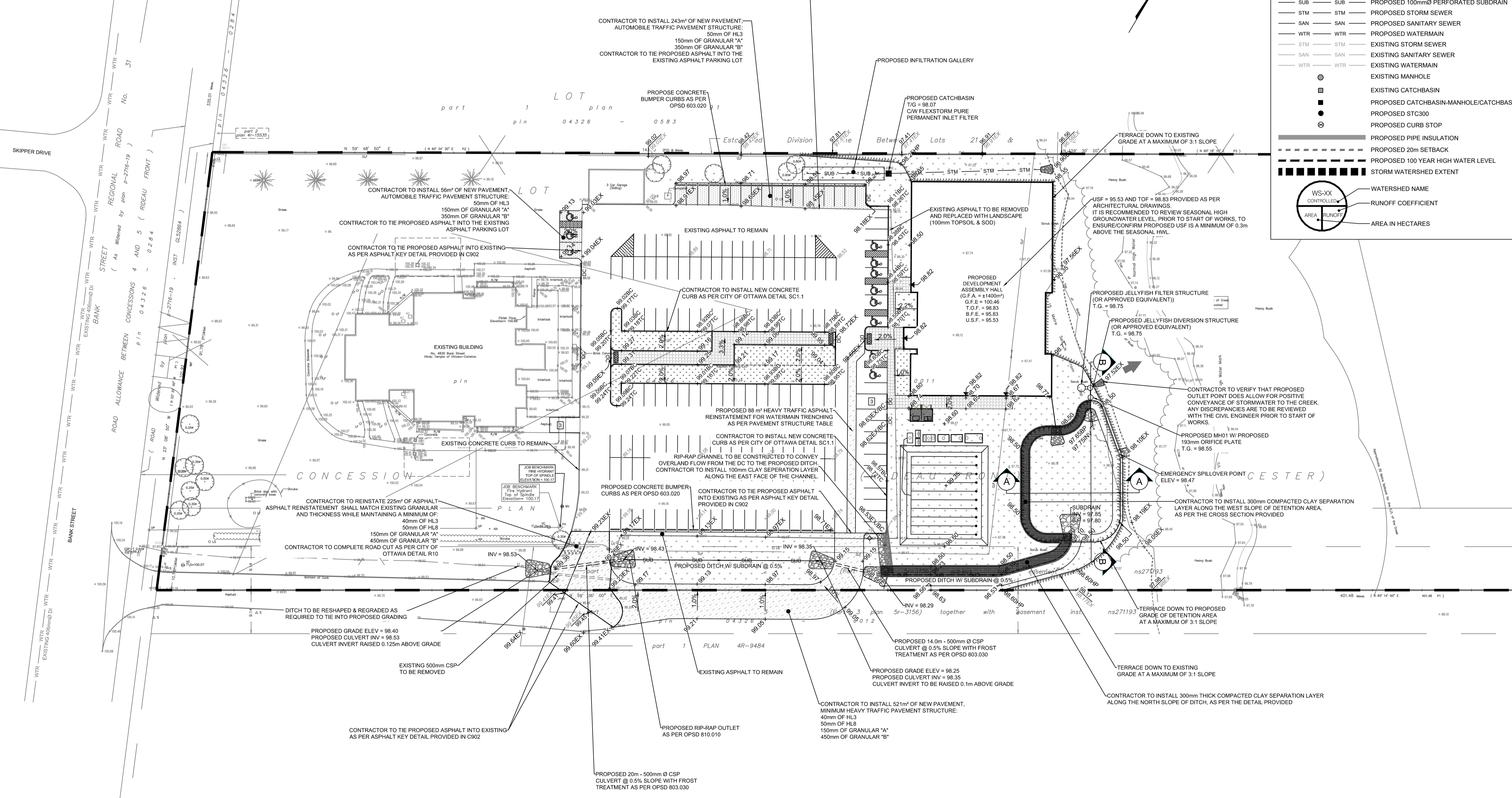
PAVEMENT STRUCTURE

| COURSE | MATERIAL | THICKNESS (mm) | |
|------------|----------------------|--------------------|-----------------------------|
| | | AUTOMOBILE PARKING | TRUCK ROUTE (HEAVY TRAFFIC) |
| SURFACE | HL.3 A/C (PG 58-34) | 50 | 40 |
| BINDER | HL.8 A/C (PG 58-34) | -- | 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. PAVEMENT STRUCTURE AS PER THE GEOTECHNICAL REPORT PREPARED BY LRL ASSOCIATES DATED NOVEMBER 2019.

LEGEND:

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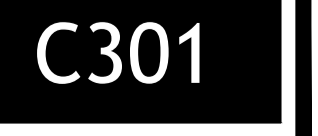
LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON
DESIGNED BY: P.P. DRAWN BY: K.H. APPROVED BY: M.B.

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE: GRADING AND DRAINAGE PLAN

PROJECT NO: 170132
DATE: JAN2020



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 OPSD STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. CONSTRUCTION TO OPSD 206, 310 & 314. MATERIALS TO OPSD 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 SPMD.
2. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH OPSD 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 AS PER DETAIL PROVIDED IN C901.

WATERMAIN TABLE

Table with 4 columns: DESCRIPTION, CHAINAGE, OBVERT ELEVATION TO MATCH EXISTING, FINISHED GRADE. Rows include CONNECTION TO EXISTING, TEE CONNECT #1, 45° BEND #1, 45° BEND #2, TEE CONNECT #2, FIRE HYDRANT, 45° BEND #3, 45° BEND #4, and PROPOSED DEVELOPMENT.

NOTES:
*2.4m BELOW BASE OF DITCH TRENCH
**DIVERGES AT TEE CONNECTION #2

LEGEND:

Legend detailing symbols for property lines, curbs, terracing, fences, elevations, manholes, catchbasins, and various pipe types and materials.

USE AND INTERPRETATION OF DRAWINGS

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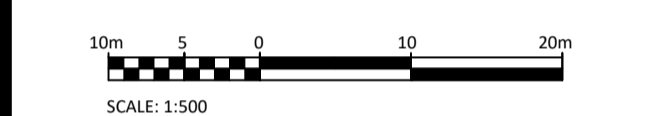
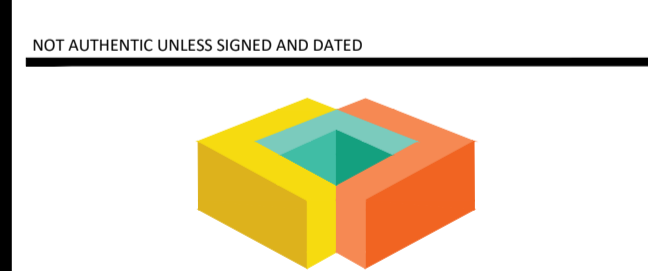


Table with 4 columns: No., REVISIONS, BY, DATE. Lists revision 04 (RE-ISSUED FOR SITE PLAN APPLICATION, 22 SEPT 2021), 03 (RE-ISSUED FOR SITE PLAN APPLICATION, 23 DEC 2020), 02 (ISSUED FOR CLIENT REVIEW, 11 DEC 2020), and 01 (ISSUED FOR CLIENT APPROVAL, 11 MAR 2020).



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www.lrl.ca | (613) 842-3434

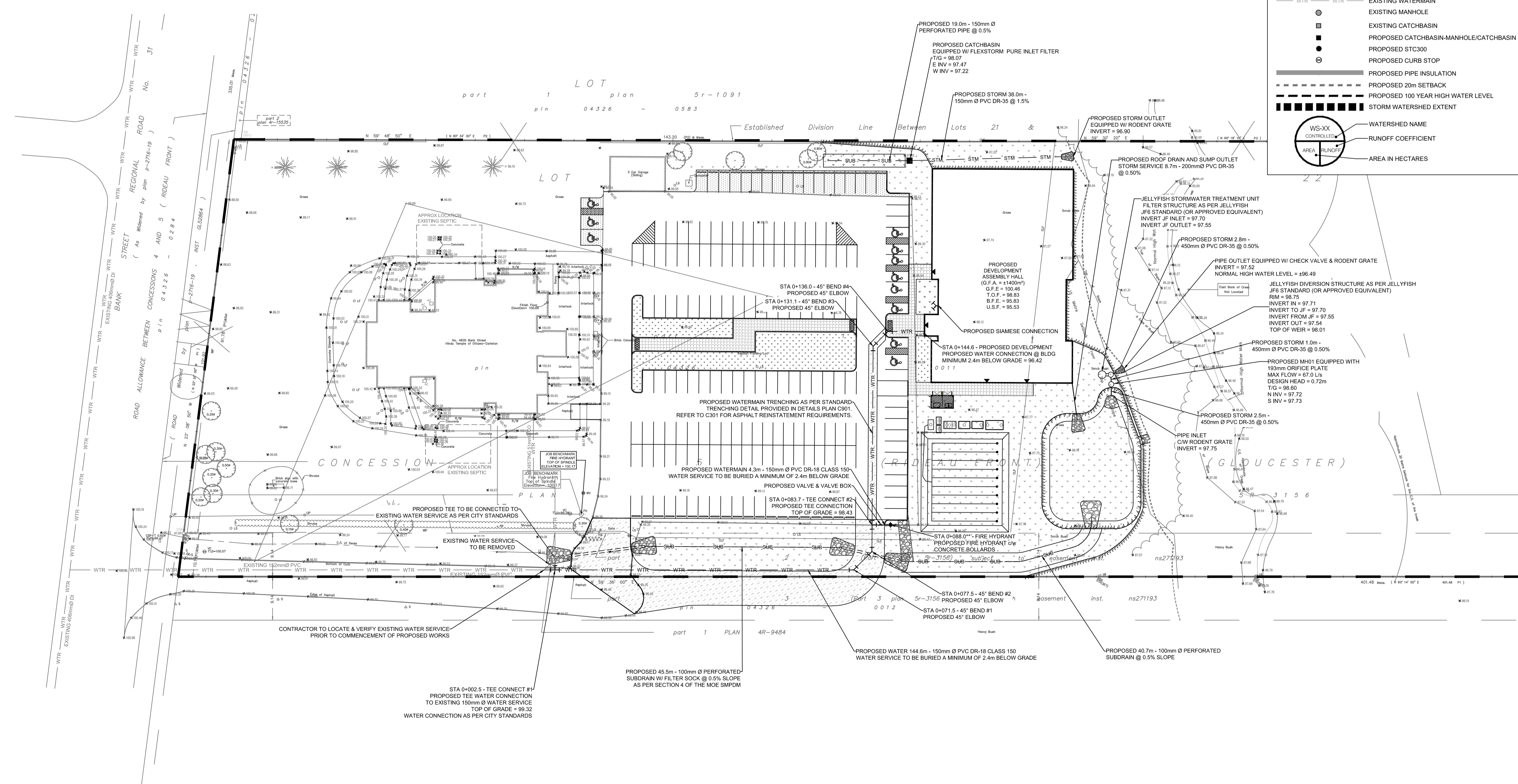
CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

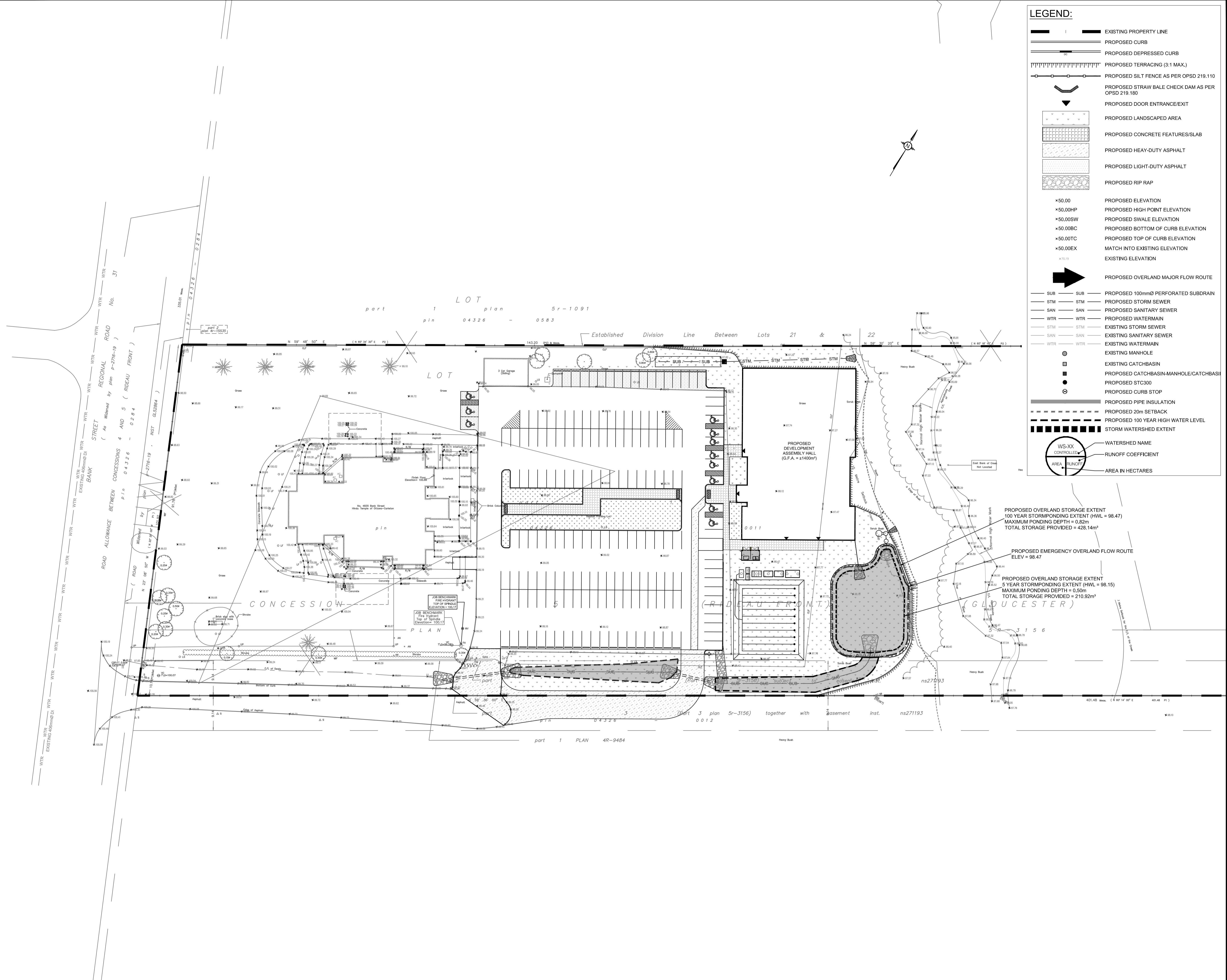
DESIGNED BY: P.P. DRAWN BY: K.H. APPROVED BY: M.B.

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE: SERVICING PLAN

PROJECT NO: 170132 DATE: JAN2020





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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- *70.10 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
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- WTR WTR PROPOSED WATERMAIN
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- WTR WTR EXISTING WATERMAIN
- EXISTING MANHOLE
- EXISTING CATCHBASIN
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| No. | REVISIONS | BY | DATE |
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CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

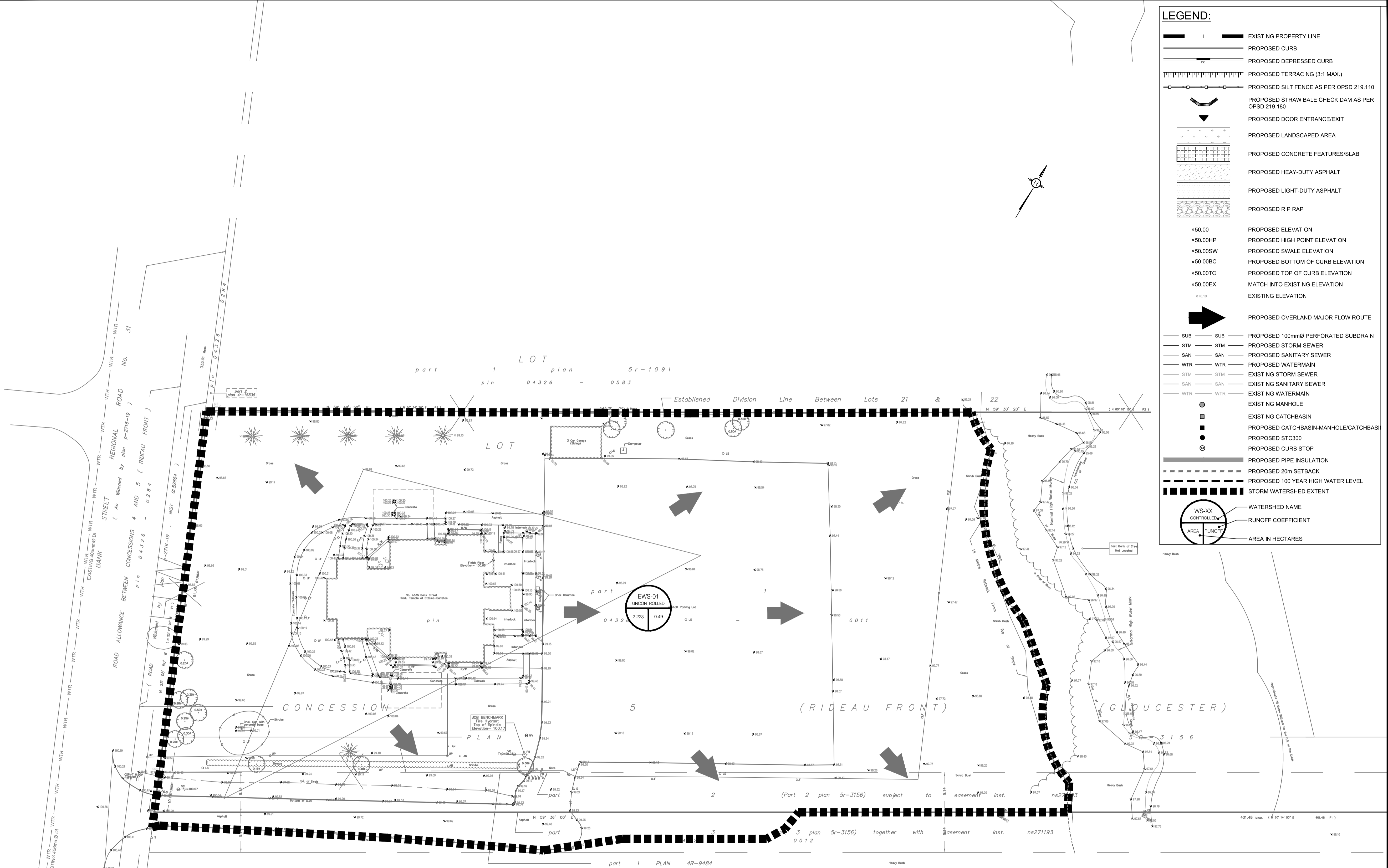
DESIGNED BY: P.P. DRAWN BY: K.H. APPROVED BY: M.B.

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE: STORMWATER MANAGEMENT PLAN

PROJECT NO: 170132 DATE: JAN2020

C601



LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MAX.)
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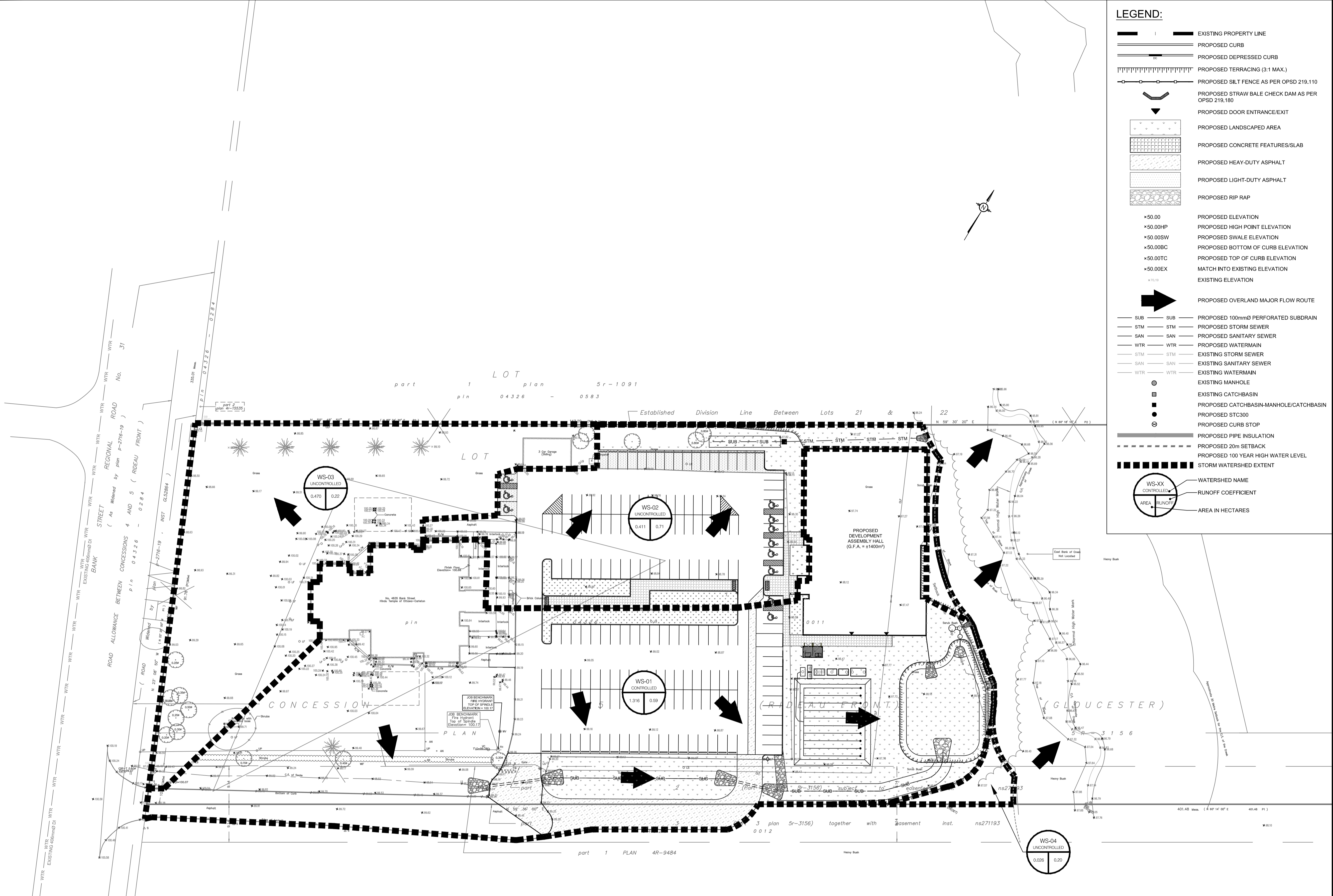
| CLIENT | DESIGNED BY: | DRAWN BY: | APPROVED BY: |
|--|--------------|-----------|--------------|
| THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON | P.P. | K.H. | M.B. |

PROJECT
**PROPOSED ASSEMBLY HALL
4835 BANK STREET, OTTAWA**

DRAWING TITLE
**PRE-DEVELOPMENT
WATERSHED PLAN**

PROJECT NO.
170132
DATE
JAN2020





LEGEND:

- EXISTING PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
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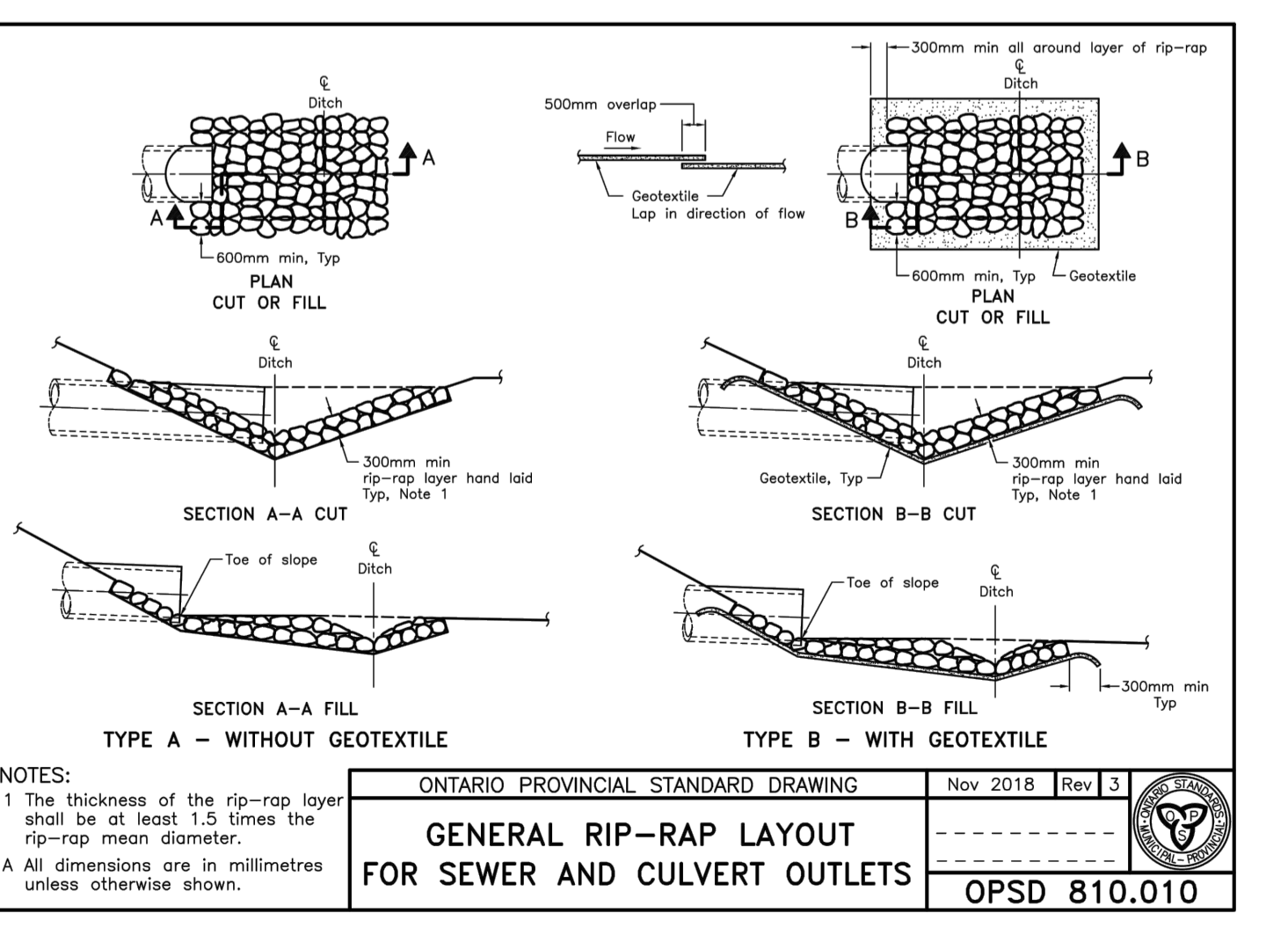
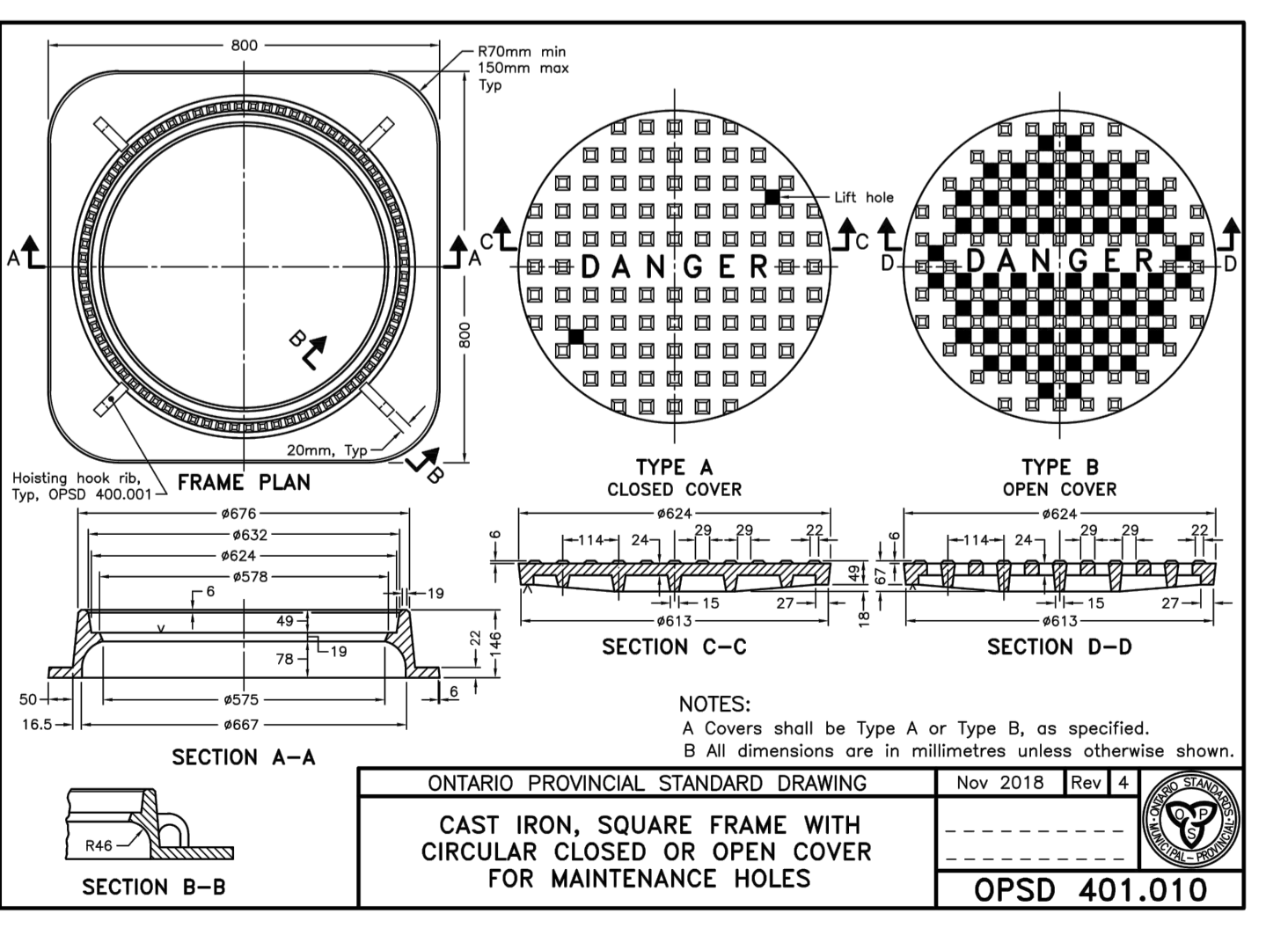
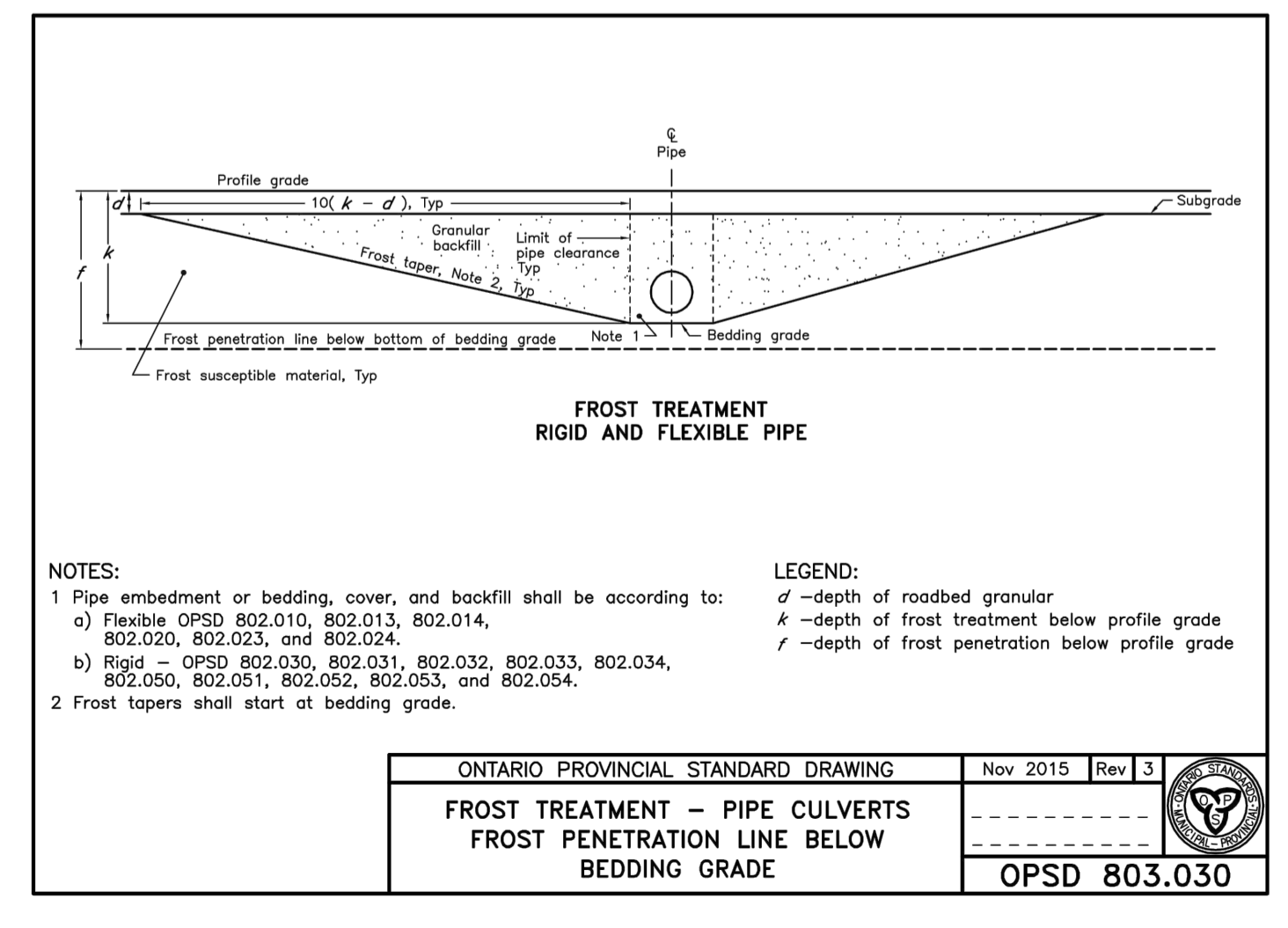
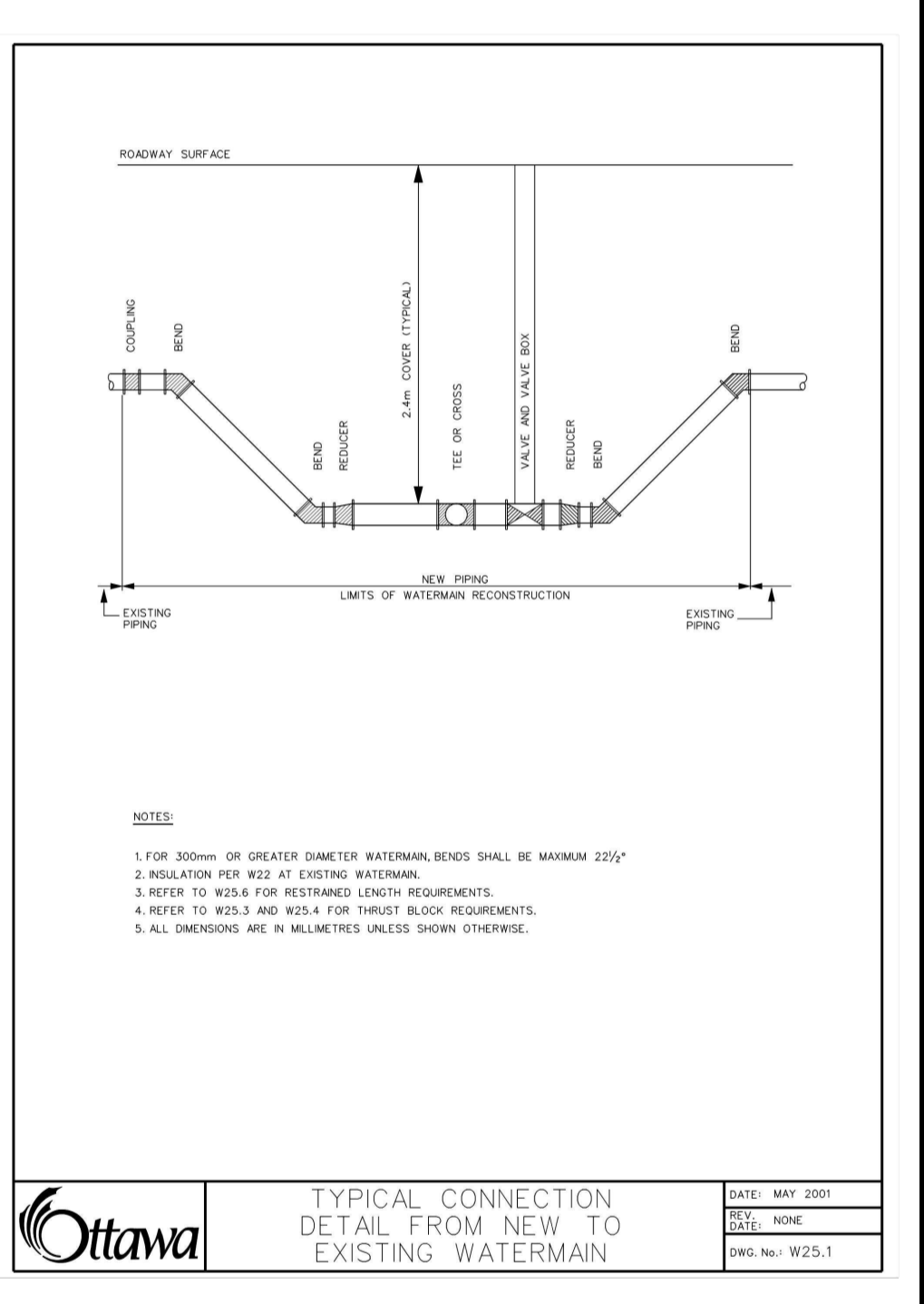
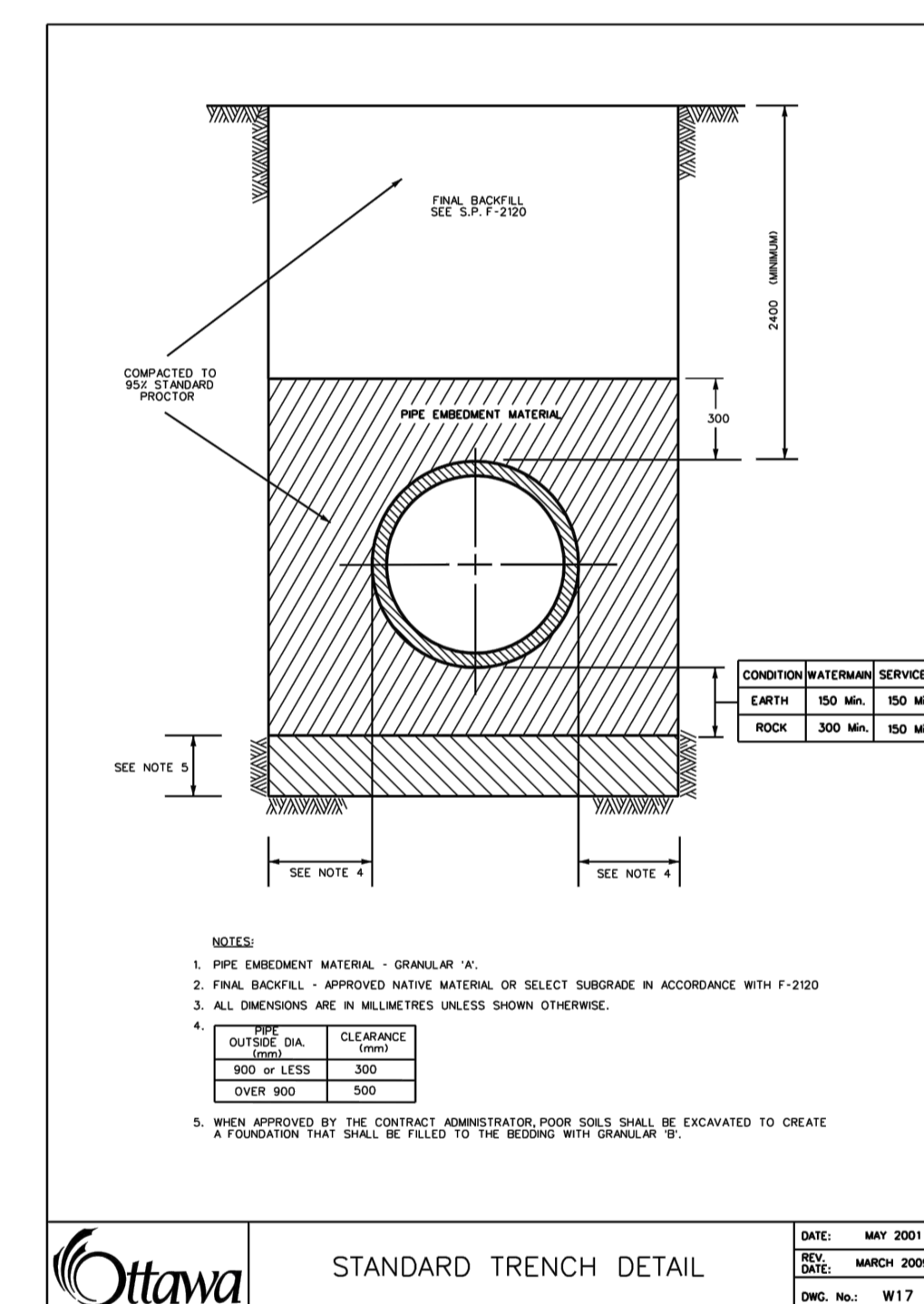
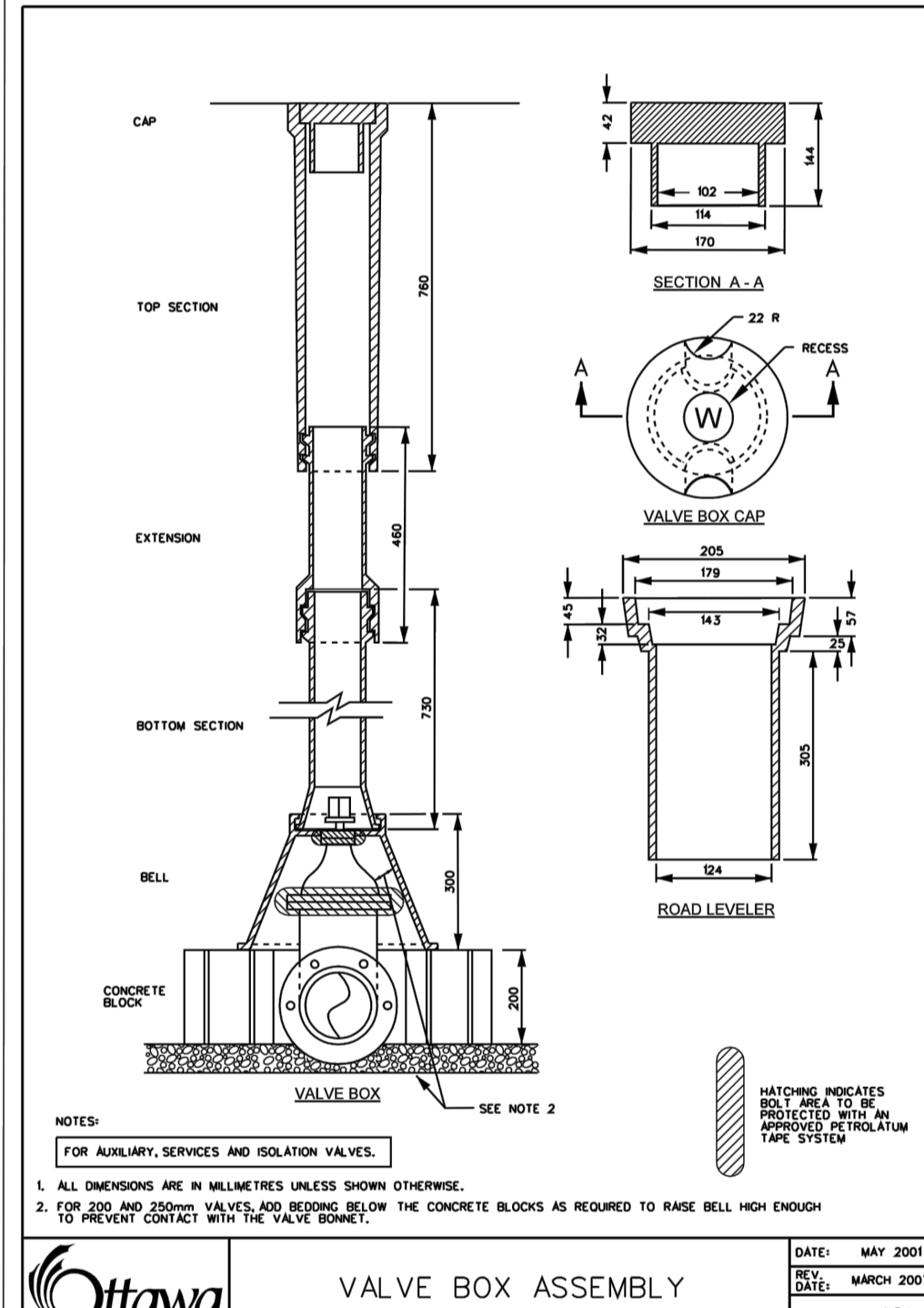
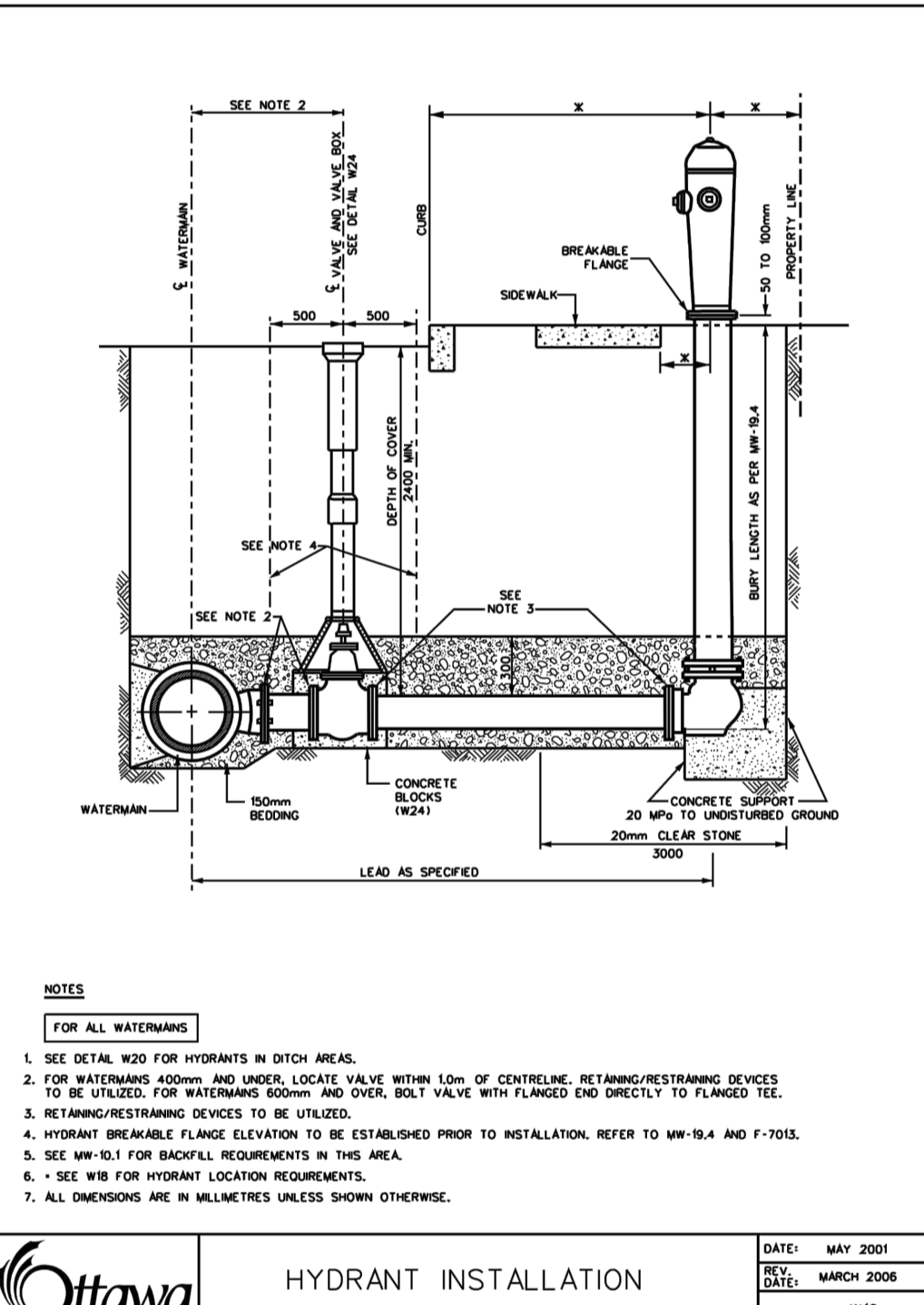
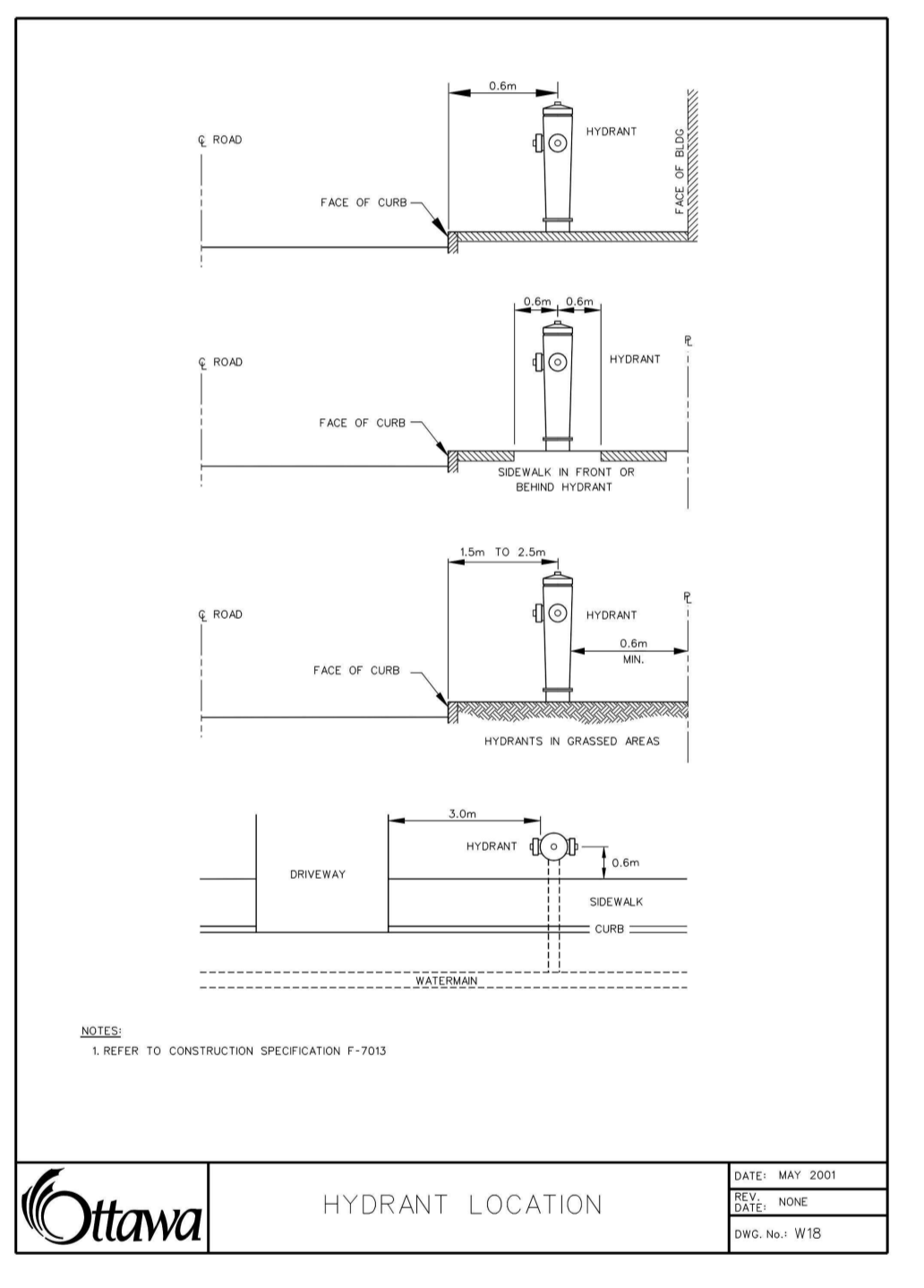
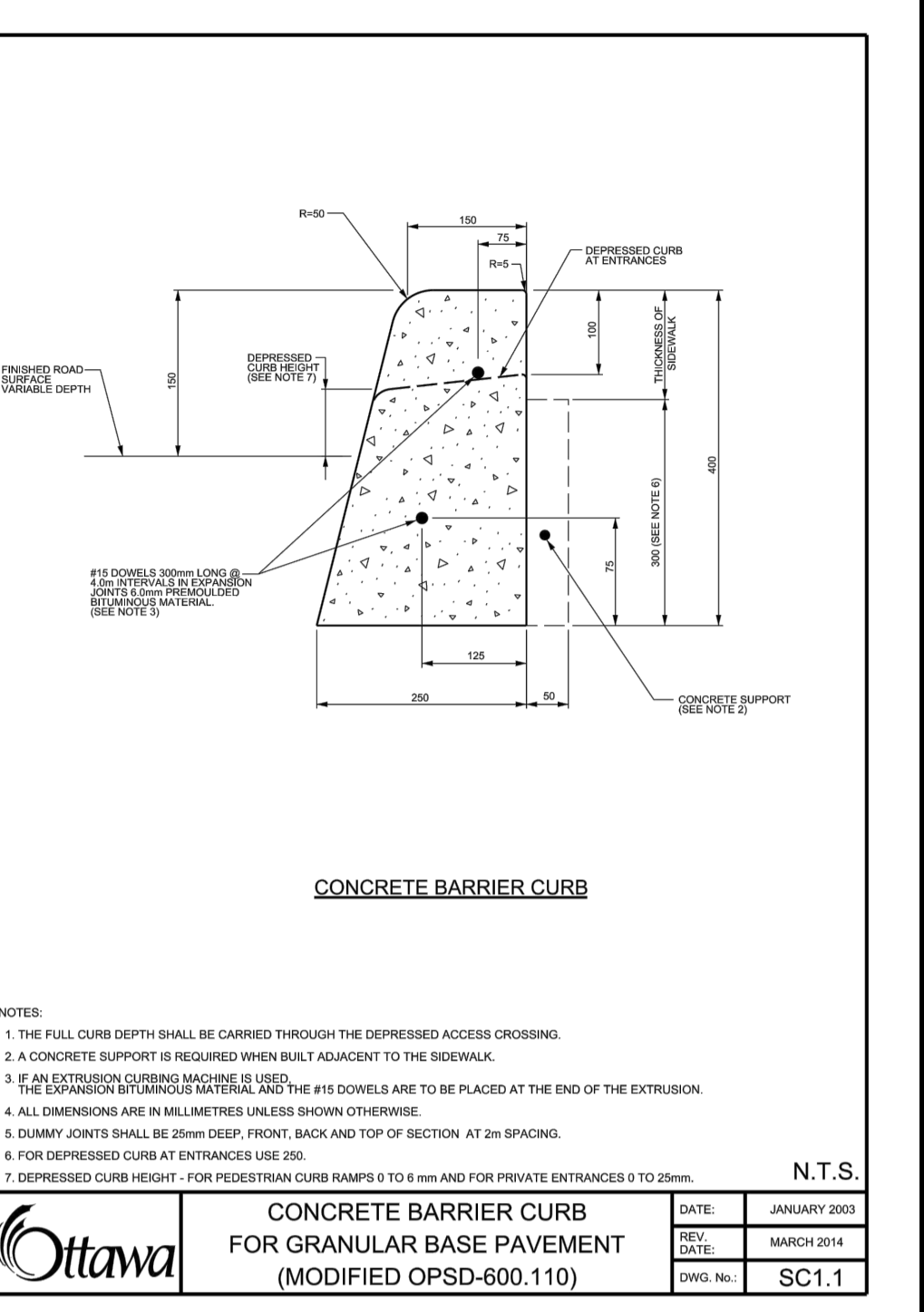
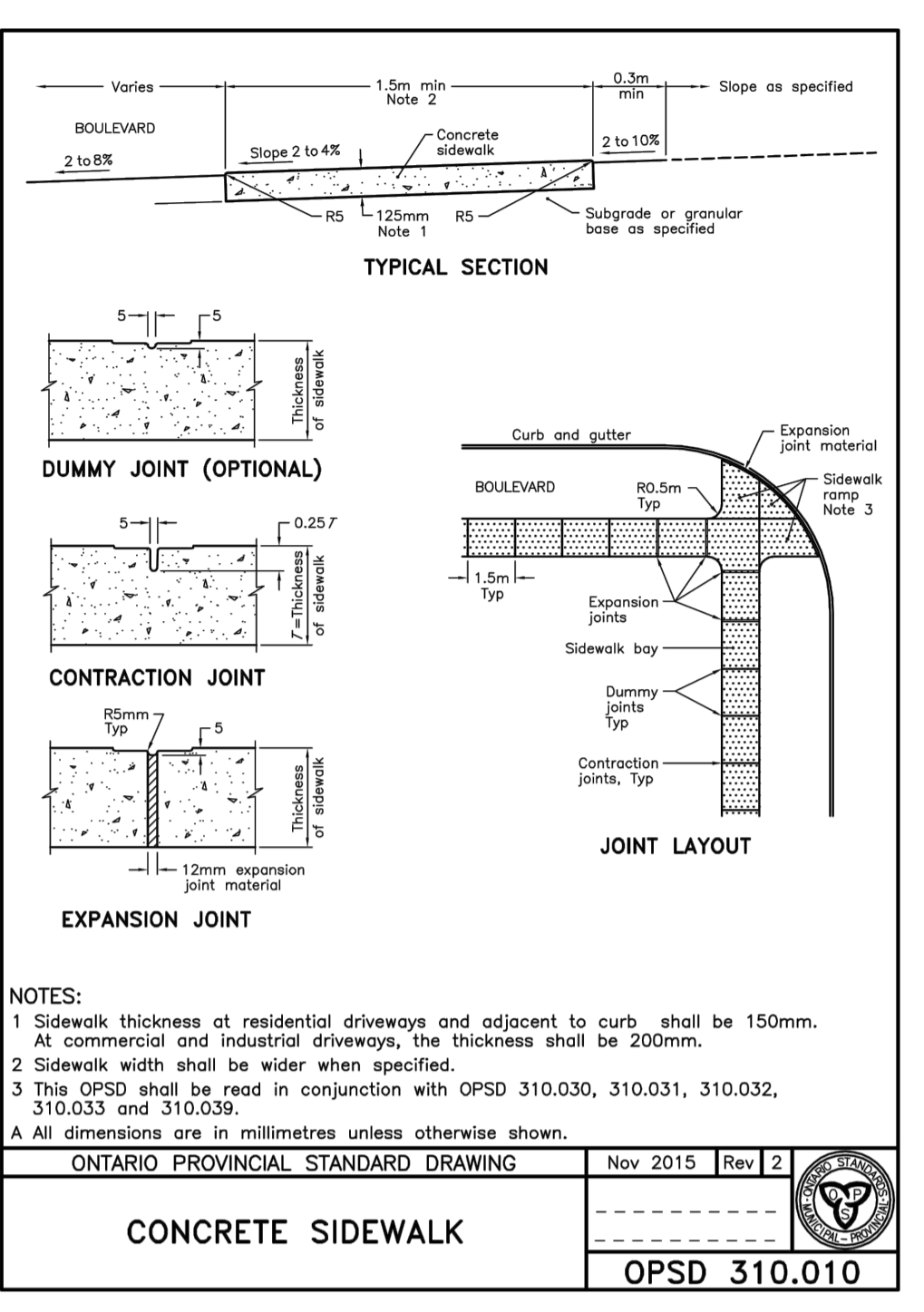
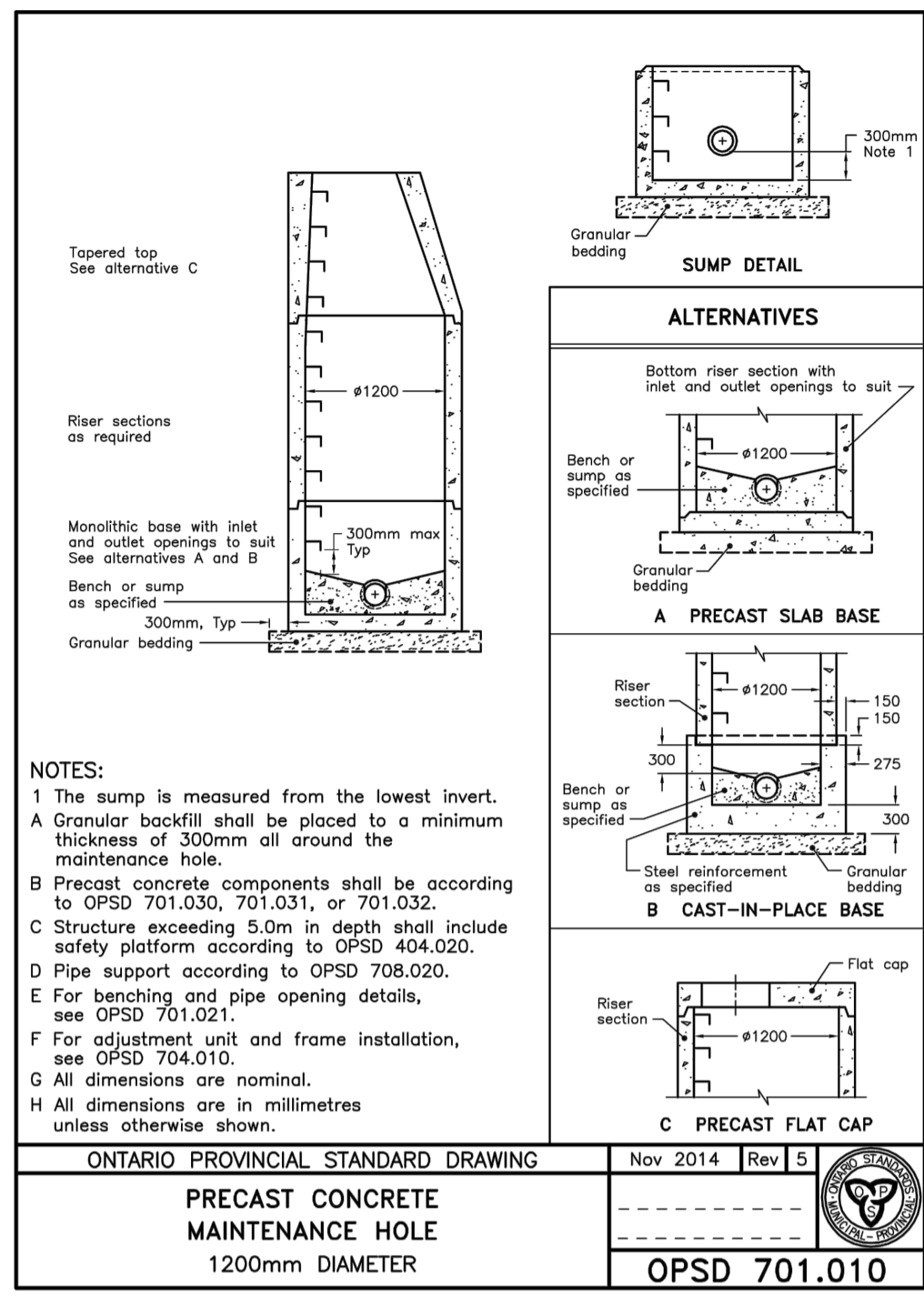
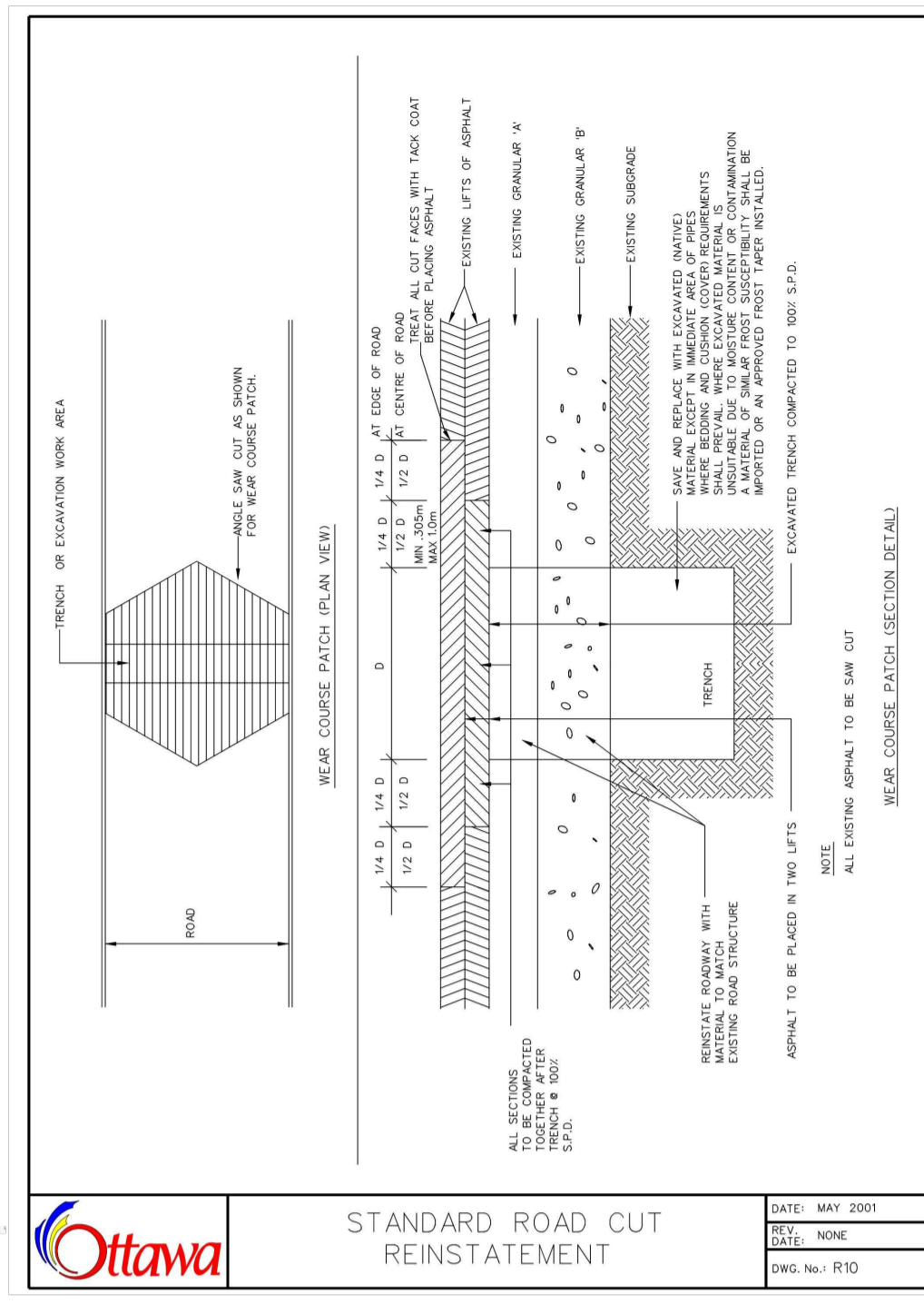
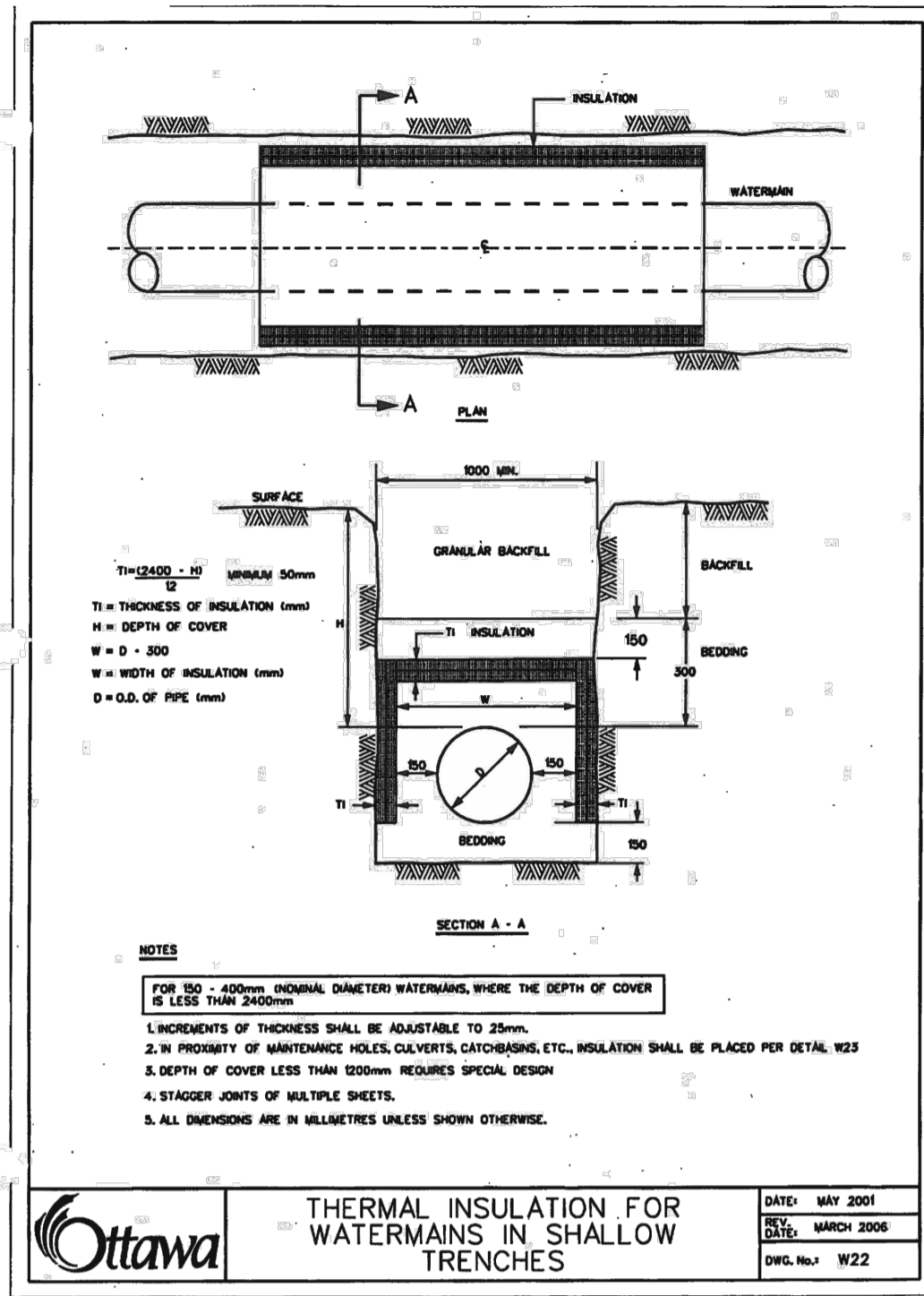
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www.lrl.ca | (613) 842-3434

| | | | |
|---------------|--|--------------|------|
| CLIENT | THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON | | |
| DESIGNED BY: | P.P. | DRAWN BY: | K.H. |
| | | APPROVED BY: | M.B. |
| PROJECT | PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA | | |
| DRAWING TITLE | POST-DEVELOPMENT WATERSHED PLAN | | |
| PROJECT NO. | 170132 | | |
| DATE | JAN2020 | | |





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 CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL AUTHORITY AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL AUTHORITY AND FOR OBTAINING ALL NECESSARY INFORMATION FROM THE LOCAL AUTHORITY.

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 NOTICED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

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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:

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

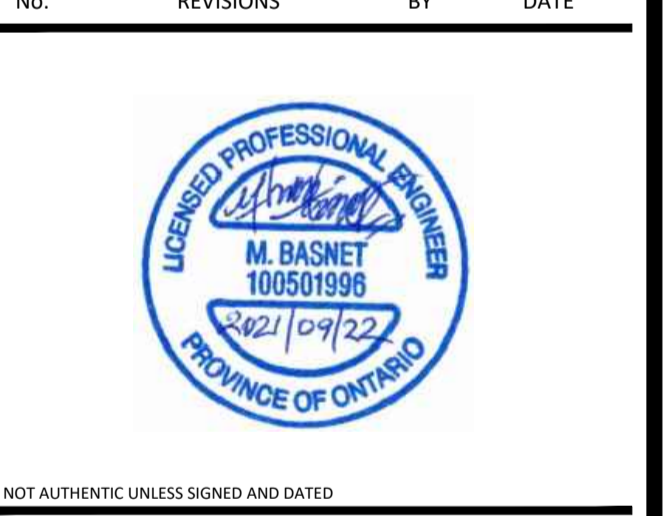
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CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

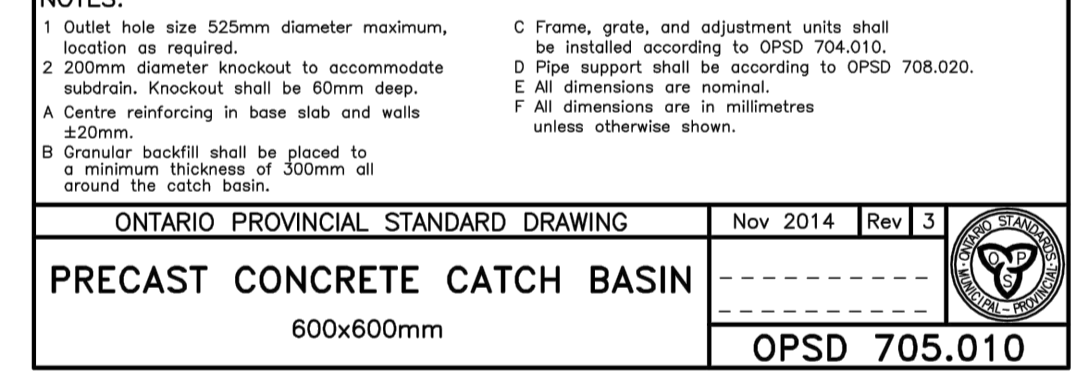
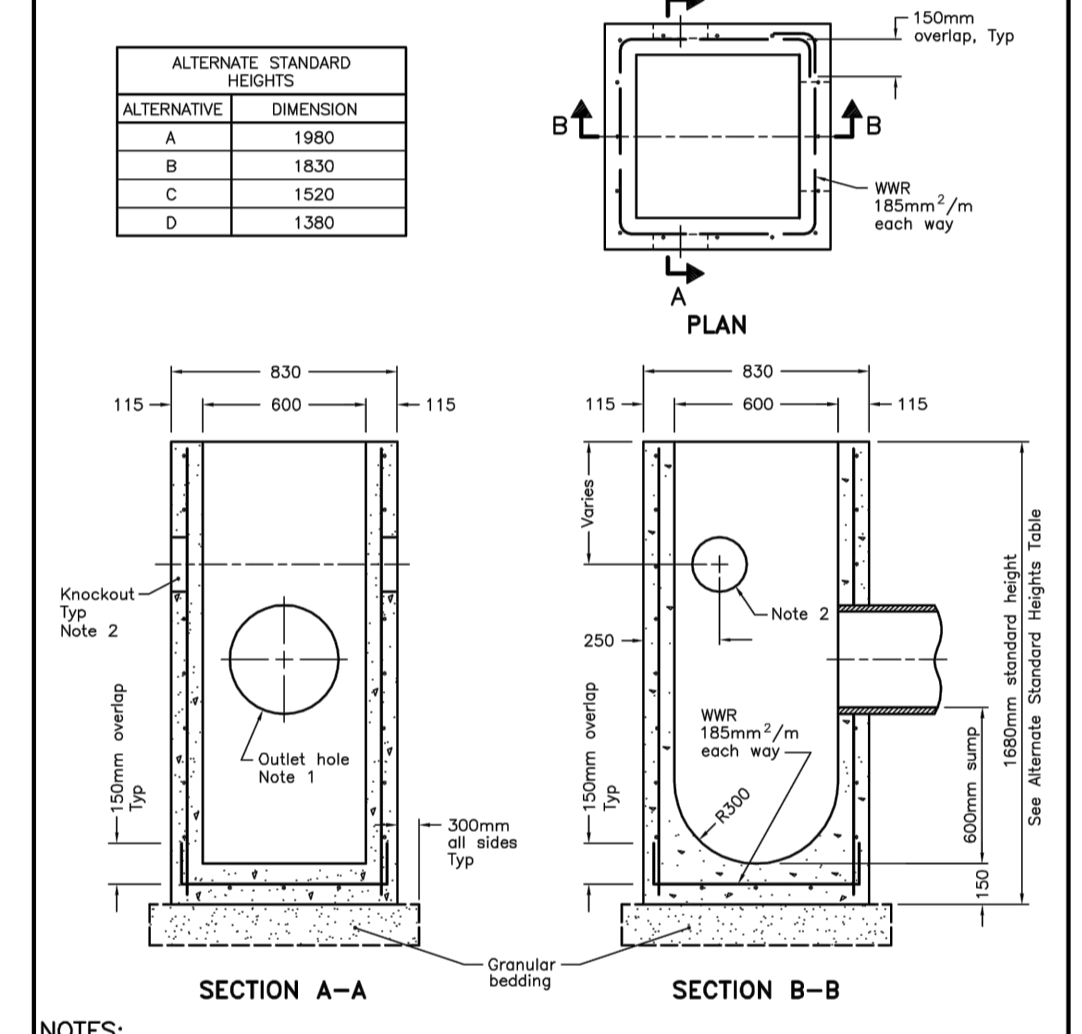
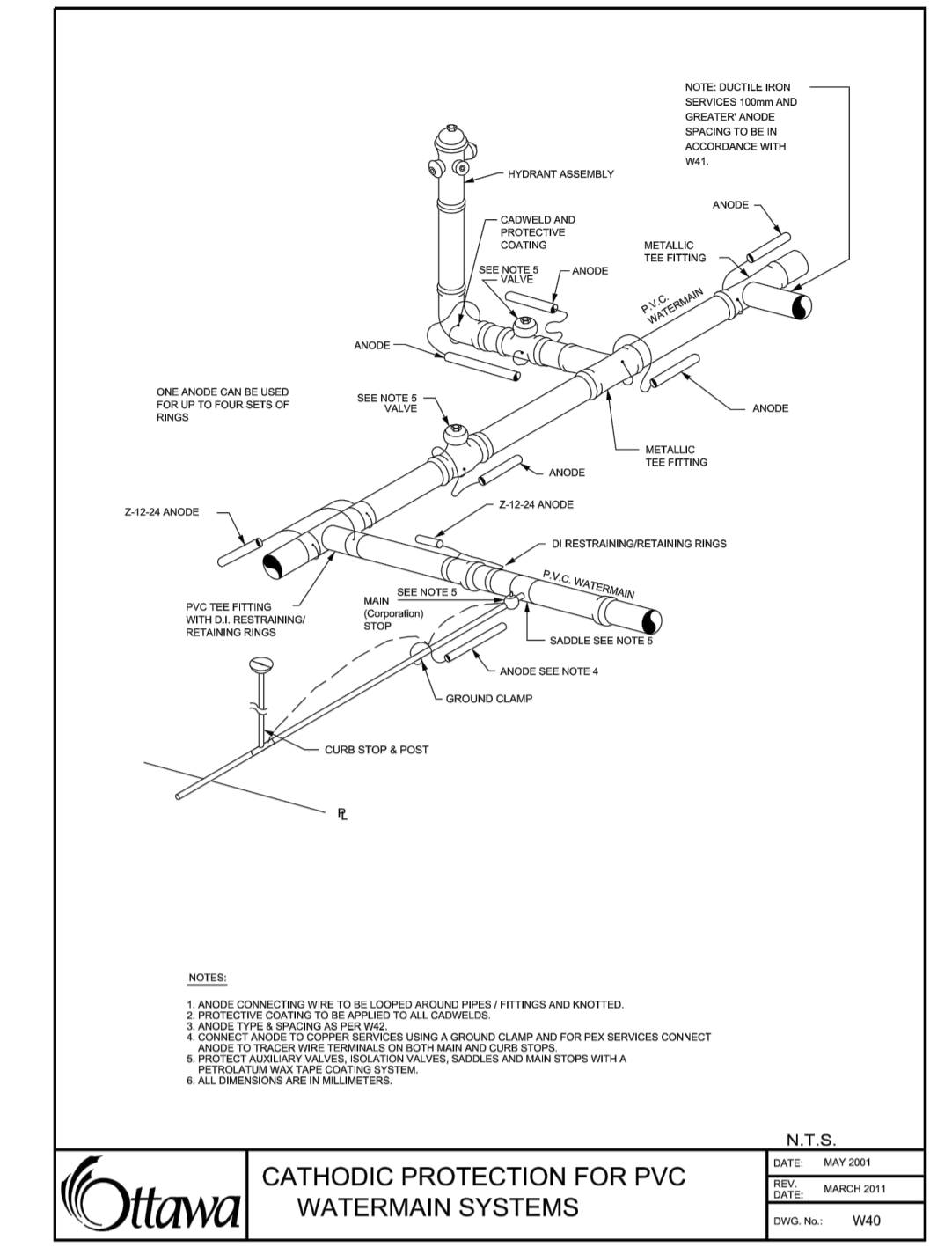
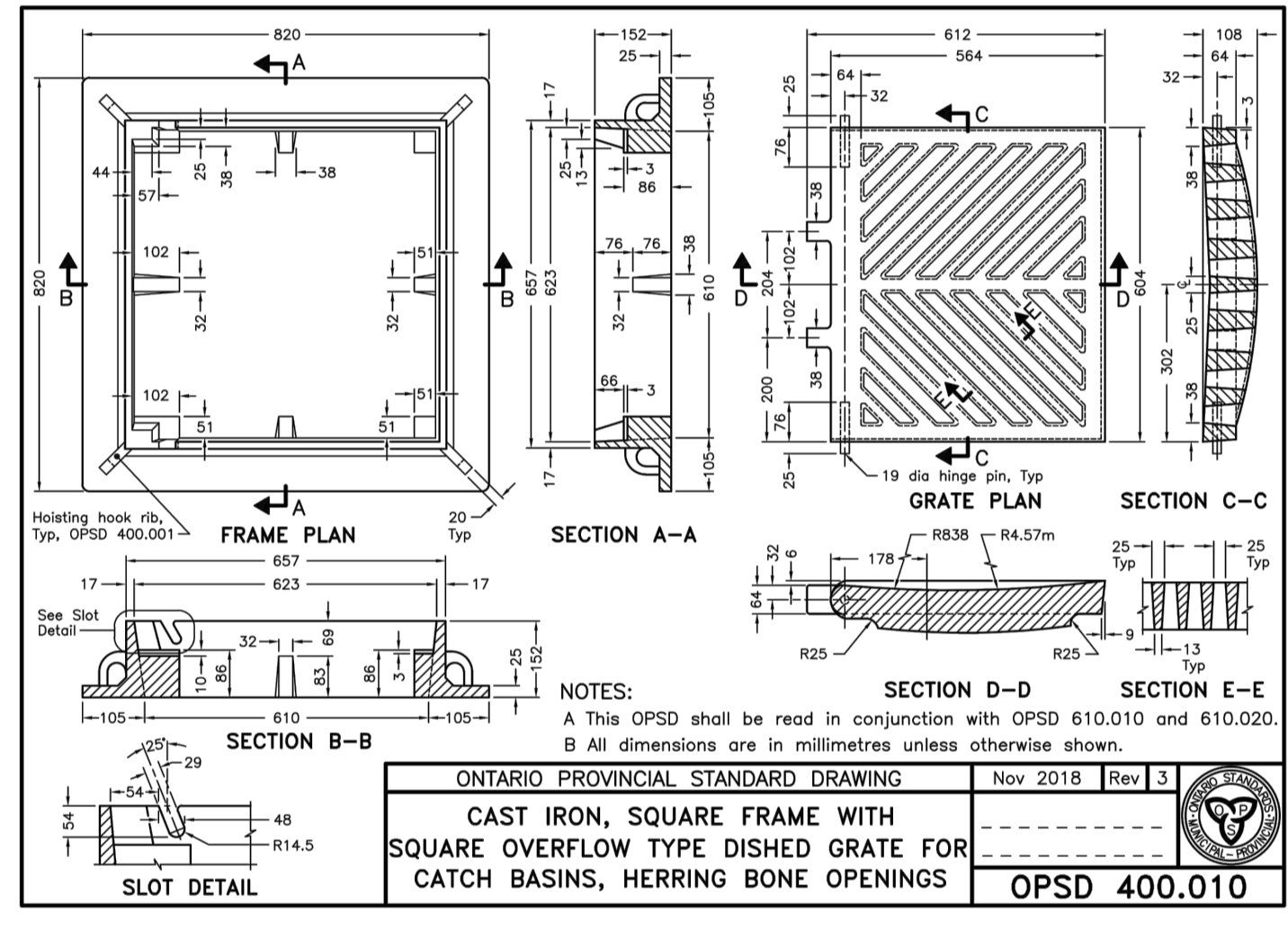
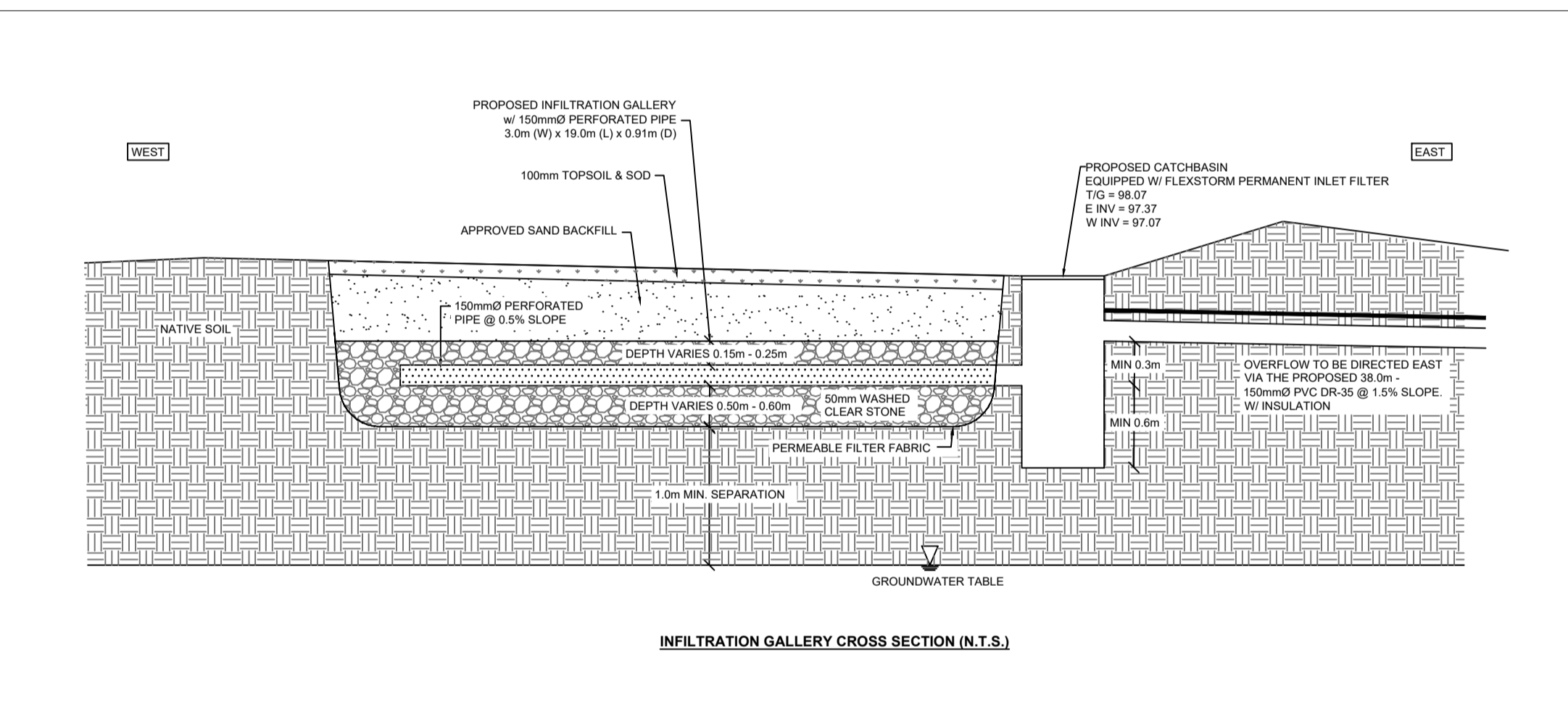
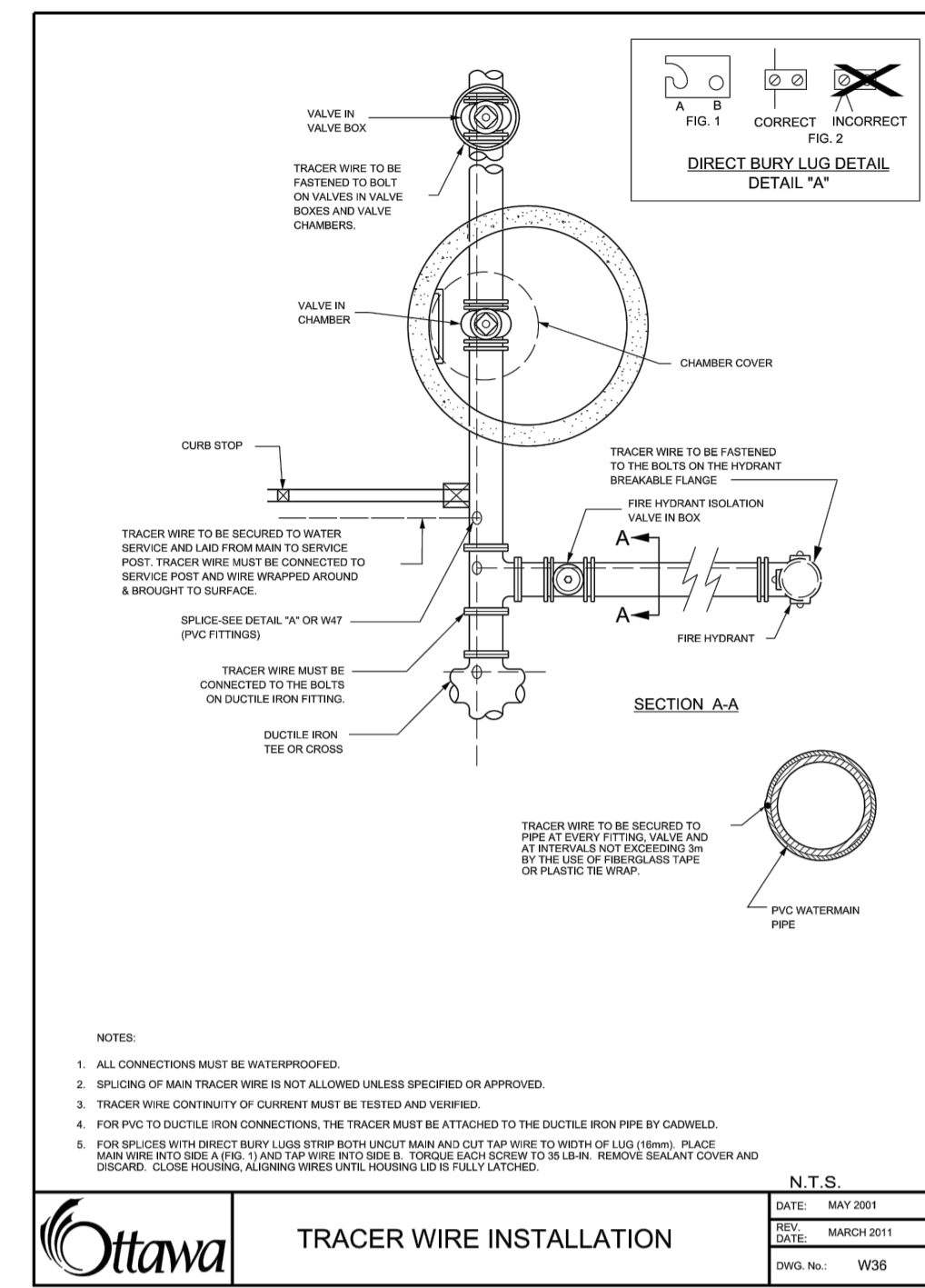
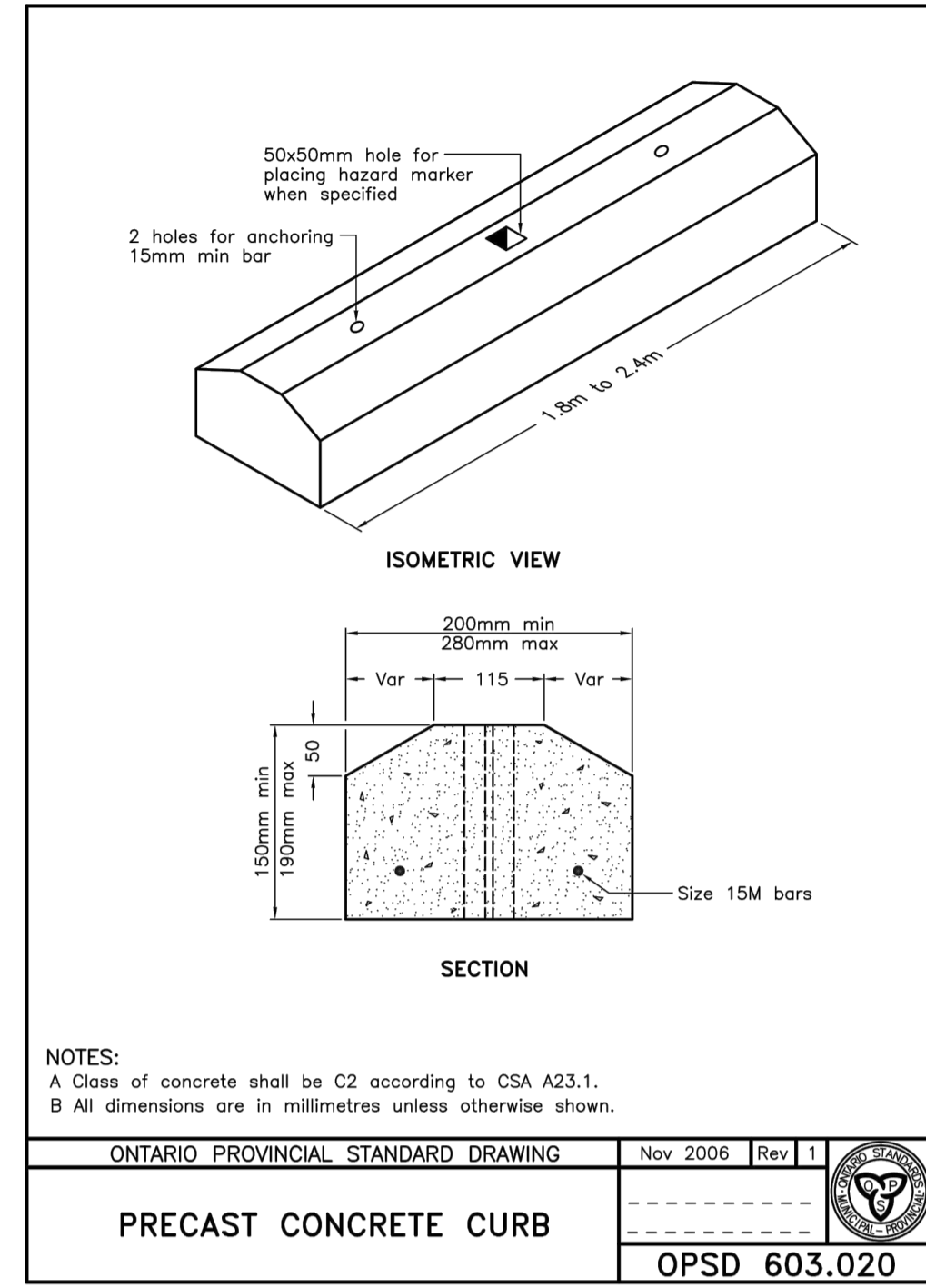
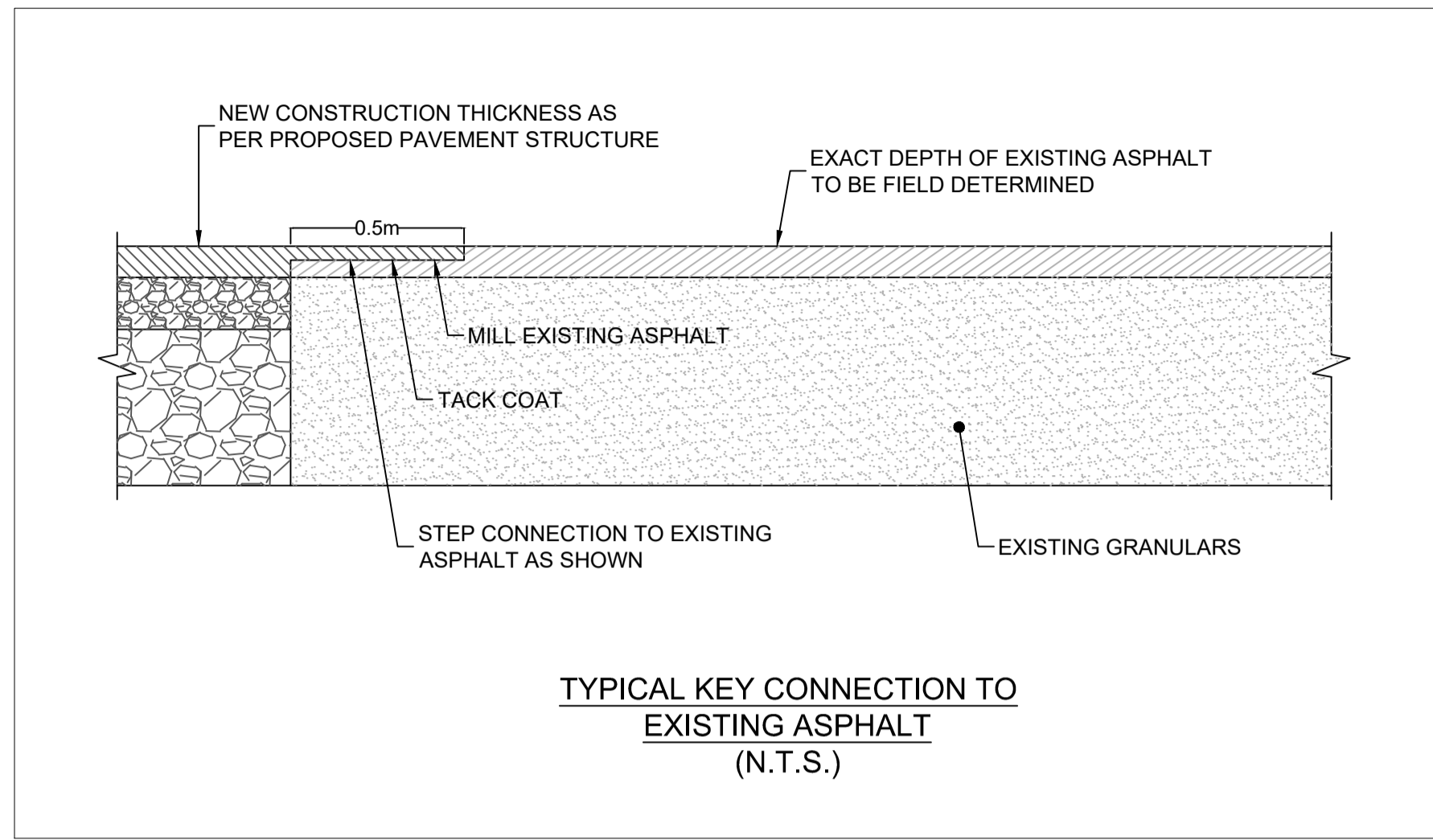
DESIGNED BY: P.P. DRAWN BY: K.H. APPROVED BY: M.B.

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE: CONSTRUCTION DETAIL PLAN

PROJECT NO: 170132
DATE: JAN 2020

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 REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAIL AS SHOWN UNLESS OTHERWISE SHOWN COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

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www.lrl.ca | (613) 842-3434

CLIENT: THE HINDU HERITAGE CENTRE OF OTTAWA CARLETON

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

PROJECT: PROPOSED ASSEMBLY HALL 4835 BANK STREET, OTTAWA

DRAWING TITLE: CONSTRUCTION DETAIL PLAN

PROJECT NO: 170132
DATE: JAN2020

C902

- GENERAL NOTES:**
- ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
 - JELLYFISH STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
 - UNLESS OTHERWISE NOTED, ALL BRASS AND STRUCTURE SHALL BE AS PER UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE JELLYFISH SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
 - DRAWING FOR INFORMATIONAL PURPOSES ONLY. REFER TO ENGINEERS SITE QUALITY PLAN FOR STRUCTURE ORIENTATION.
 - NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED TO DAVIS PRIOR TO PROJECTS 90 DATE, OR AS DIRECTED BY THE ENGINEER'S RECORD.

- JELLYFISH STRUCTURE & DESIGN NOTES:**
- THE MAINTENANCE ACCESS WALL TO BE USED FOR CLEANOUT AND ACCESS BELOW CARTRIDGE DECK.
 - CARTRIDGE 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.
 - CARTRIDGE AND GRADE RINGS, OR DOORS AND DOOR RISERS, OR BOTH, SHALL BE GRADED FOR WATER TIGHTNESS. STRUCTURE SHALL MEET ASHFTO 20. ASSUMING EARTH COVER OF 0.7. AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER'S RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET ASHFTO X306 LOAD RATING AND BE CAST WITH THE MANHOLE LOG.
 - ALL STRUCTURAL SECTIONS AND PARTS TO MEET OR EXCEED ASTM C-476, ASTM A443, AND ASTM A-507 CORROSION RESISTANT TO ASHFTO SPECIFIC CATHODES, AND ANY OTHER SITE OR LOCAL STANDARDS.
 - CONCRETE RISER SECTIONS FROM BOTTOM TO TOP WILL BE ADDED AS REQUIRED INCLUDING TRANSITION PIECES TO SMALLER DIAMETER RISERS FOR STRUCTURE. TOP SLAB SHALL NOT BE EXPOSED TO BRING WHERY 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.
 - STEPS TO BE APPROXIMATELY 330 MM (13") APART AND DIMENSIONS MUST MEET LOCAL STANDARDS. STEPS SHALL BE INSTALLED AT THE CARTRIDGE DECK IN PLACE.
 - CONSPIRACY OF INLET AND OUTLET PIPE CANARY TO MEET SITE'S NEEDS. IT IS THE RESPONSIBILITY OF OTHERS TO PROPERLY PROTECT THE TREATMENT DEVICE AND KEEP THE DEVICE OPENING 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 CONTACTS STORM DRAINAGE TO THE TREATMENT DEVICE. CARTRIDGES SHALL BE FURNISHED NEW, AT THE TIME OF FINAL ACCEPTANCE.
 - THIS DRAWING MUST BE VIEWED IN CONJUNCTION WITH THE STANDARD JELLYFISH SPECIFICATION, AND STORMWATER QUALITY FILTER TREATMENT JELLYFISH DOCUMENTS.

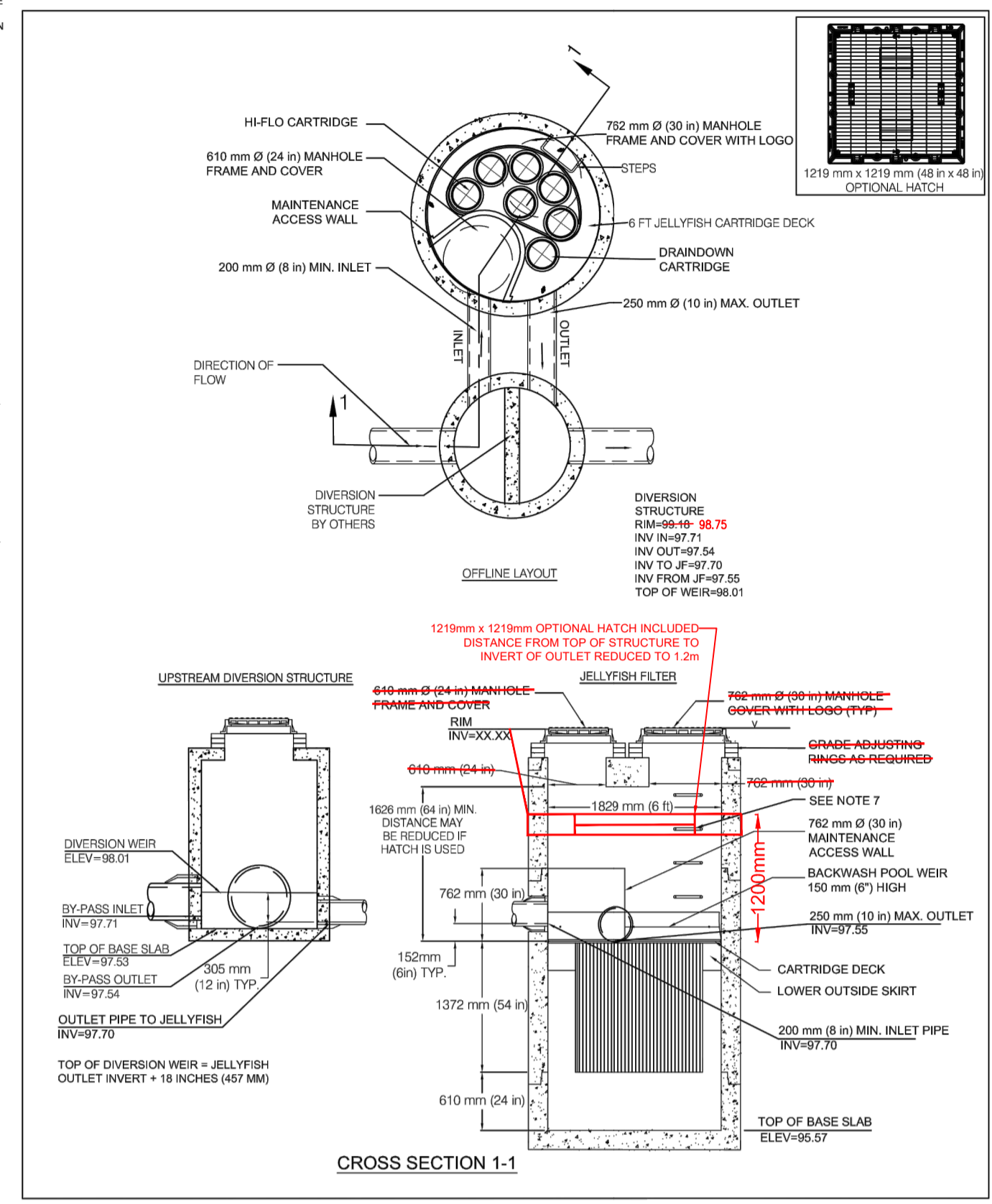
- INSTALLATION NOTES:**
- DATE, DIMENSIONS, BACKFILL DEPTH, AND/OR ANTI-FILTRATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER'S RECORD.
 - CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED).
 - CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE ROOT.
 - CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION RELATED EROSION RUNOFF.
 - CARTRIDGE INSTALLATION BY AIRLIFT, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT MANUFACTURER TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

STANDARD OFFLINE JELLYFISH RECOMMENDED PIPE SIZES

| Flow Rate (L/s) | Flow Rate (MGD) | Recommended Inlet Pipe Size (mm) | Recommended Outlet Pipe Size (mm) |
|-----------------|-----------------|----------------------------------|-----------------------------------|
| 1.0 | 0.22 | 100 | 100 |
| 2.0 | 0.44 | 150 | 150 |
| 3.0 | 0.66 | 200 | 200 |
| 4.0 | 0.88 | 250 | 250 |
| 5.0 | 1.10 | 300 | 300 |
| 6.0 | 1.32 | 350 | 350 |
| 7.0 | 1.54 | 400 | 400 |
| 8.0 | 1.76 | 450 | 450 |
| 9.0 | 1.98 | 500 | 500 |
| 10.0 | 2.20 | 550 | 550 |

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 CONFIGURATION MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE.

DRAWING NOT TO BE USED FOR CONSTRUCTION



JELLYFISH DESIGN NOTES

JELLYFISH TREATMENT CAPACITY AS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN. (8000 LPM) MANHOLE JELLYFISH PEAK TREATMENT CAPACITY IS 2.8 L/s (1.16 CFS). TREATMENT FLOW RATE IS BASED ON 40% CARTRIDGE SELECTION.

| Cartridge Selection | Flow Rate (L/s) | Flow Rate (MGD) |
|---------------------|-----------------|-----------------|
| 15" | 2.8 | 0.62 |
| 27" | 4.0 | 0.88 |
| 40" | 5.6 | 1.23 |
| 54" | 8.0 | 1.76 |
| 67" | 11.2 | 2.47 |
| 81" | 15.4 | 3.38 |
| 94" | 21.6 | 4.75 |
| 108" | 28.0 | 6.19 |
| 122" | 35.2 | 7.74 |
| 136" | 42.4 | 9.29 |
| 150" | 50.4 | 11.04 |
| 164" | 58.4 | 12.79 |
| 178" | 66.4 | 14.54 |
| 192" | 74.4 | 16.29 |
| 206" | 82.4 | 18.04 |
| 220" | 90.4 | 19.79 |
| 234" | 98.4 | 21.54 |
| 248" | 106.4 | 23.29 |
| 262" | 114.4 | 25.04 |
| 276" | 122.4 | 26.79 |
| 290" | 130.4 | 28.54 |
| 304" | 138.4 | 30.29 |
| 318" | 146.4 | 32.04 |
| 332" | 154.4 | 33.79 |
| 346" | 162.4 | 35.54 |
| 360" | 170.4 | 37.29 |
| 374" | 178.4 | 39.04 |
| 388" | 186.4 | 40.79 |
| 402" | 194.4 | 42.54 |
| 416" | 202.4 | 44.29 |
| 430" | 210.4 | 46.04 |
| 444" | 218.4 | 47.79 |
| 458" | 226.4 | 49.54 |
| 472" | 234.4 | 51.29 |
| 486" | 242.4 | 53.04 |
| 500" | 250.4 | 54.79 |
| 514" | 258.4 | 56.54 |
| 528" | 266.4 | 58.29 |
| 542" | 274.4 | 60.04 |
| 556" | 282.4 | 61.79 |
| 570" | 290.4 | 63.54 |
| 584" | 298.4 | 65.29 |
| 598" | 306.4 | 67.04 |
| 612" | 314.4 | 68.79 |
| 626" | 322.4 | 70.54 |
| 640" | 330.4 | 72.29 |
| 654" | 338.4 | 74.04 |
| 668" | 346.4 | 75.79 |
| 682" | 354.4 | 77.54 |
| 696" | 362.4 | 79.29 |
| 710" | 370.4 | 81.04 |
| 724" | 378.4 | 82.79 |
| 738" | 386.4 | 84.54 |
| 752" | 394.4 | 86.29 |
| 766" | 402.4 | 88.04 |
| 780" | 410.4 | 89.79 |
| 794" | 418.4 | 91.54 |
| 808" | 426.4 | 93.29 |
| 822" | 434.4 | 95.04 |
| 836" | 442.4 | 96.79 |
| 850" | 450.4 | 98.54 |
| 864" | 458.4 | 100.29 |
| 878" | 466.4 | 102.04 |
| 892" | 474.4 | 103.79 |
| 906" | 482.4 | 105.54 |
| 920" | 490.4 | 107.29 |
| 934" | 498.4 | 109.04 |
| 948" | 506.4 | 110.79 |
| 962" | 514.4 | 112.54 |
| 976" | 522.4 | 114.29 |
| 990" | 530.4 | 116.04 |
| 1004" | 538.4 | 117.79 |
| 1018" | 546.4 | 119.54 |
| 1032" | 554.4 | 121.29 |
| 1046" | 562.4 | 123.04 |
| 1060" | 570.4 | 124.79 |
| 1074" | 578.4 | 126.54 |
| 1088" | 586.4 | 128.29 |
| 1102" | 594.4 | 130.04 |
| 1116" | 602.4 | 131.79 |
| 1130" | 610.4 | 133.54 |
| 1144" | 618.4 | 135.29 |
| 1158" | 626.4 | 137.04 |
| 1172" | 634.4 | 138.79 |
| 1186" | 642.4 | 140.54 |
| 1200" | 650.4 | 142.29 |
| 1214" | 658.4 | 144.04 |
| 1228" | 666.4 | 145.79 |
| 1242" | 674.4 | 147.54 |
| 1256" | 682.4 | 149.29 |
| 1270" | 690.4 | 151.04 |
| 1284" | 698.4 | 152.79 |
| 1298" | 706.4 | 154.54 |
| 1312" | 714.4 | 156.29 |
| 1326" | 722.4 | 158.04 |
| 1340" | 730.4 | 159.79 |
| 1354" | 738.4 | 161.54 |
| 1368" | 746.4 | 163.29 |
| 1382" | 754.4 | 165.04 |
| 1396" | 762.4 | 166.79 |
| 1410" | 770.4 | 168.54 |
| 1424" | 778.4 | 170.29 |
| 1438" | 786.4 | 172.04 |
| 1452" | 794.4 | 173.79 |
| 1466" | 802.4 | 175.54 |
| 1480" | 810.4 | 177.29 |
| 1494" | 818.4 | 179.04 |
| 1508" | 826.4 | 180.79 |
| 1522" | 834.4 | 182.54 |
| 1536" | 842.4 | 184.29 |
| 1550" | 850.4 | 186.04 |
| 1564" | 858.4 | 187.79 |
| 1578" | 866.4 | 189.54 |
| 1592" | 874.4 | 191.29 |
| 1606" | 882.4 | 193.04 |
| 1620" | 890.4 | 194.79 |
| 1634" | 898.4 | 196.54 |
| 1648" | 906.4 | 198.29 |
| 1662" | 914.4 | 200.04 |
| 1676" | 922.4 | 201.79 |
| 1690" | 930.4 | 203.54 |
| 1704" | 938.4 | 205.29 |
| 1718" | 946.4 | 207.04 |
| 1732" | 954.4 | 208.79 |
| 1746" | 962.4 | 210.54 |
| 1760" | 970.4 | 212.29 |
| 1774" | 978.4 | 214.04 |
| 1788" | 986.4 | 215.79 |
| 1802" | 994.4 | 217.54 |
| 1816" | 1002.4 | 219.29 |
| 1830" | 1010.4 | 221.04 |
| 1844" | 1018.4 | 222.79 |
| 1858" | 1026.4 | 224.54 |
| 1872" | 1034.4 | 226.29 |
| 1886" | 1042.4 | 228.04 |
| 1900" | 1050.4 | 229.79 |
| 1914" | 1058.4 | 231.54 |
| 1928" | 1066.4 | 233.29 |
| 1942" | 1074.4 | 235.04 |
| 1956" | 1082.4 | 236.79 |
| 1970" | 1090.4 | 238.54 |
| 1984" | 1098.4 | 240.29 |
| 1998" | 1106.4 | 242.04 |
| 2012" | 1114.4 | 243.79 |
| 2026" | 1122.4 | 245.54 |
| 2040" | 1130.4 | 247.29 |
| 2054" | 1138.4 | 249.04 |
| 2068" | 1146.4 | 250.79 |
| 2082" | 1154.4 | 252.54 |
| 2096" | 1162.4 | 254.29 |
| 2110" | 1170.4 | 256.04 |
| 2124" | 1178.4 | 257.79 |
| 2138" | 1186.4 | 259.54 |
| 2152" | 1194.4 | 261.29 |
| 2166" | 1202.4 | 263.04 |
| 2180" | 1210.4 | 264.79 |
| 2194" | 1218.4 | 266.54 |
| 2208" | 1226.4 | 268.29 |
| 2222" | 1234.4 | 270.04 |
| 2236" | 1242.4 | 271.79 |
| 2250" | 1250.4 | 273.54 |
| 2264" | 1258.4 | 275.29 |
| 2278" | 1266.4 | 277.04 |
| 2292" | 1274.4 | 278.79 |
| 2306" | 1282.4 | 280.54 |
| 2320" | 1290.4 | 282.29 |
| 2334" | 1298.4 | 284.04 |
| 2348" | 1306.4 | 285.79 |
| 2362" | 1314.4 | 287.54 |
| 2376" | 1322.4 | 289.29 |
| 2390" | 1330.4 | 291.04 |
| 2404" | 1338.4 | 292.79 |
| 2418" | 1346.4 | 294.54 |
| 2432" | 1354.4 | 296.29 |
| 2446" | 1362.4 | 298.04 |
| 2460" | 1370.4 | 299.79 |
| 2474" | 1378.4 | 301.54 |
| 2488" | 1386.4 | 303.29 |
| 2502" | 1394.4 | 305.04 |
| 2516" | 1402.4 | 306.79 |
| 2530" | 1410.4 | 308.54 |
| 2544" | 1418.4 | 310.29 |
| 2558" | 1426.4 | 312.04 |
| 2572" | 1434.4 | 313.79 |
| 2586" | 1442.4 | 315.54 |
| 2600" | 1450.4 | 317.29 |
| 2614" | 1458.4 | 319.04 |
| 2628" | 1466.4 | 320.79 |
| 2642" | 1474.4 | 322.54 |
| 2656" | 1482.4 | 324.29 |
| 2670" | 1490.4 | 326.04 |
| 2684" | 1498.4 | 327.79 |
| 2698" | 1506.4 | 329.54 |
| 2712" | 1514.4 | 331.29 |
| 2726" | 1522.4 | 333.04 |
| 2740" | 1530.4 | 334.79 |
| 2754" | 1538.4 | 336.54 |
| 2768" | 1546.4 | 338.29 |
| 2782" | 1554.4 | 340.04 |
| 2796" | 1562.4 | 341.79 |
| 2810" | 1570.4 | 343.54 |
| 2824" | 1578.4 | 345.29 |
| 2838" | 1586.4 | 347.04 |
| 2852" | 1594.4 | 348.79 |
| 2866" | 1602.4 | 350.54 |
| 2880" | 1610.4 | 352.29 |
| 2894" | 1618.4 | 354.04 |
| 2908" | 1626.4 | 355.79 |
| 2922" | 1634.4 | 357.54 |
| 2936" | 1642.4 | 359.29 |
| 2950" | 1650.4 | 361.04 |
| 2964" | 1658.4 | 362.79 |
| 2978" | 1666.4 | 364.54 |
| 2992" | 1674.4 | 366.29 |
| 3006" | 1682.4 | 368.04 |
| 3020" | 1690.4 | 369.79 |
| 3034" | 1698.4 | 371.54 |
| 3048" | 1706.4 | 373.29 |
| 3062" | 1714.4 | 375.04 |
| 3076" | 1722.4 | 376.79 |
| 3090" | 1730.4 | 378.54 |
| 3104" | 1738.4 | 380.29 |
| 3118" | 1746.4 | 382.04 |
| 3132" | 1754.4 | 383.79 |
| 3146" | 1762.4 | 385.54 |
| 3160" | 1770.4 | 387.29 |
| 3174" | 1778.4 | 389.04 |
| 3188" | 1786.4 | 390.79 |
| 3202" | 1794.4 | 392.54 |
| 3216" | 1802.4 | 394.29 |
| 3230" | 1810.4 | 396.04 |
| 3244" | 1818.4 | 397.79 |
| 3258" | 1826.4 | 399.54 |
| 3272" | 1834.4 | 401.29 |
| 3286" | 1842.4 | 403.04 |
| 3300" | 1850.4 | 404.79 |
| 3314" | 1858.4 | 406.54 |
| 3328" | 1866.4 | 408.29 |
| 3342" | 1874.4 | 410.04 |
| 3356" | 1882.4 | 411.79 |
| 3370" | 1890.4 | 413.54 |
| 3384" | 1898.4 | 415.29 |
| 3398" | 1906.4 | 417.04 |
| 3412" | 1914.4 | 418.79 |
| 3426" | 1922.4 | 420.54 |
| 3440" | 1930.4 | 422.29 |
| 3454" | 1938.4 | 424.04 |
| 3468" | 1946.4 | 425.79 |
| 3482" | 1954. | |

APPENDIX P
Septic Design

