

Amendment to the
Engineer's Report for the
East Savage Municipal Drain

Prepared For:



Prepared By:

Robinson Consultants Inc.
Consulting Engineers

Our Project No. 16002
Final - September 2021

September 10, 2021

Mayor and Members of Council
City of Ottawa
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Attention: Mr. Rick O'Connor
City Clerk

Reference: Amendment to the Engineer's Report
East Savage Municipal Drain
Cumberland Ward
Our Project No. 16002

Dear Sir:

This Amendment to the Engineer's Report for the East Savage Municipal Drain, Cumberland Ward, which is respectfully submitted for Council's consideration, was initiated by petition to the City of Ottawa under Section 4 of the Drainage Act, RSO 1990.

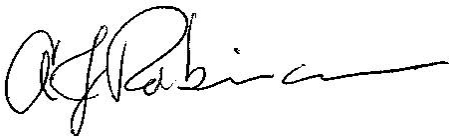
The purpose of the report is to accommodate a change in land use from rural/agricultural to urban development for portions of the lands within the drainage area of the East Savage Municipal Drain and to extend the existing East Savage Municipal Drain to the location of the proposed Stormwater Management Pond. This Report makes modifications to the "Engineer's Report East Branch of Savage Drain", August 1965, by Stidwill & Associates Ltd. which was enacted by By-Law No. 1623 of the former Township of Cumberland, dated August 27th, 1965. All sections of the East Branch of the Savage Drain covered by the August 1965 report have been incorporated into this report, therefore, the previous report will no longer have any status under the Drainage Act, RSO 1990 once the by-law for this report is enacted.

All costs associated with this Engineer's Report and identified improvements to the East Savage Municipal Drain will be assessed to the owners/developers of the lands identified as Block A on Dwg. No. 16002-A3. Modifications to the East Savage Municipal Drain will be completed in advance of the development of the lands.

If you have any questions, please feel free to contact Andy Robinson at ajrobinson@rcii.com or Lorne Franklin at lfranklin@rcii.com.

Yours very truly,

ROBINSON CONSULTANTS INC.



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AJR: plw

c.c. David Ryan, P. Geo., Municipal Drainage Manager/Drainage Superintendent,
City of Ottawa

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1.0 INTRODUCTION

1.1 Appointment

Robinson Consultants Inc. was appointed by the City of Ottawa on February 10, 2016 to complete an Engineer's Report to amend the existing Engineer's Report, entitled "Engineer's Report - Maintenance East Branch of Savage Drain – Township of Cumberland 1965", dated August 27, 1965. The Amendment to the Engineer's Report for the extension and modifications to the Municipal Drain was initiated by the City of Ottawa as a result of a petition under Section 4 of the Drainage Act by the developers/landowners of the lands within the proposed development area.

1.2 On-Site Meeting

An on-site meeting of the affected landowners and concerned parties was held on February 9, 2017. Comments, concerns and questions from the on-site meeting include the following:

- Noted that there is a 1990s report for Bear Brook and the engineer should review the Bear Brook report to see if it requires maintenance or improvements and provides sufficient outlet. Also noted that there is a lot of rock on Bear Brook near the Village of Bear Brook.
- Concern that no matter how much East Savage is improved Bear Brook cannot accept the flow unless improved.
- Concern that a drain cannot be defined in the swamp (Mer Bleue).
- Suggested that flows be redirected to Mer Bleue and not East Savage Municipal Drain. Noted that there is a diversion between the two at the upper end.
- Concern about cost associated with environmental features that may be required.
- Several suggestions that storm water from proposed developments should be taken to the Ottawa River.
- East Savage Drain runs very slowly—floods fields multiple weeks in the spring and sometimes in the summer.
- Will there be funding to replace existing bridges.
- Maybe Bear Brook should be included in any improvements.
- Golf course property has erosion control issues on steep banks near house.

1.3 History

The most recent report on the drain is entitled "Engineer's Report - Maintenance East Branch of Savage Drain – Township of Cumberland – 1965", by Stidwill & Associates Ltd., and date August 27, 1965. Quoting from that report "The Main Drain of the Savage Drain, which is not considered under this report, was originally constructed in 1912. It follows the west limit of the boundary road between the Township of Gloucester and Cumberland. Thence turns southeasterly towards the Bear Brook. The original East Branch entered the Main Drain at a point opposite the northwest corner of

lot 17, concession 11. As the general slope of the land runs to the southeast, the water in the old branch tended to flow across the road allowance between concessions 10 and 11 in an easterly direction, thereby overflowing lands in concession 10.”

“To remedy this situation a new course was laid out in 1945, following more closely the slope of the land. This new drain was constructed in 1945 and still bears the name of East Branch of the Savage Drain, although it has no connection with the original Savage Drain because it has its own outlet into the Bear Brook.”

The 1965 Report made allowance for maintenance and improvements including deepening of the drain and the installation of farm crossings.

2.0 PURPOSE OF THE AMENDMENT REPORT

The City of Ottawa initiated the Amendment to the Engineer's Report under Section 4 of the Drainage Act, RSO 1990, in response to a petition from landowners in conjunction with the proposed urban development of lands within the drainage area. The purpose of the report is to extend the existing drain from its present terminus to the limit of the proposed development and to accommodate the change in land use from rural/agricultural to urban development for the lands identified as Block A on Dwg. No. 16002-A3 and Dwg. No. A3.1 and A3.2 in detail.

To accommodate these changes, amendments are required to the profile in the existing 1965 Engineer's Report. Additionally, the drain must be extended from its present terminus to the outlet structure of the proposed Stormwater Management Pond. The Stidwill report was adopted by By-Law 1623 of the Township of Cumberland, dated September 1965. All sections of the 1965 Engineer's Report have been incorporated into this report, therefore, the 1965 Engineer's Report and all prior reports related to the East Branch of the Savage Drain will no longer have any status under the Drainage Act, RSO 1990 following the enactment of this current Engineer's Report.

For the purpose of clarity, the drain will be referred to as the East Savage Municipal Drain since it is not a “branch” of the original Savage Municipal Drain.

Modifications are as detailed in the following sections.

2.1 Modifications – Main Drain

Modifications to the existing East Branch of the Savage Drain include establishing a new profile and cross-section for the existing portion of the drain and extending the drain from the present limit to the location of the Stormwater Management Pond in the proposed development area. Where required to accommodate the design flow, existing culverts will also be replaced.

3.0 EXISTING CONDITIONS

3.1 Location of the Drain

The main drain as identified by this report commences at Station 0+000 at the confluence with the Bear River (Bear Brook) Municipal Drain. The drain continues in a generally north-westerly direction to the Limit of Construction as per the 1965 Engineer's Report (Station 7+008.77) located in Lot 8, Con. 11 (geographic Township of Gloucester). The drain is extended upstream by this report in a generally north-westerly direction from the 1965 Engineer's Report Limit of Construction to the proposed outlet of the Stormwater Management Pond at Station 8+218.46. The location of the drainage basin is shown on the Location Plan - **Figure 3.1**.

3.2 Drainage Basin and Limits

The drainage basin for the East Savage Municipal Drain is adjusted to conform to the drainage scheme for the proposed development and to reflect current drainage conditions for the drainage area.

The drainage basin includes parts of the following lots and Concessions:

- Lots 9 through 13 (inclusive) and Lot 17, Concession 9 in the former Township of Cumberland.
- Lots 8 through 17 (inclusive), Concession 10 in the former Township of Cumberland.
- Lots 4 through 12 (inclusive), Concession 11 in the former Township of Cumberland.
- Lots 1 through 3 (inclusive), Concession 4 in the former Township of Gloucester.
- Lot 1 Concession 5 in the former Township of Gloucester.

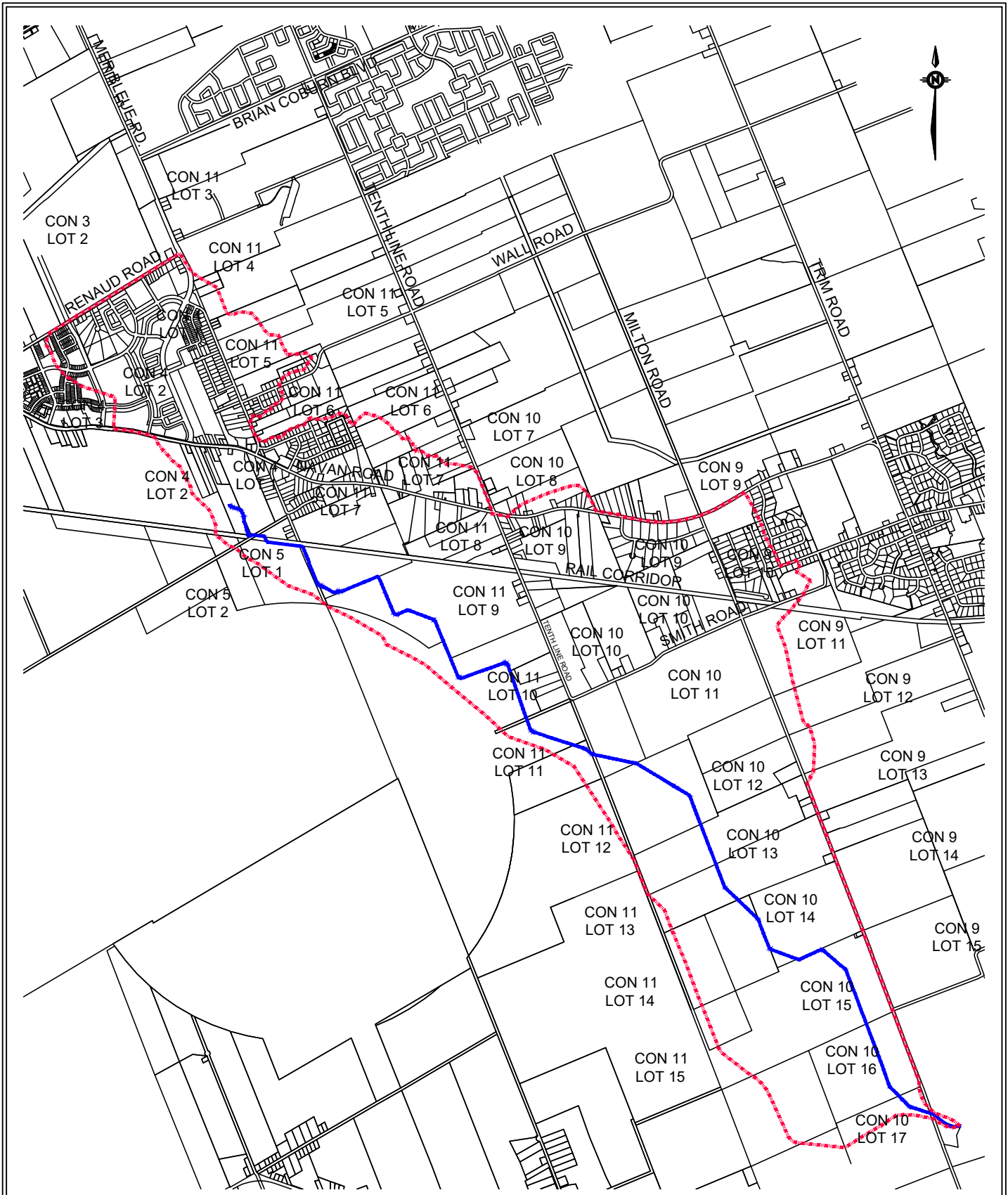
The drainage area of the East Savage Municipal Drain is approximately 1237 hectares (3057 acres). The limits of the drainage boundary (drainage basin) are shown on Dwg. No. 16002-A1. These limits have been determined by the drainage design of the proposed development, the drainage area boundaries of adjacent drains, existing City of Ottawa LiDAR mapping of the area, field reconnaissance and the area defined in the South Nation Conservation Authority flood plain mapping report.

Should the final approval for the development area result in changes or modifications to the drainage area, an additional Engineer's Report amending the drainage area to match the final approved area will be required.

3.3 Drawings Forming Part of the Engineer's Report

Dwg. No. 16002-A1 has been prepared showing the drainage area boundary and the proposed drain.

Dwg. No. 16002-A1.1 has been prepared showing the area of the proposed extension of the drain in detail.



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Consultants

Title		LOCATION PLAN		Fig. No.	3.1	
Project			EAST SAVAGE MUNICIPAL DRAIN		Job No.	16002
				Scale	Date	SEPT. 2021

Dwg. No. 16002-A2 (and Dwg. A2.1 and A2.2 – in detail) shows existing and proposed culverts as well as minimum required sediment and erosion control measures.

Dwg. No. 16002-A3 (and Dwg. A3.1 and A3.2 – in detail) has been prepared showing individual properties and blocks that form part of the drainage area indicating Blocks A through K and an ID number for other (individual) properties for reference to the Schedule of Assessment for future maintenance, and the area of each property that is within the drainage area.

Dwg. No. 16002-P1 through P12 provide a proposed profile for the modification and extension of the existing drain.

The design cross-sections for the main drain are shown of Dwg. No. 16002-C1 and 16002-C2.

The drawings as noted above are attached to this report in **Appendix A**.

4.0 AREA REQUIRING DRAINAGE

The area requiring drainage under this report for Modifications and Improvements of the East Savage Municipal Drain is Block A as shown on Dwg. No. 16002-A3 and Dwg. No. A3.1 in detail.

5.0 DESIGN CONSIDERATIONS

5.1 Proposed Development Areas

The drainage design within Block A was completed by Stantec Consulting Ltd. the engineer retained to complete the engineering for the development of the lands in Block A and was approved by the City of Ottawa, the South Nation River Conservation Authority (SNCA), Ministry of Natural Resources and Forestry (MNR), Ministry of Environment, Conservation and Parks (MECP) and Department of Fisheries and Oceans (DFO). Hydrology, hydraulics and stormwater management criteria and analysis associated with Block A is included in the report entitled East Urban Community Phase 2 Environmental Management Plan, August 2013 by CH2M Hill and East Urban Community Phases 1A, 2A and 2B Site Servicing and Stormwater Management Report, October 2017 by Stantec Consulting Ltd.

5.2 Hydrologic Modeling

The South Nation Conservation Authority undertook flood risk mapping for the McKinnon's Creek sub-watershed which includes the McFadden Municipal Drain, the East Savage Municipal Drain and the McKinnon's Creek Municipal Drain. As part of the flood risk mapping study detailed hydrologic and hydraulic modeling was completed to determine the limits of the flooding impacts. The models are contained in the report "McKinnon's Creek Subwatershed (McKinnon's, McFadden and East Savage Creeks) Flood Risk Mapping Report" (DRAFT), dated March 27, 2018, prepared by SNCA.

The SWM HYMO hydrologic model was completed in 2018 by Water's Edge on behalf of SNCA. The hydrologic model was developed to generate runoff rates from rainfall events for existing conditions. The rainfall events used for the generation of these hydrographs are the 2, 5, 10, 25, 50 and 100 years design storms.

A 1D GeoHECRAS model was developed by J.F. Sabourin and Associates (JFSA) on behalf of SNCA. Due to the flat topography of the downstream portion of the water course and the spill areas that were generated a 2D HECRAS hydraulic model was developed by JFSA. The peak flows from the 2D HECRAS model were utilized for the updated 1D HECRAS model.

5.3 Modeling Results

The rainfall-runoff relationship of the East Savage Municipal Drain was evaluated for existing land use conditions and modifications within the watershed. This provided flow estimates for the watershed under existing and proposed conditions. The total instantaneous peak flow for various return period design flows at key locations along the Drain is presented in Table 5.1. Table 5.1 should be reviewed in conjunction with Dwg. No. 16002-A1, which shows a plan view of the watershed. The flows are calculated at the various locations along the main drain. The flows in Table 5.1 have been taken from "Table 9: Riparian Peak Flows – McKinnon's Creek Sub-watershed 2D Hydraulic Model Development", page 28, JFSA, February 2018.

Table 5.1
Peak Flow Estimates

Locations	Peak Flow m ³ /s					
	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Main Drain						
Sta. 8+231.54 to Sta. 7+204	2.608	4.433	5.867	7.831	9.467	11.226
Sta. 7+204 to Sta, 6+720	3.818	5.654	7.031	8.853	10.274	11.767
Sta. 6+720 to Sta. 5+279	2.575	4.336	5.596	7.353	8.602	10.075
Sta. 5+279 to Sta. 3+640	1.941	2.811	3.654	5.179	6.476	7.929
Sta. 3+640 to Sta. 1+768	2.021	3.979	5.406	7.035	7.421	9.027
Sta. 1+768 to Sta 0+490	2.335	3.586	4.681	5.984	7.018	8.361
Sta. 0+490 to Sta. 0+000	4.433	6.955	8.521	11.747	15.330	19.124

5.4 Hydraulic Modeling

At the request of SNCA the existing 1D HEC-RAS model was updated with the proposed geometry to analyze the impacts to the watercourse. The water levels during the 100 year flood event were compared to the SNCA flood risk mapping study results. Proposed water levels were found to be less than or equal to the existing conditions. Please refer to **Appendix F** for a copy of the technical memorandum prepared for SNCA.

5.5 Side Slopes (Typical Cross Section)

The side slopes on the various sections of the main drain are as shown on Dwg. No. 16002-C1 and 16002-C2.

5.6 Capacity of Culverts and Bridges

5.6.1 General

The capacities of existing culverts along the East Savage Municipal Drain were obtained using MTO nomographs. The modeled flow at these culverts was then used to verify if sufficient capacity exists. A summary of capacities and flows is included in **Table 5.2**.

Table 5.2
Summary of Culvert Capacities

Culvert No. and Location	Existing Capacity* (m ³ /s)	Peak Flow (m ³ /s)					
		2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Roadway Culverts							
Rail Corridor (7+785.5)	1.900	2.608	4.433	5.867	7.831	9.467	11.226
Milton Road (0+252.4)	11.000	4.433	6.955	8.521	11.747	15.330	19.124
Access Culverts							
Farm Lane (6+300.8)	1.450	2.575	4.336	5.596	7.353	8.602	10.075
Farm Lane (3+612.9)	4.900	2.021	3.979	5.406	7.035	7.421	9.027
Farm Lane (3+297.8)	6.300	2.021	3.979	5.406	7.035	7.421	9.027
Farm Lane (2+937.1)	3.050	2.021	3.979	5.406	7.035	7.421	9.027
Farm Lane (1+540.0)	2.550	2.335	3.586	4.681	5.984	7.018	8.361
Farm Lane (0+857.5)	4.900	2.335	3.586	4.681	5.984	7.018	8.361

Notes: Culvert Stations are listed to the approximate centerline of the culvert

*Existing capacity is based on inlet control with a HW/D equal to 1.

5.6.2 Culverts Requiring Replacement

In accordance with Section 26 of The Drainage Act, any increase in cost of the work caused by the existence of a utility is chargeable directly to the road authority or public utility in addition to all other normal assessment sums charged against the road authority or public utility when the work is required as part of the Engineer's Report. Based on the Drainage Act, the road or other authority shall be assessed only for the actual increased cost of the project due to the existence of the roadway or utility and such work shall be provided under separate construction items.

Under Section 69 of the Drainage Act, a road authority or other public utility has the option to carry out this work itself. When a road authority or public utility carries out this work, any respective Special Assessments will be reduced to reflect only the actual accrued engineering costs that will remain as a Special Assessment against the respective road authority or public utility. The cost of replacing the road authority culverts is not included in the report. Therefore, all assessments against the road authority have already been reduced by the cost of the culverts and represent the net amount payable.

It is the responsibility of the individual authority to advise the Municipality of its intentions regarding the bridge/culvert sites under Section 69, The Drainage Act RSO, 1990. If the authority or public utility does not complete the work in a timely fashion, then the Municipality will complete the work and charge the cost to the authority or utility as an assessment under The Drainage Act RSO, 1990 and in accordance with this report.

The Road Authority structures have been inspected throughout the course of the proposed drainage works and improvements are recommended where needed to provide satisfactory drainage of the adjacent lands. Recommendations for improvements to Road Authority structures are made only when such structures are deficient in elevation or capacity necessary for drainage. Roadway culverts should be sized to accommodate the 25 years return period flow at a minimum in order to provide satisfactory drainage of the lands for rural purposes. Design standards for roadway culverts are typically based on criteria established by the Road Authority. The design return period for each structure depends on its type, location and function. For the East Savage Municipal Drain the sizing will also be dictated by the design considerations and allowable water level elevations within the proposed developments. **Table 5.3** lists roadway culverts that require replacement to increase capacity or must be lowered to accommodate the drain profile.

The closest standard culvert size was chosen to accommodate the design flow. The selection of the design return period culvert size (greater or equal to the minimum indicated), and culvert material is to be made by the Road Authority, based on the most current design standards and hydrologic/hydraulic information.

The initial cost of replacing the culverts under any existing road on the East Savage Municipal Drain is to be the responsibility of the property owners of Block A since the replacement is as a direct result of the proposed development. Future maintenance of the culverts under existing roads will be the responsibility of the Road Authority. The Road Authority has the option to replace the structure on its own, or to have the municipality replace the structure as part of the Drainage Works.

The private farm and residential culverts that require replacement to increase capacity or added for access are noted in **Table 5.3**. Where the alignment of the drain segments a property, each landowner is entitled to the installation (or replacement where required) of one standard access crossing (up to 10 meters in length). Additional crossings (existing or otherwise), or non-standard crossings (additional length, decorative headwalls, etc.) will be installed or replaced at the individual owner's expense.

The cost of replacing roadway, rail corridor and private culverts identified in this report is to be paid through the assessed cost to the property owners of Block A as part of the Modifications of the East Savage Municipal Drain. No private culverts, other than those noted in **Table 5.4**, will be replaced or added as part of these improvements.

Table 5.3
Capacity of Roadway Culverts that
Require Replacement

Culvert Location	Design Return Period	Existing		Proposed	
		Size/Type (mm)	Capacity * (m ³ /s)	Size/Type (mm)	Capacity * (m ³ /s)
Rail Corridor (7+785.5)	25 year	1700x1200 Conc. Box	3.20	2400x1500 Conc. Box	6.24

Notes: Culvert Stations are listed to the approximate centerline of the culvert
 *Capacity is based on inlet control with a HW/D equal to 1.

Table 5.4
Capacity of Private and Farm Crossings that
Require Replacement or are Additional

Culvert Location	Design Return Period	Existing		Proposed	
		Size/Type (mm)	Capacity * (m ³ /s)	Size/Type (mm)	Capacity * (m ³ /s)
Farm Lane (6+300.8)	5 year	1100 CSP	1.45	2130x1400 CSPA	4.10
Farm Lane (3+612.9)	5 year	1850 CSP	4.90	1800 CSP	4.90
Farm Lane (3+297.8)	5 year	2000 CSP	6.30	2130x1400 CSPA	4.10

Table 5.4
Capacity of Private and Farm Crossings that
Require Replacement or are Additional

Culvert Location	Design Return Period	Existing		Proposed	
		Size/Type (mm)	Capacity * (m ³ /s)	Size/Type (mm)	Capacity * (m ³ /s)
Farm Lane (2+937.1)	5 year	1500 CSP	3.05	1800 CSP	4.90
Farm Lane (1+540.0)	5 year	1400 CSP	2.60	2130x1400 CSPA	4.10
Farm Lane (0+857.5)	5 year	1850 CSP	4.90	1800 CSP	4.90

*Notes: Culvert Stations are listed to the approximate centerline of the culvert
 Capacity is based on inlet control with a HW/D equal to 1.

5.6.3 Future Private or Roadway Culverts

Future private crossing culverts or public roadway culverts installed on the drain shall not impact upstream land usage by obstructing the drainage flow. The proponent of new culverts shall obtain approvals from all governing agencies as well as the Drainage Superintendent. Provided that the full cost of the culverts is paid for by the proponent and are installed under the direction of the Drainage Superintendent there is no requirement to complete an amendment report to this drainage report for new private or roadway culverts. A record of the additional culverts must be appended to the original by-Law and report.

5.7 Clearing

Landowners are advised that the Contractor will clear only those trees, which may affect its operation within the working area. All trees having a diameter of 150 mm or greater shall be cleared of limbs and cut in reasonable lengths and neatly piled clear of the drain so that the wood may be salvaged by the property owners. All brush, limbs and other debris resulting from the clearing operation shall be chipped and disposed of at a location agreed to by the owner or shall be removed from the site at the Contractor's expense (note restrictions may apply with regard to Ash – Emerald Ash Borer).

5.8 Excavation

The construction of the East Savage Municipal Main Drain will be an open channel with design grades, side slopes and ditch bottom widths as specified on the design profile Dwg. No. 16002-P1 through 16002-P12 and Cross-Section Drawings No. 16002-C1 and 16002-C2.

Associated with the drain improvements for the existing drain, erosion control measures will be placed at bends which are subject to erosion, at tile outlets, at culverts, confluences, and areas of bank instability. Erosion control measures will be of an engineering type, primarily rock protection with filter cloth.

5.9 Fisheries Act and Special Design Considerations

The existing East Savage Municipal Drain is classified as a "Type F" Municipal Drain (ID No. 96695) by the Department of Fisheries and Oceans (DFO). The Classification was last reviewed by the DFO in 2017.

Typical conditions for a "Type F" drain include periods of the year where the drain is subject to low or no flows, may be periodically dry and has no sensitive species present that use the drain. As such, where work is completed within the prescribed time frame, there is a limited impact on fish and fish habitat. However, the drain classification/class authorization process is for the purpose of maintenance of an existing drain only. The drain classification is provided for reference only. The extension of the drain and increase in the overall width of the drain to provide for additional capacity to accommodate upstream changes in land use as required exceeds class authorization condition limiting action to maintenance as per the existing report. As this condition cannot be met, a site-specific review may be required by the Department of Fisheries and Oceans.

While the proposed work will provide for additional capacity it is not anticipated that the work will change the nature of the drain or the fish that utilize the drain. As such we proposed that the standard conditions for the maintenance of a "Type F" Municipal Drain (except as noted above) be implemented for the reconstruction of the drain.

Typical conditions for work on a "Type F" Municipal Drain are listed below:

Based on the site assessment several recommendations which are likely to enhance and protect fish habitat and improve water quality will be implemented as part of the drain reconstruction. These recommendations are as follows:

- Timing - All work to be completed within prescribed timing windows.
- Complete all work in dry or low flow conditions.
- Seed all banks within 48 hours of construction.
- Sediment control features to be in place prior to the commencement of work and to remain in place until permanent features (such as vegetation) are in place.

Reconstruction is proposed to be completed from the south/west side of the drain as there are areas of bank instability on this side to be addressed. The primary method for addressing bank instability will be slope flattening (to the standard 2h:1v side-slope).

During construction a series of check dams (Straw Bale – OPSD 219.180 or Rock – OPSD 219.211) will be installed to control sediment movement to downstream areas.

Sediment traps will be constructed in conformance with Std. Dwg. 1 upstream of the check dams. These excavations are typically 500 mm deep, 15 metres long and the width of the channel. Once construction has been completed the check dams will be removed along with the sediment and the excavations will remain. Depending on placement, these excavations form areas of concentrated future cleanout (where close to roads), limiting the need for full maintenance activities, or provide pool habitat/refuge (remote locations). Culverts will be installed with invert elevations below that of the adjacent drain by 150mm for culverts sized 600mm to 1500mm, or by 10% of the height for circular, arches or box culverts greater than 1500mm in height. The proposed culvert inset complies with the intent of DFO recommendations in this regard, while preserving culvert capacity, and ensures barrier-free fish passage.

Rock or straw bale check dams, complete with sediment traps, will be installed at locations as shown on Drawing No. 16002-A2 (and A2.1 and A2.2 in detail).

Tree removal will be required to complete the work.

Where possible, excavation will be limited to one side of the drain, leaving one side of the drain intact, while providing the required additional channel width. In zones of current bank instability banks will be repaired and/or protected as necessary, with efforts made to maintain as much of the natural conditions as possible.

Following construction, the disturbed areas (excluding spread areas on agricultural fields outside of the scheduled buffer area) will be seeded with a seed mix composed of perennial rye, white clover, red top, creeping red fescue and Canada bluegrass, as detailed in Section 6.1 of the Engineer's Report.

Seeding will be completed as soon as possible after the channel is excavated. Erosion and sediment control works will be implemented and maintained throughout the length of the drain during and following construction, until other measures implemented, such as seeding, become effective. The locations and details of proposed erosion and sediment control works are shown on Dwg. No. 16002-A2 (and A2.1 and A2.2 in detail).

Other erosion or sediment control works may be implemented by the contractor, if approved by the Drainage Engineer, in an effort to maintain the required sediment free conditions downstream of the work area.

5.10 Environmental Authority Mitigation Measures

Typical measures recommended by the reviewing environmental authorities, including (but not limited to) the South Nation Conservation Authority (SNCA), Ministry of Environment Conservation and Parks (MECP), Ministry of Natural Resources and Forestry (MNRF) and the Department of Fisheries and Oceans (DFO) for the type of work are listed below. When implemented, these measures should allow for reasonable mitigation of the proposed reconstruction.

The proposed Municipal Drain construction must abide by timing window restrictions, which include "no in-water work between March 15th and July 15th to protect local fish spawning populations".

- Finished channel to be as narrow and deep as possible.
- Riparian vegetation can be removed from either bank (preferably not both).
- Minimize tree removal.
- Install sediment & erosion control measures.
- Bends in channel to be stabilized.
- Work in water only when flows not elevated.
- Where applicable, measures must be implemented to protect any hibernating turtles during the period from October 15th to March 15th and nesting turtles from March 15th to June 30th.

The requirements associated with Species at Risk (SAR) legislation are included in the Special Provisions of this report.

The above noted requirements have been addressed in the design of the proposed works and are anticipated to form part of the permitting requirements by the SNCA, MNRF, MECP and DFO. Where applicable, the permit conditions will be incorporated into the construction contract.

5.11 Disposal of Excavated Materials

The excavation of the drain shall be completed along all sections as previously described and all materials including silt, debris, etc. shall be removed from the drain.

In excavation areas, all suitable material(s) will be placed outside the required buffer area, on the side of the drain that is best suited for the owner and/or where clearing is not required for disposal. The excavated material shall be spread and seeded (except in areas of tilled agricultural fields). All material shall be spread on the adjacent lands no closer than 5 metres to the top of slope (buffer strip) and to a maximum depth of 150mm for all areas. Drainage openings shall be constructed wherever required throughout the disposal area at a maximum spacing of 50 meters for agricultural land and 100 meters for non-agricultural land. All drainage openings shall be maintained, and the soil spread to accommodate these drainage openings to ensure that the drainage from adjacent land is not impeded. Any non-suitable material, such as rock, boulders, hard-pan or garbage/debris, shall be disposed of on the adjacent property, in an area of the property designated by the owner.

In areas scheduled for the spreading of material, owners who wish to pay the Contractor to have the Contractor dispose of the excavated material off-site rather than spread the material may make arrangements directly with the Contractor, subject to approval by the Drainage Engineer.

5.12 Permit Requirements and Underground Utilities

It may be expected that the Contractor will have to fill out an application for an encroachment permit within the City right-of-ways prior to the commencement of construction. It is also expected that underground utility lines may be encountered during the construction of the project. A copy of the drawings must be submitted by the contractor to all area utilities, so that they may show underground plant on the plan. A copy of the drawings so marked, must be returned to the Drainage Engineer prior to commencing construction.

The Contractor will also be required to arrange with all Utilities to mark underground cables or pipelines in the field before commencing construction. If any owner knows of other underground utilities, please make the Drainage Engineer aware of such.

Typical contract methodology for the placement of culverts including the impoundment and by-pass pumping of water or passive in stream diversion no longer require Ministry of Environment Conservation and Parks (MECP) registration or a Permit-To-Take-Water provided that prescribed procedures are met. The Contractor may be required to obtain a Permit-To-Take-Water (PTTW) from the MECP should its methodology exceed the MECP conditions for exemption.

5.13 Site Access and Access Plan

It is intended that for the purpose of construction and future maintenance, the drain be accessed from adjacent roads with equipment moving along the side of the drain scheduled for construction, within the designated work area as specified in SP1.0, and designated future Drain Right-of-Way. Equipment may only cross the drain at existing or constructed crossings as shown on the Culvert and Sediment/Erosion Control Plan, Drawing 16002-A2, 16002-A2.1 and 16002-A2.2.

Wherever possible, isolated work areas are to be accessed by existing roads (farm lanes/unpaved driveways) on adjacent lands. This is to limit the disturbance of non-work areas adjacent to the drain. The Contractor is required to provide notification to the landowner of the intended use of existing farm lanes in advance of the usage (minimum 48 hours). The Contractor will be responsible for the repair and maintenance of any access used, and for the restoration of the access following the construction to existing or better conditions. The contractor will be required to make the arrangements for access and notify the Drainage Engineer of the proposed access routes.

6.0 EROSION CONTROL

6.1 Seeding

To help protect the drain banks against erosion, all disturbed banks and spread spoils shall be hand seeded within 48 hours of construction. The seed mixture is to be as follows:

Sow Rate (minimum)	100 kg/ha
Creeping Red Fescue	60%
Canada Bluegrass	20%
White Clover	3%
Perennial Rye	12%
Red Top	5%

Perennial rye will encourage quick establishment of a ground cover, while red fescue provides deeper rooting vegetation that is shade and water tolerant with limited requirement for seed bed preparation, white clover provides quick cover and produces nitrogen to aid in the establishment of other vegetation and red top's root system is well suited for holding soils on wetlands, waterways and ditch banks.

6.2 Buffer Strips

It is recognized that buffer strips have a role in reducing bank erosion, reducing pollution (pesticides and nutrient runoff) and improving fish and wildlife habitat by providing shading and habitable areas, as well as reducing water temperatures. The provision and maintenance of adequate buffer strips is environmentally friendly and reduces long term costs associated with drain maintenance for all properties assessed on the drain and is a benefit to all. As such, it is strongly recommended that where the drain passes through cropland, where soil erosion is now occurring, or land where the farmer indicates the intention of tilling the soil for continuous field crop production, a strip of uncultivated land at least 5 m wide along the edge of the drain be retained. It is recommended that the owners take hay off this buffer strip, but that the soil not to be tilled.

6.3 Fencing

Where fences are encountered or for access to the drain, it will be the Contractor's responsibility to remove the existing fence and re-erect the fence in a condition equal to or better than the condition of the fence prior to the commencement of the work.

6.4 Rock Protection

Associated with the drain improvements, Rock Protection with filter cloth will be placed at typical areas as per Drawing Nos. 16002-A2 and 16002-P1 through 16002-P12 and Std. Dwg. C. Rock Protection at tile drain outlets shall be installed at all existing outlets in accordance with Std. Dwg. F. Std. Dwg's are provided in **Appendix A**. In general, Rock Protection will be installed at all locations as indicated below (at the discretion of the Drainage Engineer) and may not necessarily be indicated on plans and profiles.

- Rock Protection at channel ends of realignment sections (Std. Dwg. D)
- Rock Protection at significant bends (Std. Dwg. D)
- Rock Protection at storm sewer outlets (Std. Dwg. D)
- Rock Protection at tile drain outlets (Std. Dwg. F)

- Rock Protection at culverts and concrete structures (Std. Dwg. C)
- Rock Protection at confluence of branch drains (Std. Dwg. E)
- Rock Protection at areas of current or on-going erosion (Std. Dwg. D)

6.5 Flow Checks and Sediment Traps

6.5.1 Excavation

Sediment trap excavation shall be 15 m in length and 0.5 m below the proposed grade (drain bottom) in conformance with Std. Dwg. I. and directly upstream of the flow checks (Straw Bale – OPSD 219.180 or Rock Checks – 219.211). Std. Dwg's are provided in **Appendix A**.

6.5.2 Sediment Removal

Accumulated sediment in sediment traps shall be removed as necessary to affect maintenance repairs and immediately prior to the removal of the flow checks.

6.5.3 Locations

Straw Bale (OPSD 219.180) or Rock Flow Checks (OPSD 219.211) shall be installed as indicated to prevent sediment passage from the upstream to the downstream side of the flow check and shall be installed at all specified locations as per Drawing No. 16002-A2 (and A2.1 and A2.2 in detail), and 16002-P1 through 16002-P12. Std. Dwg's are provided in **Appendix A**.

6.5.4 Long-Term Use

Excavated sediment basins will remain in place following removal of the flow check. It is anticipated that these basins will continue to serve as localized concentrated cleanout areas, and possible interim pool refuge fish habitat. Removal of sediment in these cleanout areas is expected to have long term fish habitat benefits by reducing the need for full scale maintenance along the length of the drain.

7.0 ASSESSMENTS

7.1 General

The Drainage Act requires that the total estimated cost be assessed against the affected lands and roads under the categories of benefit (Section 22), outlet liability (Section 23), injuring liability (Section 23), special benefit (Section 24) and special assessment of public utility or road authority (Section 26). On this project there is an assessment for injuring liability in the form of maintenance and an allowance for insufficient outlet (Section 32) related to the downstream impact on Bear River Municipal Drain.

7.2 Benefit

Benefit by definition under the Drainage Act, RSO 1990 is the “advantages to any lands, roads, building or other structures from the construction, improvement, repair or maintenance of a drainage works such as will result in a higher market value or increased crop production or improved appearance or better control of surface or subsurface water, or any other advantages relating to the betterment of lands, roads, buildings, or other structures”.

7.3 Outlet and Injuring Liability Assessment

7.3.1 Outlet Liability

Lands and roads that may be assessable for outlet liability are those lands that use a drainage works as an outlet or for which after construction or improvement of the drainage works an improved outlet is provided. The outlet or improved outlet may be provided either directly or indirectly through any drainage works, overland flow, swale, ravine, creek or watercourse. Assessment for outlet is based on location, area and rate of flow.

7.3.2 Injuring Liability

If, from any land or road, water is artificially caused by any means to flow upon and injure any other land or road, the land or road from which the water is caused to flow may be assessed for injuring liability with respect to a drainage works to relieve the injury so caused to such other land or road.

Section 32, RSO 1990 provides for an allowance for damage due to insufficient outlet, where in the opinion of the engineer, the cost of continuing a drainage works to a sufficient outlet or the cost of constructing or improving a drainage works with sufficient capacity to carry off the water will exceed the amount of injury likely to be caused to low-lying lands along the course of or below the termination of the drainage works, instead of continuing the works to such an outlet, or making it of such capacity, the engineer may include in the estimated cost a sufficient sum to compensate the owners of such low-lying lands for any injuries they may sustain from the drainage works, and in the report the engineer shall determine the amount to be paid to the owners of such low-lying lands in respect of such injuries.

For the initial construction injuring liability assessment is made against the lands in the proposed development area for maintenance and compensation for insufficient outlet related to the increase in volume of runoff that will impact the Bear River Municipal Drain and properties that are negatively impacted by the increase in volume of runoff resulting from the change in land usage. The East Savage Municipal Drain is tributary to the Bear River Municipal Drain.

7.4 Assessment for Special Benefit

Special Benefit as defined under the Drainage Act, RSO 1990 is “any additional work or feature included in the construction, repair or improvement of a drainage works that has no effect on the functioning of the drainage works.” An Assessment for Special Benefit and/or a Special Assessment is charged against any owner, public utility, agency, authority or municipality for which special consideration was required to accommodate special design consideration or a special feature.

For the initial construction of the drain identified in this report all costs associated with the initial design, construction, other costs and the Engineer's Report are assessed as a Special Benefit Assessment to the owner(s) of the lands in Block A.

7.5 Assessment Schedules

7.5.1 Initial Construction

All costs associated with this report, the initial design, allowances, other costs and construction are a result of the proposed land use changes to accommodate the proposed development and will be paid for by the landowners in Block A. As such, there is no distribution of costs to other landowners for the Engineer's Report, allowances, other costs or initial construction.

7.5.2 Future Maintenance

Following the completion of the initial construction, the cost for any future maintenance is to be distributed to all landowners within the drainage area as shown on Dwg. 16002-A2 and the Schedule of Assessment for Future Maintenance. As part of this Engineer's Report an assessment schedule has been developed for the East Savage Municipal Drain that reflects a fair and equitable distribution of costs for future maintenance. The Schedule of Assessment for Future Maintenance is provided in **Appendix C**.

The exact method of determining the appropriate assessment and the distribution between outlet and benefit is left to the Drainage Engineer using best judgment to provide a system of assessments that is fair to all concerned. There are a number of basic principles that apply to the assessment for future maintenance of the East Savage Municipal Drain. The principles are:

1. You cannot assess a property for any part of the cost of work that is completed upstream from it, unless there is a special circumstance.
2. You cannot make a benefit assessment against a property for work completed some distance downstream, although you do assess the property for outlet liability for this work.

3. You can only assess benefit for lands that are reasonably close to the drain. These usually are properties abutting the drain or which otherwise have direct access to the drain.
4. You cannot assess those lands that are too low to make use of the works, such as a gravel pit or quarry, unless they are clearly connected by an outlet to the drain.
5. You must assess public utilities and road authorities for the increase in the actual cost of the proposed drainage work caused by the existence of the works of the public utility or road authority. An example is a culvert on a public roadway.
6. In assessing lands covered with bush and trees, if the situation is such that once the drain is in place, the property owner will be able to clear the bush and cultivate the land, then the property should be assessed in the same way as land already under cultivation, unless there is an agreement or legal restrictions which prevent clearing and cultivation.

The principles of assessment for municipal drains have evolved over time. At present, the recommended approach is to divide the drain into a series of sections in arriving at the ultimate benefit and outlet assessment schedules. This permits the cost estimates to be developed for each section and should result in a fair distribution of costs throughout the drainage basin. The division of the drain into sections is most beneficial for assessing the cost of future maintenance.

A technique that is employed to simplify the assessment process, involves converting all the lands within the watershed into a factored or equivalent area. In the case of benefit assessment, this includes the area of the land within the basin and a factor that is related to land use. In the case of outlet assessment, we use the area of the land within the drainage basin, the land use and a factor that represents the location of the land relative to the drain. For the location factor (or the distance from the drain), the principle is to apply a higher factor for lands that are closer to the drain, or to an outlet that connects directly into the drain, and a lower factor to lands that are more remote from the drain. The factored area method allows the Drainage Engineer to recognize that the volume and rate of flow of water differs with different land uses, soil types, surface conditions and distance from the drain. This method brings the entire area within a watershed to a common denominator and simplifies the application of outlet assessments.

Based on the principle that properties are only assessed for works that are undertaken downstream of the property in question, we have further introduced a factor within each section which divides the section into three equal parts (subsections) and applies a subsection factor to the outlet assessment. Therefore, the properties with an outlet within the downstream one-third of a section of drain are in essence only using one-third of the total section of drain, whereas the lands that are in the upstream one-third or beyond, are using the whole section of the drain. Hence, we have applied a subsection factor to the lands within the section of the drain where maintenance will be carried out.

All of the lands upstream of the section where maintenance is being undertaken are also assessed a portion of the costs of the drainage works. The assessment on the lands upstream of the section where maintenance is being completed are charged a section factor equal to the most upstream portion of the lands within the section where the work is being completed.

7.6 Maintenance Sections

The drain has been subdivided into separate maintenance sections in order to develop schedules for future maintenance charges for the East Savage Municipal Drain, as such there are two sections as follows:

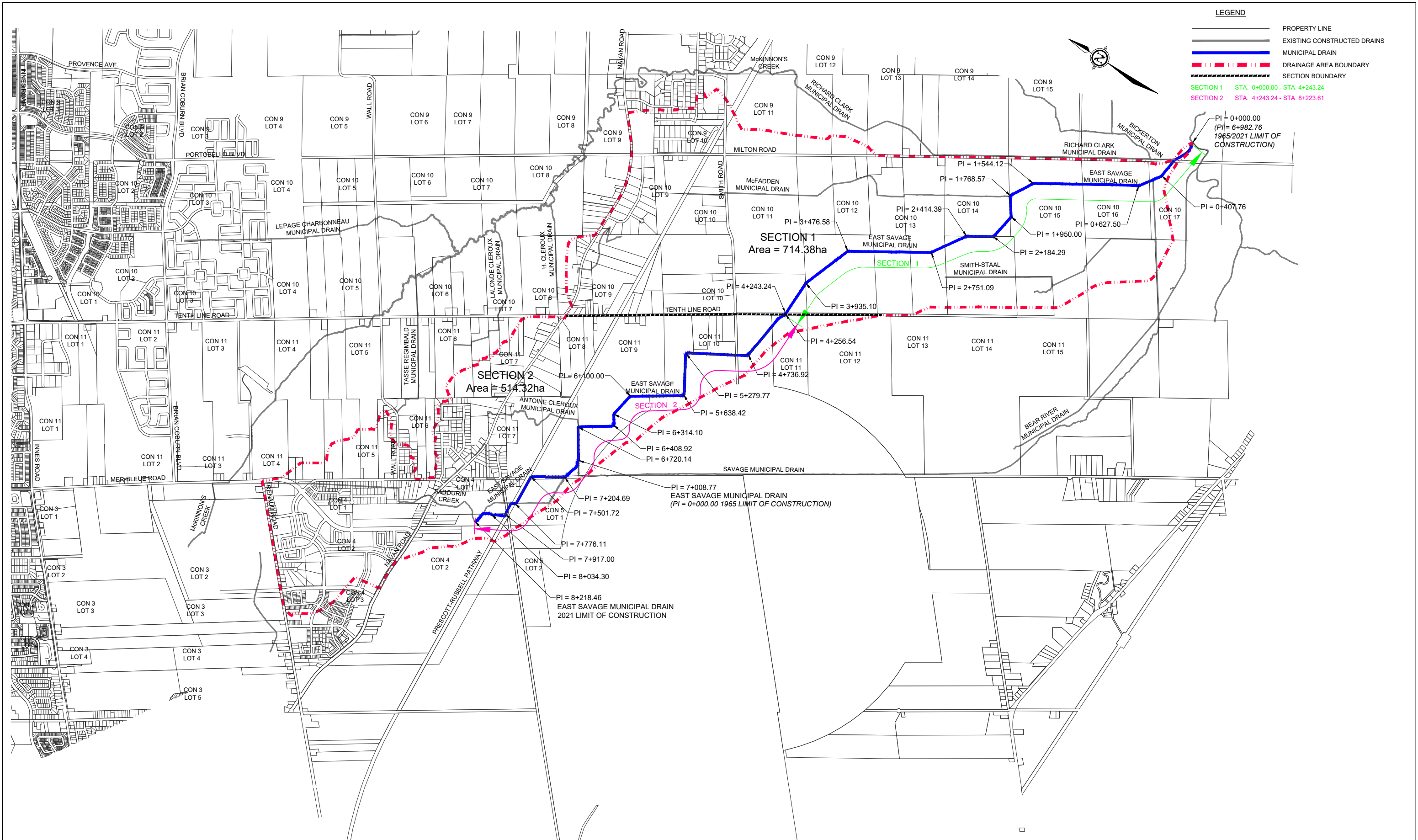
- From the outlet of the drain at the East Savage Municipal Drain, Station 0+000 at the confluence with the Bear River Municipal Drain to the easterly limit of the unopened ROW for Tenth Line Road (4+243.24).
- From Station 4+243.24 to the upstream Limit of Construction, Station 8+218.46, at the outlet of the development Storm Water Management Pond.

The locations of the sections are shown on **Figure 7.1**. The area that is tributary to each section has been determined based on the sub-drainage basins. In calculating the outlet assessment for the sections of the East Savage Municipal Drain indicated in the previous paragraph, each section has been divided into three subsections or parts. The upstream subsection is assigned a factor of 1.00, the middle subsection of the drain is assigned a factor of 0.67 and the downstream subsection is assigned a factor of 0.33. Each individual property is assigned a subsection factor corresponding to the location where the drainage from the property enters the drain. All properties upstream of the section where maintenance is being undertaken are assigned a subsection factor of 1.0.

The use of the subsection or section factor is based on the principle that all land is assessed for maintenance that is undertaken downstream of the location where the runoff from the land enters the drain.

7.7 Land Use Factor

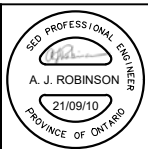
A land use factor is included in the assessment calculation in order to account for the volume of runoff from lands that are used for different purposes. A numeric value of 1.0 is given to all agricultural, rural use, large lot residential (greater than 2.0ha), vacant lands, unprotected forest lands (not subject to a registered management agreement) or any land where an alternative factor is not otherwise specified. A value of 2.0 is given to small lots that are 5 acres (2.0 Ha) or less. A value of 4.0 is given to land that is classified as higher density residential, institutional and commercial or is a road right-of-way. A value of 2.0 is used for Hydro right-of-ways. A value of 0.5 is provided for all lands designated as Provincially Significant Wetland (PSW) and subsequently protected by legislation. A value of 0.7 may be applied to forested land where the Drainage



LEGEND

- PROPERTY LINE
- EXISTING CONSTRUCTED DRAINS
- MUNICIPAL DRAIN
- - - DRAINAGE AREA BOUNDARY
- - - SECTION BOUNDARY
- SECTION 1 STA. 0+000.00 - STA. 4+243.24
- SECTION 2 STA. 4+243.24 - STA. 8+223.61

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



Professional Engineers
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Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
Limitations: Providing plans, technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

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DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

EAST SAVAGE MUNICIPAL DRAIN

MAINTENANCE SECTIONS and SECTION DRAINAGE AREAS

PROJECT No.	18002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	FIG 7.1

Engineer has been provided documentation confirming that the forested land is subject to a registered Forest Management Agreement and subsequently protected from modification by the agreement.

The area of each parcel of land within the drainage basin is multiplied by the land use factor to arrive at a factored area that in turn is used to determine the final benefit and outlet assessment. Therefore, one hectare of road right-of-way is assessed at four times the rate applied to one hectare of agricultural land.

7.8 Distance Factor

A distance factor was developed to account for the proximity of land to the drain and the relative amount of water that will enter the drain. A band is drawn on each side of the drain at a distance of approximately 200 meters, a second band is drawn at a distance of approximately 600 metres from the drain, and a third at 1000 meters from the drain. A property that is included entirely within the first band is given a distance factor of 1.0. A property that falls entirely within the second band is given a distance factor 0.75. A property that falls entirely within the third band is given a distance factor 0.5 and the land that is located beyond 1000 metres from the drain (outside the third band), is given a distance factor of 0.3. In many cases, a property will not be entirely included within one of the bands. For example, one-half of a property might fall within the first band and the other half might fall in the second band. In this case, a distance factor of 0.875 is assigned to that property. The distance factor information is included on **Figure 7.2**.

7.9 Outlet and Injuring Liability Assessment

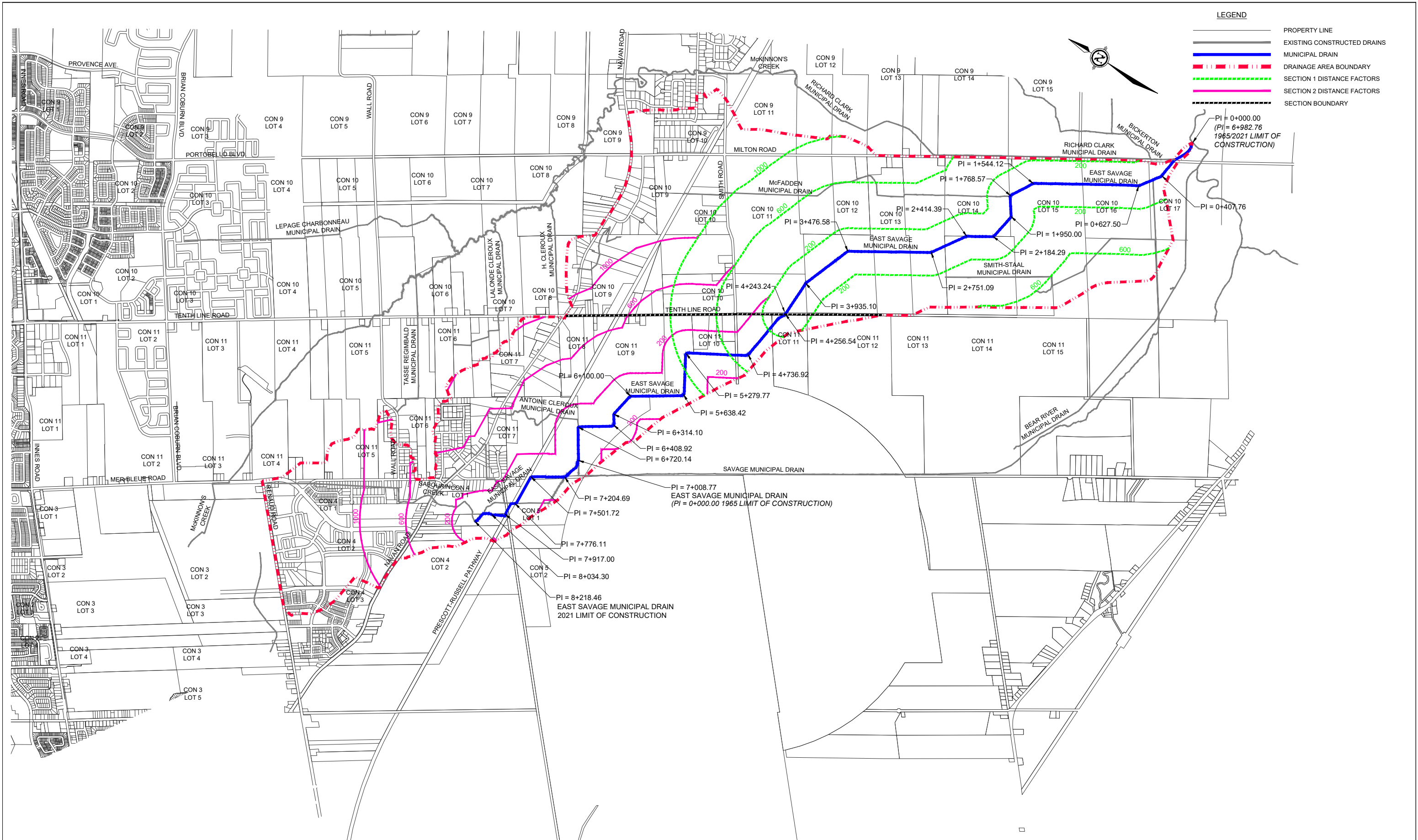
7.9.1 Outlet Assessment

Each parcel of land that lies within the drainage basin and is upstream of the location where maintenance is being undertaken pays for a portion of the cost of the maintenance through an outlet assessment.

The outlet assessment factored area for each property is determined by multiplying the area of each property in the drainage basin by the land use factor, the distance factor and the section or subsection factor. Using the outlet assessment factored area for all of the properties being assessed and the cost of the future maintenance assigned to outlet assessment, a cost per unit outlet factored area (factored hectare) is determined. This is then multiplied by the total outlet assessment factored area of each property to calculate the outlet assessment that is applied to that property.

7.9.2 Injuring Liability Assessment

If, from any land or road, water is artificially caused by any means to flow upon and injure any other land or road, the land or road from which the water is caused to flow may be assessed for injuring liability with respect to a drainage works to relieve the injury so caused to such other land or road.



LEGEND

	PROPERTY LINE
	EXISTING CONSTRUCTED DRAINS
	MUNICIPAL DRAIN
	DRAINAGE AREA BOUNDARY
	SECTION 1 DISTANCE FACTORS
	SECTION 2 DISTANCE FACTORS
	SECTION BOUNDARY

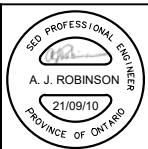
PI = 0+000.00
 (PI = 6+982.76
 1965/2021 LIMIT OF
 CONSTRUCTION)

PI = 0+407.76

PI = 7+008.77
 EAST SAVAGE MUNICIPAL DRAIN
 (PI = 0+000.00 1965 LIMIT OF CONSTRUCTION)

PI = 8+218.46
 EAST SAVAGE MUNICIPAL DRAIN
 2021 LIMIT OF CONSTRUCTION

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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HORIZONTAL		

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DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

EAST SAVAGE
 MUNICIPAL DRAIN

DISTANCE FACTORS

PROJECT No.	18002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	FIG 7.2

For the initial construction injuring liability assessment is made against the lands in Block A for maintenance and compensation for insufficient outlet related to the increase in the volume of runoff that will impact the Bear River Municipal Drain and properties that are negatively impacted by the increase in volume of runoff resulting from the change in land usage. The East Savage Municipal Drain is tributary to the Bear River Municipal Drain.

A calculation of the cost of Injuring Liability, including for maintenance and compensation for insufficient outlet, as included in the overall assessed cost for initial construction, is provided in **Appendix B**.

The funds collected for maintenance will be held in a special maintenance account by the City of Ottawa for future maintenance, which shall be governed by the existing Engineer's Report Bear River Municipal Drain Maintenance and Improvements, August 1990 by McNeely Engineering Limited.

The Bear River Municipal Drain has a long history of flooding during the growing season when crops are susceptible to the impact of direct flooding or saturation of the root zone. A full discussion of the history of flooding and considerations for alleviating the impact of summer floods is available in the above noted Engineer's Report. It was determined that it was not feasible to lower the drain in order to relieve the regular summer flooding so an alternative was required. As introduced above, where it is not possible to provide a sufficient outlet, Section 32 of the Drainage Act, RSO, 1990 and its previous versions has a provision to compensate landowners whose land is being impacted by drainage from upstream properties by assessing this land for injuring liability in the form of an allowance for damage due to insufficient outlet.

As noted in the 1990 Engineer's Report referenced above, the project as presented included the following: 1) Compensation for insufficient outlet under the Drainage Act, 2) Buffer Strips along the drain to assist in stream slope stabilization and to reduce sediment loads reaching the drain, 3) Low level crossings to permit access for some owners owning lands on both sides of the drain, 4) Allowances for fencing and watering facilities in order to assist in keeping farm animals out of the drain, 5) Maintenance and improvements to the channel.

The maintenance funds collected under this Engineer's Report will be deposited in an account with the City of Ottawa to be used to complete maintenance of the Bear River Municipal Drain as partial compensation to the owners of impacted property in accordance with the provisions in the noted 1990 Engineer's Report. The maintenance funds will be maintained in an account until there is a sufficient amount to permit maintenance to be completed to the plans and profiles included in the 1990 Engineer's Report. The funds collected will be utilized for maintenance initially or in the future. If the amount collected for maintenance exceeds the initial cost of maintenance the remaining funds will be held in the designated account for future maintenance.

The funds collected for compensation for insufficient outlet will be paid to the owners of property identified for compensation in the 1990 Engineer's Report.

Any future land use changes within the watershed that will result in an increase in the total volume of runoff shall be assessed an injuring liability maintenance assessment which shall be assigned to the special maintenance account referenced in this section. This amount will be in addition to any other assessment resulting from the change in land use.

7.10 Benefit Assessment

Lands that are located immediately adjacent to the drain are charged a benefit assessment. A benefit assessment for maintenance is only charged against properties in the section where work is being completed. The benefit factored area is determined by multiplying the individual assessed area of each property that is immediately adjacent to the drain, by the land use factor. Using the benefit factored area for all of the properties and the cost of maintenance assigned to benefit assessment, a cost per unit benefit factored area (factored hectare) is determined. This amount is then multiplied by the total benefit factored area of each property to calculate the benefit assessment that is applied to that property.

7.11 Special Benefit Assessment

The drain is being upgraded to accommodate the proposed development area, therefore, all costs associated with the initial design, construction, allowances, other costs and the Engineer's Report are assessed as a Special Benefit Assessment to the property owners of the lands in Block A.

7.12 Block Assessment

Lands that are located within Block A as indicated on Dwg. No. 16002-A3 are charged a Block Assessment. Block assessments for other built-up areas in addition to Block A are shown on the Assessment Schedule for Future Maintenance. With regard to Block Assessments the Drainage Act states the following:

Engineer may assess a block, etc.

25. (1) of the Drainage Act: The council of the local municipality may direct the engineer to assess as a block, a built-up area designated by the council, and the sum assessed therefore may be levied against all the ratable properties in the designated area proportionately on the basis of the assessed value of the land and buildings. R.S.O. 1990, c. D.17, s. 25 (1).

Assessment to be charged against public roads

(2) Where the engineer makes a block assessment under subsection (1), the engineer shall designate the proportion of the assessment to be charged against the public roads in the designated area. R.S.O. 1990, c. D.17, s. 25 (2).

As such, the costs with regard to the assessments as noted above (where applicable), associated with each block are charged as a block assessment to the individual blocks.

For the initial distribution of costs (or assessments) all lands, including roads, within the development areas have been included in the Special Benefit Assessment charged to the property owners in Block A.

For the distribution of costs associated with future maintenance within the identified Block the costs for roads, utility corridors and other public lands (if there are any public lands) are to be excluded from the property portion of the block and charged as a separate assessment to the road authority, owner of public lands or utility authority (Utility Corridors) in proportion to the area of such public or private land as a percentage of the total area of the block respectively, based on the amounts shown in Assessment Schedules for future maintenance costs for the block. The distribution within blocks for future maintenance is provided on **Schedule D2**, provided in **Appendix C**.

7.13 Assessment Schedules

As described in this report, the drain is divided into two (2) maintenance sections. The land area, land use factor, section or subsection factor and distance factor have been entered into an Excel spreadsheet for each section of the drain. The total area of each land parcel is further divided as required, placing the appropriate portion of area in each sub-section of the drain. Once the total cost of future maintenance is determined, this amount can be entered on the spreadsheet and the outlet, benefit and total assessments are calculated. Where the one-third grant on agricultural land is applicable, this is calculated and deducted from the total assessment to arrive at the net cost assessed against the property. For lands where the agricultural grant is available the Drainage Superintendent should modify the schedules to apply the amount of grant that is in existence at the time that maintenance is undertaken.

In developing the Assessment Schedule, the cost for outlet and benefit has been set to reflect the relative use of the drain by immediate benefiting landowners including the landowners in the commercial/urbanized upstream part of the watershed. The Assessment Schedules have been developed with the percentage split between Outlet Assessment and Benefit Assessment as follows:

Summary Schedule of Assessment

Section 1	–	Station 0+000 to Station 4+243.24	
		Outlet Assessment -	90%
		Benefit Assessment -	10%
Section 2	–	Station 4+243.24 to Station 8+218.46	
		Outlet Assessment -	90%
		Benefit Assessment -	10%

8.0 COST ESTIMATE

8.1 General

The total estimated cost associated with the construction, engineering, contract administration, Engineer's Report, allowances, other costs and contingencies for the drain modifications will be paid directly by the property owners of the lands in Block A in conjunction with the development of these lands. There is no assessment to the remaining landowners for the initial construction between Station 0+000 and Station 8+218.46, the outlet channel from the Stormwater Management Pond serving Block A.

The cost estimates for maintenance and compensation for insufficient outlet related to the Bear River Municipal Drain are included in **Appendix B**. The cost estimate for maintenance is based on the value of the cost of maintenance in the 1990 Engineers report projected to the present using the RS Means Cost Index.

The estimate of compensation for insufficient outlet is based on an allowance of 10% of the amount included in the 1990 Engineer's Report to reflect an estimate of the impact of the increase in the volume of runoff as a result of the change in land use of the lands in question, projected to the present using the RS Means Cost Index.

8.2 Allowances

The parcels of land that have been granted allowances are outlined in the Schedule of Allowances provided in **Appendix B**. The allowances have been established in accordance with Sections 29, 30 and 31 of the Drainage Act, RSO 1990. The allowance for the land (Section 29) is for the land lost due to ditch widening or extending. The allowance for use of the working area and for damage to lands and crops in the working area (Sections 29 & 30) is on lands that are presently being cropped and are anticipated to be out of production during construction and for a period thereafter. The area damaged is calculated using the length and width of the access route and the area for spreading excavated material. The allowance for existing drains (Section 31) is to compensate property owners for the costs associated with improvements to drainage works which were not constructed by requisition or petition under the Act but which will be incorporated in whole or in part in the drainage works. Section 31 of the Drainage Act stipulates that the Engineer shall estimate and allow in money to the owner of such drain the value of such drainage works and shall include the sum in the estimated cost of construction, improvement, repair or maintenance of the drainage works.

These allowances are fixed amounts and are in accordance with Section 62 (3) and 62(4) of the Drainage Act, RSO 1990. The allowance shown for each property may be deducted from the final assessment levied before the assessment is collected from the affected owner.

Payment to the owner would only be made when the allowance is greater than the assessment against the property. The allowances can only be changed if modified prior to adoption of the report by bylaw. Where the allowance is greater than any assessment, as is the case with the initial construction, the municipality shall collect the amount and pay the amount to the respective landowners.

The allowance for land lost due to the Municipal Drain construction or widening has been calculated using local area estimated land values.

The allowance for crop loss assumes full loss for the first year, 60% reduction for the second year and 40% reduction for the third year in areas where excavated material has been spread or for equipment access for construction on lands presently under cultivation.

Local crops were determined to be grains, corn and beans. The allowance for crops lost due to the construction or spreading of material has been calculated using the averaged value for the above noted crops as posted by AgriCorp as the value of this type of crop for production insurance.

9.0 CHANGING THE SCOPE OF THE WORK

Should changes, deletions or extensions in construction be requested or required after the bylaw is passed, the report must be amended, and a revised bylaw must be passed. Since this project will be constructed through provisions of the Drainage Act, a bylaw must first be passed to authorize the work. If it is desired to make any substantial increase or decrease in the scope of work as designed it will be necessary that either a revised report be prepared and processed or, if the desired works are considered to be a gross error in accordance with the Drainage Act, that an application be made to the Agricultural, Food and Rural Affairs Appeal Tribunal (Drainage Tribunal) pursuant to Section 58(4) of the Drainage Act to obtain approval for such change. If any individual or group of owners require additional work and are prepared to apply for such and do not wish to be part of the drainage works they may make their own arrangements with the Contractor, but the Drainage Engineer must approve such in order to ensure that no detrimental effect to the drain or its maintenance results.

10.0 MAINTENANCE

Future maintenance of the project shall be the responsibility of the City of Ottawa, although the individual owners shall be responsible for periodic inspection of the drain and reporting maintenance problems to the City's Drainage Superintendent.

The cost of future maintenance is to be assessed in proportion to the Schedule(s) of Assessment for Future Maintenance. The schedule(s) for this drain, as well as a schedule of distribution for properties within Block A-M is provided in **Appendix C** of this report. Therefore, maintenance costs are to be levied against the lands upstream from the location of the maintenance work pro-rata with the assessments for Benefit and

Outlet in the Schedule for Future Maintenance, which is in accordance with the requirements of the Drainage Act. For the purpose of calculation, the schedules are based on \$10,000.00 of maintenance work completed on each section of the drain. However, the actual value of the maintenance undertaken will be used in determining the amount to be assessed in proportion to the schedule when maintenance is undertaken.

Maintenance of private culverts and fences shall be the responsibility of the adjacent landowners at their own cost. Maintenance of public road culverts shall be the responsibility of the Road Authority, however, if the Road Authority does not complete the maintenance, then the City of Ottawa will complete the maintenance and charge the cost to the Road Authority.

Future maintenance of tile outlets shall be the responsibility of and shall be at the cost of the affected landowners.

11.0 WORKING SPACE – FUTURE MAINTENANCE

A right-of-way or working area must be available, preferably along the east and north sides of the proposed drain, or the side that is best suited for construction. For open drainage works, a right-of-way of up to 40 m from the top of bank is necessary to allow construction to be carried out and excavated material to be spread. This right-of-way can be reduced to 30 m when the excavated material is being disposed of off-site. A right-of-way of 30 m from the top of the bank is designated for future access and maintenance along the side of the drain that is best suited for clean-out as determined by the Drainage Superintendent.

12.0 MINISTRY OF ENVIRONMENT CONSERVATION AND PARKS SPECIES AT RISK

The draft Engineer's Report for the East Savage Municipal Drain was circulated to the Ministry of Environment Conservation and Parks (MECP) for review and screening with regard to Species at Risk (SAR). The MECP provides documentation for SAR in the general vicinity of the drain and may require specific permissions/authorizations where the proposed work has direct impact on SAR or their habitat.

Where provided, a copy of the MECP Letter of Advice including conditions is attached and included in **Appendix D**.

The documented occurrences of Species at Risk of note for this project as identified by the MECP or anticipated to be within the local area are included in the following sections.

General mitigation measures include the following:

- Avoidance – Work on Municipal Drains is limited by prescribed in-water work timing windows to be within the period from July 1st to October 15th of any year. While protecting aquatic species, this timing window also affords general protection to breeding birds and nesting turtles.
- Avoidance – a general sweep of the work area is prescribed by contract conditions for each workday in the proposed work area. Where active nests or SAR are found, additional measures are implemented.
- Awareness – contractors are required to be aware of potential SAR and to stop all work when the presence of SAR is suspected.

12.1 Documented Endangered Species

“Endangered Species” with documented occurrences within the general vicinity of the East Savage Municipal Drain include the following:

Birds

- Common Nighthawk (Special Concern)
- Barn Swallow (Threatened)
- Bank Swallow (Threatened)
- Bobolink (Threatened)
- Eastern Meadowlark (Threatened)
- Chimney Swift (Threatened)
- Wood Thrush (Special Concern)
- Peregrine Falcon (Special Concern)
- Short-eared Owl (Special Concern)
- Eastern Whip-poor-will (Threatened)

Mammals

- Species at risk Bats (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat)

Aquatic Species

- Blanding's Turtle (Threatened)
- Snapping Turtle (Special Concern)
- Spotted Turtle (Endangered)

Insects

- Monarch (Special Concern)

Plants

- Butternut

12.2 Birds

Bird Species at Risk (SAR) were documented as noted by the Ministry of Environment Conservation and Parks (MECP) as being in the “general vicinity” of the project. The proposed work involves the cleanout and modification of an existing municipal drain, primarily adjacent to tilled agricultural fields. As such, it is generally not anticipated that the proposed work area provides habitat for SAR and SAR will be unaffected by the proposed work. Primary habitat for most SAR is found within the nearby Mer Bleu Provincially Significant Wetland which is not impacted by this project but is considered to be in the “general vicinity”. It is noted that the existing drain and improvements are not directly linked to the PSW nor do they provide similar habitat to the PSW.

General awareness is provided for species of “Special Concern”. Avoidance and mitigation measures put in place for other “Endangered” or “Threatened” species will also provide some protection for species of “Special Concern”, however, no direct measures are prescribed by the MECP for species of “Special Concern”.

12.2.1 Common Nighthawk (Special Concern)

The Government of Ontario SAR website defines the habitat for Common Nighthawk as follows:

“...habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings and along gravel roads and railways, they tend to occupy natural sites.”

General awareness is provided for species of “Special Concern”.

12.2.2 Barn and Bank Swallows (Threatened)

The Government of Ontario SAR website defines the habitat for Barn and Bank Swallows as follows:

“Barn swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. The species is attracted to open structures that include ledges where they can build their nests.”

“Bank swallows’ nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits.”

It is not anticipated that Barn or Bank Swallow habitat will be disturbed by this project. Culverts on this project do not typically provide suitable habitat due to their smaller size and frequent full capacity flows. Banks on this project are typically heavier clay materials and do not provide suitable habitat.

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the nesting bird season. Should active nests be found additional measures will be implemented.

12.2.3 Bobolink and Meadowlark (Threatened)

The Government of Ontario SAR website defines the habitat for Bobolink and Meadowlark as follows:

“Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields.”

“Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs or fence posts are used as elevated song perches.”

It is not anticipated that Bobolink or Meadowlark habitat will be disturbed by this project. Adjacent agriculture is typically actively farmed in soybean or corn production (not hay fields or pasture).

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the nesting season. Should active nests be found additional measures will be implemented.

12.2.4 Chimney Swift (Threatened)

The Government of Ontario SAR website defines the habitat for Chimney Swift as follows:

“Before European settlement Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. They also tend to stay close to water as this is where the flying insects they eat congregate.”

It is not anticipated that Chimney Swift habitat will be disturbed by this project. Primary "near water" habitat is anticipated to be provided in the PSW and unaffected by this project. Manmade structures are unaffected by this project.

"Avoidance" is prescribed as the primary mitigation measure – standard timing windows limit work during the nesting bird season. Should active nests be found additional measures will be implemented.

12.2.5 Wood Thrush (Special Concern)

The Government of Ontario SAR website defines the habitat for Wood Thrush as follows:

"The wood thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests but will also use smaller stands of trees. They build their nests in living saplings, trees or shrubs, usually in sugar maple or American beech."

General awareness is provided for species of "Special Concern".

12.2.6 Peregrine Falcon (Special Concern)

The Government of Ontario SAR website defines the habitat for Peregrine Falcon as follows:

"Peregrine Falcons usually nest on tall, steep cliff ledges close to large bodies of water. Although most people associate Peregrine Falcons with rugged wilderness, some of these birds have adapted well to city life. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas. Cities offer peregrines a good year-round supply of pigeons and starlings to feed on."

General awareness is provided for species of "Special Concern".

12.2.7 Short Eared Owl (Special Concern)

The Government of Ontario SAR website defines the habitat for Short Eared Owl as follows:

"The Short-eared Owl lives in open areas such as grasslands, marshes and tundra where it nests on the ground and hunts for small mammals, especially voles."

General awareness is provided for species of "Special Concern".

12.2.8 Eastern Whip-Poor-Will (Threatened)

The Government of Ontario SAR website defines the habitat for Eastern Whip-Poor-Will as follows:

“The Eastern Whip-Poor-Will is usually found in areas with a mix of open and forested areas, such as savannahs, open woodlands or openings in more mature, deciduous, coniferous and mixed forests. It forages in these open areas and uses forested areas for roosting (resting and sleeping) and nesting. It lays its eggs directly on the forest floor, where its colouring means it will easily remain undetected by visual predators.”

It is not anticipated that Eastern Whip-Poor-Will habitat will be disturbed by this project.

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the nesting bird season. Should active nests be found additional measures will be implemented.

12.3 Mammals

Mammal Species at Risk (SAR) were documented as noted by the Ministry of Environment Conservation and Parks (MECP) as being in the “general vicinity” of the project. The proposed work involves the cleanout and modification of an existing municipal drain, primarily adjacent to tilled agricultural fields. As such, it is generally not anticipated that the proposed work area provides habitat for SAR and SAR will be unaffected by the proposed work. Primary habitat for most SAR is found within the nearby Mer Bleu Provincially Significant Wetland which is not impacted by this project but may be considered to be in the “general vicinity”. It is noted that the existing drain and improvements are not directly linked to the PSW.

General awareness is provided for species of “Special Concern”. Avoidance and mitigation measures put in place for other “Endangered” or “Threatened” species will also provide some protection for species of “Special Concern”, however, no direct measures are prescribed by the MECP for species of “Special Concern”.

12.3.1 Bats (Endangered)

The Government of Ontario SAR website defines the habitat for SAR Bats (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat) as follows:

“In the spring and summer, eastern small-footed bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each year.”

It is not anticipated that SAR Bats habitat will be disturbed by this project.

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the nesting bird season. Should active nests be found additional measures will be implemented.

12.4 Aquatic Species at Risk (Turtles)

Aquatic Species at Risk (SAR) – Turtles, were documented as noted by the Ministry of Environment Conservation and Parks (MECP) as being in the “general vicinity” of the project. The proposed work involves the cleanout and modification of an existing municipal drain. The existing East Savage Municipal Drain is classified as a “Type F” Municipal Drain (ID No. 96695) by the Department of Fisheries and Oceans (DFO). The Classification was last reviewed by the DFO in 2017. Typical conditions for a “Type F” drain include periods of the year where the drain is subject to low or no flows, may be periodically dry and has no sensitive species present that use the drain.

While turtles and aquatic species at risk may exist within the general vicinity, the impact of the proposed work will be limited due to the anticipated dry conditions at the time of construction. Additionally, work within the prescribed timing windows will limit the potential impact during breeding or hibernating windows. Primary habitat for most aquatic SAR is found within the nearby Mer Bleu Provincially Significant Wetland which is not impacted by this project but may be considered to be in the “general vicinity”. It is noted that the existing drain and improvements are not directly linked to the PSW.

General awareness is provided for species of “Special Concern”. Avoidance and mitigation measures put in place for other “Endangered” or “Threatened” species will also provide some protection for species of “Special Concern”, however, no direct measures are prescribed by the MECP for species of “Special Concern”.

12.4.1 Blanding’s Turtle (Threatened)

The Government of Ontario SAR website defines the habitat for Blanding’s Turtles as follows:

“Blanding’s Turtles live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. It is not unusual, though, to find them hundreds of metres from the nearest water body, especially while they are searching for a mate or traveling to a nesting site. Blanding’s Turtles hibernate in the mud at the bottom of permanent water bodies from late October until the end of April.

It is not anticipated that Blanding’s Turtle habitat will be disturbed by this project. Primary “permanent water” habitat is anticipated to be provided in the PSW and unaffected by this project. Heavy clay banks of the drain do not generally provide suitable nesting sites.

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the turtle nesting season. Should active nests be found additional measures will be implemented.

12.4.2 Snapping Turtle (Special Concern)

The Government of Ontario SAR website defines the habitat for Snapping Turtles as follows:

Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid-summer, females travel overland in search of a suitable nesting site, usually gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.

It is not anticipated that Snapping Turtle habitat will be disturbed by this project. Primary “permanent water” habitat is anticipated to be provided in the PSW and unaffected by this project. Heavy clay banks of the drain do not generally provide suitable nesting sites.

General awareness is provided for species of “Special Concern”.

12.4.3 Spotted Turtle (Endangered)

The Government of Ontario SAR website defines the habitat for Spotted Turtles as follows:

“The Spotted turtle is semi-aquatic and prefers ponds, marshes, bogs and even ditches with slow-moving, unpolluted water and an abundant supply of aquatic vegetation. They are found in different types of wetlands throughout the province, depending on the types of habitats that are available. Females dig their nests in sunny locations where there is not a lot of woody vegetation. This species usually hibernates in wetlands or seasonally wet areas associated with structures including overhanging banks, hummocks, tree roots, or aquatic animal burrows.

It is not anticipated that Spotted Turtle habitat will be disturbed by this project. Primary “permanent water” habitat is anticipated to be provided in the PSW and unaffected by this project. Heavy clay banks of the drain do not generally provide suitable nesting sites.

“Avoidance” is prescribed as the primary mitigation measure – standard timing windows limit work during the turtle nesting season. Should active nests be found additional measures will be implemented.

12.5 Insect Species at Risk

Insect Species at Risk (SAR) – Monarch Butterflies, were documented as noted by the Ministry of Environment Conservation and Parks (MECP) as being in the “general vicinity” of the project. The proposed work involves the cleanout and modification of an existing municipal drain, primarily adjacent to tilled agricultural fields. As such, it is generally not anticipated that the proposed work area provides habitat for SAR and SAR will be unaffected by the proposed work. Primary habitat for most SAR is found within the nearby Mer Bleu Provincially Significant Wetland which is not impacted by this project but may be considered to be in the “general vicinity”. It is noted that the existing drain and improvements are not directly linked to the PSW.

General awareness is provided for species of “Special Concern”. Avoidance and mitigation measures put in place for other “Endangered” or “Threatened” species will also provide some protection for species of “Special Concern”, however, no direct measures are prescribed by the MECP for species of “Special Concern”.

12.5.1 Monarch Butterflies (Special Concern)

The Government of Ontario SAR website defines the habitat for Monarch Butterflies as follows:

“Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Monarchs spend the winter in Oyamel Fir forests found in central Mexico.”

It is not anticipated that Monarch Butterfly habitat will be significantly disturbed by this project. Some areas of milkweed may be disturbed however, primary habitat is anticipated to be provided in the PSW and unaffected by this project.

General awareness is provided for species of “Special Concern”.

12.6 Plants

Plant Species at Risk (SAR) – Butternut Trees were documented as noted by the Ministry of Environment Conservation and Parks (MECP) as being in the “general vicinity” of the project.

12.6.1 Butternut Trees

Butternut trees may exist in this area. Specific locations are unknown. Butternut trees, as a species, are subject to a disease known as “Butternut Canker”. Some butternut trees are resilient despite some canker (known as retainable) and some are resistant to the butternut canker disease (known as “archivable butternut trees”). Only retainable and archivable butternut trees are afforded protection under the SAR Act.

Where identified within the construction work area, the status of a butternut tree must be verified by a "Qualified Butternut Health Assessor" (BHA). Protection measures will be put in place if a protected tree is identified. Compensation measures as prescribed by the Ontario Ministry of Environment Conservation and Parks (MECP) will be implemented should the removal of a protected tree be required.

13.0 SOUTH NATION CONSERVATION AUTHORITY PERMIT

The draft Engineer's Report for the East Savage Municipal Drain was circulated to South Nation Conservation Authority (SNCA) for review and permit. The SNCA provides permission under the Conservation Authorities Act, O. Reg. 175/06, for the "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses".

A copy of the Permit under O. Reg. 175/06 including conditions is attached as **Appendix D**.

14.0 DEPARTMENT OF FISHERIES AND OCEANS

The Federal Department of Fisheries and Oceans (DFO) provide review of projects where additional review is required by the completion of a self-screening process. Authorization under the Fisheries Act may be required as an outcome of the review process.

In conjunction with the preparation of the Draft Engineer's Report, preliminary self-screening was completed with regard to fish and fish habitat. The self-screening indicated that the existing East Savage Municipal Drain is considered to be a "Type F" Municipal Drain (ID No. 96695) by the Department of Fisheries and Oceans (DFO). The Classification was last reviewed by the DFO in 2017.

Typical conditions for a "Type F" drain include periods of the year where the drain is subject to low or no flows and is periodically dry with no sensitive species present that use the drain. As such, where work is completed within this time frame, there is a limited impact on fish and fish habitat. However, the drain classification/class authorization process is for the purpose of maintenance of an existing drain only. An increase in the overall width of the drain to provide for additional capacity to accommodate upstream changes in land use is required, therefore, the condition limiting maintenance to the existing report cannot be met and a site-specific review is required by the Department of Fisheries and Oceans.

For authorization of this work Robinson Consultants Inc. proposes the implementation of modified Class Authorization measures, typical of a "Class E" (updated conditions as per the DFO Class Authorization). Implementation of these measures will minimize or eliminate the impact on this or adjacent watercourses, fish or Endangered Species. These measures have been incorporated into this report and the related plans and specifications.

Consultation and the required site-specific review by the DFO are to be completed in conjunction with draft circulation of the Engineer's Report. It is anticipated that all applicable conditions have been addressed by this Report, however, where provided, additional conditions/requirements are to be included in Section 14.1.

14.1 Department of Fisheries and Oceans – Conditions and Authorization

Where provided a copy of the DFO Authorization is included in **Appendix D** of this Report.

15.0 MINISTRY OF ENVIRONMENT CONSERVATION AND PARKS STORM WATER ENVIRONMENTAL COMPLIANCE APPROVAL

In conjunction with circulation of the Draft Engineer's Report, consultation was conducted with the Ministry of Environment Conservation and Parks (MECP). It was determined that the standard MECP Stormwater Environmental Compliance Approval was required. Typical Municipal Drain projects are exempt from this requirement; however, the exemption does not apply to projects where the primary purpose is to provide drainage for urban development.

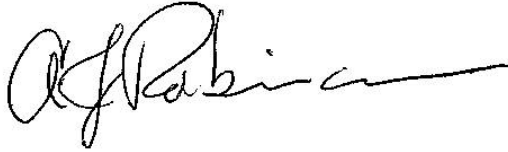
An application will be made for the required MECP Environmental Compliance Approval (ECA). Where received a copy of the ECA is provided in **Appendix D**. It is anticipated that the ECA will not be received in advance of the distribution of the report – when received, this item is to be appended to the report and by-law.

16.0 PERMITS AND AUTHORIZATIONS

All required permits and authorizations required for the initial construction, including, but not limited to, Department of Fisheries and Oceans (DFO), Ministry of Environment Conservation and Parks – Species at Risk (MECP-SAR), the South Nation Conservation Authority (SNCA) and Ontario Ministry of the Environment Conservation and Parks (MECP-ECA) have been applied for in conjunction with the preparation of the Engineer's Report and, where applicable, are provided in **Appendix D**.

All of which is respectfully submitted,

ROBINSON CONSULTANTS INC.



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Drainage Engineer



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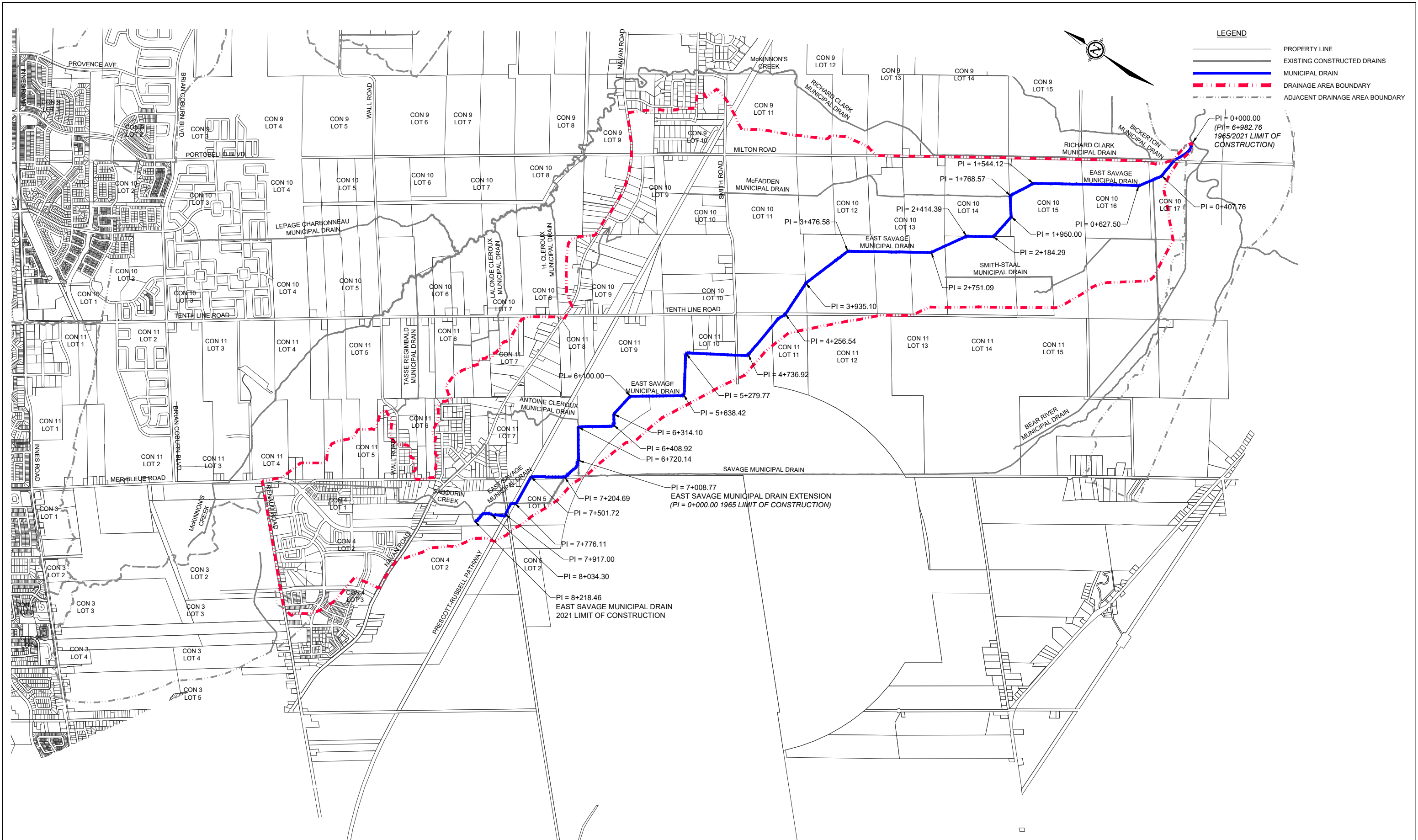
Limitations: Providing plans, non-technical content of
reports and other non-technical advice for submission
under the Ontario Drainage Act.

Association of Professional Engineers of Ontario

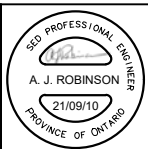
Appendix A

Plans, Profiles, Cross-Sections and Details

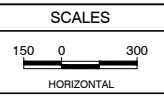
- Drainage Area Plan
- Proposed Realignment Detail
- Culvert and SEC Plan and Details
- Property Ownership Plan and Details
- Drain Profiles – P1-P12
- Drain Cross-Sections – C1-C2
- Std. Detail Dwgs. – A Through I
- OPSD
- DFO BMP – Culvert Replacement



No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
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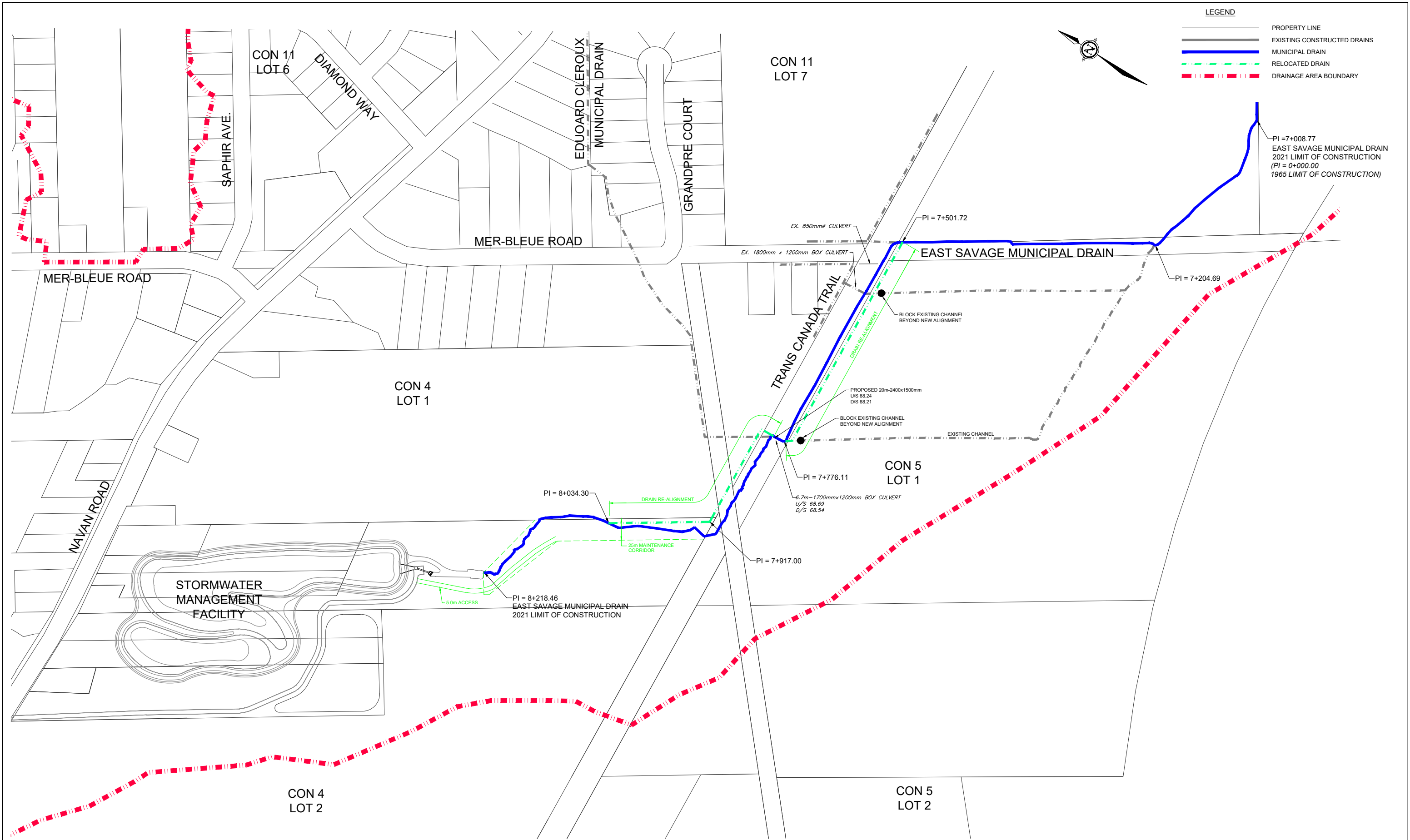
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DRAWN	JHB
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APPROVED	AJR

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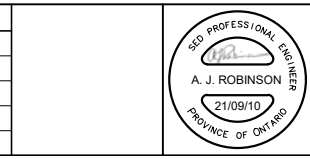
EAST SAVAGE
MUNICIPAL DRAIN

DRAINAGE AREA PLAN

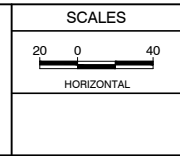
PROJECT No.	18002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-A1



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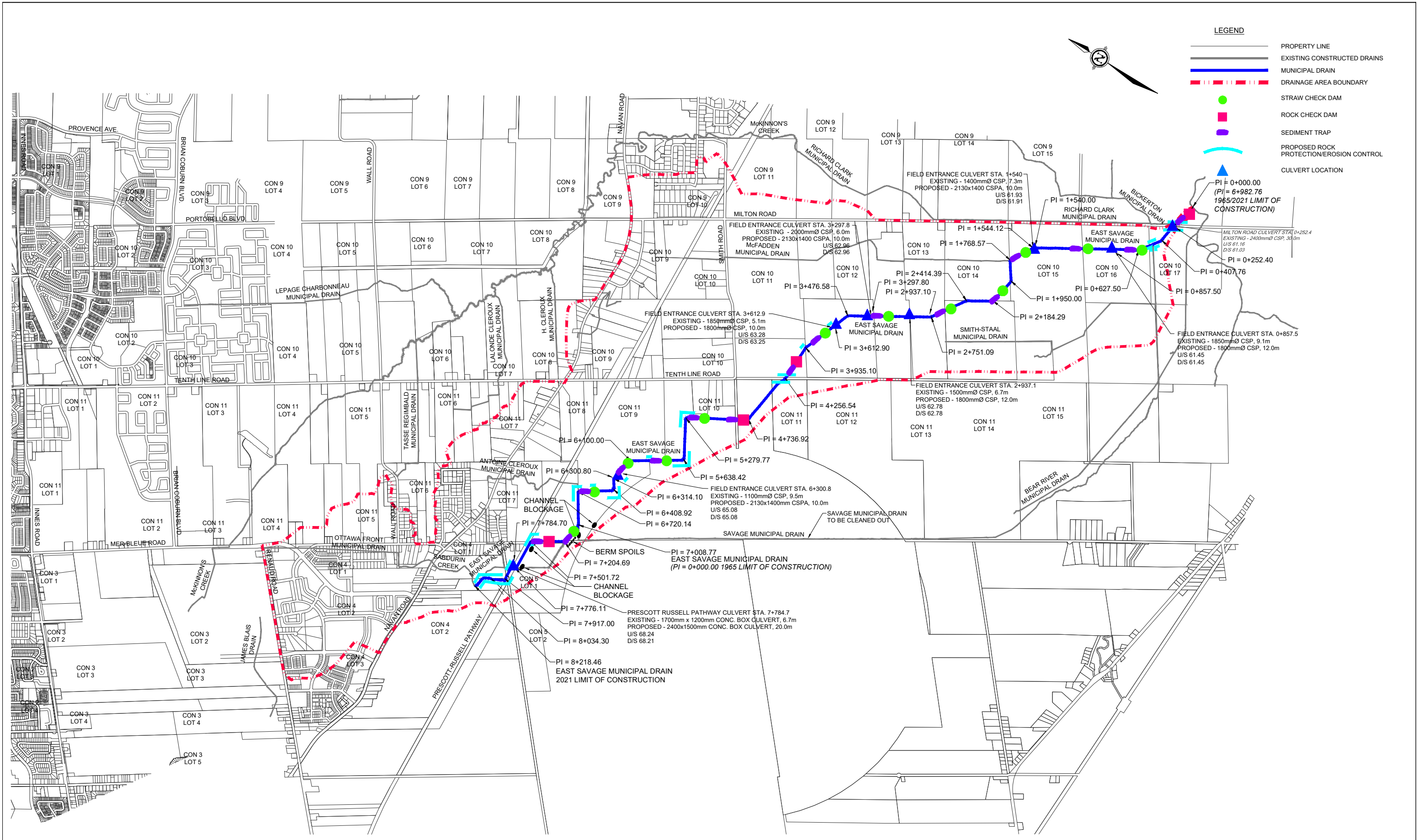
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CHECKED	AJR
DRAWN	JHB
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APPROVED	AJR

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EAST SAVAGE MUNICIPAL DRAIN

PROPOSED REALIGNMENT DETAIL

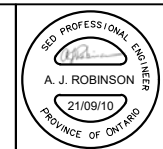
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CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-A1.1



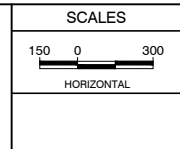
LEGEND

	PROPERTY LINE
	EXISTING CONSTRUCTED DRAINS
	MUNICIPAL DRAIN
	DRAINAGE AREA BOUNDARY
	STRAW CHECK DAM
	ROCK CHECK DAM
	SEDIMENT TRAP
	PROPOSED ROCK PROTECTION/EROSION CONTROL
	CULVERT LOCATION

No.	DATE	REVISION	BY
1	06.04.20	ISSUED FOR AGENCY REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
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DRAWN	JHB
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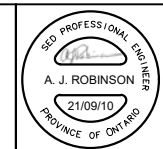
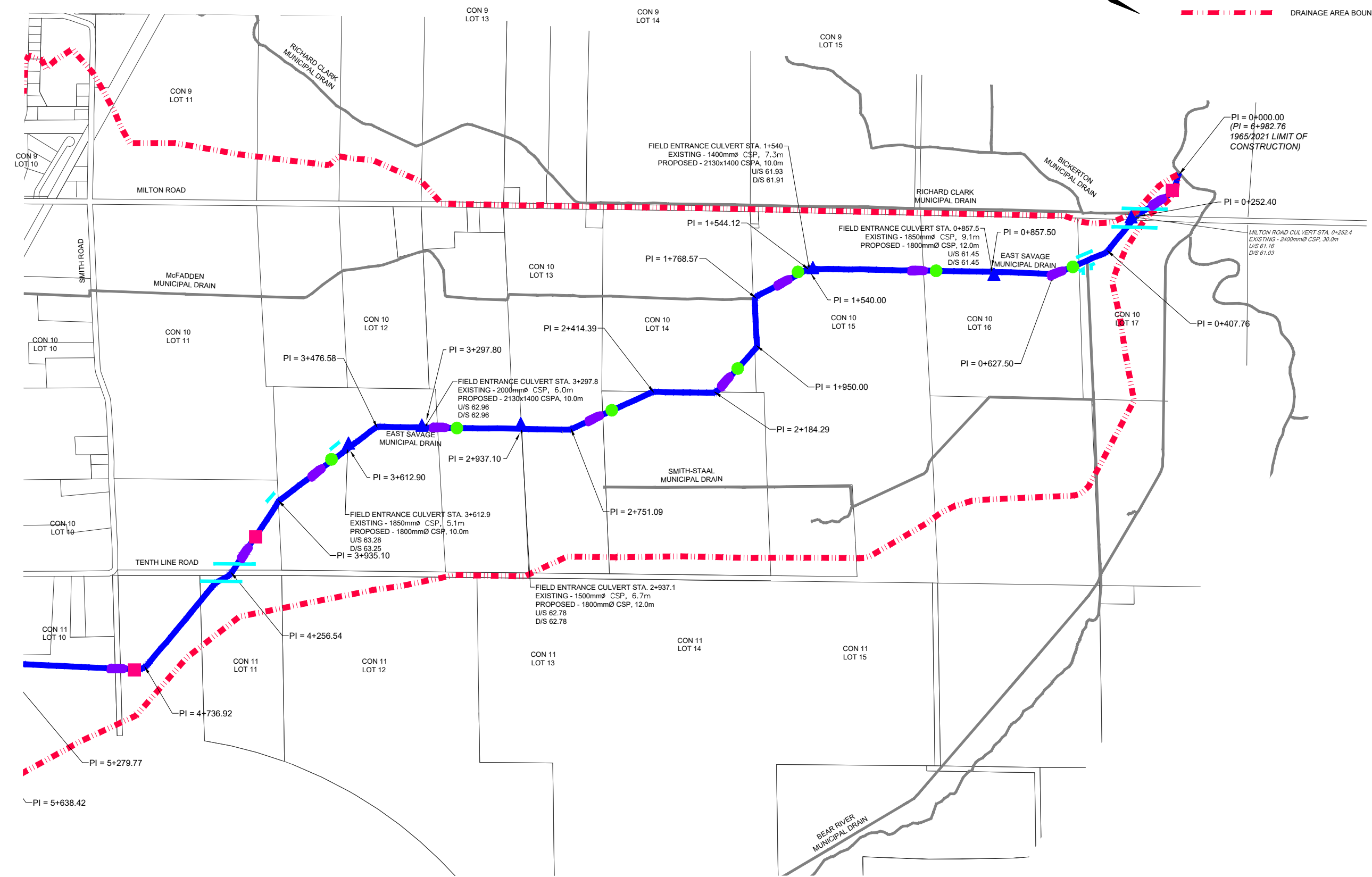
EAST SAVAGE MUNICIPAL DRAIN

CULVERT AND SEDIMENT AND EROSION CONTROL PLAN

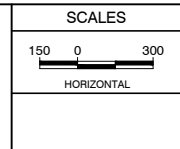
PROJECT No.	18002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	18002-A2

LEGEND

-  PROPERTY LINE
-  EXISTING CONSTRUCTED DRAINS
-  MUNICIPAL DRAIN
-  DRAINAGE AREA BOUNDARY



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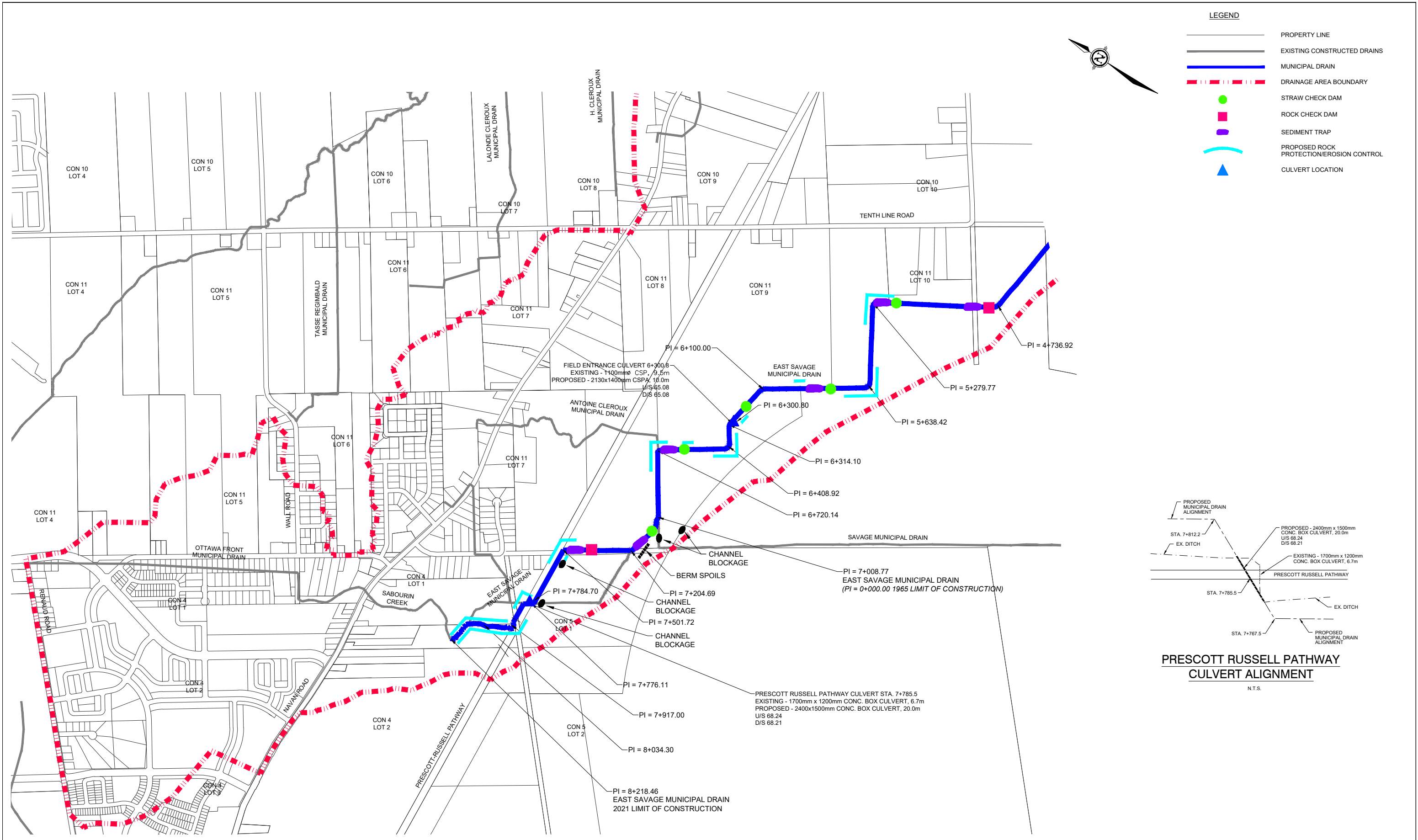
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APPROVED	AJR

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EAST SAVAGE
MUNICIPAL DRAIN

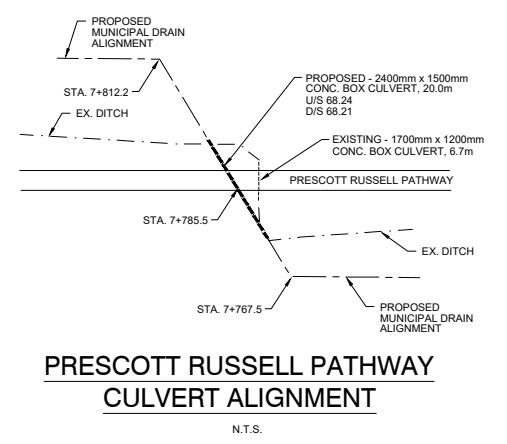
**CULVERT AND SEDIMENT AND
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PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-A2.1

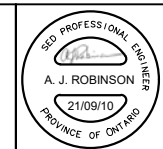


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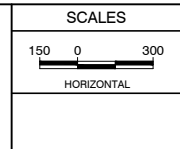
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	MUNICIPAL DRAIN
	DRAINAGE AREA BOUNDARY
	STRAW CHECK DAM
	ROCK CHECK DAM
	SEDIMENT TRAP
	PROPOSED ROCK PROTECTION/EROSION CONTROL
	CULVERT LOCATION



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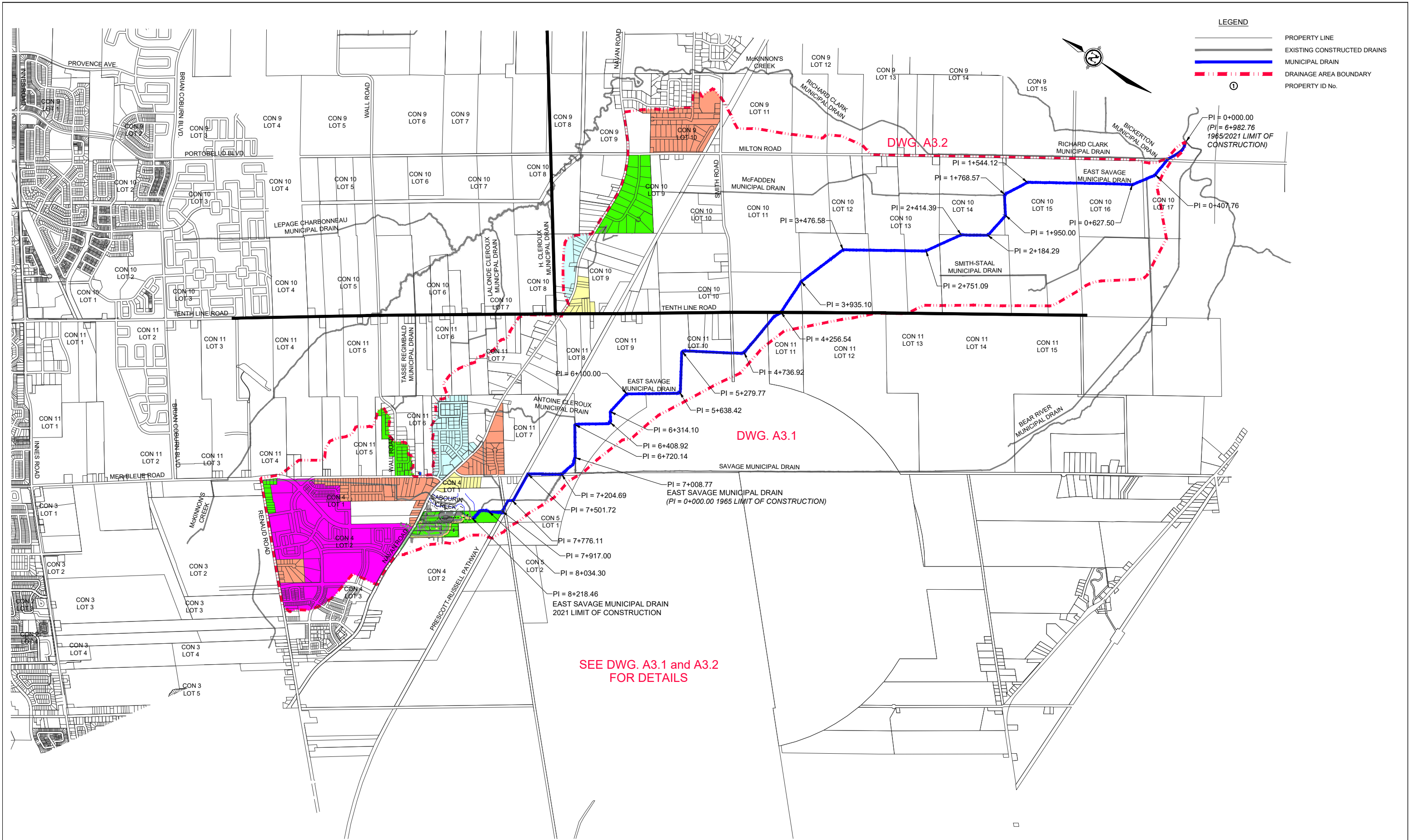
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APPROVED	AJR

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EAST SAVAGE MUNICIPAL DRAIN

CULVERT AND SEDIMENT AND EROSION CONTROL PLAN

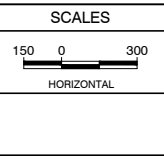
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CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-A2.2



No.	DATE	REVISION	BY
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
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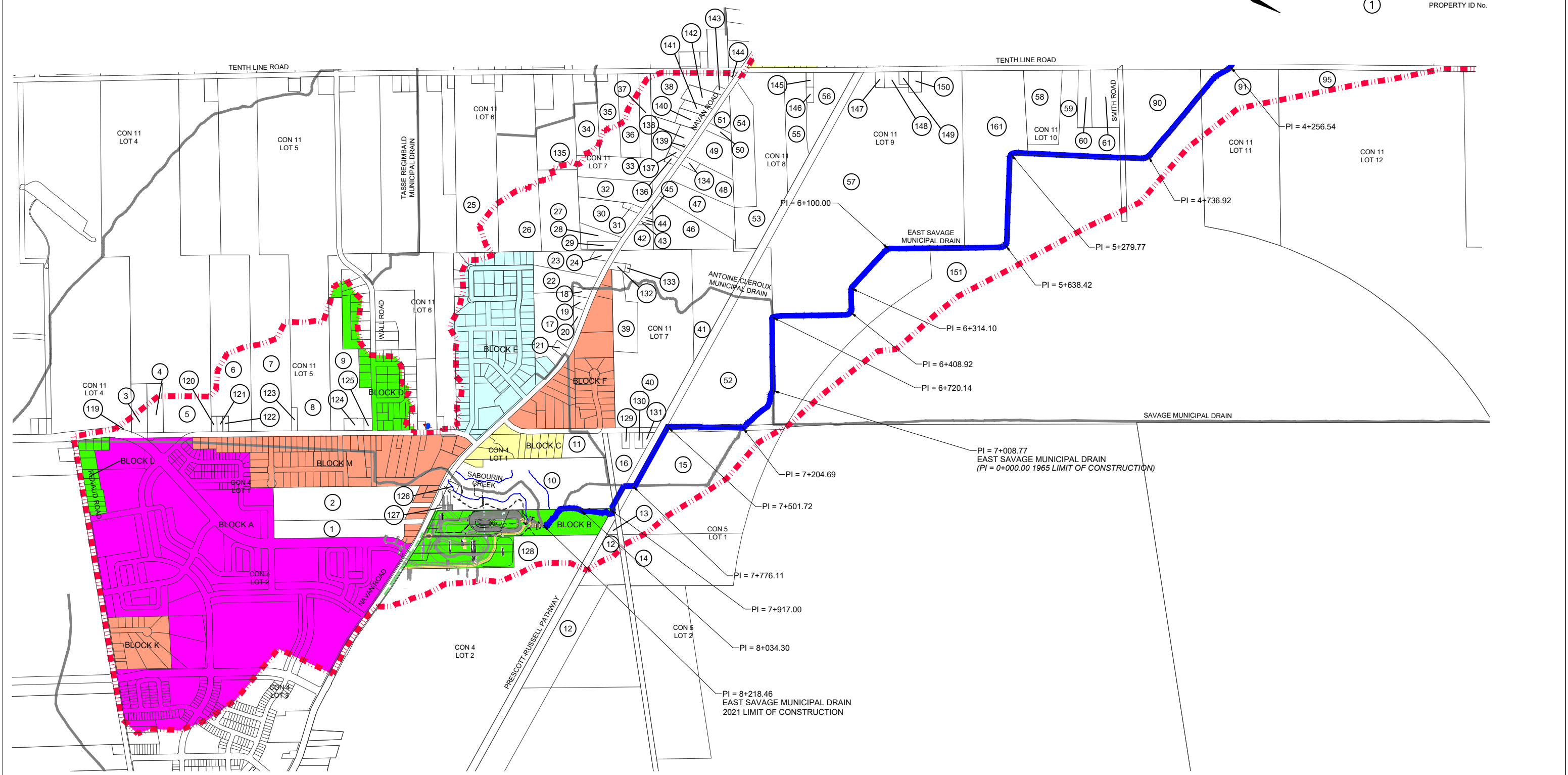
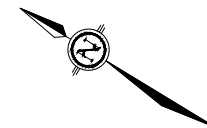
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EAST SAVAGE MUNICIPAL DRAIN

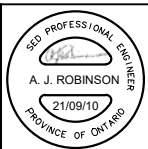
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PROJECT No. 16002
CONTRACT No.
DATED SEPTEMBER 2021
DWG. No. 16002-A3

LEGEND

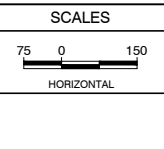
-  PROPERTY LINE
-  EXISTING CONSTRUCTED DRAINS
-  MUNICIPAL DRAIN
-  DRAINAGE AREA BOUNDARY
-  PROPERTY ID No.



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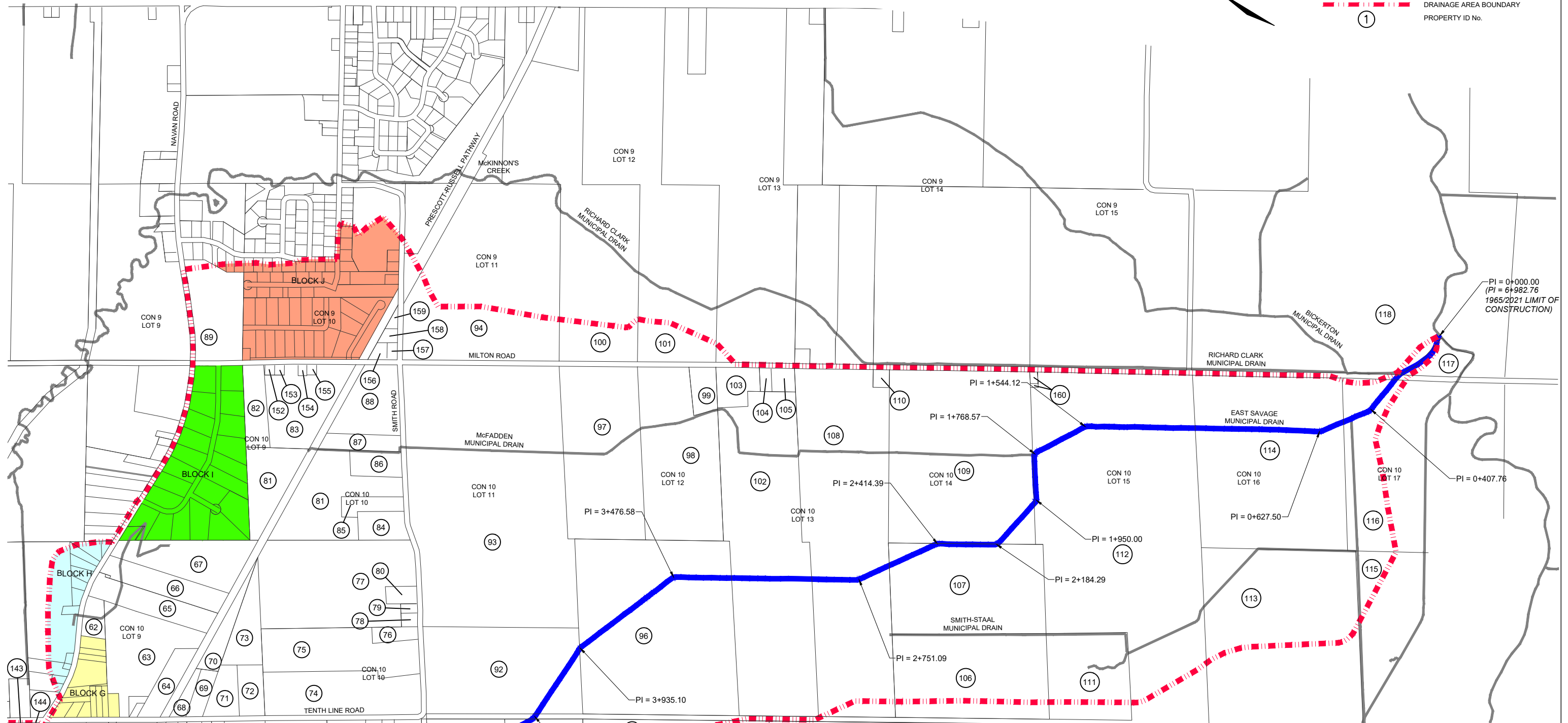
EAST SAVAGE
MUNICIPAL DRAIN

PROPERTY OWNERSHIP
PLAN

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-A3.1

LEGEND

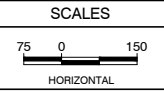
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-  EXISTING CONSTRUCTED DRAINS
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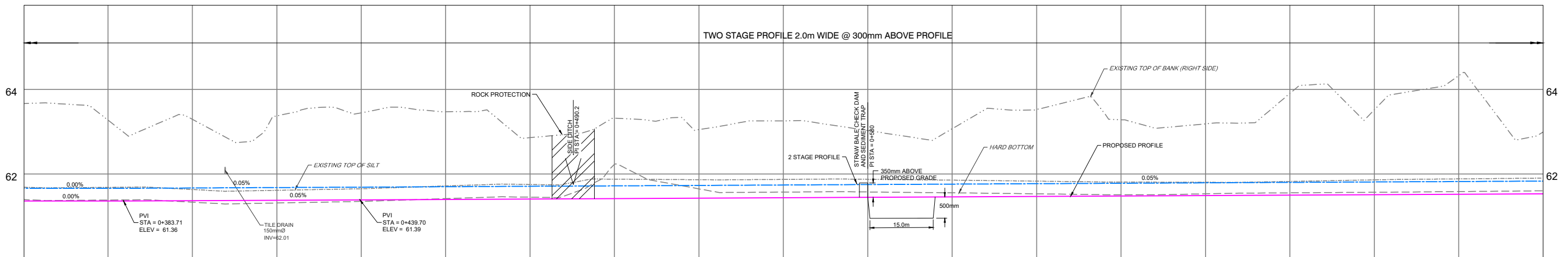
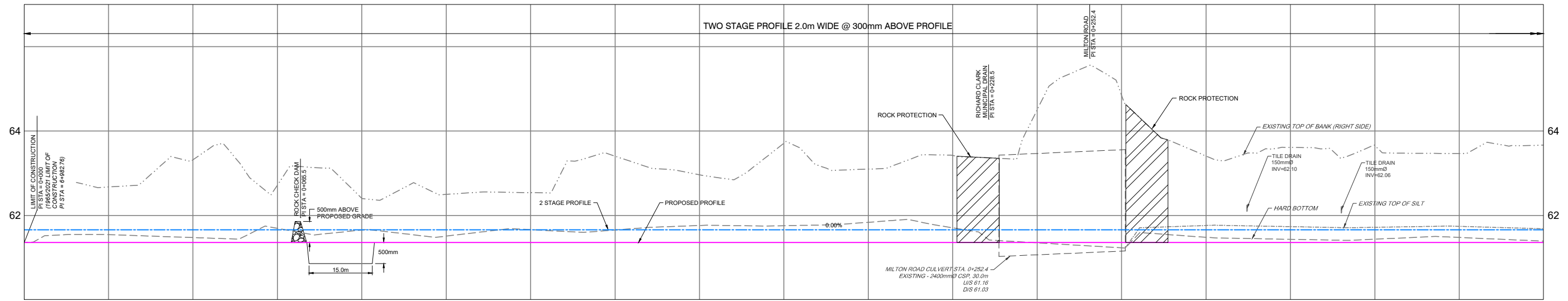
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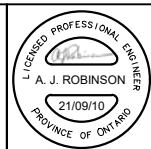
EAST SAVAGE
MUNICIPAL DRAIN

PROPERTY OWNERSHIP
PLAN

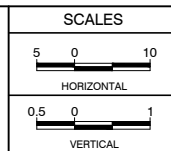
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DATED	SEPTEMBER 2021
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No.	DATE	REVISION	BY
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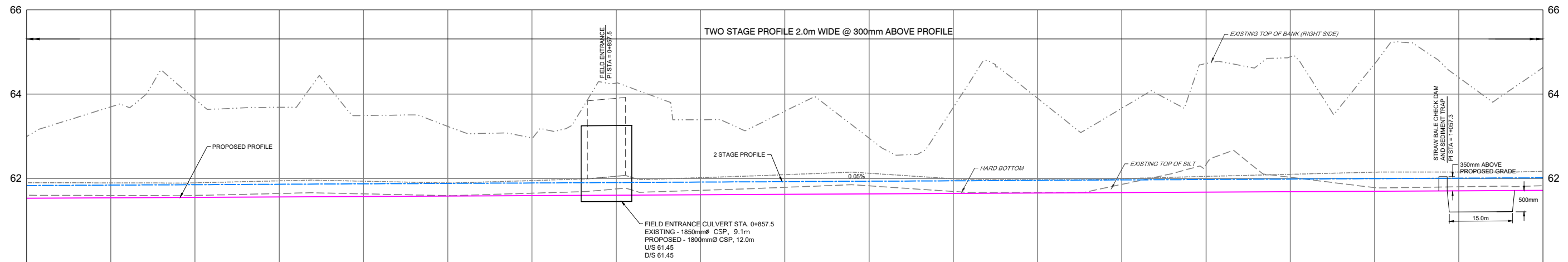
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APPROVED	AJR

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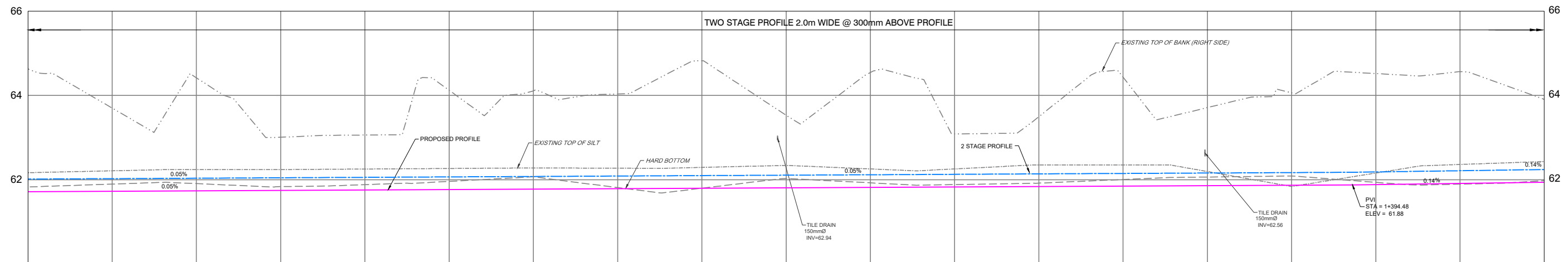
EAST SAVAGE
 MUNICIPAL DRAIN

DRAIN PROFILE
 STA. 0+000 TO STA. 0+720

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P1

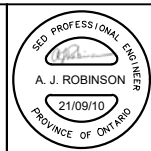


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EXISTING FIRM BOTTOM	61.60	61.59	61.60	61.64	61.63	61.59	61.65	61.75	61.72	61.79	61.82	61.69	61.67	61.66	62.32	62.03	61.79	61.80	61.83
STATION	0+720	0+740	0+760	0+780	0+800	0+820	0+840	0+860	0+880	0+900	0+920	0+940	0+960	0+980	1+000	1+020	1+040	1+060	1+080



PROPOSED GRADE	61.72	61.73	61.74	61.75	61.76	61.77	61.76	61.79	61.80	61.81	61.82	61.83	61.84	61.85	61.86	61.87	61.88	61.91	61.94
EXISTING FIRM BOTTOM	61.80	61.80	61.91	61.84	61.86	61.86	62.07	61.81	61.80	62.03	61.83	61.86	61.82	62.01	62.06	62.09	61.84	61.80	61.86
STATION	1+080	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280	1+300	1+320	1+340	1+360	1+380	1+400	1+420	1+440

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SCALES	
5 0 10	HORIZONTAL
0 0 1	VERTICAL

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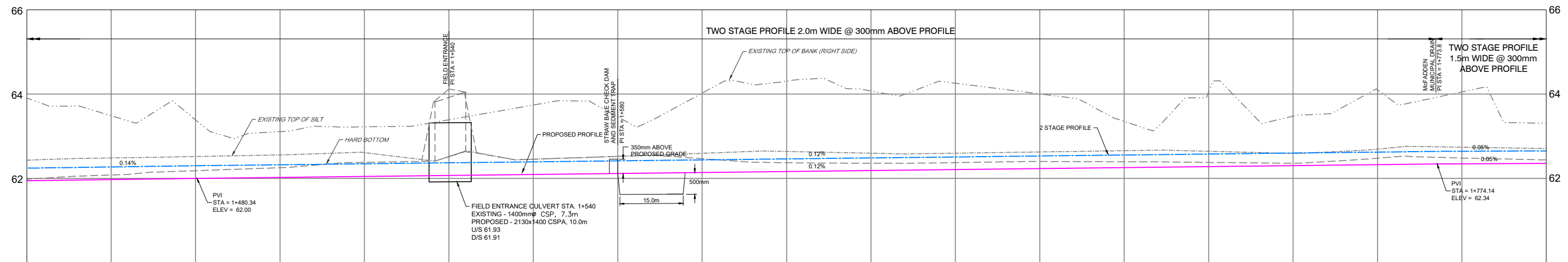
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DRAWN	LG
CHECKED	LF
APPROVED	AJR

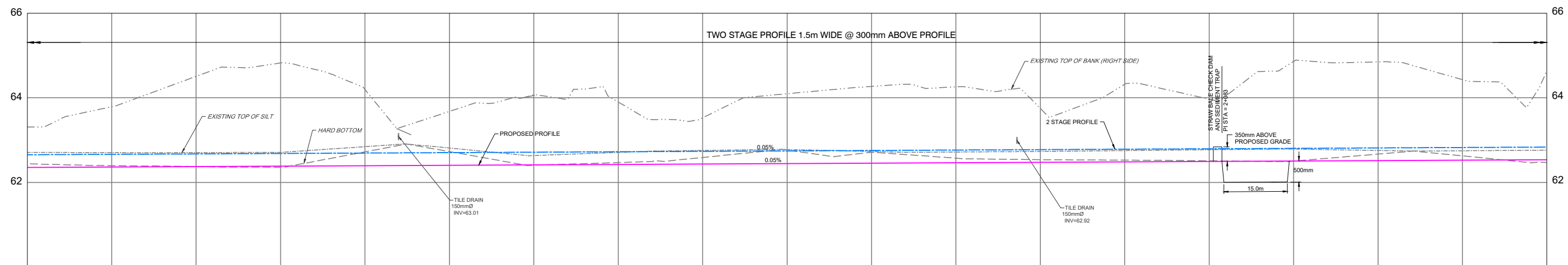
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 0+720 TO STA. 1+440

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P2

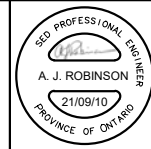


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EXISTING FIRM BOTTOM	61.98	62.08	62.18	62.25	62.38	62.52	62.45	62.52	62.47	62.37	62.36	62.37	62.40	62.39	62.39	62.36	62.46	62.46	62.44
STATION	1+440	1+460	1+480	1+500	1+520	1+540	1+560	1+580	1+600	1+620	1+640	1+660	1+680	1+700	1+720	1+740	1+760	1+780	1+800

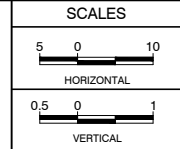


PROPOSED GRADE	62.35	62.36	62.37	62.38	62.39	62.40	62.41	62.42	62.43	62.44	62.45	62.46	62.47	62.48	62.49	62.50	62.51	62.52	62.53
EXISTING FIRM BOTTOM	62.44	62.40	62.37	62.36	62.72	62.73	62.40	62.47	62.59	62.76	62.71	62.57	62.54	62.53	62.51	62.50	62.67	62.63	62.47
STATION	1+800	1+820	1+840	1+860	1+880	1+900	1+920	1+940	1+960	1+980	2+000	2+020	2+040	2+060	2+080	2+100	2+120	2+140	2+160

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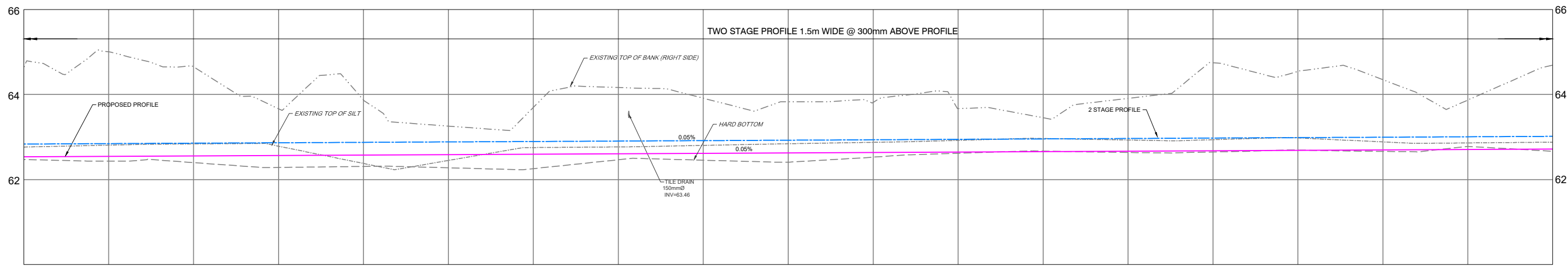
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DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

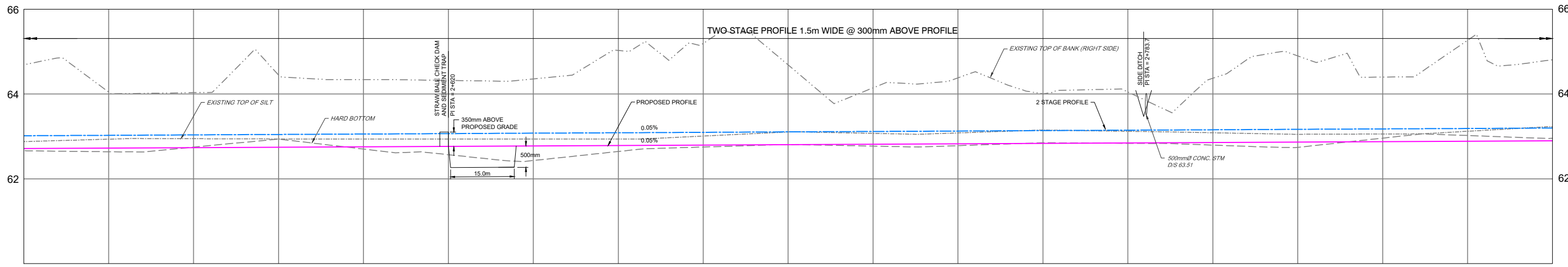
CITY OF OTTAWA
 EAST SAVAGE MUNICIPAL DRAIN

DRAIN PROFILE
 STA. 1+440 TO STA. 2+160

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P3

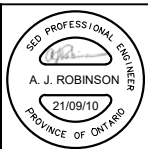


PROPOSED GRADE	62.53	62.54	62.55	62.56	62.57	62.58	62.59	62.60	62.62	62.63	62.64	62.65	62.66	62.67	62.68	62.69	62.70	62.71	62.72
EXISTING FIRM BOTTOM	62.47	62.47	62.40	62.28	62.31	62.28	62.26	62.46	62.45	62.41	62.53	62.62	62.67	62.64	62.65	62.69	62.66	62.78	62.66
STATION	2+160	2+180	2+200	2+220	2+240	2+260	2+280	2+300	2+320	2+340	2+360	2+380	2+400	2+420	2+440	2+460	2+480	2+500	2+520

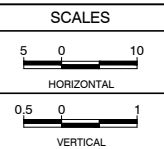


PROPOSED GRADE	62.72	62.73	62.74	62.75	62.76	62.77	62.78	62.79	62.80	62.81	62.82	62.83	62.84	62.85	62.86	62.87	62.88	62.89	62.90
EXISTING FIRM BOTTOM	62.66	62.64	62.75	62.84	62.70	62.57	62.43	62.64	62.75	62.80	62.77	62.78	62.85	62.84	62.80	62.74	62.86	63.02	62.85
STATION	2+520	2+540	2+560	2+580	2+600	2+620	2+640	2+660	2+680	2+700	2+720	2+740	2+760	2+780	2+800	2+820	2+840	2+860	2+880

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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 21/09/10
 Licensed Engineering Technologist
 Name: L. FRANKLIN
 Number: 10951335
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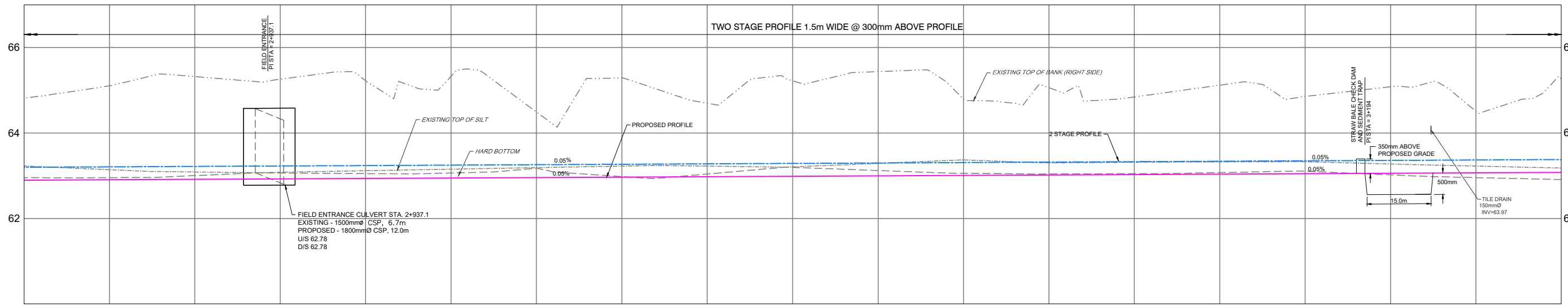
350 Palladium Drive, Suite 210
 Ottawa, ON K2V 1A8
 (613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

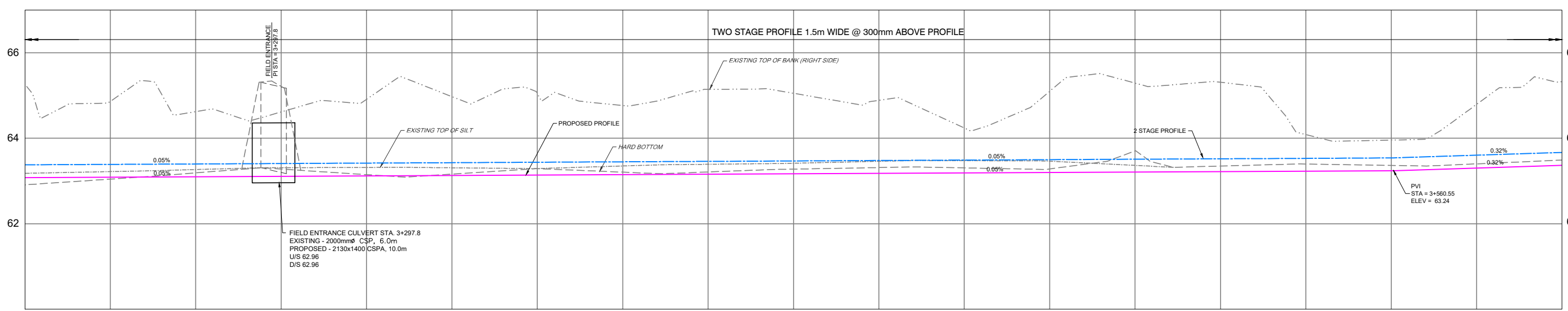
CITY OF OTTAWA
 EAST SAVAGE MUNICIPAL DRAIN

DRAIN PROFILE
 STA. 2+160 TO STA. 2+880

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P4

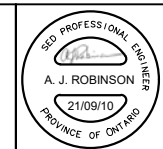


PROPOSED GRADE	62.80	62.81	62.82	62.83	62.84	62.85	62.86	62.87	62.88	62.89	63.00	63.01	63.02	63.03	63.04	63.05	63.06	63.07	63.08
EXISTING FIRM BOTTOM	62.65	62.66	62.67	62.68	62.69	62.70	62.71	62.72	62.73	62.74	62.75	62.76	62.77	62.78	62.79	62.80	62.81	62.82	62.83
STATION	2+880	2+900	2+920	2+940	2+960	2+980	3+000	3+020	3+040	3+060	3+080	3+100	3+120	3+140	3+160	3+180	3+200	3+220	3+240

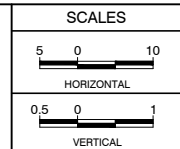


PROPOSED GRADE	63.08	63.09	63.10	63.11	63.12	63.13	63.14	63.15	63.16	63.17	63.18	63.19	63.20	63.21	63.22	63.23	63.24	63.30	63.37
EXISTING FIRM BOTTOM	62.97	62.98	62.99	63.00	63.01	63.02	63.03	63.04	63.05	63.06	63.07	63.08	63.09	63.10	63.11	63.12	63.13	63.14	63.15
STATION	3+240	3+260	3+280	3+300	3+320	3+340	3+360	3+380	3+400	3+420	3+440	3+460	3+480	3+500	3+520	3+540	3+560	3+580	3+600

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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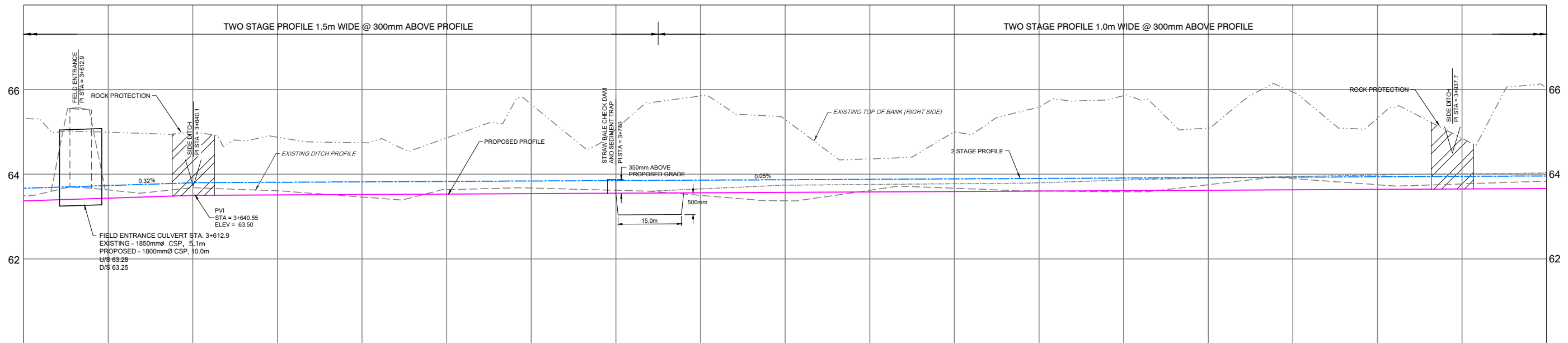
350 Palladium Drive, Suite 210
 Ottawa, ON K2V 1A8
 (613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

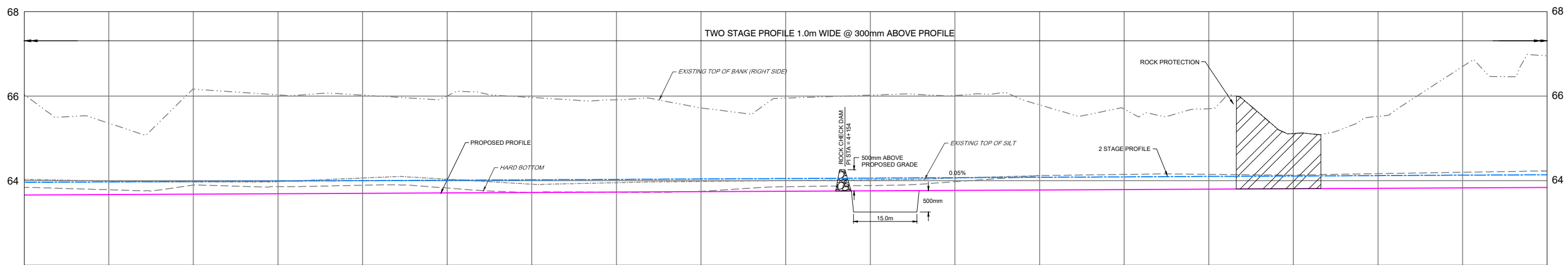
CITY OF OTTAWA
 EAST SAVAGE
 MUNICIPAL DRAIN

DRAIN PROFILE
 STA. 2+880 TO STA. 3+600

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P5

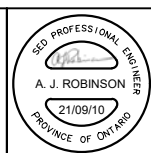


PROPOSED GRADE	63.37	63.43	63.50	63.51	63.52	63.53	63.54	63.55	63.56	63.57	63.58	63.59	63.60	63.61	63.62	63.63	63.64	63.65	63.66
EXISTING FIRM BOTTOM	63.49	63.63	63.69	63.67	63.46	63.63	63.67	63.62	63.60	63.37	63.62	63.67	63.61	63.59	63.75	63.90	63.75	63.77	63.84
STATION	3+600	3+620	3+640	3+660	3+680	3+700	3+720	3+740	3+760	3+780	3+800	3+820	3+840	3+860	3+880	3+900	3+920	3+940	3+960

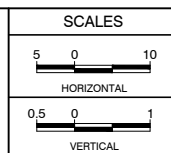


PROPOSED GRADE	63.66	63.67	63.68	63.69	63.70	63.71	63.72	63.73	63.74	63.75	63.76	63.77	63.78	63.79	63.80	63.81	63.82	63.83	63.84
EXISTING FIRM BOTTOM	63.84	63.79	63.80	63.86	63.89	63.80	63.72	63.73	63.75	63.86	63.89	63.88	64.12	64.15	64.15	64.13	64.17	64.20	64.23
STATION	3+960	3+980	4+000	4+020	4+040	4+060	4+080	4+100	4+120	4+140	4+160	4+180	4+200	4+220	4+240	4+260	4+280	4+300	4+320

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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Name: L. FRANKLIN
Number: 100501335
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Association of Professional Engineers of Ontario



Robinson
Consultants

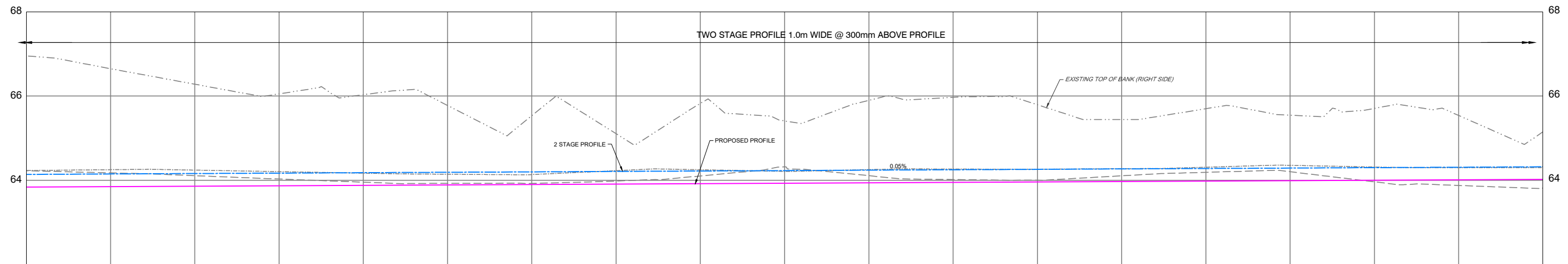
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(613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

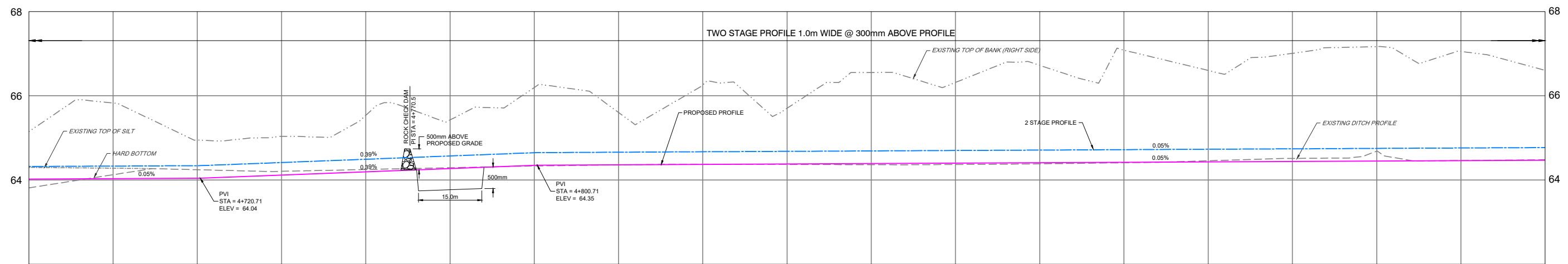
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 3+600 TO STA. 4+320

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P6

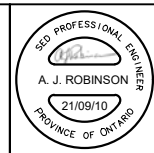


PROPOSED GRADE	63.84	63.85	63.86	63.87	63.88	63.89	63.90	63.91	63.92	63.93	63.94	63.95	63.96	63.97	63.98	63.99	64.00	64.01	64.02
EXISTING FIRM BOTTOM	64.23	64.17	64.11	64.03	63.95	63.83	63.93	63.89	64.10	64.32	64.11	64.02	64.00	64.11	64.19	64.20	63.95	63.89	63.81
STATION	4+320	4+340	4+360	4+380	4+400	4+420	4+440	4+460	4+480	4+500	4+520	4+540	4+560	4+580	4+600	4+620	4+640	4+660	4+680

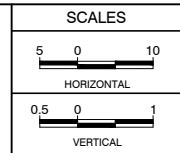


PROPOSED GRADE	64.02	64.03	64.04	64.11	64.19	64.27	64.35	64.36	64.37	64.38	64.39	64.40	64.41	64.42	64.43	64.44	64.45	64.46	64.47
EXISTING FIRM BOTTOM	63.87	64.13	64.24	64.27	64.25	64.29	64.33	64.36	64.37	64.37	64.36	64.37	64.38	64.41	64.46	64.51	64.69	64.46	64.48
STATION	4+680	4+700	4+720	4+740	4+760	4+780	4+800	4+820	4+840	4+860	4+880	4+900	4+920	4+940	4+960	4+980	5+000	5+020	5+040

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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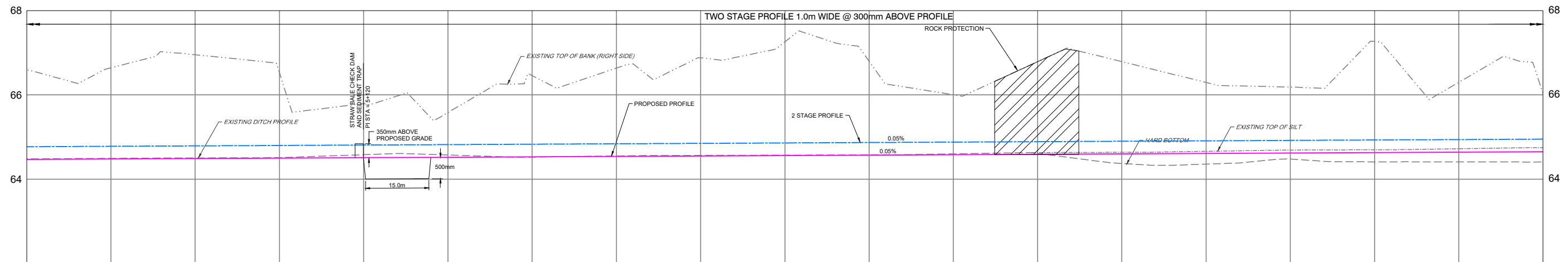
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DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

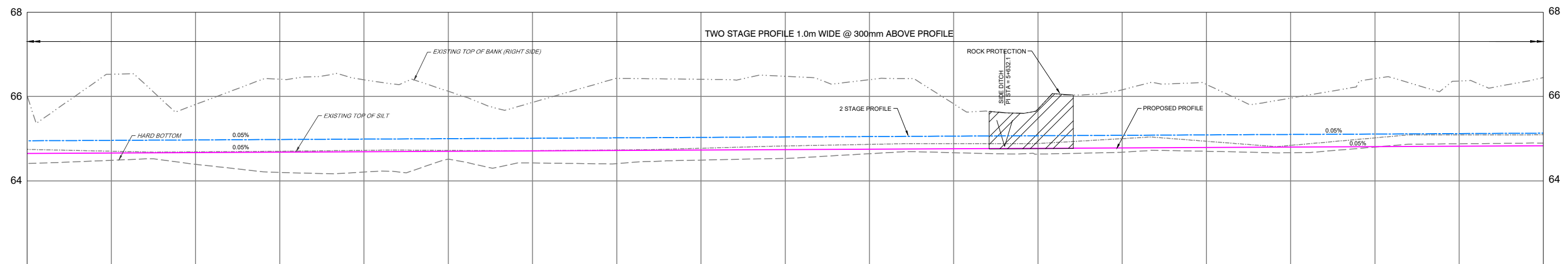
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 4+320 TO STA. 5+040

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P7

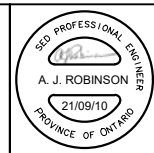


PROPOSED GRADE	64.47	64.48	64.49	64.50	64.51	64.52	64.53	64.54	64.55	64.56	64.57	64.58	64.59	64.60	64.61	64.62	64.63	64.64	64.65
EXISTING FIRM BOTTOM	64.46	64.49	64.50	64.51	64.56	64.57	64.52	64.55	64.56	64.57	64.58	64.60	64.61	64.37	64.39	64.46	64.41	64.47	64.47
STATION	5+040	5+060	5+080	5+100	5+120	5+140	5+160	5+180	5+200	5+220	5+240	5+260	5+280	5+300	5+320	5+340	5+360	5+380	5+400

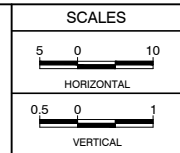


PROPOSED GRADE	64.65	64.66	64.67	64.68	64.69	64.70	64.71	64.72	64.73	64.74	64.75	64.76	64.77	64.78	64.79	64.80	64.81	64.82	64.83
EXISTING FIRM BOTTOM	64.41	64.49	64.39	64.20	64.21	64.51	64.42	64.41	64.49	64.53	64.64	64.67	64.63	64.68	64.70	64.67	64.60	64.68	64.69
STATION	5+400	5+420	5+440	5+460	5+480	5+500	5+520	5+540	5+560	5+580	5+600	5+620	5+640	5+660	5+680	5+700	5+720	5+740	5+760

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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Licensed Engineering Technologist
Name: L. FRANKLIN
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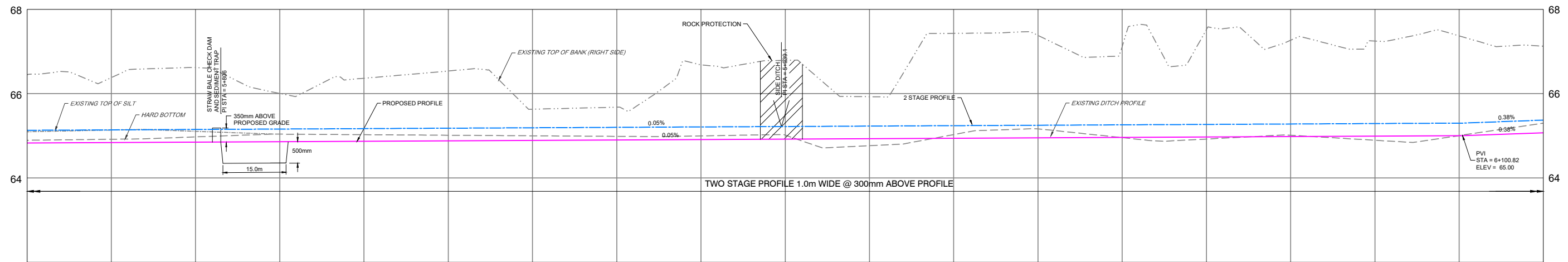
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DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

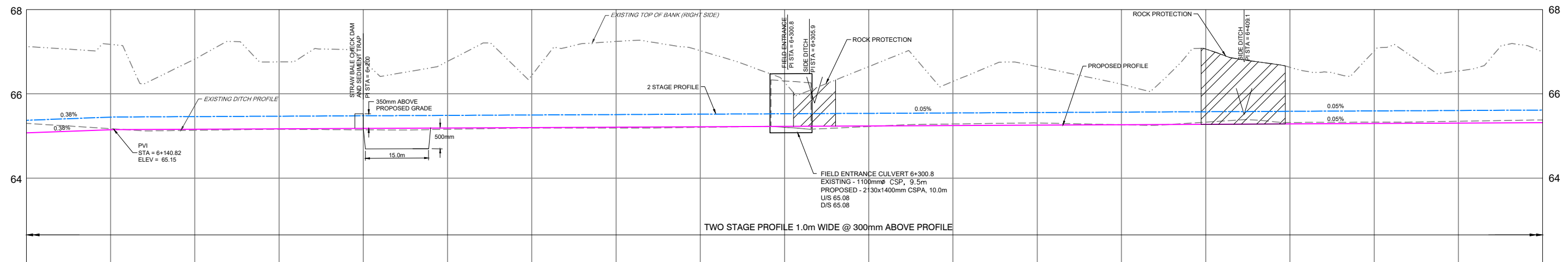
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 5+040 TO STA. 5+760

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P8

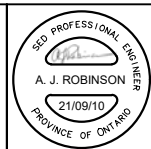


PROPOSED GRADE	64.83	64.84	64.85	64.86	64.87	64.88	64.89	64.90	64.91	64.92	64.93	64.94	64.95	64.96	64.97	64.98	64.99	65.00	65.07
EXISTING FIRM BOTTOM	64.89	64.82	64.97	65.04	65.03	65.01	65.00	64.99	65.00	65.02	64.76	65.03	65.16	64.96	64.92	65.01	64.89	65.00	65.30
STATION	5+760	5+780	5+800	5+820	5+840	5+860	5+880	5+900	5+920	5+940	5+960	5+980	6+000	6+020	6+040	6+060	6+080	6+100	6+120



PROPOSED GRADE	65.07	65.15	65.16	65.17	65.18	65.19	65.20	65.21	65.22	65.23	65.24	65.25	65.26	65.27	65.28	65.28	65.29	65.30	65.31
EXISTING FIRM BOTTOM	65.30	65.17	65.14	65.16	65.15	65.16	65.19	65.19	65.21	65.21	65.22	65.29	65.31	65.27	65.33	65.32	65.33	65.35	65.39
STATION	6+120	6+140	6+160	6+180	6+200	6+220	6+240	6+260	6+280	6+300	6+320	6+340	6+360	6+380	6+400	6+420	6+440	6+460	6+480

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



Professional Engineers
Ontario
21/09/10
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 10951335
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Association of Professional Engineers of Ontario

SCALES	
HORIZONTAL	1:1000
VERTICAL	1:10



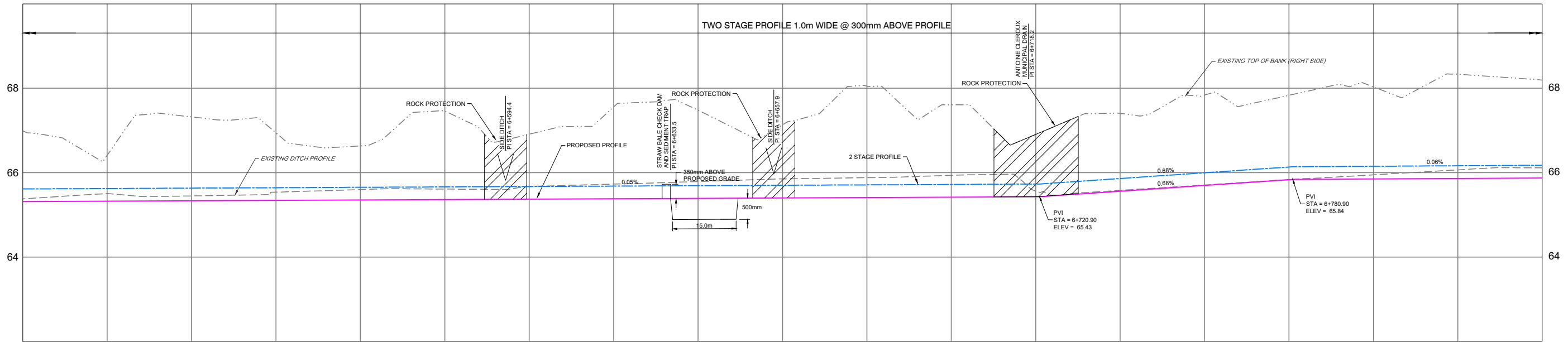
350 Palladium Drive, Suite 210
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

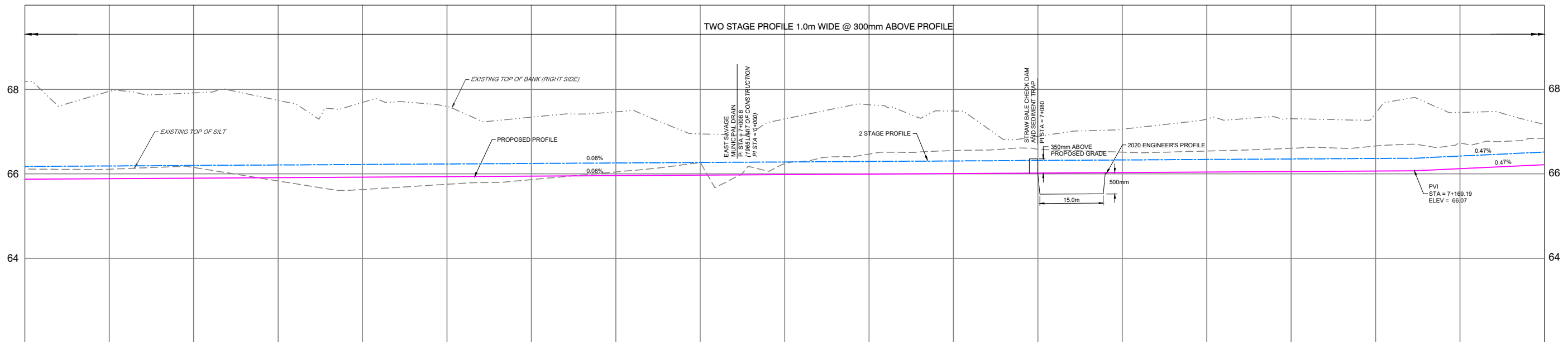
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 5+760 TO STA. 6+480

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P9

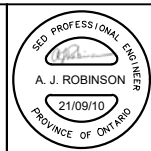


PROPOSED GRADE	65.31	65.32	65.33	65.34	65.35	65.36	65.37	65.38	65.39	65.40	65.41	65.42	65.43	65.56	65.70	65.83	65.85	65.86	65.87
EXISTING FIRM BOTTOM	65.39	65.51	65.45	65.54	65.60	65.61	65.67	65.73	65.79	65.85	65.89	65.94	65.99	65.99	65.71	65.63	65.95	66.07	66.11
STATION	6+480	6+500	6+520	6+540	6+560	6+580	6+600	6+620	6+640	6+660	6+680	6+700	6+720	6+740	6+760	6+780	6+800	6+820	6+840



PROPOSED GRADE	65.07	65.09	65.90	65.91	65.92	65.93	65.95	65.96	65.97	65.98	65.99	66.01	66.02	66.03	66.04	66.05	66.06	66.12	66.22
EXISTING FIRM BOTTOM	66.11	66.11	66.15	66.63	66.63	66.75	66.86	66.04	66.27	66.24	66.47	66.55	66.59	66.51	66.54	66.61	66.66	66.73	66.85
STATION	6+840	6+860	6+880	6+900	6+920	6+940	6+960	6+980	7+000	7+020	7+040	7+060	7+080	7+100	7+120	7+140	7+160	7+180	7+200

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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Association of Professional Engineers of Ontario

SCALES	
HORIZONTAL	5 0 10
VERTICAL	0.5 0 1



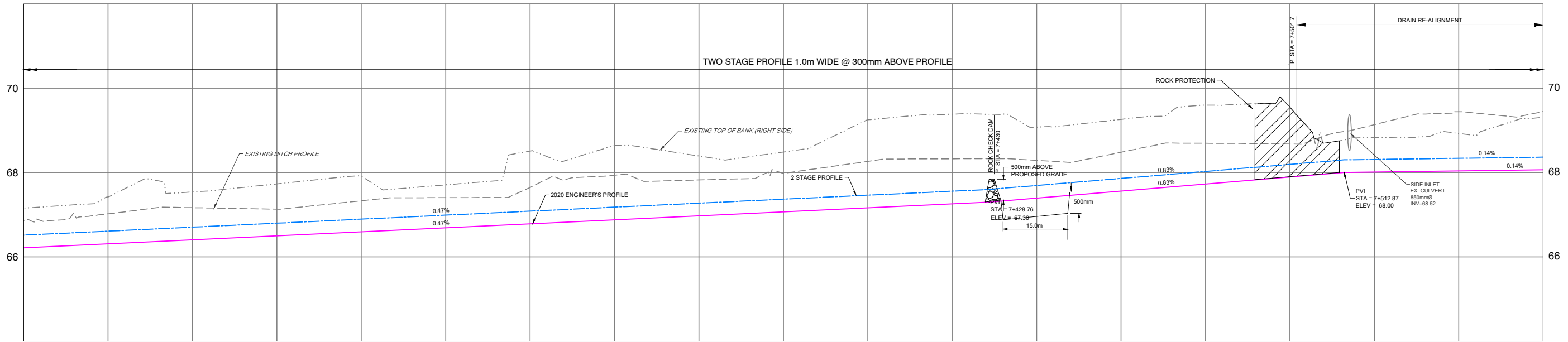
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(613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

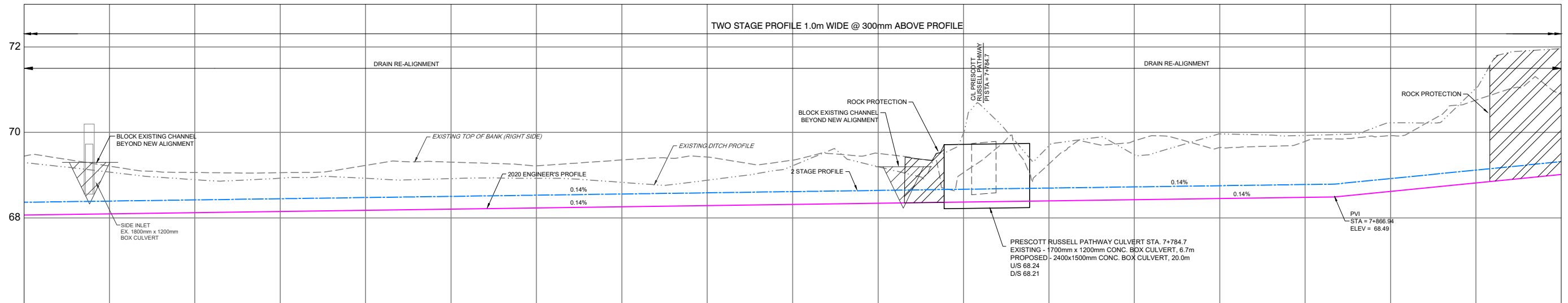
CITY OF OTTAWA
EAST SAVAGE
MUNICIPAL DRAIN

DRAIN PROFILE
STA. 6+480 TO STA. 7+200

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P10

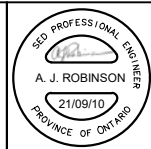


PROPOSED GRADE	68.22	68.31	68.41	68.50	68.60	68.69	68.78	68.88	68.97	69.07	69.16	69.26	69.39	69.56	69.73	69.89	69.91	69.94	69.97
EXISTING FIRM BOTTOM	66.66	67.02	67.17	67.13	67.33	67.40	67.65	67.94	67.82	67.99	68.26	68.33	68.29	68.46	68.69	68.69	69.14	69.44	69.45
STATION	7+200	7+220	7+240	7+260	7+280	7+300	7+320	7+340	7+360	7+380	7+400	7+420	7+440	7+460	7+480	7+500	7+520	7+540	7+560

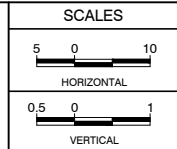


PROPOSED GRADE	68.07	68.09	68.12	68.15	68.18	68.20	68.23	68.26	68.29	68.32	68.34	68.37	68.40	68.43	68.45	68.48	68.52	68.52	68.52
EXISTING FIRM BOTTOM	69.45	69.21	69.06	69.06	69.23	69.31	69.22	69.36	69.42	69.35	69.51	69.06	69.26	69.80	69.65	69.79	69.92	70.75	70.89
STATION	7+560	7+580	7+600	7+620	7+640	7+660	7+680	7+700	7+720	7+740	7+760	7+780	7+800	7+820	7+840	7+860	7+880	7+900	7+920

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



Professional Engineers Ontario
 21/09/10
 Licensed Engineering Technologist
 Name: L. FRANKLIN
 Number: 10951335
 Limitations: Providing plans, technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
 Association of Professional Engineers of Ontario



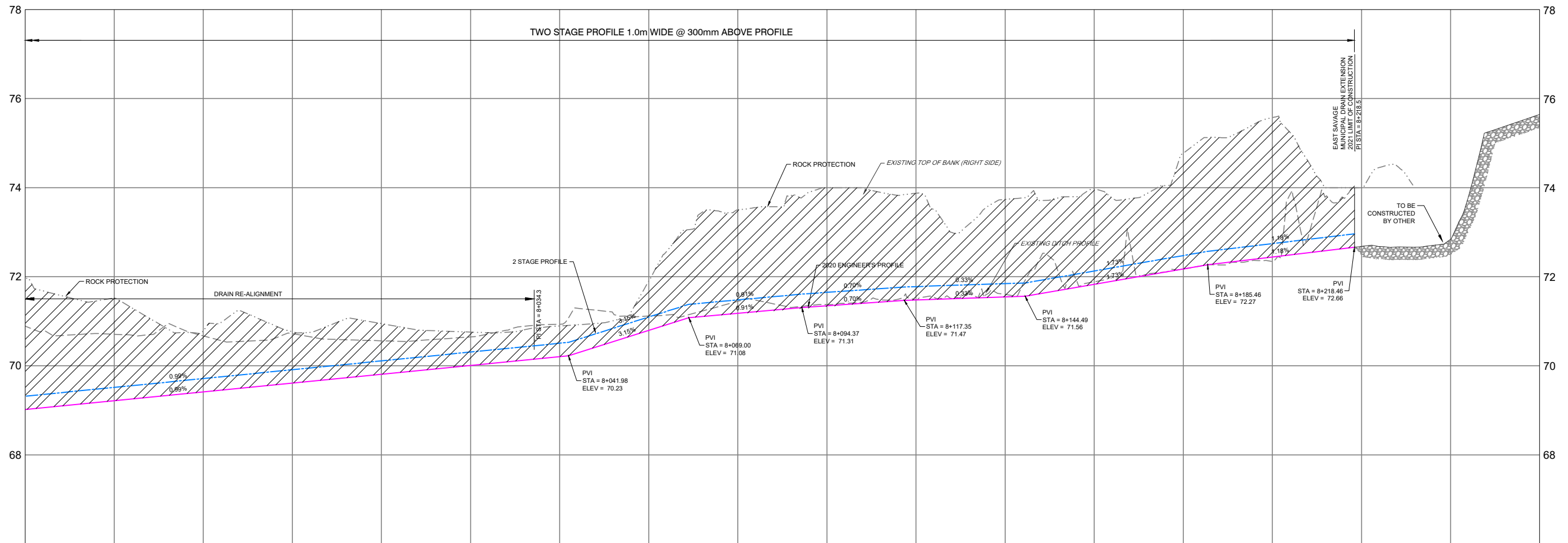
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 Ottawa, ON K2V 1A8
 (613) 592-6060 rcii.com

DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA
 EAST SAVAGE MUNICIPAL DRAIN
 (EXTENSION)

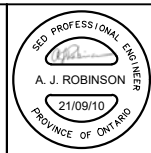
DRAIN PROFILE
 STA. 7+200 TO STA. 7+920

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P11



PROPOSED GRADE	69.02	69.22	69.41	69.61	69.81	70.01	70.21	70.80	71.18	71.35	71.48	71.55	71.83	72.18	72.44
EXISTING FIRM BOTTOM	70.69	70.71	70.67	70.72	70.66	70.65	70.63	71.12	71.45	71.39	71.46	71.60	71.69	72.17	72.34
STATION	7+920	7+940	7+960	7+980	8+000	8+020	8+040	8+060	8+080	8+100	8+120	8+140	8+160	8+180	8+200

No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



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Ontario
21/09/10
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
Limitations: Providing plans, technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

SCALES	
HORIZONTAL	5 0 10
VERTICAL	0.5 0 1



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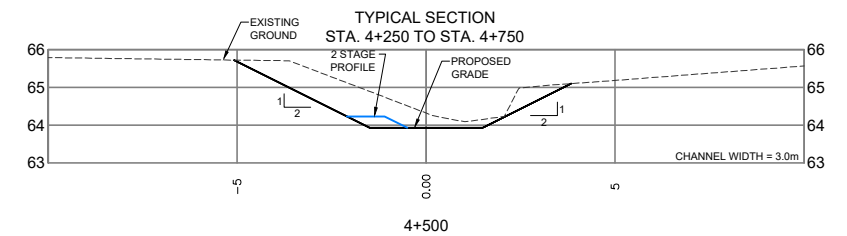
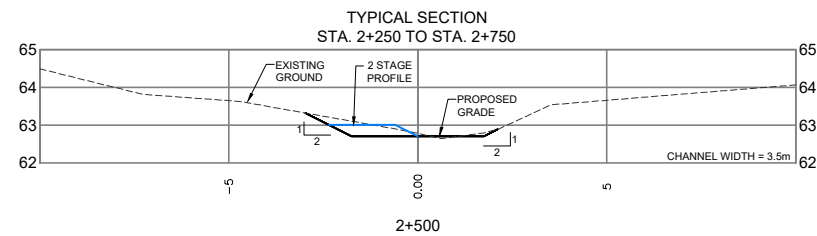
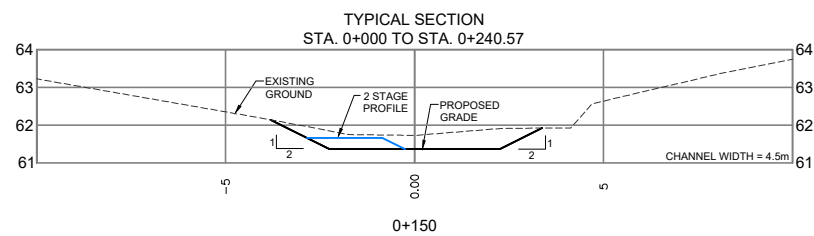
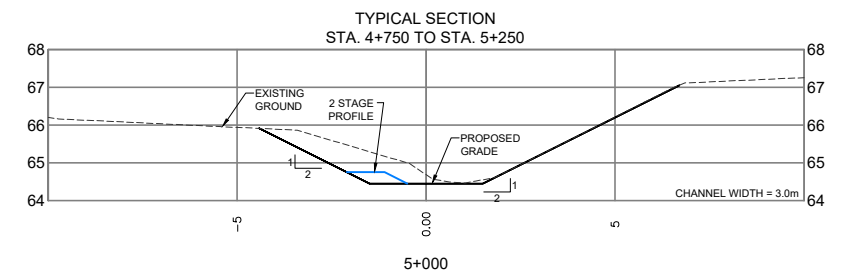
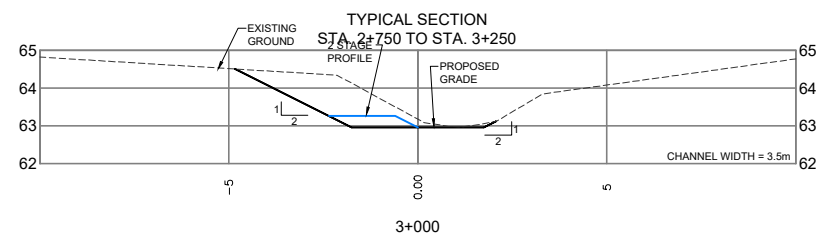
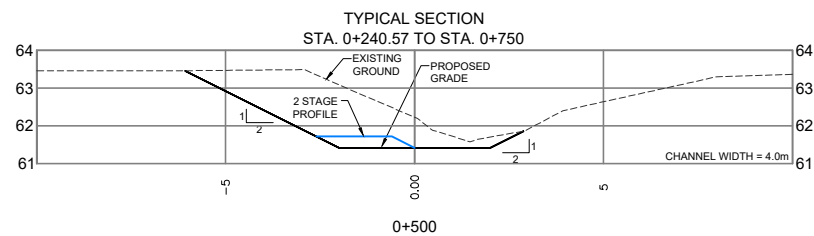
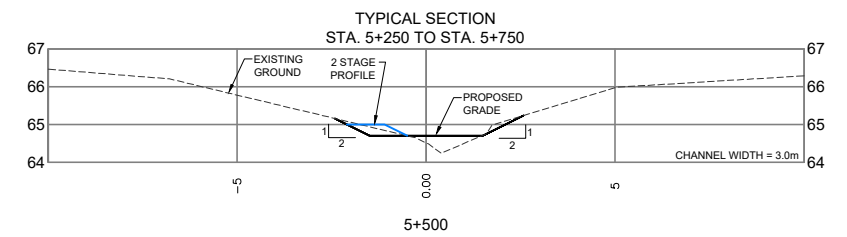
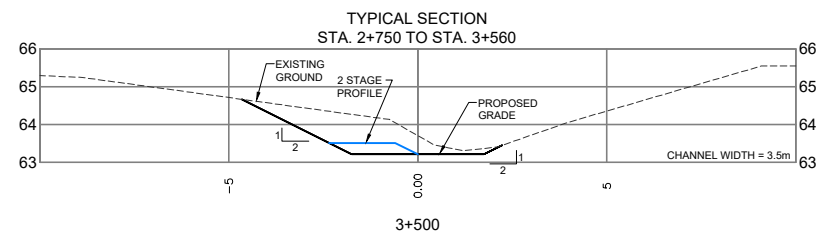
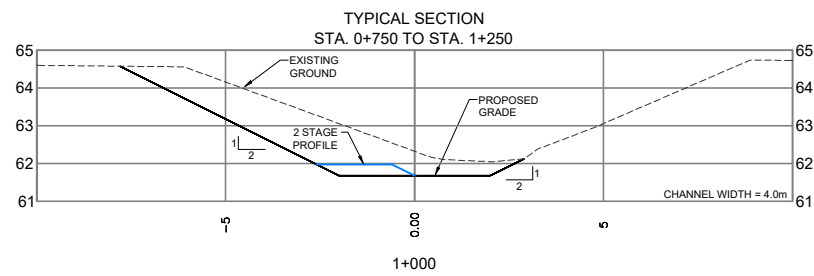
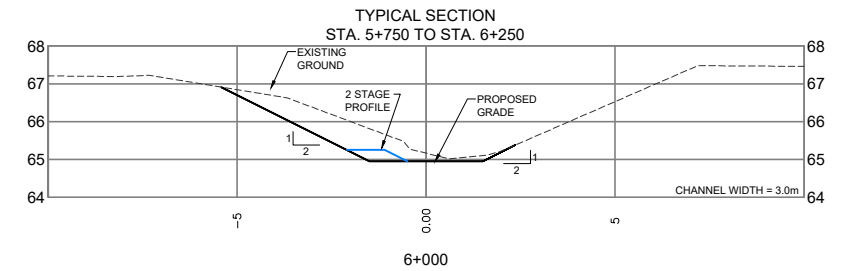
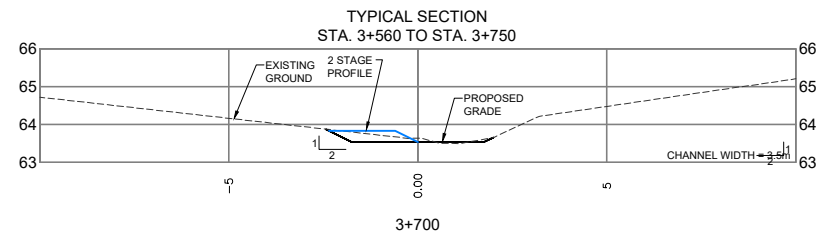
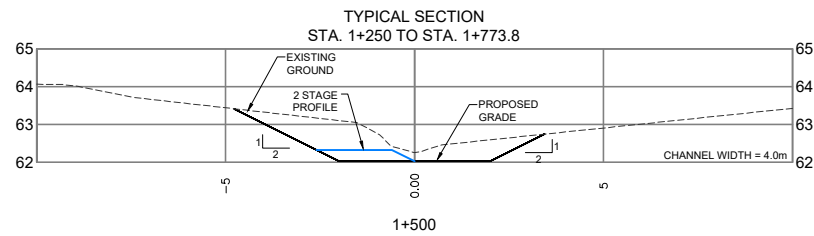
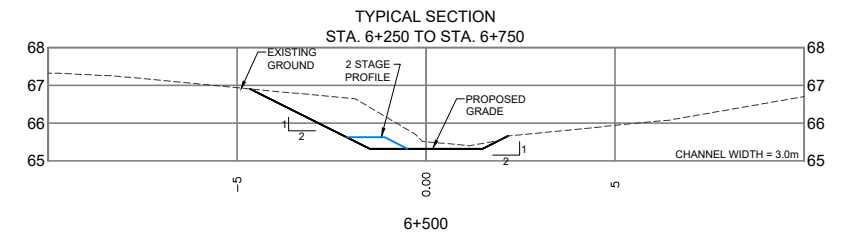
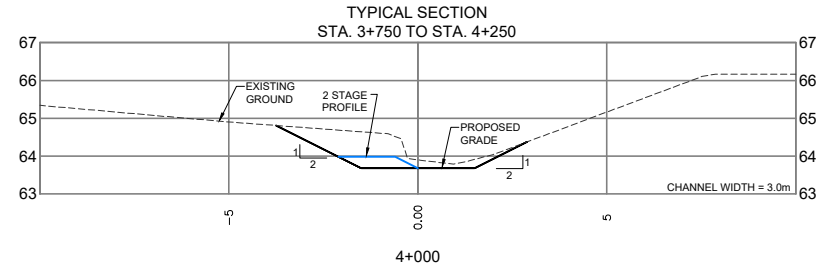
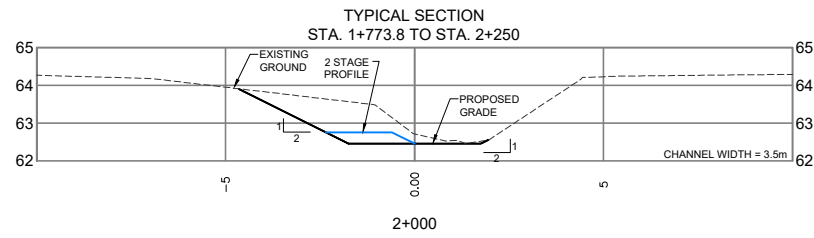
DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

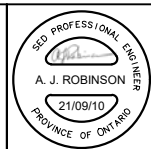
EAST SAVAGE MUNICIPAL DRAIN
(EXTENSION)

DRAIN PROFILE
STA. 7+920 TO STA. 8+218.46

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-P12

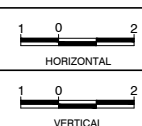


No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR
3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



Professional Engineers
Ontario
21/09/10
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
Limitations: Providing plans, technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

SCALES



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Consultants

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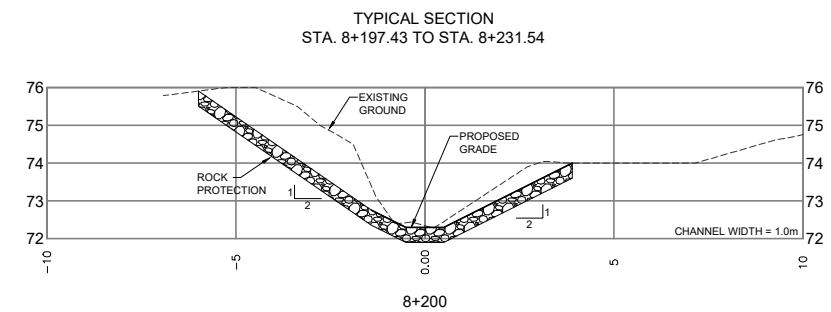
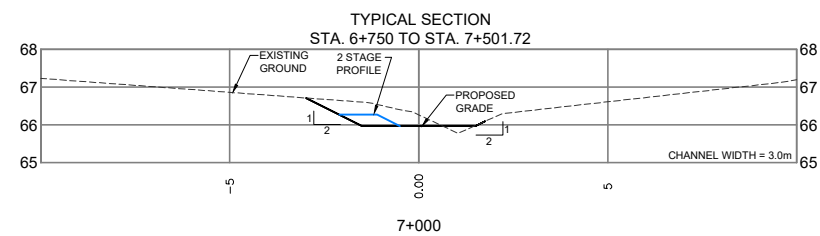
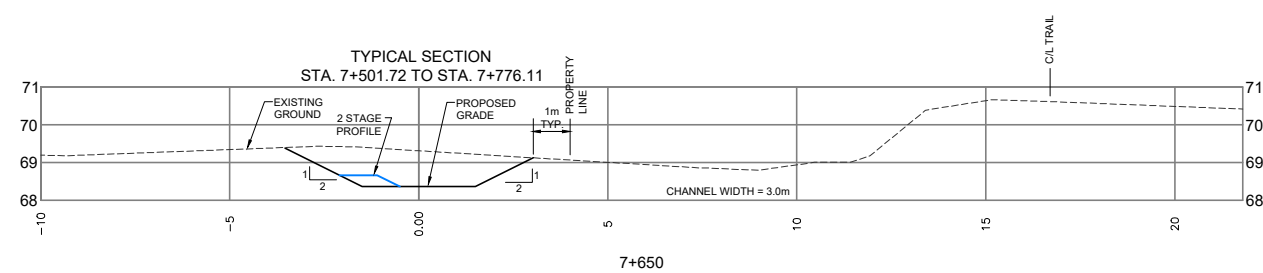
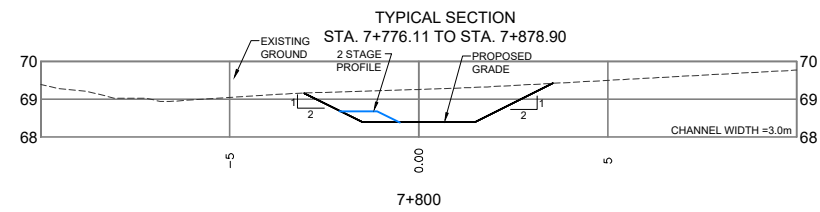
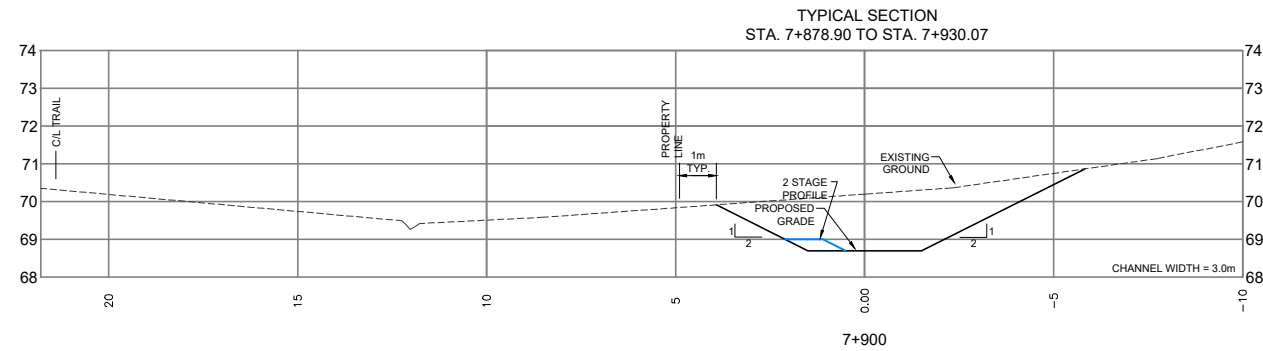
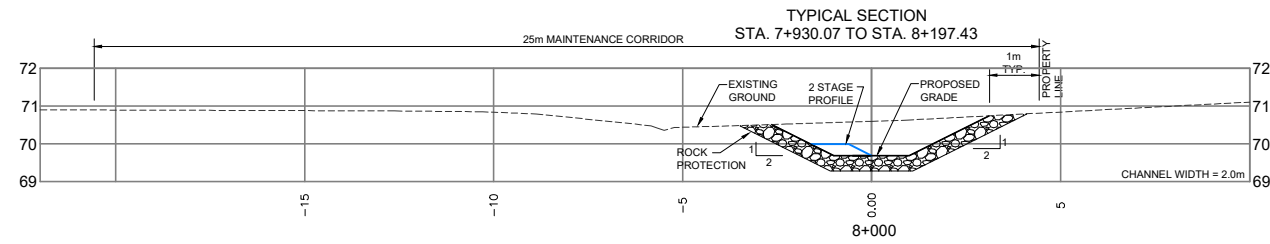
DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

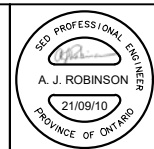
EAST SAVAGE MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN

PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-C1



No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
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3	24.03.21	ISSUED FOR ECA REVIEW	AJR
4	10.09.21	ISSUED FOR DISTRIBUTION	AJR



Professional Engineers
Ontario
21/09/10
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
Limitations: Providing plans, technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
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SCALES	
1	0 2
HORIZONTAL	
1	0 2
VERTICAL	

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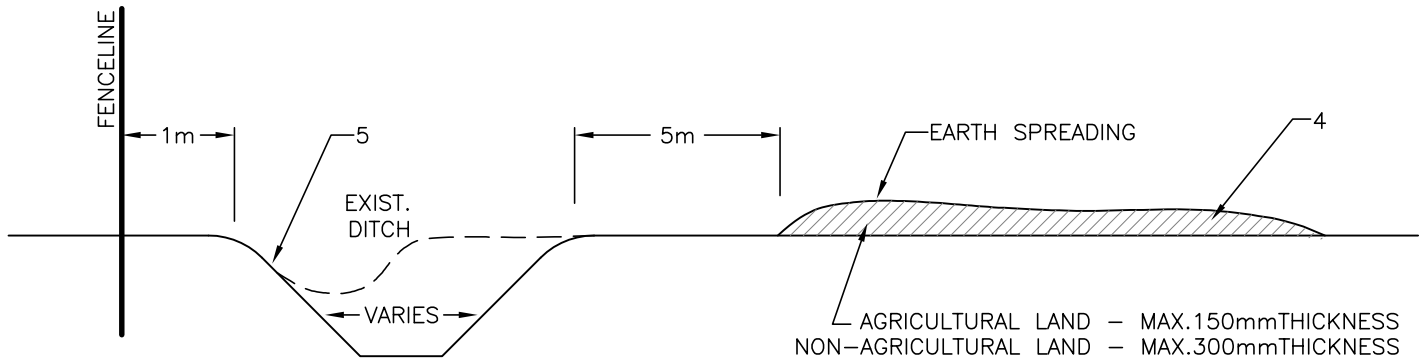
DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

EAST SAVAGE MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN


PROJECT No.	16002
CONTRACT No.	
DATED	SEPTEMBER 2021
DWG. No.	16002-C2

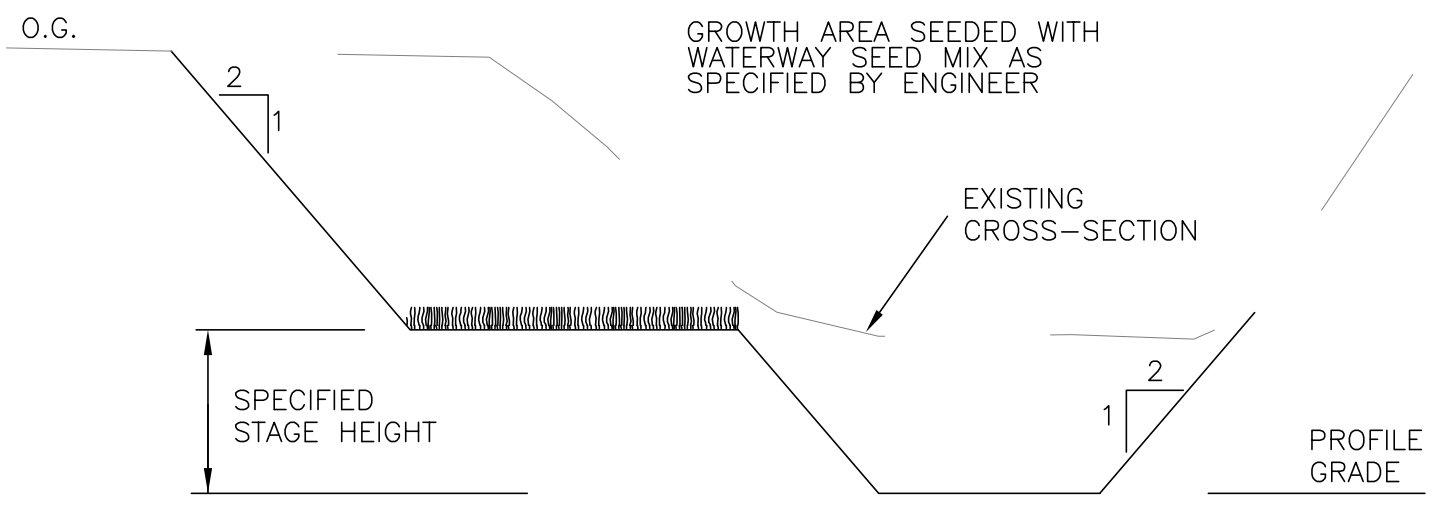
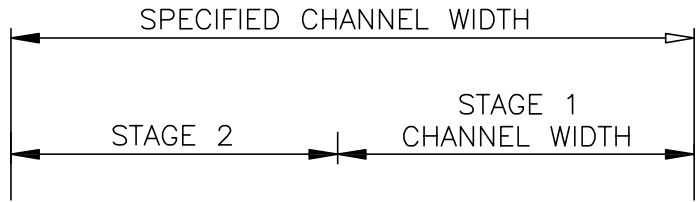


NOTES:

1. NO EXCAVATION WITHIN 1 METRE OF EXISTING FENCELINE.
2. SIDE SLOPES AND CHANNEL DIMENSIONS AS PER CONTRACT DRAWINGS.
3. NO SPOIL OR SPREADING WITHIN 5 METRES OF TOP OF BANK.
4. SPOIL THICKNESS, WIDTH, DRAINAGE OPENINGS AND SPREADING LOCATION AS NOTED IN THE SPECIAL PROVISIONS OR THE CONTRACT DOCUMENTS.
5. WHERE ONE-SIDED CONSTRUCTION IS SPECIFIED, THE EXISTING GRASSED SLOPE SHALL BE PRESERVED WHERE POSSIBLE.
6. SEEDING TO BE COMPLETED WITHIN 48 HOURS OF CONSTRUCTION.

DATED: FEB/21

	CONSULTING ENGINEERS 350 Palladium Dr., Suite 210 Kanata, Ontario, K2V 1A8 Telephone (613) 592-6060	SCALE	MUNICIPAL DRAIN	PROJECT NO.
		HORIZONTAL		OPEN CHANNEL SYSTEMS EARTH CUT CHANNEL
N.T.S.		A		
VERTICAL				
N.T.S.				



DATED: FEB/21

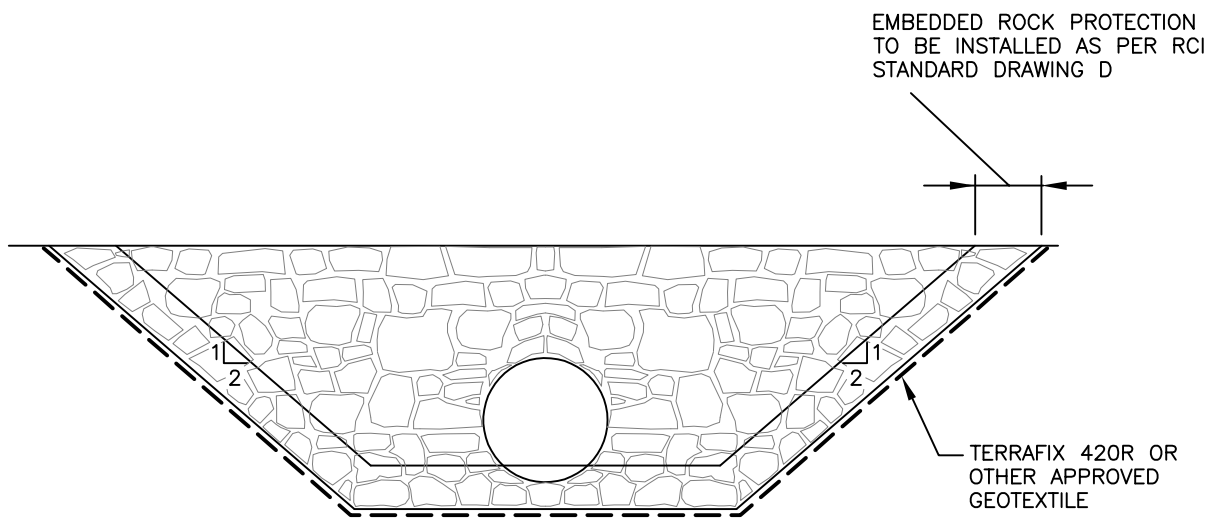
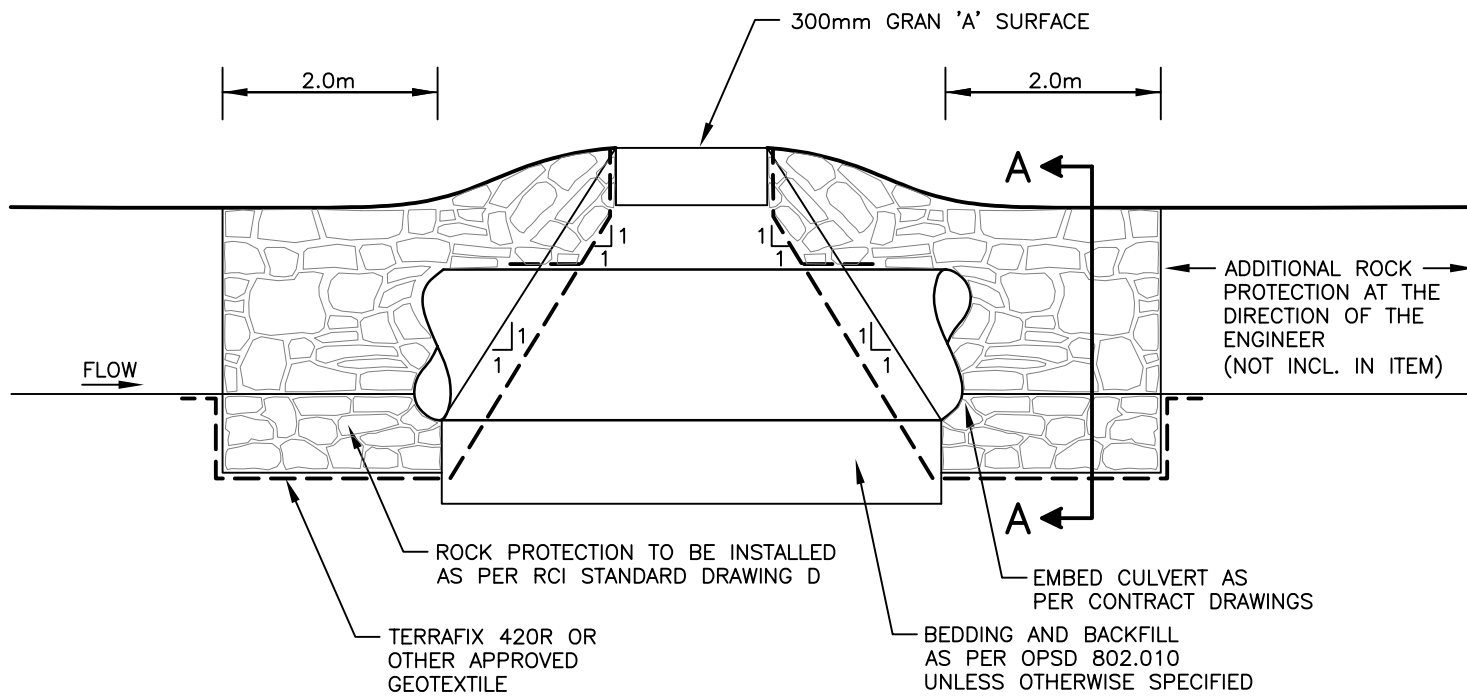
Robinson
Consultants

CONSULTING ENGINEERS
350 Palladium Dr., Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

SCALE
HORIZONTAL N.T.S.
VERTICAL N.T.S.

MUNICIPAL DRAIN
TWO STAGE CHANNEL

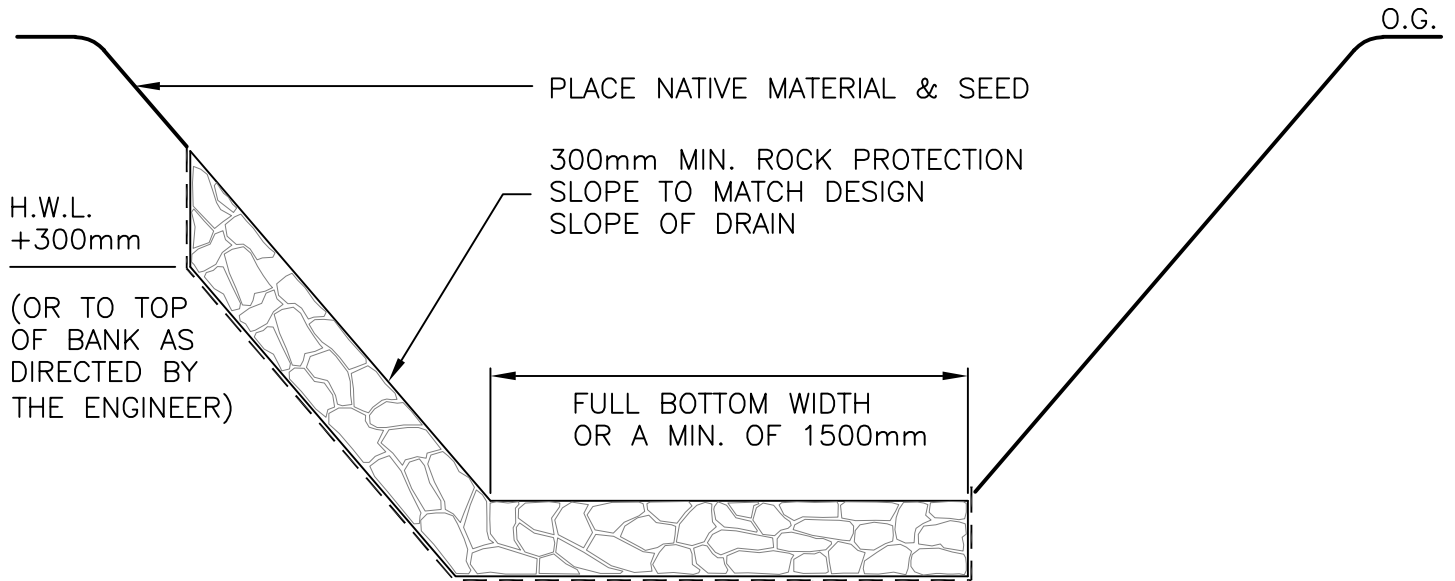
PROJECT NO.
STD.DWG.No. B



END SECTION A-A

DATED: FEB/21

Robinson Consultants	CONSULTING ENGINEERS 350 Palladium Dr., Suite 210 Kanata, Ontario, K2V 1A8 Telephone (613) 592-6060	SCALE	MUNICIPAL DRAIN	PROJECT NO.
		HORIZONTAL		STANDARD FARM CROSSING AND CULVERT END TREATMENT DETAIL
		N.T.S.		
		VERTICAL		
		N.T.S.		



NOTE:

1. SURFACE OF ROCK PROTECTION TO BE FLUSH WITH FINISHED SURFACE OF DRAIN UPSTREAM AND DOWNSTREAM OF THE EROSION CONTROL. MIN. SIDE SLOPE IS 1 VERT TO 1 HOR. OR AS SPECIFIED IN ENGINEER'S REPORT OR THE CONTRACT DRAWINGS.
2. FOR ROCK PROTECTION, USE R-50 AS PER OPSS 1004.05.05.02 OR ROCK PROTECTION AS PER OPSS 1004.05.05.03.

TERRAFIX 420R
OR OTHER APPROVED
GEOTEXTILE

DATED: FEB/21

Robinson
Consultants

CONSULTING ENGINEERS
350 Palladium Dr., Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

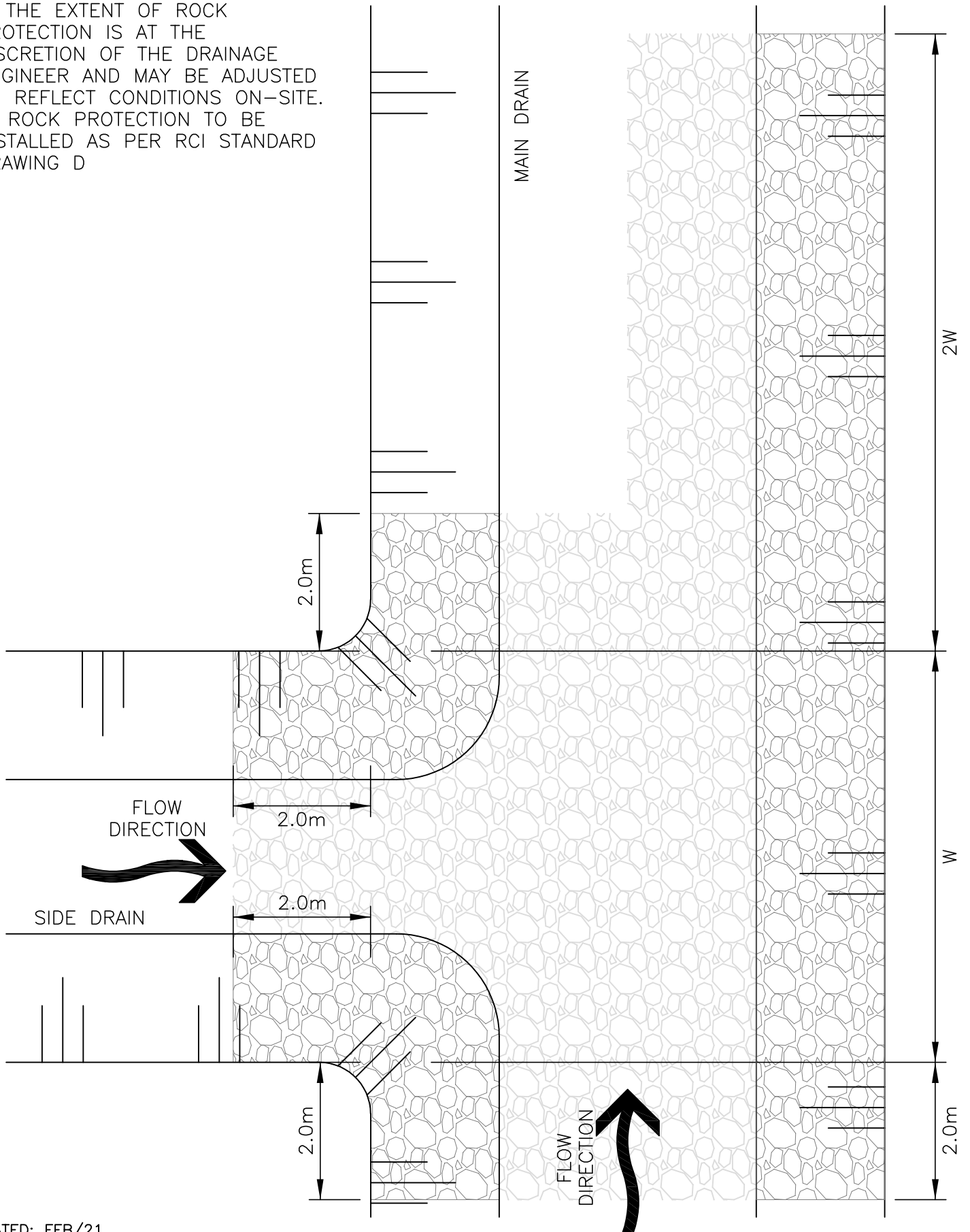
SCALE
HORIZONTAL N.T.S.
VERTICAL N.T.S.

MUNICIPAL DRAIN
TYPICAL ROCK PROTECTION EROSION CONTROL

PROJECT NO.
STD.DWG.No. D

NOTE:

1. THE EXTENT OF ROCK PROTECTION IS AT THE DISCRETION OF THE DRAINAGE ENGINEER AND MAY BE ADJUSTED TO REFLECT CONDITIONS ON-SITE.
2. ROCK PROTECTION TO BE INSTALLED AS PER RCI STANDARD DRAWING D



DATED: FEB/21

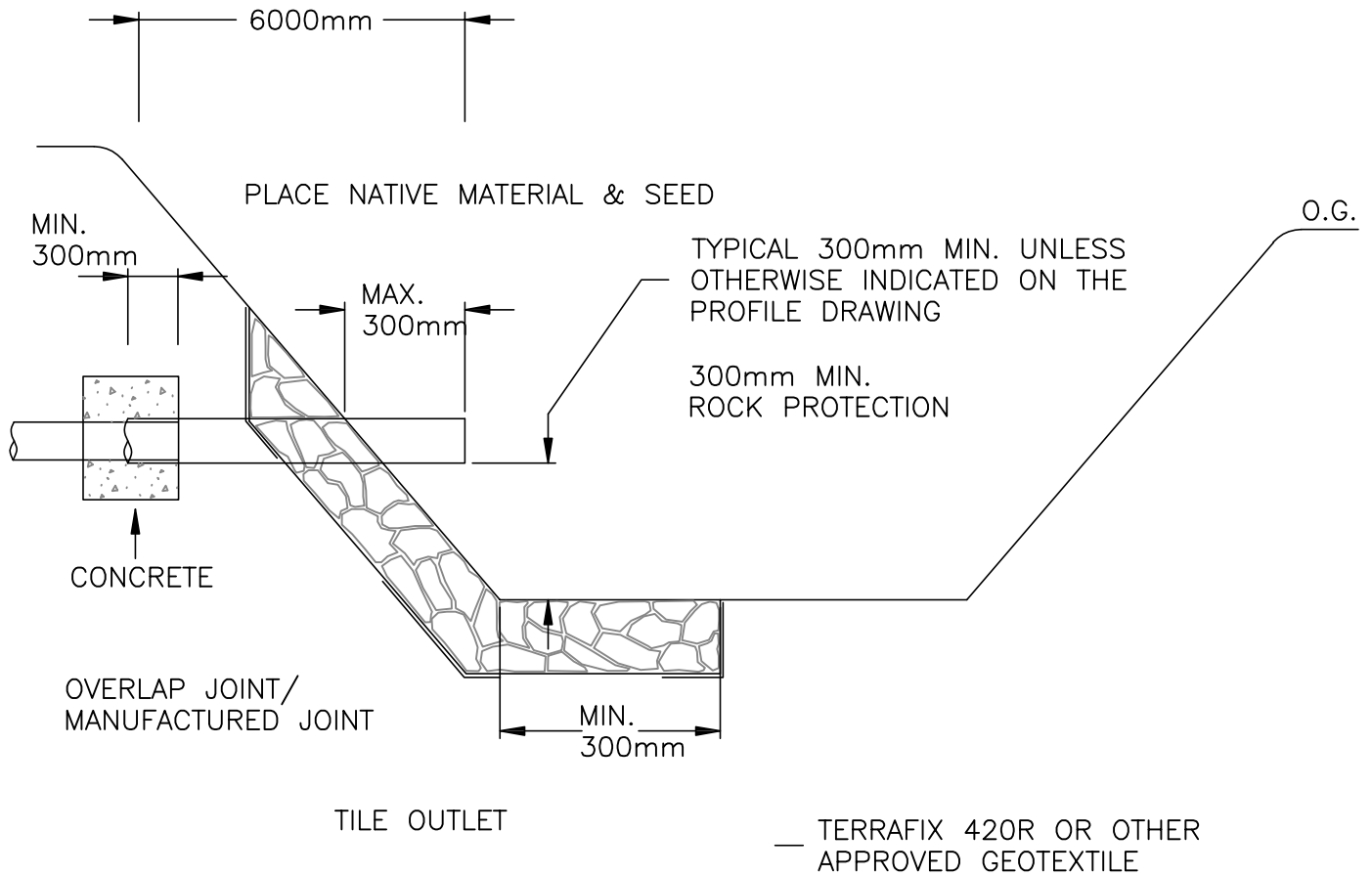
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350 Palladium Dr., Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

SCALE
HORIZONTAL N.T.S.
VERTICAL N.T.S.

MUNICIPAL DRAIN
STANDARD SIDE DITCH
ROCK PROTECTION


PROJECT NO.
STD.DWG.No. E

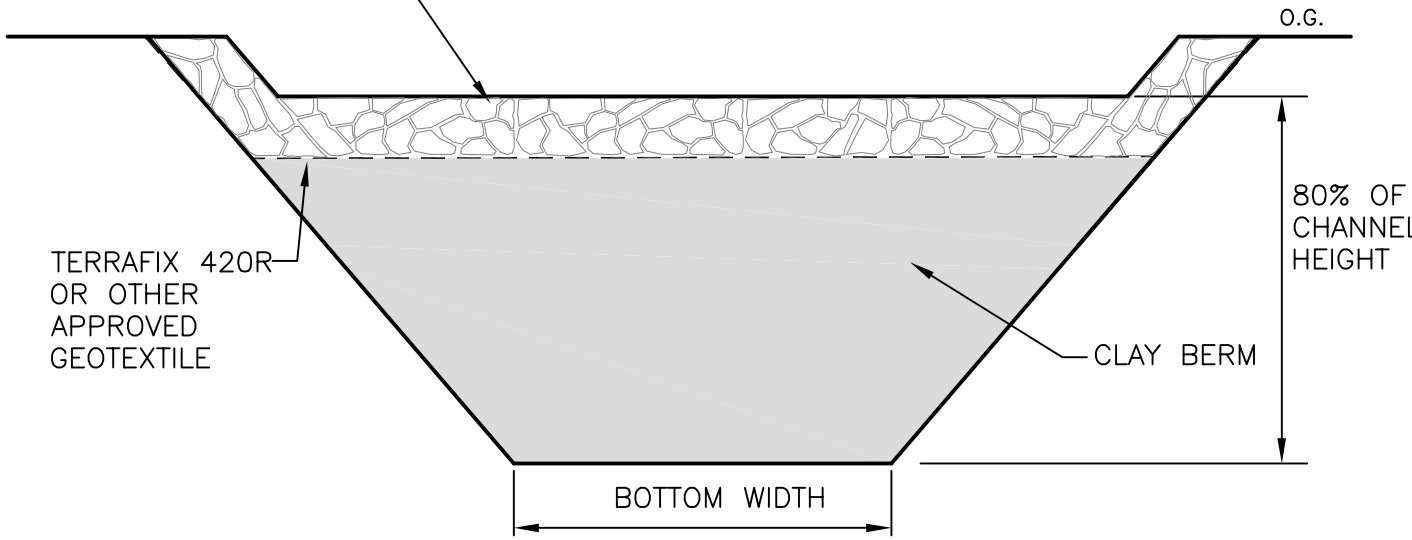
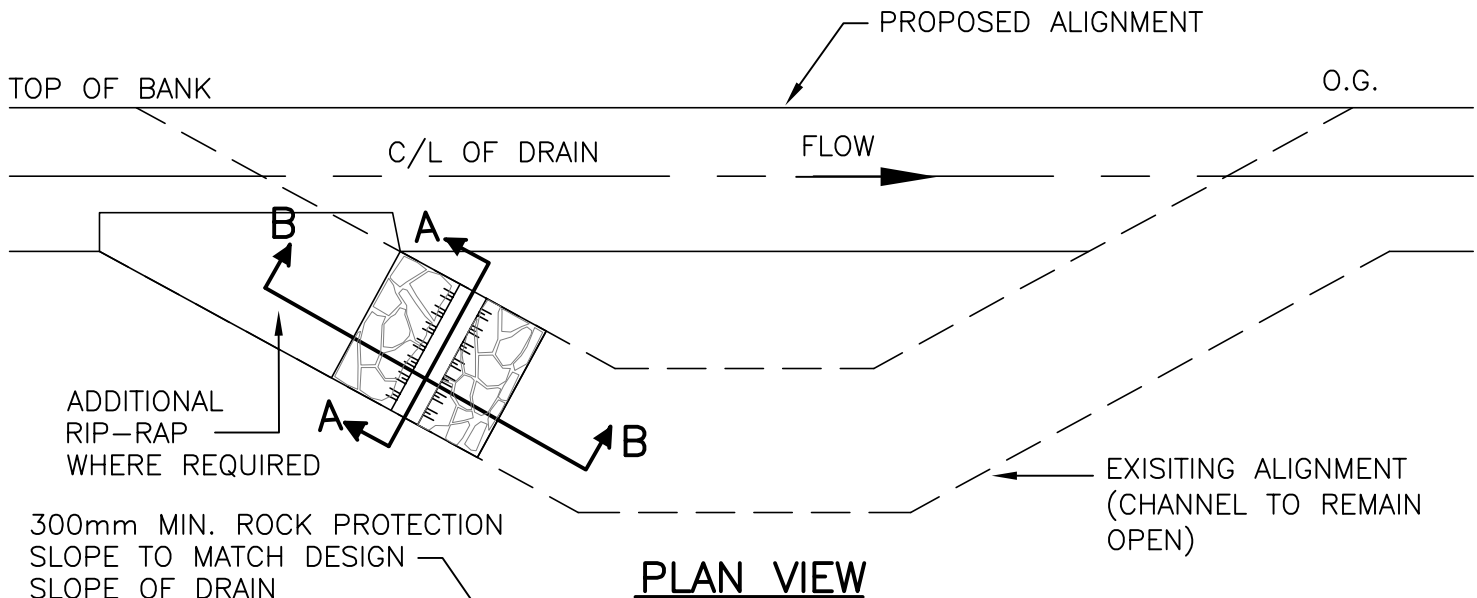


NOTES:

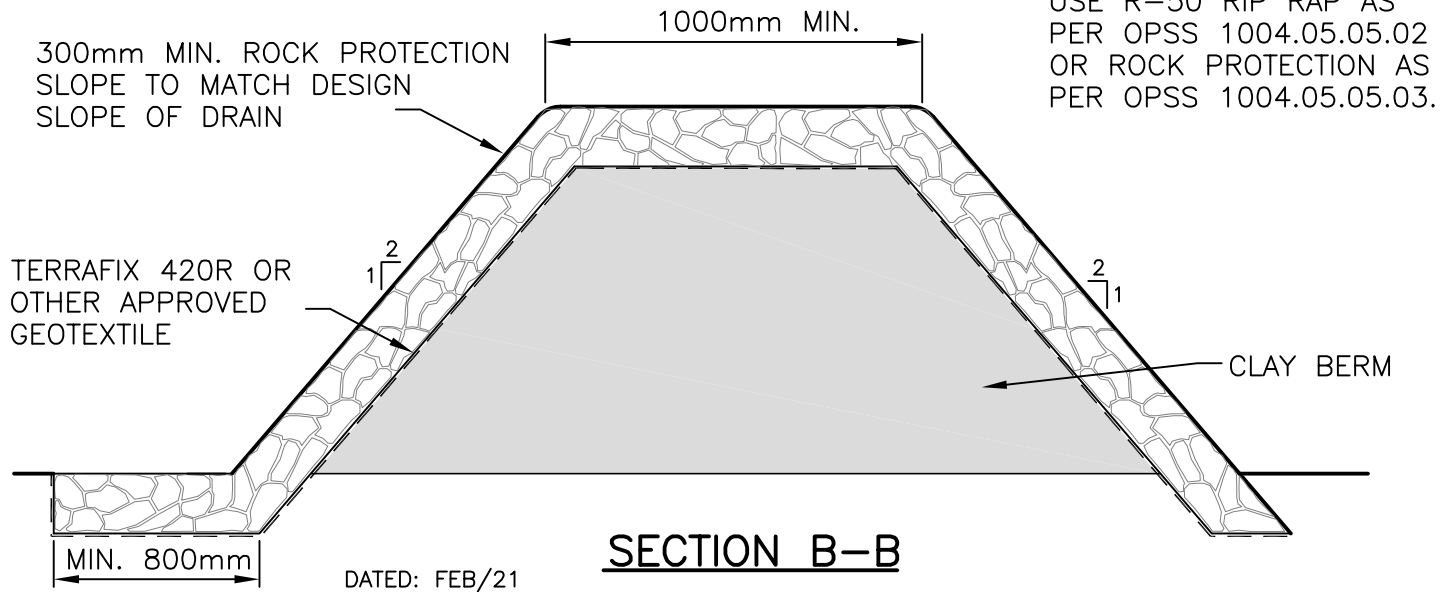
1. OUTLET TO BE CONTINUOUS HDPE (SMOOTHWALL – MIN. STIFFNESS OF 320KPa) AND A MIN. LENGTH OF 8.0m
2. ROCK PROTECTION TO BE PLACED AS REQUIRED TO PREVENT EROSION. THE SURFACE TO BE FLUSH WITH THE STREAM BED AND BANK. ROCK PROTECTION TO EXTEND A MINIMUM OF 1000mm UPSTREAM AND 1000mm DOWNSTREAM OF THE TILE OUTLET
3. THE CONNECTION BETWEEN THE OUTLET AND THE FIELD TILE IS TO BE A LOCKING MANUFACTURED JOINT – TAPE SEALED OR OVERLAP JOINT (MIN. 300mm) AND ENCASED IN CONCRETE.
4. A RODENT GRATE IS TO BE INSTALLED AT THE END OF THE TILE OUTLET
5. MIN. SIDE SLOPE IS 1 VERT TO 2 HOR OR AS SPECIFIC IN THE ENGINEER’S REPORT
6. FOR ROCK PROTECTION, USE R-50 RIP-RAP AS PER OPSS MUNI 1004.05.05.02

DATED: FEB/21

	CONSULTING ENGINEERS 350 Palladium Dr., Suite 210 Kanata, Ontario, K2V 1A8 Telephone (613) 592-6060	SCALE HORIZONTAL N.T.S. VERTICAL N.T.S.	MUNICIPAL DRAIN STANDARD TILE OUTLET	PROJECT NO. STD.DWG.No. F
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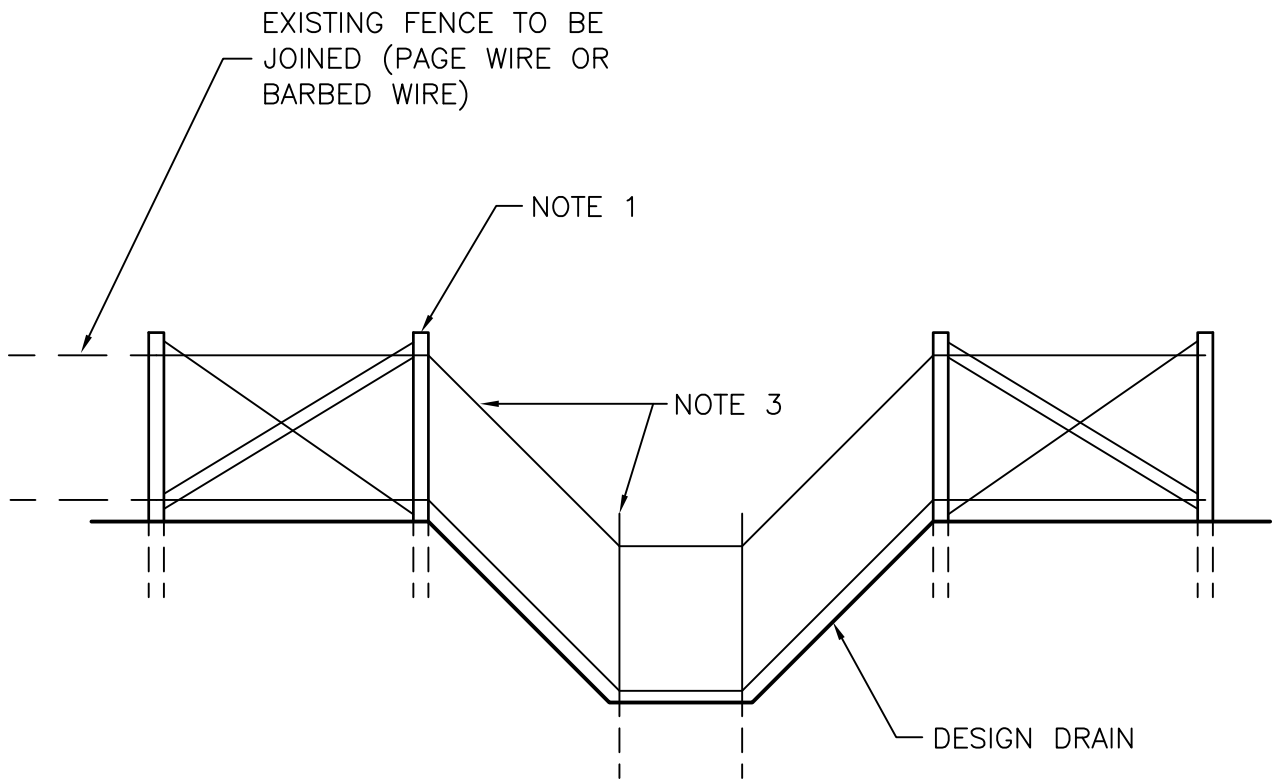


NOTE:
 1. FOR ROCK PROTECTION, USE R-50 RIP RAP AS PER OPSS 1004.05.05.02 OR ROCK PROTECTION AS PER OPSS 1004.05.05.03.



DATED: FEB/21

<p>350 Palladium Dr. Suite 210 Ottawa, Ontario, K2V 1A8 (613) 592-6060 rcii.com</p>	SCALE	MUNICIPAL DRAIN TYPICAL CHANNEL BLOCKAGE DETAIL (FOR CHANNEL REALIGNMENT)	PROJECT NO.
	HORIZONTAL N.T.S.		STD.DWG.No.
	VERTICAL N.T.S.		G



NOTES:

1. REFER TO OPSD DWG. No. 971.101 FOR BRACE PANEL DETAIL
2. USE OPSD 971.101 FOR REINSTATEMENT OF FENCE WHERE REQUIRED
3. T-RAILS SHALL BE NEW STEEL, MINIMUM LENGTH 2.4m.
4. CROSS-FENCE WIRE SHALL BE HEAVY GAUGE BARBED WIRE, MINIMUM 6 STRANDS AT EVEN SPACING

DATED: FEB/21

Robinson
Consultants

CONSULTING ENGINEERS
350 Palladium Dr., Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

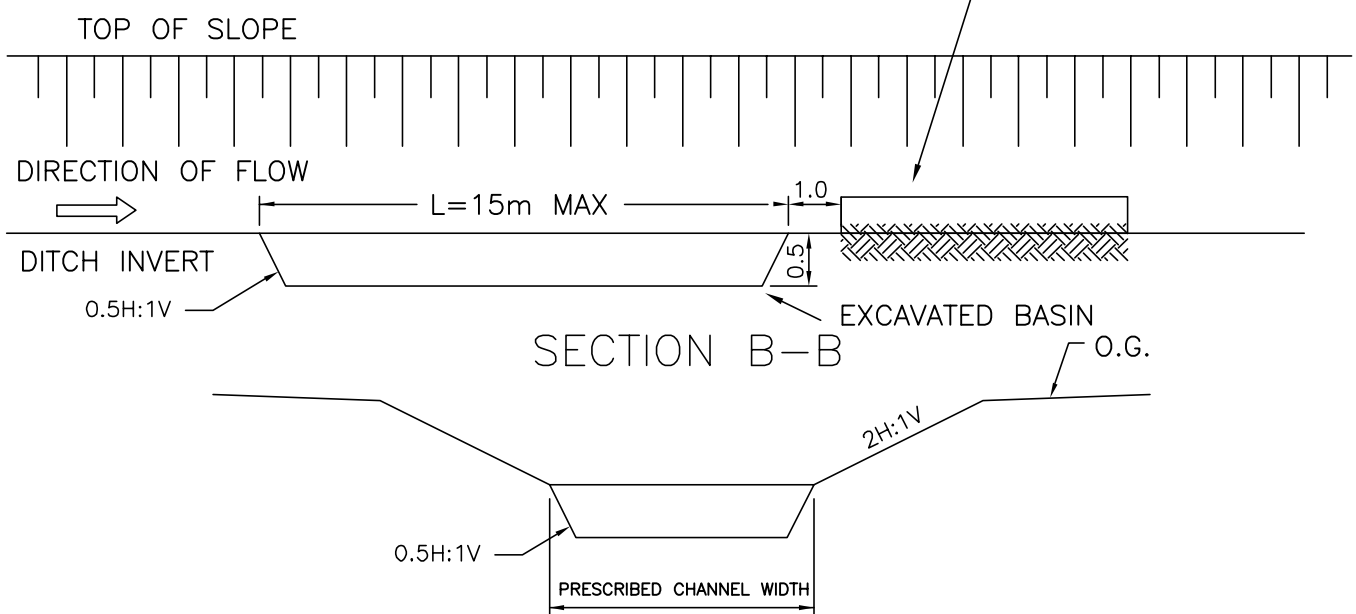
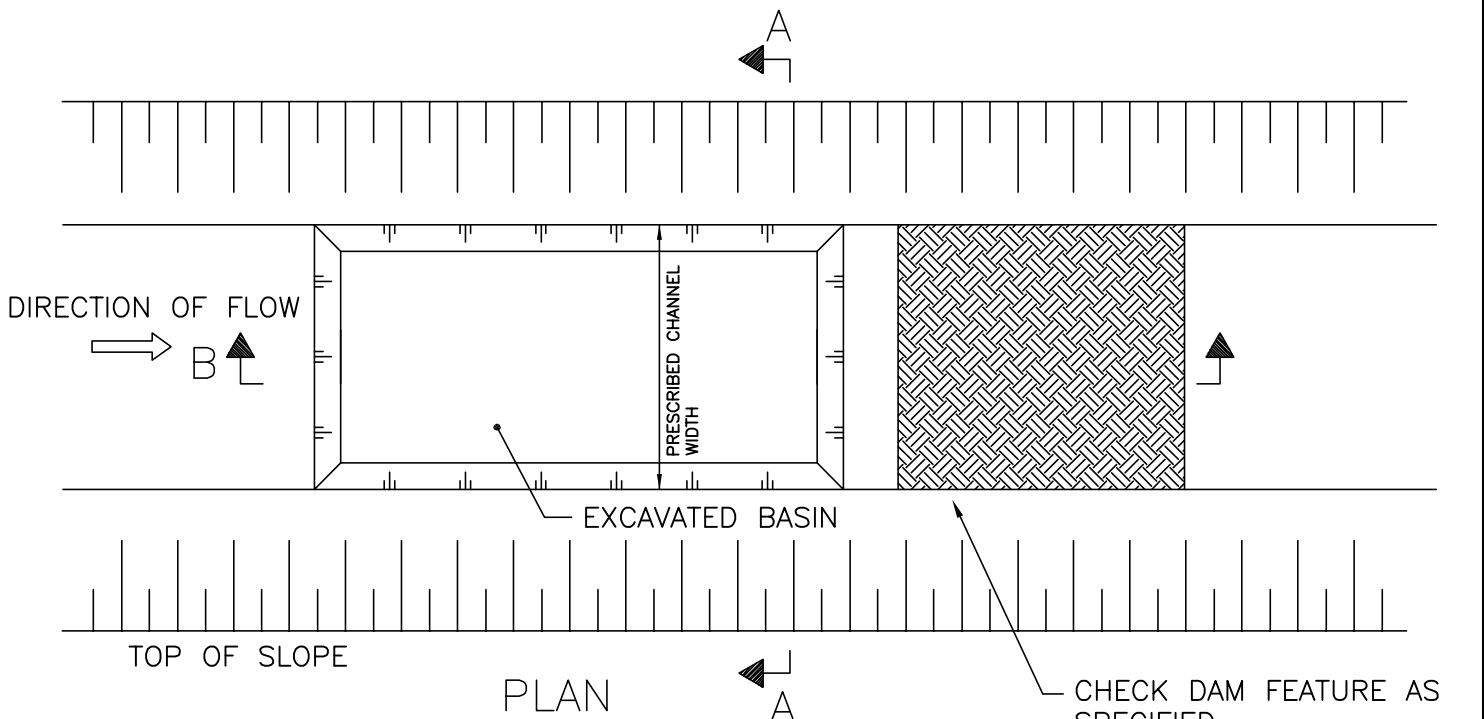
SCALE
HORIZONTAL
N.T.S.
VERTICAL
N.T.S.

MUNICIPAL DRAIN
FENCE REINSTATEMENT AND CROSSING DETAIL

PROJECT NO.

STD.DWG.No.

H



NOTES:

SECTION A-A

1. THIS DRAWING MODIFIES OPSD 219.220
2. DITCH CROSS-SECTION UPSTREAM OR DOWNSTREAM OF SEDIMENT TRAP MAY BE FLAT BOTTOM OR V-SHAPED, FLAT BOTTOM SHOWN.
3. THIS STANDARD DRAWING SHALL BE READ IN CONJUNCTION WITH OPSD 219.180 OR 219.191 OR 219.211 FOR THE SPECIFIED CHECK DAM FEATURE.
4. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

DATED: FEB/21

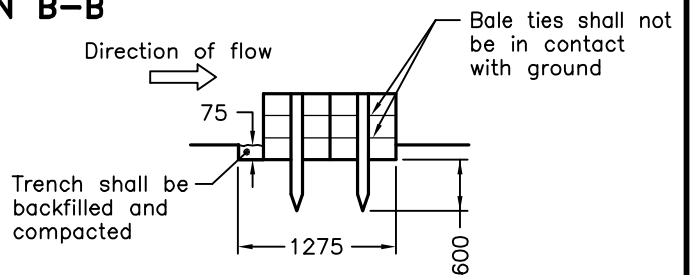
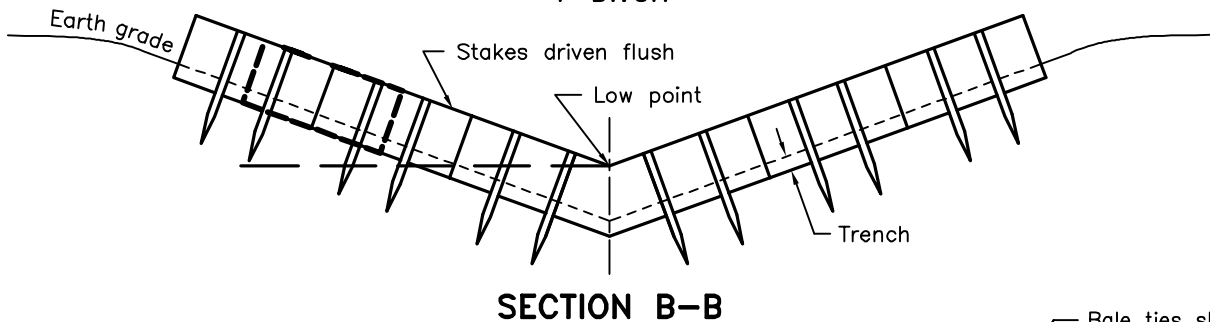
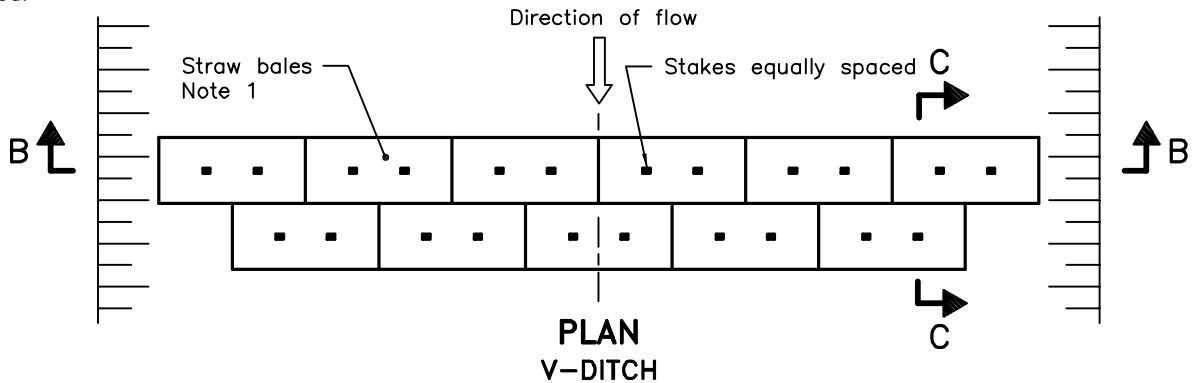
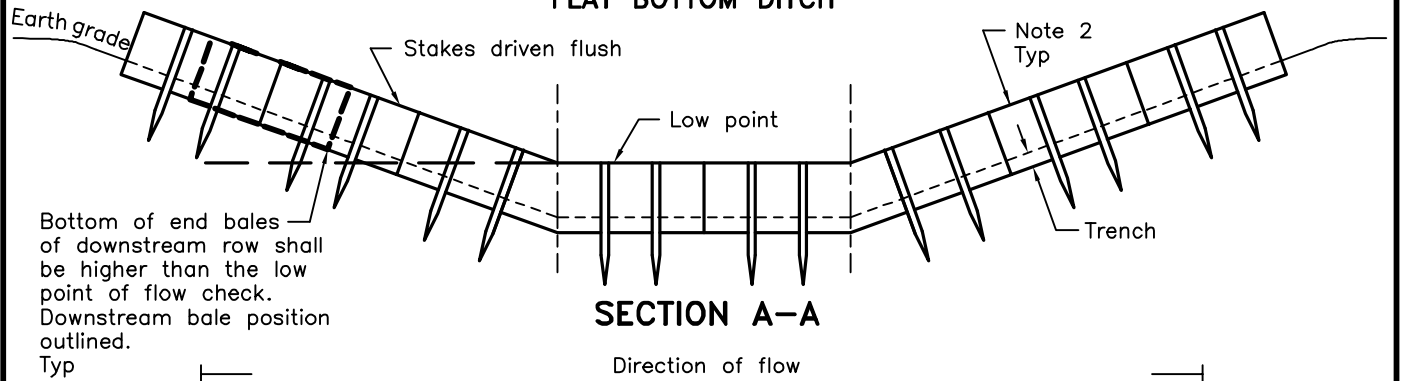
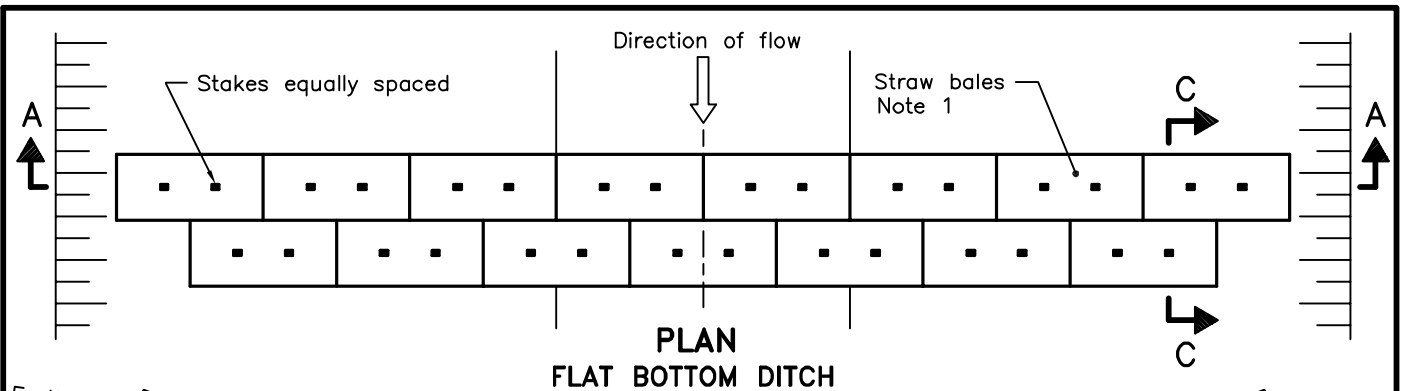
Robinson
Consultants

CONSULTING ENGINEERS
350 Palladium Dr., Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

SCALE
HORIZONTAL N.T.S.
VERTICAL N.T.S.

MUNICIPAL DRAIN
SEDIMENT TRAP

PROJECT NO.
STD.DWG.No. 1

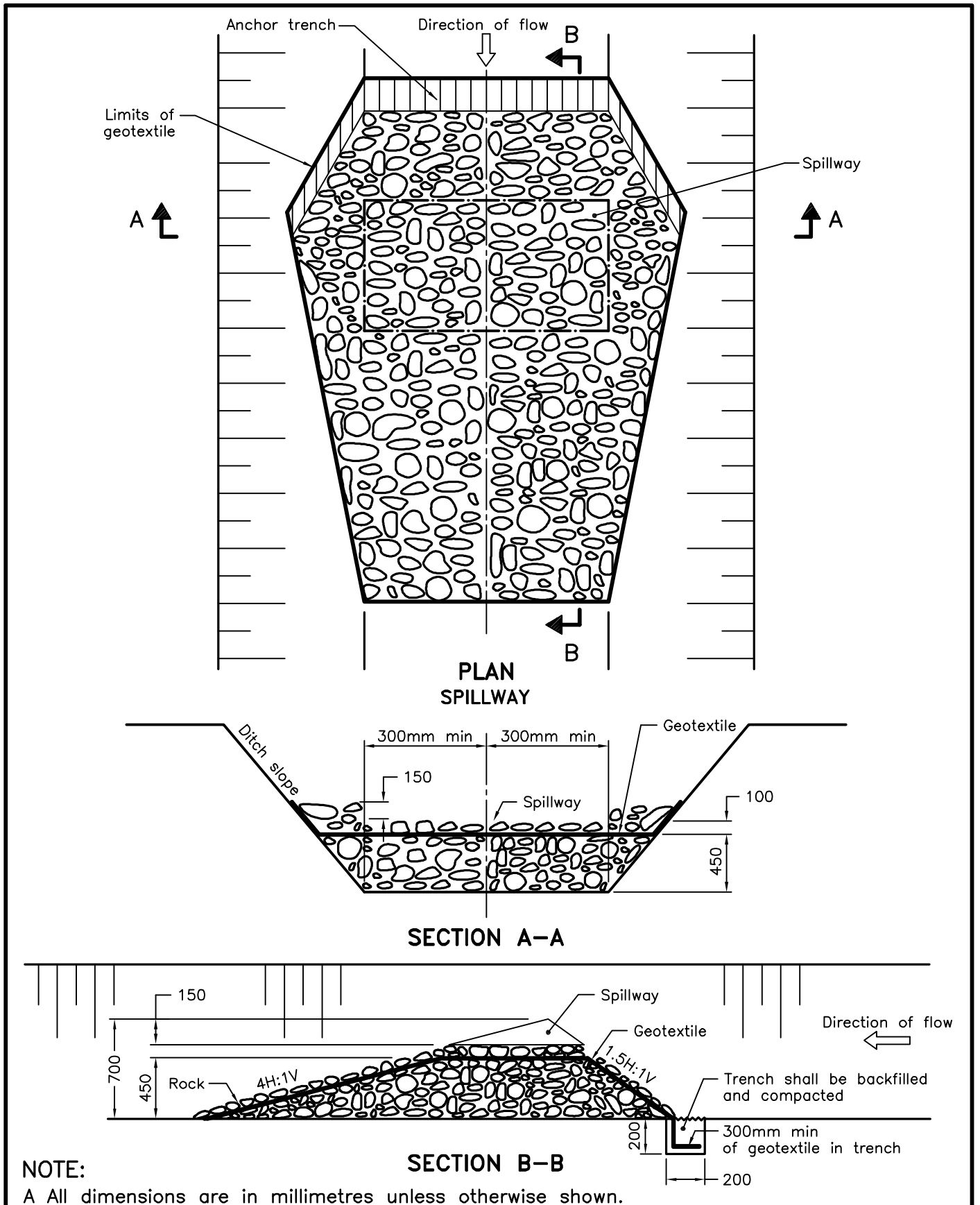



NOTES:

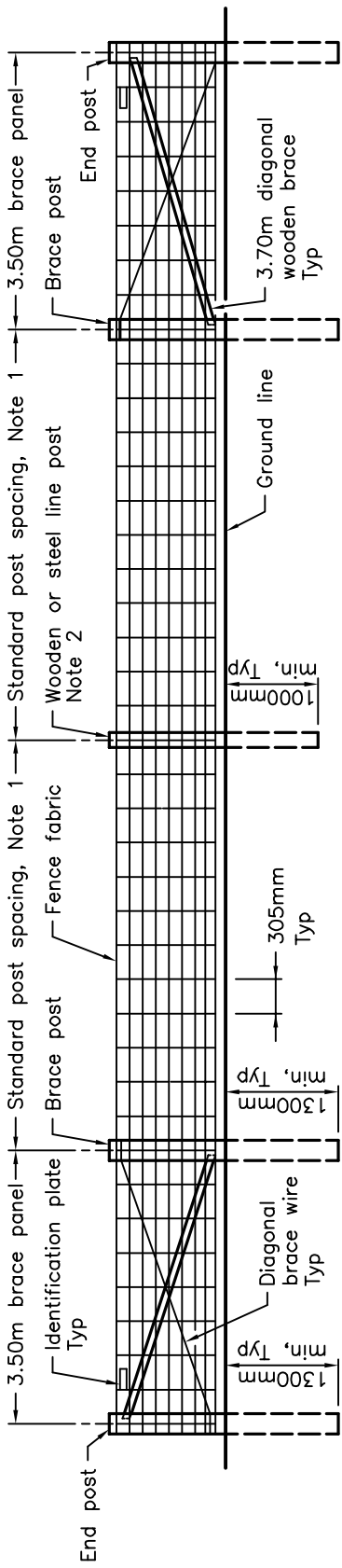
- 1 Number of bales varies and shall suit ditch.
- 2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.

A All dimensions are in millimetres unless otherwise shown.

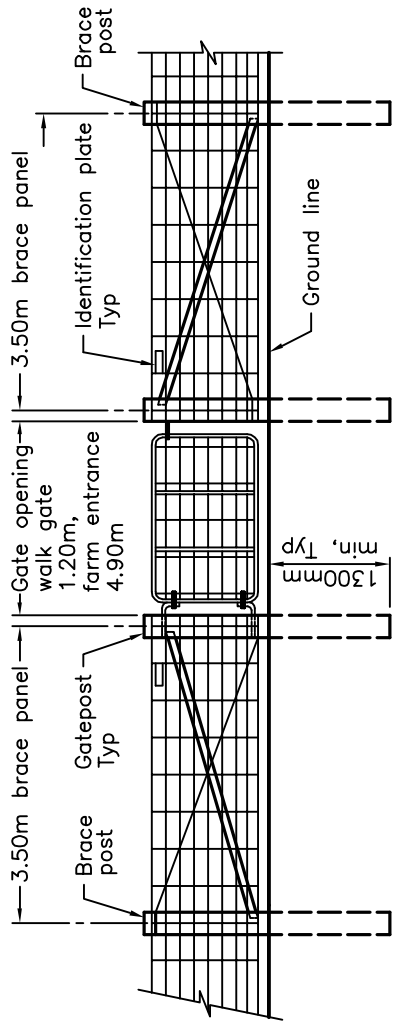
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2	
STRAW BALE FLOW CHECK DAM			
OPSD 219.180			



ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2015	Rev 2
TEMPORARY ROCK FLOW CHECK DAM FLAT BOTTOM DITCH			
		OPSD 219.211	



**HIGHWAY FENCE
IN EARTH, SHALE, LOOSE ROCK, OR FRIABLE ROCK**



GATE DETAIL

NOTES:

- 1 Standard post spacing shall be 6.0m for wooden post to wooden post and 5.0m for steel post to steel or wooden post.
- 2 Ratio of steel posts to wooden posts shall be 3:1.
- A This OPSD shall be read in conjunction with OPSD 971.103.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016 Rev 4



**FENCE, HIGHWAY
IN EARTH, SHALE, LOOSE ROCK, OR FRIABLE ROCK
INSTALLATION**

OPSD 971.101

BEST MANAGEMENT PRACTICES – CULVERT REPLACEMENTS IN MUNICIPAL DRAINS

This document describes the conditions on which one may proceed with a culvert replacement in a municipal drain without DFO approval/notification. All municipal, provincial, or federal legislation that applies to the work being proposed must be respected. If the conditions/requirements below cannot be met, please complete the drain notification form and submit it to the Fisheries Protection Program form review at: FisheriesProtection@dfo-mpo.gc.ca.

Potential Impacts to Fish Habitat

- Infilling fish habitat by encroachment of the water crossing footprint or channel realignment to accommodate culvert
- Harmful substrate alteration of fish habitat (e.g. blockage of groundwater upwellings, critical Species at Risk (SAR) habitat, spawning areas)
- Removal of vegetation on top and along the banks of the municipal drain
- Removal of edge habitat (e.g. undercut bank, shallower areas with lower velocity, aquatic vegetation) creation of barriers to fish movement (e.g. perched crossings, velocity barriers, alteration of the natural stream gradient)
- Alteration of channel flow velocity and/or depth (e.g. oversized culvert resulting in insufficient depth for fish passage at low flow or undersized culvert resulting in a flow velocity barrier at high flow)
- Alteration of channel morphology and sediment transport processes caused by the physical structure of the crossing resulting in upstream and downstream sediment aggradation/erosion
- Re-entry of sediment that was removed/stockpiled into the watercourse
- Erosion downstream from sudden release of water due to the failure of site isolation
- Stranding of fish in isolated ponds following de-watering of the site
- Impingement or entrainment of fish when de-watering pumps are used
- Short term or chronic transport of deleterious substances, including sediment, into fish habitat from construction or road drainage

Requirements

The following requirements must be met:

- There are no aquatic SAR present in the work zone or impact zone. To confirm there are no aquatic SAR present, refer to the following website at: <http://www.dfo-mpo.gc.ca/species-especes/fpp-ppp/index-eng.htm>.
- The culvert is embedded into the streambed and must allow for the free passage of fish.
- The work involves like-for-like replacements of existing road or private access culverts on all drain types without SAR.
- On C and F drains only, this can also include replacements with extensions and end walls for the purposes of providing the property or road with safe access; however, the project does not involve temporary or permanent work that requires modifications (e.g. encroachment, dewatering, realignment, and relocation) over a total surface area of more than 250 m² below the high water mark.

- The project does not involve replacing a bridge or arch with one or more culverts installed in parallel or a larger-diameter culvert with more than one culvert installed in parallel.
- The project does not involve building more than one culvert installed in parallel on a single watercourse crossing site (e.g. twin culvert).
- The project does not involve temporarily narrowing the watercourse to an extent or for a duration that is likely to cause erosion, structural instability or fish passage problems.
- The municipal drain has no flow/low flow or is frozen to the bottom at the time of the replacement.
- In-water work is scheduled to respect Restricted Activity Timing Windows ([Tables 1 and 2](#)) to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms upon which they feed.
- The work can be conducted using the Culvert Removal Method described below and Standard Measures to Avoid Causing Serious Harm to Fish will be implemented when required.

Note: If your project must be conducted without delay in response to an emergency (e.g. the project is required to address an emergency that poses a risk to public health or safety or to the environment or property), you may apply for an Emergency Authorization (<http://www.dfo-mpo.gc.ca/asp/forceDownload.asp?FilePath=/pnw-ppe/reviews-revues/Emergency-Authorizations-Autorisations-Urgences-eng.pdf>).

Culvert Removal Methodology

- Plan/manage the work site in a manner that prevents sediment from entering the municipal drain by installing sediment and erosion control materials where required. Ensure that a sediment and erosion control plan is developed and modified as necessary for the site.
- Where required, install effective erosion and sediment control measures before starting work to prevent sediment from entering the municipal drain.
- Implement site isolation measures when in-water work is required.
 - Install an impervious barrier upstream of the work area ([Figure 1](#)). If possible, install a secondary barrier upstream of the work area for added protection.
 - Attempt to drive out the fish from the work area and then install the impervious barrier downstream of the work area. This may reduce or eliminate the need for a fish salvage.
 - When the drain is flowing, maintain downstream flows (e.g. bypass water around the work site using pumps or flume pipes; [Figure 2](#)). Provide temporary energy dissipation measures (e.g. rip-rap) at discharge point of the hose or temporary outlet pipe when required. Routinely inspect bypass pump and hose or pipe to ensure proper operation. Inspect discharge point for erosion and reposition hose/pipe or install additional temporary energy dissipation material as needed.
 - Dewater the isolated work area. The hose for a pump may discharge along the top of the bank into existing vegetation; however, the area should be monitored for signs of erosion. Reposition the hose or install additional temporary energy dissipation material as needed.

- A fish screen with openings no larger than 2.54 mm (0.10 inches) should be equipped on any pump used during the operation. Note: Additional information regarding fish screens can be found in the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline document (<http://www.dfo-mpo.gc.ca/Library/223669.pdf>).
- Collect any fish present in the isolated work area and relocate them downstream.
- Fish salvage operations must be conducted under a license issued by the Ontario Ministry of Natural Resources and Forestry (MNR). The MNR should be contacted well in advance of any work to obtain the required fish collection license.
- Install the culvert so that it is embedded into the streambed; ensure the culvert remains passable (e.g. does not become perched) by fish and wildlife.
- Decommission the site isolation in a manner that minimizes the introduction of sediment. The downstream isolation barrier shall gradually be removed first, to equalize water levels inside and outside of the isolated area and to allow suspended sediments to settle.
- Stabilize and remove waste from the site.
- Where required, maintain effective erosion and sediment control measures until complete re-vegetation of disturbed areas is achieved.



Figure 1. Isolation of site.

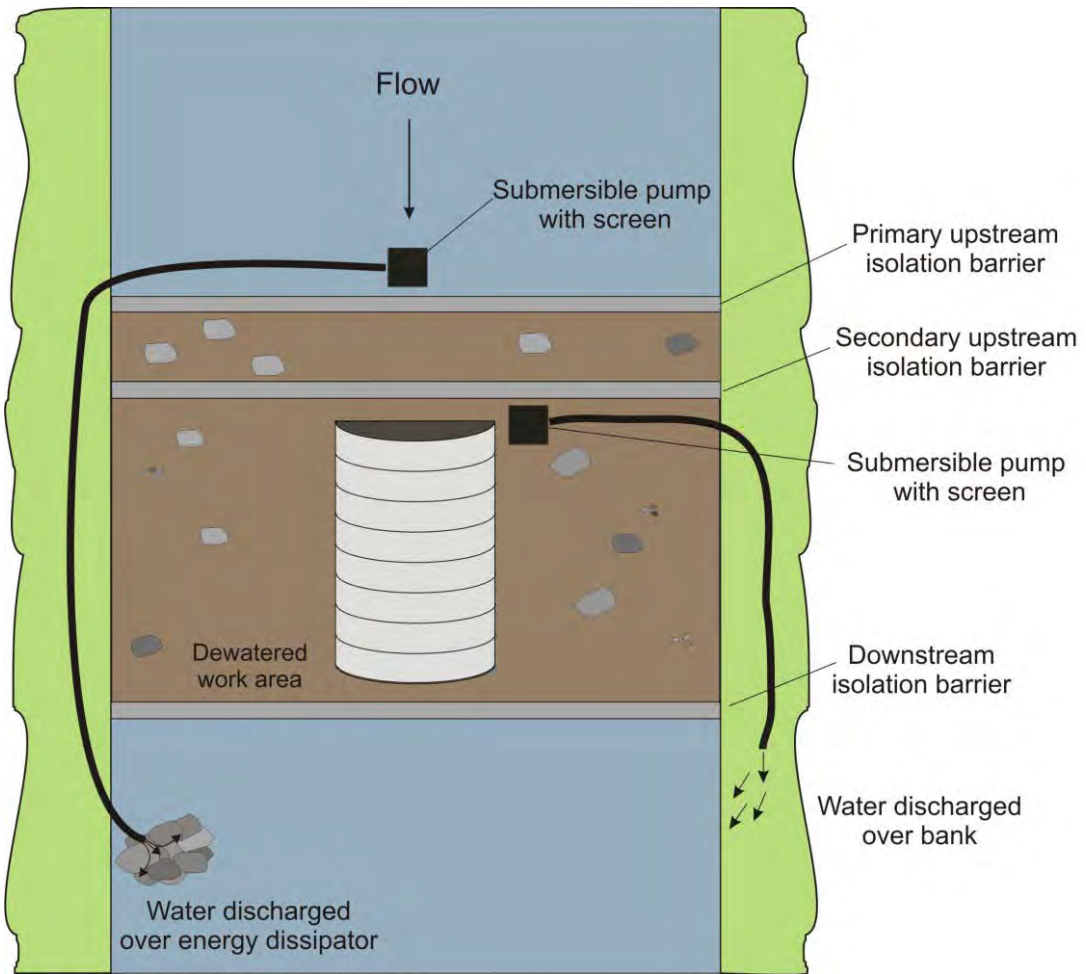


Figure 2. Isolation and bypass diversion when working in-water.

Restricted Activity Timing Windows

Figure 3 and [Tables 1 and 2](#) can be used to determine the Restricted Activity Timing Window for the drain based on its classification. Note: Restricted Activity Timing Windows identified on [Conservation Authority](#) permits or [Ministry of Natural Resources](#) (Government of Ontario) work permits may differ and take precedence.



Figure 3. Ontario's Northern and Southern Region boundaries for determining application of Restricted Activity Timing Windows.

Table 1. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Northern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	September 1 to July 15
B	April 1 to July 15
C	April 1 to July 15
D	September 1 to July 15
E	April 1 to July 15
F ¹	Periods of Flow
Unrated	September 1 to July 15

¹Flow is defined as the movement of water between two points.

Table 2. Restricted Activity Timing Windows for the protection of spawning fish and developing eggs and fry in the Southern Region. Dates represent when work should be avoided.

Drain Class	Restricted Activity Period
A	October 1 to July 15
B	March 15 to July 15
C	March 15 to July 15
D	October 1 to July 15
E	March 15 to July 15
F ¹	Periods of Flow
Unrated	October 1 to July 15

¹Flow is defined as the movement of water between two points.

Standard Measures to Avoid Causing *Serious Harm to Fish*

When implementing a culvert removal project in a municipal drain, the *Fisheries Act* still requires an individual/company to ensure they avoid causing *serious harm to fish* during any activities in or near water. The following advice will help one avoid causing harm and comply with the *Act* (for additional information see <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html>).

1. Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation.
2. Whenever possible, operate machinery on land above the high water mark or on ice and in a manner that minimizes disturbance to the banks and bed of the municipal drain.
 - Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks.
 - Limit machinery fording of the municipal drain to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the municipal drain are required, construct a temporary crossing structure.
 - Wash, refuel, and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
 - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
3. Install effective sediment and erosion control measures before starting work to prevent sediment from entering the municipal drain. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
4. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the municipal drain and runoff water is clear.
5. Undertake all in-water activities in isolation of open or flowing water while maintaining the natural flow of water downstream and avoid introducing sediment into the municipal drain.
6. Ensure applicable permits for relocating fish are obtained and relocate any fish that become trapped in isolated pools or stranded in newly flooded areas to the main channel of the watercourse.
7. Ensure that the water that is being pumped/diverted from the site is filtered (sediment removed) prior to being released (e.g. pumping/diversion of water to a vegetated area).
8. Implement measures for containing and stabilizing waste material (e.g. dredging spoils, construction waste and materials, logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
9. Stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
10. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
11. Remove all construction materials from site upon project completion.

Appendix B

Cost Estimate, Injuring Liability and Initial Construction Assessment

- Schedule of Assessment for Initial Construction
- Detailed Cost Estimate
- Calculation of Injuring Liability Cost
- Schedule of Allowances

**SCHEDULE A1 - SUMMARY OF ASSESSMENTS AND ALLOWANCES
FOR THE CONSTRUCTION OF ALL SECTIONS
OF THE EAST SAVAGE MUNICIPAL DRAIN**

Project No.: B16002
Date: 10-Sep-21

ALLOWANCES

ID	Roll No.	Allowances		
		S1	S2	Total
<i>City of Ottawa -- Individual Landowners</i>				
15	600220091000000	\$ -	\$ 12,814.66	\$ 12,814.66
52	500301472000000	\$ -	\$ 3,907.15	\$ 3,907.15
57	500301483000000	\$ -	\$ 31,675.97	\$ 31,675.97
92	500301270000000	\$ 9,411.79	\$ -	\$ 9,411.79
96	500301273000000	\$ 19,185.07	\$ -	\$ 19,185.07
102	500301275000000	\$ 9,865.12	\$ -	\$ 9,865.12
107	500301277000000	\$ 11,189.43	\$ -	\$ 11,189.43
108	500301275000000	\$ 7,728.93	\$ -	\$ 7,728.93
109	Unknown	\$ 7,185.42	\$ -	\$ 7,185.42
112	500301279000000	\$ 27,344.72	\$ -	\$ 27,344.72
114	500301281000000	\$ 24,503.65	\$ -	\$ 24,503.65
116	500301283000000	\$ 10,496.80	\$ -	\$ 10,496.80
151	5003 014 920 00000	\$ -	\$ 37,563.79	\$ 37,563.79
TOTAL		\$ 126,910.92	\$ 85,961.56	\$ 212,872.48

ASSESSMENTS

ID	Roll No.	Special Benefit		
		S1	S2	Total
<i>Blocks</i>				
Block A		\$ 598,131.85	\$ 659,920.56	\$ 1,258,052.41
TOTAL		\$ 598,131.85	\$ 659,920.56	\$ 1,258,052.41

**DETAILED COST ESTIMATE
SECTION 1
THE EAST SAVAGE MUNICIPAL DRAIN**



Project No: B16002
Date: 10-Sep-21

Type	Item No.	Item	Unit	Cost/Unit	Quantity	Total	
Section 1 (Sta 0+000 to Sta 1+205)						1,205.00m	
Construction							
Construction	Site Preparation Activities						
			Mobilization (maximum 2% of total construction cost)	LS	\$ 4,000.00	100%	\$ 4,000.00
			Erosion and Sediment Control Plan	LS	\$ 10,000.00	50%	\$ 5,000.00
			Erosion and Sediment Control Measures -- Minimum as Follows:				
			- Rock Check Dam c/w Sediment Trap	each	\$ 1,000.00	2.00	\$ 2,000.00
			- Straw Bale Dam c/w Sediment Trap	each	\$ 500.00	3.00	\$ 1,500.00
			- Additional Silt Fence (where required)	m	\$ 11.00	500.00	\$ 5,500.00
			Clearing/Grubbing (including individual tree removals)	ha	\$ 5,000.00	0.43	\$ 2,150.00
		Excavation Activities					
			Earth Ex. - Ditch (full construction) - Incl. Spreading	m ³	\$ 5.25	18650.00	\$ 97,912.50
			Culvert(s) -- 1800 dia CSP	m	\$ 475.00	34.00	\$ 16,150.00
			Culvert(s) -- 2130 x 1400 dia CSPA	m	\$ 525.00	20.00	\$ 10,500.00
		Reinstatement Activities					
			Tile Outlet Restoration/Protection	each	\$ 500.00	9.00	\$ 4,500.00
			Hand Seeding	m ²	\$ 0.50	42850.00	\$ 21,425.00
		Rock Protection - Erosion Control	m ²	\$ 27.50	467.76	\$ 12,863.40	
		Rock Protection - Culvert End Treatments	each	\$ 825.00	10.00	\$ 8,250.00	
		Sub-Total - Construction Costs				\$ 191,750.90	
		Contingency Allowance - Construction				\$ 20,000.00	
		Total - Construction Costs				\$ 211,750.90	
Engineering/Administration							
		Engineer's Report (apportioned by Section)	LS	\$ 240,000.00	50%	\$ 120,000.00	
		Contract Administration/Inspection	LS	\$ 50,000.00	50%	\$ 25,000.00	
		Sub-Total - Routine Engineering				\$ 145,000.00	
		Total - Engineering/Administration				\$ 145,000.00	
Other							
		Injuring Liability -- Bear River Liability Compensation	L.S.	\$ 39,840.00	50%	\$ 19,920.00	
		Injuring Liability -- Bear River Maintenance Compensation	L.S.	\$ 160,560.00	50%	\$ 80,280.00	
		Carrying Cost(s)	L.S.	(4% OF Costs Above)		\$ 14,270.04	
		Allowances	LS	(See Schedule)		\$ 126,910.92	
		Total - Other Costs				\$ 241,380.95	
		Sub-Total - Net Costs				\$ 598,131.85	
Special Benefits							
Developers -- Block A Section 1		<i>Consideration is given that all work associated with the current construction and Engineer's Report are fully for the benefit of the developers of Block A. A "Special Benefit" is assessed to Block A (Developers) for work associated with the current engineering and construction in the amount perscribed below.</i>					
		Total - Developer (Block A) Costs				\$ 598,131.85	
Total Net Costs - Section 1 (For Distribution to Properties)						\$ -	

**DETAILED COST ESTIMATE
SECTION 2
THE EAST SAVAGE MUNICIPAL DRAIN**



Project No: B16002
Date: 10-Sep-21

Type	Item No.	Item	Unit	Cost/Unit	Quantity	Total	
Section 2 (Sta 1+205 to Sta 2+890)						1,685.00m	
Construction							
Construction	Site Preparation Activities						
		Mobilization (maximum 2% of total construction cost)	L.S.	\$ 5,500.00	100%	\$ 5,500.00	
		Erosion and Sediment Control Plan	L.S.	\$ 10,000.00	50%	\$ 5,000.00	
		Erosion and Sediment Control Measures -- Minimum as Follows:					
		- Rock Check Dam c/w Sediment Trap	each	\$ 1,000.00	2.00	\$ 2,000.00	
		- Straw Bale Dam c/w Sediment Trap	each	\$ 500.00	2.00	\$ 1,000.00	
		- Additional Silt Fence (where required)	m	\$ 11.00	500.00	\$ 5,500.00	
		Clearing/Grubbing (including individual tree removals)	ha	\$ 5,000.00	1.17	\$ 5,850.00	
	Excavation Activities						
		Earth Ex. - Ditch (full construction) - Incl. Spreading	m ³	\$ 5.25	12950.00	\$ 67,987.50	
		Culvert(s) -- 2130 x 1400 CSPA	m	\$ 525.00	10.00	\$ 5,250.00	
		Culvert(s) -- 2400 x 1500 CONC BOX	m	\$ 3,165.00	20.00	\$ 63,300.00	
		Rail Bed Reinstatement for Culvert	L.S.	\$ 18,300.00	1.00	\$ 18,300.00	
	Reinstatement Activities						
		Tile Outlet Restoration/Protection	each	\$ 500.00	0.00	\$ -	
		Hand Seeding	m ²	\$ 0.50	29100.00	\$ 14,550.00	
		Rock Protection - Erosion Control	m ²	\$ 27.50	3200.00	\$ 88,000.00	
		Rock Protection - Culvert End Treatments	each	\$ 825.00	4.00	\$ 3,300.00	
		Sub-Total - Construction Costs				\$ 285,537.50	
		Contingency Allowance - Construction				\$ 25,000.00	
		Total - Construction Costs				\$ 310,537.50	
	Engineering/Administration						
			Engineer's Report (apportioned by Section)	L.S.	\$ 240,000.00	50%	\$ 120,000.00
			Contract Administration/Inspection	L.S.	\$ 50,000.00	50%	\$ 25,000.00
			Sub-Total - Engineering				\$ 145,000.00
Total - Engineering/Administration						\$ 145,000.00	
Other							
		Injuring Liability -- Bear River Liability Compensation	L.S.	\$ 39,840.00	50%	\$ 19,920.00	
		Injuring Liability -- Bear River Maintenance Compensation	L.S.	\$ 160,560.00	50%	\$ 80,280.00	
		Carrying Cost(s)	L.S.	(4% OF Costs Above)		\$ 18,221.50	
		Allowances	L.S.	(See Schedule)		\$ 85,961.56	
Total - Other Costs						\$ 204,383.06	
Sub-Total - Net Costs						\$ 659,920.56	
Special Benefits							
Developers -- Block A Section 1		<i>Consideration is given that all work associated with the current construction and Engineer's Report are fully for the benefit of the developers of Block A. A "Special Benefit" is assessed to Block A (Developers) for work associated with the current engineering and construction in the amount prescribed below.</i>					
		Total - Developer (Block A) Costs				\$ 659,920.56	
Total Net Costs - Section 2 (For Distribution to Properties)						\$ -	

BEAR RIVER MUNICIPAL DRAIN
(Insufficient Outlet (Injurious Liability) Compensation- \$120,000)

Areas of Development-Amazon & CRRRC

Block A	Amazon Site	Regimbald	39.39 Ha
Block B	CRRRC	Regimbald	<u>26.51 Ha</u>
		Total Regimbald	65.90 Ha
Block C	CRRRC	Simpson	76.55 Ha
Block E	CRRRC	Wilson-Johnston	39.11 Ha

Area Tributary to East Savage Drain (EUC) and McKinnon's Creek

EUC & Savage Drain	Proposed Development	240 Ha
McKinnon's Creek	Proposed Development	300 Ha

Total Area of Development

Total EUC & Savage	240 Ha
McKinnon's Creek	300 Ha
Regimbald	65.9 Ha
Simpson	76.55 Ha
Wilson Johnson	<u>39.11 Ha</u>
Total Proposed	721.56 Ha
Total Rounded	721 Ha

Using a figure of \$120,000 for Injurious Liability Compensation and using the total area of proposed development, the cost per Ha will be $\$120,000/721 = \166.44 or \$166. The amount of \$120,000 was determined by using 10% of the amount of compensation in the 1991 Engineer's Report projected to the 2019 value as an estimate to account for the additional volume of water resulting from development of the areas outlined herein impacting the properties in the area of compensation from the 1991 Engineer's Report.

Insufficient Outlet Compensation Contribution-EUC Tributary to E Savage Municipal Drain and Area Tributary to Proposed McKinnon's Creek Municipal Drain

EUC E Savage	Proposed	240 (\$166)	\$39,840	or	\$39,840
McKinnon's Cr.	Proposed	300 (\$166)	\$49,800	or	\$49,800

BEAR RIVER MUNICIPAL DRAIN
(Maintenance Compensation- \$500K)

Areas of Development-Amazon & CRRRC

Block A	Amazon Site	Regimbald	39.39 Ha
Block B	CRRRC	Regimbald	<u>26.51 Ha</u>
		Total Regimbald	65.90 Ha
Block C	CRRRC	Simpson	76.55 Ha
Block E	CRRRC	Wilson-Johnston	39.11 Ha

Area Tributary to East Savage Drain and McKinnon's Creek

EUC & Savage Drain	Proposed	240 Ha
McKinnon's Creek	Proposed	300 Ha

Total Area of Development

Total EUC & Savage	240 Ha
McKinnon's Creek	300 Ha
Regimbald	65.9 Ha
Simpson	76.55 Ha
Wilson Johnson	<u>39.11 Ha</u>
Total	721.56 Ha
Total Rounded	721 Ha

Based on \$500,000 for maintenance compensation
Cost/Ha = \$694 charge per proposed development areas (721 Ha)

The final cost for maintenance compensation is not yet known, but we used a figure of \$500,000 on the basis of the maintenance cost in 1991 brought forward to 2019. Using the total area of proposed development, the cost per Ha will be $\$500,000/721 = 693.48$ or \$694.

Maintenance Compensation Contribution-EUC Tributary to E Savage Municipal Drain and Area Tributary to Proposed McKinnon' Creek Municipal Drain

EUC E Savage	Proposed	240 (\$694)	\$166,560	or	\$160,560
McKinnon's Cr.	Proposed	300 (\$694)	\$208,200	or	\$208,200

**CALCULATION OF INJURING LIABILITY
BEAR RIVER MUNICIPAL DRAIN
INJURING LIABILITY FOR MAINTENANCE**

The Maintenance Cost Estimate for the August 1990 Engineer's Report made provisions for the following items:

Excavation	\$	50,000.00
Rip Rap	\$	8,000.00
Maintenance	\$	45,000.00
Clearing	\$	5,000.00
Seeding	\$	3,180.00
Allowance for Disposal	\$	5,650.00
Miscellaneous	\$	25,000.00
Tender, Inspection and Administration	\$	40,000.00
Total	\$	181,830.00

For determination of the 2019 Constuction Cost Value in comparison to the Estimated 1990 Connstuction Cost Value (adjusting for inflation) the RS Means Cost Index is applied to the estimated value.

RS Means Cost Index

Cost Index 1990		94.3
Cost Index June 2019		227.3

The inflation adjusted 2019 maintenance cost value is then calculated by appling the ratio of the 2019 Index Value vs. the 1990 Index Value to the original 1990 Construction Cost Estimate

1990:	\$	181,830.00
INDEX RATIO:		227.30 : 94.30
2019 Value:	\$	438,281.64

For the pupose of estimation a rounded value is utilized.

USE:	\$	500,000.00
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**CALCULATION OF INJURING LIABILITY
BEAR RIVER MUNICIPAL DRAIN
INJURING LIABILITY FOR INSUFFICIENT OUTLET**

The compensation value for Insufficient outlet (Injuring Liability -- S. 32 and 23(2) of the Ontario Drainage Act, R.S.O. Ontario, 1990) was calculated in the 1990 Engineer's Report for the Bear River Municipal

INJURING LIABILITY -- INSUFFICIENT OUTLET: \$ 475,000.00

Consideration for an increase of 10% related to the impact of runoff resulting from urban development is applied.

1990 Injuring Liability	\$ 475,000.00
Additional Impact	10%
	<hr/>
Value	\$ 47,500.00

RS Means Cost Index

Cost Index 1990	94.30
Cost Index 2019	227.40

The inflation adjusted 2019 Additional Impact Injuring Liability cost is then calculated by applying the ratio of the 2019 RS Means Index Value vs. the 1990 Index Value to the additional impact value.

1990:	\$ 47,500.00
INDEX RATIO:	<hr/> 227.30 : 94.30
2019 Value:	\$ 114,493.64

For the purpose of estimation a rounded value is utilized.

USE: \$ 120,000.00

**SCHEDULE B1
ALLOWANCES FOR LANDS USED IN THE CONSTRUCTION OF
THE EAST SAVAGE MUNICIPAL DRAIN**

Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Owner(s)	Land Allowance						Total Value
			S1				S2		
			L	W	Area	Value	Area	Value	
<i>City of Ottawa -- Individual Landowners</i>									
15	600220091000000	BRAZEAU MARIE ROSE			0.00	\$ -	0.35	\$ 8,818.88	\$ 8,818.88
52	500301472000000	CLEROUX ANTONIO CLEROUX GEORGETTE			0.00	\$ -	0.12	\$ 3,077.81	\$ 3,077.81
57	500301483000000	1343499 ONTARIO INC			0.00	\$ -	0.85	\$ 21,306.00	\$ 21,306.00
92	500301270000000	PARENTEAU LEANDRE	320.00	8.00	0.26	\$ 6,432.00	0.00	\$ -	\$ 6,432.00
96	500301273000000	MCWILLIAMS RICHARD MILTON C MCWILLIAMS TRUDY	690.00	8.00	0.55	\$ 13,869.00	0.00	\$ -	\$ 13,869.00
102	500301275000000	NAVAN LEA FARM INC	310.00	8.00	0.25	\$ 6,231.00	0.00	\$ -	\$ 6,231.00
107	500301277000000	STAAL BASIL	440.00	7.00	0.31	\$ 7,738.50	0.00	\$ -	\$ 7,738.50
108	500301275000000	NAVAN LEA FARM INC	300.00	7.00	0.21	\$ 5,276.25	0.00	\$ -	\$ 5,276.25
109	Unknown	0	230.00	8.00	0.18	\$ 4,623.00	0.00	\$ -	\$ 4,623.00
112	500301279000000	STAAL BASIL	820.00	8.00	0.66	\$ 16,482.00	0.00	\$ -	\$ 16,482.00
114	500301281000000	PERRODALE FARMS LIMITED	600.00	7.00	0.42	\$ 10,552.50	0.00	\$ -	\$ 10,552.50
116	500301283000000	STAAL BASIL STAAL GRACE	265.00	8.00	0.21	\$ 5,326.50	0.00	\$ -	\$ 5,326.50
151	5003 014 920 00000	HOHENSTEIN BARBARA			0.00	\$ -	1.05	\$ 26,381.25	\$ 26,381.25
Total			3,975.00	69.00	3.05	\$ 76,530.75	2.37	\$ 59,583.94	\$ 136,114.69

SCHEDULE C1
ALLOWANCES FOR CROPS LOST IN THE CONSTRUCTION OF
SECTIONS OF THE EAST SAVAGE MUNICIPAL DRAIN

Project No: B16002

Date: 10-Sep-21

ID	Roll No.	Crop Allowance				Total Value
		S1		S2		
		Area	Total	Area	Total	
<i>City of Ottawa -- Individual Landowners</i>						
15	600220091000000	0.00	\$ -	0.96	\$ 3,995.78	\$ 3,995.78
52	500301472000000	0.00	\$ -	0.20	\$ 829.34	\$ 829.34
57	500301483000000	0.00	\$ -	2.49	\$ 10,369.97	\$ 10,369.97
92	500301270000000	0.72	\$ 2,979.79	0.00	\$ -	\$ 2,979.79
96	500301273000000	1.28	\$ 5,316.07	0.00	\$ -	\$ 5,316.07
102	500301275000000	0.87	\$ 3,634.12	0.00	\$ -	\$ 3,634.12
107	500301277000000	0.83	\$ 3,450.93	0.00	\$ -	\$ 3,450.93
108	500301275000000	0.59	\$ 2,452.68	0.00	\$ -	\$ 2,452.68
109	Unknown	0.62	\$ 2,562.42	0.00	\$ -	\$ 2,562.42
112	500301279000000	2.61	\$ 10,862.72	0.00	\$ -	\$ 10,862.72
114	500301281000000	3.36	\$ 13,951.15	0.00	\$ -	\$ 13,951.15
116	500301283000000	1.24	\$ 5,170.30	0.00	\$ -	\$ 5,170.30
151	5003 014 920 00000	0.00	\$ -	2.69	\$ 11,182.54	\$ 11,182.54
Total		12.12	\$ 50,380.17	6.35	\$ 26,377.62	\$ 76,757.79

Crop values for the East Savage Municipal Drain were calculated by Robinson Consultants Inc. using the latest published AgriCorp Market prices for area crops at the average area yield as published by the Ontario Ministry of Agriculture and Food.

Appendix C

Schedules of Assessment for Future Maintenance

- Schedule of Assessment for Future Maintenance
- Schedule of Distribution (Within Blocks)

**SCHEDULE A2 - SUMMARY
FOR THE FUTURE MAINTENANCE OF ALL SECTIONS
OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Benefit Cost	Outlet Cost	Sub-total Costs	Special Benefit & Utilities	Grants	Total Net Costs
		Total	Total	Total		Total	Total	Total
City of Ottawa -- Individual Landowners								
1	600215063000000	3.77	\$ -	\$ 70.16	\$ 70.16	\$ -	\$ -	\$ 70.16
2	600215056000000 600215059000000	7.28	\$ -	\$ 135.48	\$ 135.48	\$ -	\$ -	\$ 135.48
3	500301387020000	0.53	\$ -	\$ 36.51	\$ 36.51	\$ -	\$ -	\$ 36.51
4	500301387010000	0.82	\$ -	\$ 56.48	\$ 56.48	\$ -	\$ 18.64	\$ 37.84
5	Unknown	2.68	\$ -	\$ 46.15	\$ 46.15	\$ -	\$ -	\$ 46.15
6	500301388000000	4.07	\$ -	\$ 70.09	\$ 70.09	\$ -	\$ -	\$ 70.09
7	500301393000000	5.75	\$ -	\$ 99.02	\$ 99.02	\$ -	\$ -	\$ 99.02
8	500301403000000	6.44	\$ -	\$ 110.90	\$ 110.90	\$ -	\$ -	\$ 110.90
9	500301397000000	5.00	\$ -	\$ 86.10	\$ 86.10	\$ -	\$ -	\$ 86.10
10	600215047000000	12.27	\$ 67.66	\$ 211.21	\$ 278.86	\$ -	\$ -	\$ 278.86
11	600215052000000	1.96	\$ 10.82	\$ 33.77	\$ 44.59	\$ -	\$ -	\$ 44.59
12	600215072100000	0.75	\$ -	\$ 11.97	\$ 11.97	\$ -	\$ -	\$ 11.97
13	600215058000000	0.13	\$ -	\$ 2.08	\$ 2.08	\$ -	\$ -	\$ 2.08
14	600220093000000	0.16	\$ -	\$ 2.55	\$ 2.55	\$ -	\$ -	\$ 2.55
15	600220091000000	12.14	\$ 66.97	\$ 193.80	\$ 260.76	\$ -	\$ -	\$ 260.76
16	600220091000000	1.87	\$ 10.33	\$ 29.90	\$ 40.24	\$ -	\$ -	\$ 40.24
17	500301440010000	3.74	\$ 82.52	\$ 195.57	\$ 278.09	\$ -	\$ -	\$ 278.09
18	500301438010000	0.24	\$ 2.65	\$ 6.29	\$ 8.95	\$ -	\$ -	\$ 8.95
19	500301438020000	0.24	\$ -	\$ 6.30	\$ 6.30	\$ -	\$ -	\$ 6.30
20	500301439000000	0.23	\$ -	\$ 5.95	\$ 5.95	\$ -	\$ -	\$ 5.95
21	500301440010000	0.21	\$ 2.29	\$ 5.44	\$ 7.73	\$ -	\$ -	\$ 7.73
22	500301438000000	1.17	\$ 6.45	\$ 15.30	\$ 21.75	\$ -	\$ -	\$ 21.75
23	500301437000000	2.17	\$ -	\$ 28.37	\$ 28.37	\$ -	\$ -	\$ 28.37
24	500301437010000	0.27	\$ -	\$ 6.95	\$ 6.95	\$ -	\$ -	\$ 6.95
25	500301410000000	0.92	\$ -	\$ 12.03	\$ 12.03	\$ -	\$ -	\$ 12.03
26	500301412000000	3.89	\$ -	\$ 50.85	\$ 50.85	\$ -	\$ -	\$ 50.85
27	500301435000000	4.81	\$ -	\$ 62.88	\$ 62.88	\$ -	\$ 20.75	\$ 42.13
28	500301434000000	0.80	\$ -	\$ 41.83	\$ 41.83	\$ -	\$ -	\$ 41.83
29	500301434000000	0.35	\$ -	\$ 18.15	\$ 18.15	\$ -	\$ -	\$ 18.15
30	500301433010000	2.65	\$ -	\$ 34.64	\$ 34.64	\$ -	\$ -	\$ 34.64
31	500301433000000	0.18	\$ -	\$ 4.65	\$ 4.65	\$ -	\$ -	\$ 4.65
32	500301432000000	2.46	\$ -	\$ 32.16	\$ 32.16	\$ -	\$ 10.61	\$ 21.55
33	500301430000000	4.47	\$ -	\$ 58.42	\$ 58.42	\$ -	\$ 19.28	\$ 39.14
34	500301414000000	0.15	\$ -	\$ 1.93	\$ 1.93	\$ -	\$ -	\$ 1.93
35	500301417000000	0.88	\$ -	\$ 11.56	\$ 11.56	\$ -	\$ 3.82	\$ 7.75
36	500301418000000	1.49	\$ -	\$ 19.50	\$ 19.50	\$ -	\$ -	\$ 19.50
37	500301419000000	1.35	\$ -	\$ 17.60	\$ 17.60	\$ -	\$ -	\$ 17.60
38	500301427050000	3.17	\$ -	\$ 41.43	\$ 41.43	\$ -	\$ -	\$ 41.43
39	500301466000000	2.61	\$ 14.40	\$ 34.12	\$ 48.52	\$ -	\$ 16.01	\$ 32.51
40	500301467000000	17.22	\$ 94.99	\$ 264.07	\$ 359.06	\$ -	\$ -	\$ 359.06
41	500301422000000	4.45	\$ 24.55	\$ 58.17	\$ 82.72	\$ -	\$ -	\$ 82.72
42	500301468010000	1.02	\$ -	\$ 13.33	\$ 13.33	\$ -	\$ 4.40	\$ 8.93
43	500301468010000	0.04	\$ -	\$ 1.15	\$ 1.15	\$ -	\$ 0.38	\$ 0.77
44	500301469000000	0.10	\$ -	\$ 2.61	\$ 2.61	\$ -	\$ -	\$ 2.61
45	500301470000000	0.12	\$ -	\$ 3.14	\$ 3.14	\$ -	\$ -	\$ 3.14
46	500301471000000	4.17	\$ -	\$ 54.51	\$ 54.51	\$ -	\$ -	\$ 54.51
47	500301474000000	2.53	\$ -	\$ 33.07	\$ 33.07	\$ -	\$ -	\$ 33.07
48	500301475010000	2.20	\$ -	\$ 28.76	\$ 28.76	\$ -	\$ -	\$ 28.76
49	500301476020000	2.01	\$ -	\$ 26.24	\$ 26.24	\$ -	\$ -	\$ 26.24
50	500301476010000	0.29	\$ -	\$ 7.61	\$ 7.61	\$ -	\$ -	\$ 7.61
51	500301476000000	0.58	\$ -	\$ 15.09	\$ 15.09	\$ -	\$ -	\$ 15.09
52	500301472000000	15.17	\$ 83.68	\$ 198.32	\$ 282.00	\$ -	\$ -	\$ 282.00
53	500301477000000	9.02	\$ -	\$ 117.85	\$ 117.85	\$ -	\$ -	\$ 117.85
54	500301477050000	4.05	\$ -	\$ 52.89	\$ 52.89	\$ -	\$ -	\$ 52.89
55	500301478000000	4.05	\$ -	\$ 52.91	\$ 52.91	\$ -	\$ -	\$ 52.91
56	500301481000000	2.85	\$ -	\$ 37.30	\$ 37.30	\$ -	\$ -	\$ 37.30
57	500301483000000	63.68	\$ 351.29	\$ 696.47	\$ 1,047.76	\$ -	\$ -	\$ 1,047.76
58	500301489050000	4.01	\$ -	\$ 35.25	\$ 35.25	\$ -	\$ -	\$ 35.25
59	500301489000000	4.80	\$ 26.46	\$ 42.20	\$ 68.66	\$ -	\$ -	\$ 68.66
60	500301489070000	1.21	\$ -	\$ 21.23	\$ 21.23	\$ -	\$ -	\$ 21.23
61	500301489010000	2.43	\$ -	\$ 21.37	\$ 21.37	\$ -	\$ -	\$ 21.37
62	500301243000000	1.20	\$ 1.80	\$ 11.17	\$ 12.97	\$ -	\$ -	\$ 12.97
63	500301256020000	9.61	\$ 7.22	\$ 44.71	\$ 51.93	\$ -	\$ -	\$ 51.93
64	500301256010000	2.78	\$ -	\$ 12.93	\$ 12.93	\$ -	\$ -	\$ 12.93

**SCHEDULE A2 - SUMMARY
FOR THE FUTURE MAINTENANCE OF ALL SECTIONS
OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Benefit Cost	Outlet Cost	Sub-total Costs	Special Benefit & Utilities	Grants	Total Net Costs
		Total	Total	Total		Total	Total	Total
65	500301241000000	4.37	\$ 3.28	\$ 20.34	\$ 23.62	\$ -	\$ -	\$ 23.62
66	500301239000000	4.00	\$ 3.01	\$ 18.62	\$ 21.63	\$ -	\$ -	\$ 21.63
67	500301237000000	8.05	\$ 6.05	\$ 37.47	\$ 43.52	\$ -	\$ -	\$ 43.52
68	500301238050000	0.82	\$ -	\$ 7.63	\$ 7.63	\$ -	\$ -	\$ 7.63
69	500301238060000	1.21	\$ -	\$ 11.26	\$ 11.26	\$ -	\$ -	\$ 11.26
70	500301267000000	2.02	\$ -	\$ 9.40	\$ 9.40	\$ -	\$ 3.10	\$ 6.30
71	500301238080000	2.09	\$ -	\$ 9.72	\$ 9.72	\$ -	\$ -	\$ 9.72
72	500301238100000	2.00	\$ -	\$ 18.61	\$ 18.61	\$ -	\$ -	\$ 18.61
73	500301267000000	3.48	\$ -	\$ 16.19	\$ 16.19	\$ -	\$ 5.34	\$ 10.85
74	500301267020000	10.12	\$ -	\$ 83.67	\$ 83.67	\$ -	\$ -	\$ 83.67
75	500301267000000	9.77	\$ -	\$ 75.85	\$ 75.85	\$ -	\$ 25.03	\$ 50.82
76	500301267100000	1.00	\$ -	\$ 17.41	\$ 17.41	\$ -	\$ 5.74	\$ 11.66
77	500301267010000	19.54	\$ -	\$ 128.29	\$ 128.29	\$ -	\$ -	\$ 128.29
78	500301267060000	0.34	\$ -	\$ 3.60	\$ 3.60	\$ -	\$ -	\$ 3.60
79	500301267050000	0.24	\$ -	\$ 2.24	\$ 2.24	\$ -	\$ -	\$ 2.24
80	500301267080000	0.83	\$ -	\$ 7.70	\$ 7.70	\$ -	\$ -	\$ 7.70
81	500301265000000	14.69	\$ 11.37	\$ 70.40	\$ 81.77	\$ -	\$ -	\$ 81.77
82	500301258000000	2.83	\$ -	\$ 13.18	\$ 13.18	\$ -	\$ -	\$ 13.18
83	500301262000000	7.57	\$ 5.69	\$ 35.23	\$ 40.92	\$ -	\$ 13.50	\$ 27.42
84	500301265100000	2.02	\$ -	\$ 15.50	\$ 15.50	\$ -	\$ -	\$ 15.50
85	500301265050000	1.15	\$ -	\$ 14.31	\$ 14.31	\$ -	\$ -	\$ 14.31
86	500301265200000	2.01	\$ 1.57	\$ 9.74	\$ 11.31	\$ -	\$ -	\$ 11.31
87	500301259000000	2.08	\$ 1.57	\$ 9.70	\$ 11.26	\$ -	\$ -	\$ 11.26
88	500301262000000	5.67	\$ -	\$ 26.40	\$ 26.40	\$ -	\$ -	\$ 26.40
89	500301071400000	6.99	\$ -	\$ 32.54	\$ 32.54	\$ -	\$ -	\$ 32.54
90	500301492000000	7.64	\$ 14.82	\$ 91.81	\$ 106.63	\$ -	\$ -	\$ 106.63
91	500301494000000	5.20	\$ 12.65	\$ 78.32	\$ 90.96	\$ -	\$ -	\$ 90.96
92	500301270000000	20.23	\$ 31.46	\$ 194.82	\$ 226.28	\$ -	\$ -	\$ 226.28
93	500301268000000	60.71	\$ 87.11	\$ 539.48	\$ 626.59	\$ -	\$ 206.77	\$ 419.81
94	500301078000000	12.99	\$ -	\$ 152.04	\$ 152.04	\$ -	\$ 50.17	\$ 101.86
95	500301494000000	3.65	\$ -	\$ 38.74	\$ 38.74	\$ -	\$ -	\$ 38.74
96	500301273000000	40.47	\$ 91.97	\$ 512.65	\$ 604.63	\$ -	\$ 199.53	\$ 405.10
97	500301271000000	20.23	\$ 32.37	\$ 80.20	\$ 112.57	\$ -	\$ -	\$ 112.57
98	500301272000000	18.45	\$ 32.53	\$ 80.58	\$ 113.10	\$ -	\$ 37.32	\$ 75.78
99	500301272010000	1.73	\$ 8.65	\$ 21.44	\$ 30.09	\$ -	\$ -	\$ 30.09
100	Unknown	4.56	\$ -	\$ 12.59	\$ 12.59	\$ -	\$ -	\$ 12.59
101	500301082000000	4.04	\$ -	\$ 12.47	\$ 12.47	\$ -	\$ 4.11	\$ 8.35
102	500301275000000	38.59	\$ 78.24	\$ 193.84	\$ 272.08	\$ -	\$ 89.79	\$ 182.29
103	500301274000000	2.34	\$ 11.73	\$ 29.07	\$ 40.80	\$ -	\$ -	\$ 40.80
104	500301274020000	0.39	\$ -	\$ 2.44	\$ 2.44	\$ -	\$ -	\$ 2.44
105	500301274010000	0.81	\$ -	\$ 4.99	\$ 4.99	\$ -	\$ -	\$ 4.99
106	500301278000000	15.92	\$ 29.48	\$ 73.03	\$ 102.52	\$ -	\$ -	\$ 102.52
107	500301277000000	20.23	\$ 45.57	\$ 155.23	\$ 200.80	\$ -	\$ 66.26	\$ 134.53
108	500301275000000	44.29	\$ 87.30	\$ 297.36	\$ 384.66	\$ -	\$ 126.94	\$ 257.72
109	Unknown	37.94	\$ 81.57	\$ 277.86	\$ 359.43	\$ -	\$ -	\$ 359.43
110	500301275010000	0.41	\$ -	\$ 2.51	\$ 2.51	\$ -	\$ -	\$ 2.51
111	500301280000000	8.66	\$ 13.33	\$ 33.01	\$ 46.34	\$ -	\$ -	\$ 46.34
112	500301279000000	70.38	\$ 144.57	\$ 295.46	\$ 440.03	\$ -	\$ 145.21	\$ 294.82
113	500301282000000	22.74	\$ 33.47	\$ 31.09	\$ 64.56	\$ -	\$ -	\$ 64.56
114	500301281000000	40.47	\$ 91.27	\$ 84.78	\$ 176.05	\$ -	\$ 58.10	\$ 117.95
115	500301285000000	2.22	\$ 3.57	\$ 3.32	\$ 6.89	\$ -	\$ -	\$ 6.89
116	500301283000000	11.10	\$ 24.40	\$ 22.67	\$ 47.06	\$ -	\$ 15.53	\$ 31.53
117	500301095000000	0.33	\$ 0.82	\$ 0.77	\$ 1.59	\$ -	\$ 0.52	\$ 1.06
118	500301096000000	0.62	\$ 1.56	\$ 1.45	\$ 3.01	\$ -	\$ 0.99	\$ 2.02
119	5003 013 860 90000	0.35	\$ -	\$ 12.05	\$ 12.05	\$ -	\$ -	\$ 12.05
120	5003 013 900 00000	0.34	\$ -	\$ 11.71	\$ 11.71	\$ -	\$ -	\$ 11.71
121	5003 013 900 20000	0.14	\$ -	\$ 4.82	\$ 4.82	\$ -	\$ -	\$ 4.82
122	5003 013 920 00000	0.34	\$ -	\$ 11.71	\$ 11.71	\$ -	\$ -	\$ 11.71
123	5003 013 950 00000	0.52	\$ -	\$ 17.91	\$ 17.91	\$ -	\$ -	\$ 17.91
124	5003 013 980 00000	0.37	\$ -	\$ 12.74	\$ 12.74	\$ -	\$ 4.21	\$ 8.54
125	5003 013 990 00000	0.34	\$ -	\$ 11.71	\$ 11.71	\$ -	\$ -	\$ 11.71
126	600215047020000	0.13	\$ 1.42	\$ 4.44	\$ 5.87	\$ -	\$ -	\$ 5.87
127	600215048000000	0.14	\$ -	\$ 4.91	\$ 4.91	\$ -	\$ -	\$ 4.91
128	6002 150 720 00000	7.30	\$ -	\$ 502.97	\$ 502.97	\$ -	\$ -	\$ 502.97
129	600220091020000	0.19	\$ -	\$ 5.94	\$ 5.94	\$ -	\$ -	\$ 5.94
130	600220091030000	0.19	\$ -	\$ 5.94	\$ 5.94	\$ -	\$ -	\$ 5.94

**SCHEDULE A2 - SUMMARY
FOR THE FUTURE MAINTENANCE OF ALL SECTIONS
OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Benefit Cost	Outlet Cost	Sub-total Costs	Special Benefit & Utilities	Grants	Total Net Costs
		Total	Total	Total		Total	Total	Total
131	600220091010000	0.19	\$ -	\$ 5.94	\$ 5.94	\$ -	\$ -	\$ 5.94
132	5003 014 350 00000	0.17	\$ -	\$ 4.44	\$ 4.44	\$ -	\$ -	\$ 4.44
133	5003 014 350 00000	0.06	\$ -	\$ 1.57	\$ 1.57	\$ -	\$ -	\$ 1.57
134	5003 014 750 00000	0.24	\$ -	\$ 6.28	\$ 6.28	\$ -	\$ -	\$ 6.28
135	5003 014 130 00000	0.18	\$ -	\$ 9.41	\$ 9.41	\$ -	\$ -	\$ 9.41
136	5003 014 290 00000	0.15	\$ -	\$ 7.84	\$ 7.84	\$ -	\$ -	\$ 7.84
137	5003 014 280 00000	0.17	\$ -	\$ 4.31	\$ 4.31	\$ -	\$ -	\$ 4.31
138	5003 014 270 00000	0.58	\$ -	\$ 30.38	\$ 30.38	\$ -	\$ -	\$ 30.38
139	5003 014 270 00000	0.02	\$ -	\$ 0.39	\$ 0.39	\$ -	\$ -	\$ 0.39
140	5003 014 260 00000	0.65	\$ -	\$ 33.94	\$ 33.94	\$ -	\$ -	\$ 33.94
141	5003 014 250 00000	0.42	\$ -	\$ 10.85	\$ 10.85	\$ -	\$ -	\$ 10.85
142	5003 014 240 00000	0.82	\$ -	\$ 21.52	\$ 21.52	\$ -	\$ -	\$ 21.52
143	5003 014 230 00000	0.11	\$ -	\$ 2.77	\$ 2.77	\$ -	\$ -	\$ 2.77
144	5003 014 210 00000	0.08	\$ -	\$ 2.09	\$ 2.09	\$ -	\$ -	\$ 2.09
145	5003 014 200 00000	0.14	\$ -	\$ 1.30	\$ 1.30	\$ -	\$ -	\$ 1.30
146	5003 014 790 00000	0.18	\$ -	\$ 3.41	\$ 3.41	\$ -	\$ -	\$ 3.41
147	5003 014 840 00000	0.21	\$ -	\$ 1.98	\$ 1.98	\$ -	\$ -	\$ 1.98
148	5003 014 870 10000	0.41	\$ -	\$ 3.82	\$ 3.82	\$ -	\$ -	\$ 3.82
149	5003 014 870 20000	0.19	\$ -	\$ 1.78	\$ 1.78	\$ -	\$ -	\$ 1.78
150	5003 014 870 30000	0.40	\$ -	\$ 7.52	\$ 7.52	\$ -	\$ -	\$ 7.52
151	5003 014 920 00000	26.30	\$ 72.55	\$ 162.22	\$ 234.77	\$ -	\$ -	\$ 234.77
152	5003 012 600 00000	0.36	\$ -	\$ 1.34	\$ 1.34	\$ -	\$ -	\$ 1.34
153	5003 012 610 00000	0.36	\$ -	\$ 1.34	\$ 1.34	\$ -	\$ -	\$ 1.34
154	5003 012 630 00000	0.35	\$ -	\$ 1.30	\$ 1.30	\$ -	\$ -	\$ 1.30
155	5003 012 640 00000	0.36	\$ -	\$ 1.34	\$ 1.34	\$ -	\$ -	\$ 1.34
156	5003 010 730 40000	0.38	\$ -	\$ 1.42	\$ 1.42	\$ -	\$ -	\$ 1.42
157	5003 010 730 30000	0.27	\$ -	\$ 1.00	\$ 1.00	\$ -	\$ -	\$ 1.00
158	5003 010 730 10000	0.36	\$ -	\$ 1.33	\$ 1.33	\$ -	\$ -	\$ 1.33
159	5003 010 750 00000	0.24	\$ -	\$ 0.88	\$ 0.88	\$ -	\$ -	\$ 0.88
160	500301279010000	0.19	\$ -	\$ 2.37	\$ 2.37	\$ -	\$ -	\$ 2.37
161	500301483000000	14.68	\$ 80.98	\$ 88.16	\$ 169.14	\$ -	\$ -	\$ 169.14
Blocks								
Block A		82.48	\$ -	\$ 5,468.43	\$ 5,468.43	\$ -	\$ -	\$ 5,468.43
Block B		11.96	\$ -	\$ 383.47	\$ 383.47	\$ -	\$ -	\$ 383.47
Block C		3.64	\$ -	\$ 161.47	\$ 161.47	\$ -	\$ -	\$ 161.47
Block D		6.45	\$ -	\$ 91.82	\$ 91.82	\$ -	\$ -	\$ 91.82
Block E		19.80	\$ -	\$ 269.79	\$ 269.79	\$ -	\$ -	\$ 269.79
Block F		11.77	\$ -	\$ 338.39	\$ 338.39	\$ -	\$ -	\$ 338.39
Block G		4.93	\$ -	\$ 63.72	\$ 63.72	\$ -	\$ -	\$ 63.72
Block H		6.94	\$ -	\$ 105.57	\$ 105.57	\$ -	\$ -	\$ 105.57
Block I		21.32	\$ -	\$ 89.29	\$ 89.29	\$ -	\$ -	\$ 89.29
Block J		24.70	\$ -	\$ 85.87	\$ 85.87	\$ -	\$ -	\$ 85.87
Block K		4.71	\$ -	\$ 43.86	\$ 43.86	\$ -	\$ -	\$ 43.86
Block L		2.14	\$ -	\$ 19.91	\$ 19.91	\$ -	\$ -	\$ 19.91
Block M		18.55	\$ -	\$ 535.49	\$ 535.49	\$ -	\$ -	\$ 535.49
City of Ottawa -- Roads/Other								
Mer-Bleue Road		5.16	\$ -	\$ 355.43	\$ 355.43	\$ -	\$ -	\$ 355.43
Renaud Road		1.21	\$ -	\$ 83.35	\$ 83.35	\$ -	\$ -	\$ 83.35
Navan Road		8.06	\$ -	\$ 555.19	\$ 555.19	\$ -	\$ -	\$ 555.19
Tenth Line Road		5.76	\$ -	\$ 350.28	\$ 350.28	\$ -	\$ -	\$ 350.28
Smith Road		4.93	\$ -	\$ 156.86	\$ 156.86	\$ -	\$ -	\$ 156.86
Milton Road		6.78	\$ -	\$ 31.26	\$ 31.26	\$ -	\$ -	\$ 31.26
Public Utilities/Authorities								
VIA Rail		13.52	\$ -	\$ 930.94	\$ 930.94	\$ -	\$ -	\$ 930.94
TOTAL		1206.73	\$ 2,000.00	\$ 18,000.00	\$ 20,000.00	\$ -	\$ 1,152.07	\$ 18,847.93

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1 Total		S1		S1	S1	S1						
City of Ottawa -- Individual Landowners																
1	600215063000000	3.77	4.00	15.08	N	0.30		\$ -	0.30	1.00	4.52	\$ 70.16	\$ 70.16	0%	\$ -	\$ 70.16
2	600215056000000 600215059000000	7.28	4.00	29.12	N	0.30		\$ -	0.30	1.00	8.74	\$ 135.48	\$ 135.48	0%	\$ -	\$ 135.48
3	500301387020000	0.53	4.00	2.12	N	0.30		\$ -	0.30	1.00	0.64	\$ 9.86	\$ 9.86	0%	\$ -	\$ 9.86
4	500301387010000	0.82	4.00	3.28	N	0.30		\$ -	0.30	1.00	0.98	\$ 15.26	\$ 15.26	100%	\$ 5.04	\$ 10.22
5	Unknown	2.68	1.00	2.68	N	0.30		\$ -	0.30	1.00	0.80	\$ 12.47	\$ 12.47	0%	\$ -	\$ 12.47
6	500301388000000	4.07	1.00	4.07	N	0.30		\$ -	0.30	1.00	1.22	\$ 18.94	\$ 18.94	0%	\$ -	\$ 18.94
7	500301393000000	5.75	1.00	5.75	N	0.30		\$ -	0.30	1.00	1.73	\$ 26.75	\$ 26.75	0%	\$ -	\$ 26.75
8	500301403000000	6.44	1.00	6.44	N	0.30		\$ -	0.30	1.00	1.93	\$ 29.96	\$ 29.96	0%	\$ -	\$ 29.96
9	500301397000000	5.00	1.00	5.00	N	0.30		\$ -	0.30	1.00	1.50	\$ 23.26	\$ 23.26	0%	\$ -	\$ 23.26
10	600215047000000	12.27	1.00	12.27	N	0.30		\$ -	0.30	1.00	3.68	\$ 57.06	\$ 57.06	0%	\$ -	\$ 57.06
11	600215052000000	1.96	1.00	1.96	N	0.30		\$ -	0.30	1.00	0.59	\$ 9.12	\$ 9.12	0%	\$ -	\$ 9.12
12	600215072100000	0.75	1.00	0.75	N	0.30		\$ -	0.30	1.00	0.23	\$ 3.49	\$ 3.49	0%	\$ -	\$ 3.49
13	600215058000000	0.13	1.00	0.13	N	0.30		\$ -	0.30	1.00	0.04	\$ 0.60	\$ 0.60	0%	\$ -	\$ 0.60
14	600220093000000	0.16	1.00	0.16	N	0.30		\$ -	0.30	1.00	0.05	\$ 0.74	\$ 0.74	0%	\$ -	\$ 0.74
15	600220091000000	12.14	1.00	12.14	N	0.30		\$ -	0.30	1.00	3.64	\$ 56.48	\$ 56.48	0%	\$ -	\$ 56.48
16	600220091000000	1.87	1.00	1.87	N	0.30		\$ -	0.30	1.00	0.56	\$ 8.72	\$ 8.72	0%	\$ -	\$ 8.72
17	500301440010000	3.74	4.00	14.96	N	0.30		\$ -	0.30	1.00	4.49	\$ 69.60	\$ 69.60	0%	\$ -	\$ 69.60
18	500301438010000	0.24	2.00	0.48	N	0.30		\$ -	0.30	1.00	0.14	\$ 2.24	\$ 2.24	0%	\$ -	\$ 2.24
19	500301438020000	0.24	2.00	0.48	N	0.30		\$ -	0.30	1.00	0.14	\$ 2.24	\$ 2.24	0%	\$ -	\$ 2.24
20	500301439000000	0.23	2.00	0.46	N	0.30		\$ -	0.30	1.00	0.14	\$ 2.12	\$ 2.12	0%	\$ -	\$ 2.12
21	500301440010000	0.21	2.00	0.42	N	0.30		\$ -	0.30	1.00	0.12	\$ 1.94	\$ 1.94	0%	\$ -	\$ 1.94
22	500301438000000	1.17	1.00	1.17	N	0.30		\$ -	0.30	1.00	0.35	\$ 5.44	\$ 5.44	0%	\$ -	\$ 5.44
23	500301437000000	2.17	1.00	2.17	N	0.30		\$ -	0.30	1.00	0.65	\$ 10.10	\$ 10.10	0%	\$ -	\$ 10.10
24	500301437010000	0.27	2.00	0.53	N	0.30		\$ -	0.30	1.00	0.16	\$ 2.48	\$ 2.48	0%	\$ -	\$ 2.48
25	500301410000000	0.92	1.00	0.92	N	0.30		\$ -	0.30	1.00	0.28	\$ 4.28	\$ 4.28	0%	\$ -	\$ 4.28
26	500301412000000	3.89	1.00	3.89	N	0.30		\$ -	0.30	1.00	1.17	\$ 18.10	\$ 18.10	0%	\$ -	\$ 18.10
27	500301435000000	4.81	1.00	4.81	N	0.30		\$ -	0.30	1.00	1.44	\$ 22.38	\$ 22.38	100%	\$ 7.39	\$ 14.99
28	500301434000000	0.80	4.00	3.20	N	0.30		\$ -	0.30	1.00	0.96	\$ 14.89	\$ 14.89	0%	\$ -	\$ 14.89
29	500301434000000	0.35	4.00	1.39	N	0.30		\$ -	0.30	1.00	0.42	\$ 6.46	\$ 6.46	0%	\$ -	\$ 6.46
30	500301433010000	2.65	1.00	2.65	N	0.30		\$ -	0.30	1.00	0.80	\$ 12.33	\$ 12.33	0%	\$ -	\$ 12.33

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1					S1							
31	500301433000000	0.18	2.00	0.36	N	0.30		\$ -	0.30	1.00	0.11	\$ 1.66	\$ 1.66	0%	\$ -	\$ 1.66
32	500301432000000	2.46	1.00	2.46	N	0.30		\$ -	0.30	1.00	0.74	\$ 11.45	\$ 11.45	100%	\$ 3.78	\$ 7.67
33	500301430000000	4.47	1.00	4.47	N	0.30		\$ -	0.30	1.00	1.34	\$ 20.79	\$ 20.79	100%	\$ 6.86	\$ 13.93
34	500301414000000	0.15	1.00	0.15	N	0.30		\$ -	0.30	1.00	0.04	\$ 0.69	\$ 0.69	0%	\$ -	\$ 0.69
35	500301417000000	0.88	1.00	0.88	N	0.30		\$ -	0.30	1.00	0.27	\$ 4.12	\$ 4.12	100%	\$ 1.36	\$ 2.76
36	500301418000000	1.49	1.00	1.49	N	0.30		\$ -	0.30	1.00	0.45	\$ 6.94	\$ 6.94	0%	\$ -	\$ 6.94
37	500301419000000	1.35	1.00	1.35	N	0.30		\$ -	0.30	1.00	0.40	\$ 6.27	\$ 6.27	0%	\$ -	\$ 6.27
38	500301427050000	3.17	1.00	3.17	N	0.30		\$ -	0.30	1.00	0.95	\$ 14.74	\$ 14.74	0%	\$ -	\$ 14.74
39	500301466000000	2.61	1.00	2.61	N	0.30		\$ -	0.30	1.00	0.78	\$ 12.14	\$ 12.14	100%	\$ 4.01	\$ 8.14
40	500301467000000	17.22	1.00	17.22	N	0.30		\$ -	0.30	1.00	5.17	\$ 80.12	\$ 80.12	0%	\$ -	\$ 80.12
41	500301422000000	4.45	1.00	4.45	N	0.30		\$ -	0.30	1.00	1.34	\$ 20.70	\$ 20.70	0%	\$ -	\$ 20.70
42	500301468010000	1.02	1.00	1.02	N	0.30		\$ -	0.30	1.00	0.31	\$ 4.75	\$ 4.75	100%	\$ 1.57	\$ 3.18
43	500301468010000	0.04	2.00	0.09	N	0.30		\$ -	0.30	1.00	0.03	\$ 0.41	\$ 0.41	100%	\$ 0.14	\$ 0.27
44	500301469000000	0.10	2.00	0.20	N	0.30		\$ -	0.30	1.00	0.06	\$ 0.93	\$ 0.93	0%	\$ -	\$ 0.93
45	500301470000000	0.12	2.00	0.24	N	0.30		\$ -	0.30	1.00	0.07	\$ 1.12	\$ 1.12	0%	\$ -	\$ 1.12
46	500301471000000	4.17	1.00	4.17	N	0.30		\$ -	0.30	1.00	1.25	\$ 19.40	\$ 19.40	0%	\$ -	\$ 19.40
47	500301474000000	2.53	1.00	2.53	N	0.30		\$ -	0.30	1.00	0.76	\$ 11.77	\$ 11.77	0%	\$ -	\$ 11.77
48	500301475010000	2.20	1.00	2.20	N	0.30		\$ -	0.30	1.00	0.66	\$ 10.24	\$ 10.24	0%	\$ -	\$ 10.24
49	500301476020000	2.01	1.00	2.01	N	0.30		\$ -	0.30	1.00	0.60	\$ 9.34	\$ 9.34	0%	\$ -	\$ 9.34
50	500301476010000	0.29	2.00	0.58	N	0.30		\$ -	0.30	1.00	0.17	\$ 2.71	\$ 2.71	0%	\$ -	\$ 2.71
51	500301476000000	0.58	2.00	1.16	N	0.30		\$ -	0.30	1.00	0.35	\$ 5.39	\$ 5.39	0%	\$ -	\$ 5.39
52	500301472000000	15.17	1.00	15.17	N	0.30		\$ -	0.30	1.00	4.55	\$ 70.58	\$ 70.58	0%	\$ -	\$ 70.58
53	500301477000000	9.02	1.00	9.02	N	0.30		\$ -	0.30	1.00	2.70	\$ 41.94	\$ 41.94	0%	\$ -	\$ 41.94
54	500301477050000	4.05	1.00	4.05	N	0.30		\$ -	0.30	1.00	1.21	\$ 18.82	\$ 18.82	0%	\$ -	\$ 18.82
55	500301478000000	4.05	1.00	4.05	N	0.30		\$ -	0.30	1.00	1.21	\$ 18.83	\$ 18.83	0%	\$ -	\$ 18.83
56	500301481000000	2.85	1.00	2.85	N	0.30		\$ -	0.30	1.00	0.86	\$ 13.27	\$ 13.27	0%	\$ -	\$ 13.27
57	500301483000000	63.68	1.00	63.68	N	0.30		\$ -	0.30	1.00	19.11	\$ 296.29	\$ 296.29	0%	\$ -	\$ 296.29
58	500301489050000	4.01	1.00	4.01	N	0.30		\$ -	0.30	1.00	1.20	\$ 18.64	\$ 18.64	0%	\$ -	\$ 18.64
59	500301489000000	4.80	1.00	4.80	N	0.30		\$ -	0.30	1.00	1.44	\$ 22.31	\$ 22.31	0%	\$ -	\$ 22.31
60	500301489070000	1.21	2.00	2.41	N	0.30		\$ -	0.30	1.00	0.72	\$ 11.22	\$ 11.22	0%	\$ -	\$ 11.22
61	500301489010000	2.43	1.00	2.43	N	0.30		\$ -	0.30	1.00	0.73	\$ 11.30	\$ 11.30	0%	\$ -	\$ 11.30

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1												
62	500301243000000	1.20	2.00	2.40	Y	0.30	0.72	\$ 1.80	0.30	1.00	0.72	\$ 11.17	\$ 12.97	0%	\$ -	\$ 12.97
63	500301256020000	9.61	1.00	9.61	Y	0.30	2.88	\$ 7.22	0.30	1.00	2.88	\$ 44.71	\$ 51.93	0%	\$ -	\$ 51.93
64	500301256010000	2.78	1.00	2.78	N	0.30		\$ -	0.30	1.00	0.83	\$ 12.93	\$ 12.93	0%	\$ -	\$ 12.93
65	500301241000000	4.37	1.00	4.37	Y	0.30	1.31	\$ 3.28	0.30	1.00	1.31	\$ 20.34	\$ 23.62	0%	\$ -	\$ 23.62
66	500301239000000	4.00	1.00	4.00	Y	0.30	1.20	\$ 3.01	0.30	1.00	1.20	\$ 18.62	\$ 21.63	0%	\$ -	\$ 21.63
67	500301237000000	8.05	1.00	8.05	Y	0.30	2.42	\$ 6.05	0.30	1.00	2.42	\$ 37.47	\$ 43.52	0%	\$ -	\$ 43.52
68	500301238050000	0.82	2.00	1.64	N	0.30		\$ -	0.30	1.00	0.49	\$ 7.63	\$ 7.63	0%	\$ -	\$ 7.63
69	500301238060000	1.21	2.00	2.42	N	0.30		\$ -	0.30	1.00	0.73	\$ 11.26	\$ 11.26	0%	\$ -	\$ 11.26
70	500301267000000	2.02	1.00	2.02	N	0.30		\$ -	0.30	1.00	0.61	\$ 9.40	\$ 9.40	100%	\$ 3.10	\$ 6.30
71	500301238080000	2.09	1.00	2.09	N	0.30		\$ -	0.30	1.00	0.63	\$ 9.72	\$ 9.72	0%	\$ -	\$ 9.72
72	500301238100000	2.00	2.00	4.00	N	0.30		\$ -	0.30	1.00	1.20	\$ 18.61	\$ 18.61	0%	\$ -	\$ 18.61
73	500301267000000	3.48	1.00	3.48	N	0.30		\$ -	0.30	1.00	1.04	\$ 16.19	\$ 16.19	100%	\$ 5.34	\$ 10.85
74	500301267020000	10.12	1.00	10.12	N	0.53		\$ -	0.53	1.00	5.39	\$ 83.67	\$ 83.67	0%	\$ -	\$ 83.67
75	500301267000000	9.77	1.00	9.77	N	0.50		\$ -	0.50	1.00	4.89	\$ 75.85	\$ 75.85	100%	\$ 25.03	\$ 50.82
76	500301267100000	1.00	2.00	2.00	N	0.56		\$ -	0.56	1.00	1.12	\$ 17.41	\$ 17.41	100%	\$ 5.74	\$ 11.66
77	500301267010000	19.54	1.00	19.54	N	0.42		\$ -	0.42	1.00	8.27	\$ 128.29	\$ 128.29	0%	\$ -	\$ 128.29
78	500301267060000	0.34	2.00	0.69	N	0.34		\$ -	0.34	1.00	0.23	\$ 3.60	\$ 3.60	0%	\$ -	\$ 3.60
79	500301267050000	0.24	2.00	0.48	N	0.30		\$ -	0.30	1.00	0.14	\$ 2.24	\$ 2.24	0%	\$ -	\$ 2.24
80	500301267080000	0.83	2.00	1.65	N	0.30		\$ -	0.30	1.00	0.50	\$ 7.70	\$ 7.70	0%	\$ -	\$ 7.70
81	500301265000000	14.69	1.00	14.69	Y	0.31	4.54	\$ 11.37	0.31	1.00	4.54	\$ 70.40	\$ 81.77	0%	\$ -	\$ 81.77
82	500301258000000	2.83	1.00	2.83	N	0.30		\$ -	0.30	1.00	0.85	\$ 13.18	\$ 13.18	0%	\$ -	\$ 13.18
83	500301262000000	7.57	1.00	7.57	Y	0.30	2.27	\$ 5.69	0.30	1.00	2.27	\$ 35.23	\$ 40.92	100%	\$ 13.50	\$ 27.42
84	500301265100000	2.02	1.00	2.02	N	0.50		\$ -	0.50	1.00	1.00	\$ 15.50	\$ 15.50	0%	\$ -	\$ 15.50
85	500301265050000	1.15	2.00	2.29	N	0.40		\$ -	0.40	1.00	0.92	\$ 14.31	\$ 14.31	0%	\$ -	\$ 14.31
86	500301265200000	2.01	1.00	2.01	Y	0.31	0.63	\$ 1.57	0.31	1.00	0.63	\$ 9.74	\$ 11.31	0%	\$ -	\$ 11.31
87	500301259000000	2.08	1.00	2.08	Y	0.30	0.63	\$ 1.57	0.30	1.00	0.63	\$ 9.70	\$ 11.26	0%	\$ -	\$ 11.26

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1												
88	500301262000000	5.67	1.00	5.67	N	0.30		\$ -	0.30	1.00	1.70	\$ 26.40	\$ 26.40	0%	\$ -	\$ 26.40
89	500301071400000	6.99	1.00	6.99	N	0.30		\$ -	0.30	1.00	2.10	\$ 32.54	\$ 32.54	0%	\$ -	\$ 32.54
90	500301492000000	7.64	1.00	7.64	Y	0.77	5.92	\$ 14.82	0.77	1.00	5.92	\$ 91.81	\$ 106.63	0%	\$ -	\$ 106.63
91	500301494000000	5.20	1.00	5.20	Y	0.97	5.05	\$ 12.65	0.97	1.00	5.05	\$ 78.32	\$ 90.96	0%	\$ -	\$ 90.96
92	500301270000000	20.23	1.00	20.23	Y	0.62	12.56	\$ 31.46	0.62	1.00	12.56	\$ 194.82	\$ 226.28	0%	\$ -	\$ 226.28
93	500301268000000	60.71	1.00	60.71	Y	0.57	34.79	\$ 87.11	0.57	1.00	34.79	\$ 539.48	\$ 626.59	100%	\$ 206.77	\$ 419.81
94	500301078000000	12.99	1.00	12.99	N	0.75		\$ -	0.75	1.00	9.80	\$ 152.04	\$ 152.04	100%	\$ 50.17	\$ 101.86
95	500301494000000	3.65	1.00	3.65	N	0.76		\$ -	0.76	0.90	2.50	\$ 38.74	\$ 38.74	0%	\$ -	\$ 38.74
96	500301273000000	40.47	1.00	40.47	Y	0.91	36.73	\$ 91.97	0.91	0.90	33.06	\$ 512.65	\$ 604.63	100%	\$ 199.53	\$ 405.10
97	500301271000000	20.23	1.00	20.23	Y	0.64	12.93	\$ 32.37	0.64	0.40	5.17	\$ 80.20	\$ 112.57	0%	\$ -	\$ 112.57
98	500301272000000	18.45	1.00	18.45	Y	0.70	12.99	\$ 32.53	0.70	0.40	5.20	\$ 80.58	\$ 113.10	100%	\$ 37.32	\$ 75.78
99	500301272010000	1.73	4.00	6.91	Y	0.50	3.46	\$ 8.65	0.50	0.40	1.38	\$ 21.44	\$ 30.09	0%	\$ -	\$ 30.09
100	Unknown	4.56	1.00	4.56	N	0.45		\$ -	0.45	0.40	0.81	\$ 12.59	\$ 12.59	0%	\$ -	\$ 12.59
101	500301082000000	4.04	1.00	4.04	N	0.50		\$ -	0.50	0.40	0.80	\$ 12.47	\$ 12.47	100%	\$ 4.11	\$ 8.35
102	500301275000000	38.59	1.00	38.59	Y	0.81	31.25	\$ 78.24	0.81	0.40	12.50	\$ 193.84	\$ 272.08	100%	\$ 89.79	\$ 182.29
103	500301274000000	2.34	4.00	9.37	Y	0.50	4.69	\$ 11.73	0.50	0.40	1.87	\$ 29.07	\$ 40.80	0%	\$ -	\$ 40.80
104	500301274020000	0.39	2.00	0.79	N	0.50		\$ -	0.50	0.40	0.16	\$ 2.44	\$ 2.44	0%	\$ -	\$ 2.44
105	500301274010000	0.81	2.00	1.61	N	0.50		\$ -	0.50	0.40	0.32	\$ 4.99	\$ 4.99	0%	\$ -	\$ 4.99
106	500301278000000	15.92	1.00	15.92	Y	0.74	11.77	\$ 29.48	0.74	0.40	4.71	\$ 73.03	\$ 102.52	0%	\$ -	\$ 102.52
107	500301277000000	20.23	1.00	20.23	Y	0.90	18.20	\$ 45.57	0.90	0.55	10.01	\$ 155.23	\$ 200.80	100%	\$ 66.26	\$ 134.53
108	500301275000000	44.29	1.00	44.29	Y	0.79	34.86	\$ 87.30	0.79	0.55	19.17	\$ 297.36	\$ 384.66	100%	\$ 126.94	\$ 257.72
109	Unknown	37.94	1.00	37.94	Y	0.86	32.57	\$ 81.57	0.86	0.55	17.92	\$ 277.86	\$ 359.43	0%	\$ -	\$ 359.43
110	500301275010000	0.41	2.00	0.81	N	0.50		\$ -	0.50	0.40	0.16	\$ 2.51	\$ 2.51	0%	\$ -	\$ 2.51
111	500301280000000	8.66	1.00	8.66	Y	0.61	5.32	\$ 13.33	0.61	0.40	2.13	\$ 33.01	\$ 46.34	0%	\$ -	\$ 46.34
112	500301279000000	70.38	1.00	70.38	Y	0.82	57.73	\$ 144.57	0.82	0.33	19.05	\$ 295.46	\$ 440.03	100%	\$ 145.21	\$ 294.82
113	500301282000000	22.74	1.00	22.74	Y	0.59	13.37	\$ 33.47	0.59	0.15	2.00	\$ 31.09	\$ 64.56	0%	\$ -	\$ 64.56
114	500301281000000	40.47	1.00	40.47	Y	0.90	36.45	\$ 91.27	0.90	0.15	5.47	\$ 84.78	\$ 176.05	100%	\$ 58.10	\$ 117.95
115	500301285000000	2.22	1.00	2.22	Y	0.64	1.43	\$ 3.57	0.64	0.15	0.21	\$ 3.32	\$ 6.89	0%	\$ -	\$ 6.89

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1					S1							
116	500301283000000	11.10	1.00	11.10	Y	0.88	9.74	\$ 24.40	0.88	0.15	1.46	\$ 22.67	\$ 47.06	100%	\$ 15.53	\$ 31.53
117	500301095000000	0.33	1.00	0.33	Y	1.00	0.33	\$ 0.82	1.00	0.15	0.05	\$ 0.77	\$ 1.59	100%	\$ 0.52	\$ 1.06
118	500301096000000	0.62	1.00	0.62	Y	1.00	0.62	\$ 1.56	1.00	0.15	0.09	\$ 1.45	\$ 3.01	100%	\$ 0.99	\$ 2.02
119	5003 013 860 90000	0.35	2.00	0.70	N	0.30		\$ -	0.30	1.00	0.21	\$ 3.26	\$ 3.26	0%	\$ -	\$ 3.26
120	5003 013 900 00000	0.34	2.00	0.68	N	0.30		\$ -	0.30	1.00	0.20	\$ 3.16	\$ 3.16	0%	\$ -	\$ 3.16
121	5003 013 900 20000	0.14	2.00	0.28	N	0.30		\$ -	0.30	1.00	0.08	\$ 1.30	\$ 1.30	0%	\$ -	\$ 1.30
122	5003 013 920 00000	0.34	2.00	0.68	N	0.30		\$ -	0.30	1.00	0.20	\$ 3.16	\$ 3.16	0%	\$ -	\$ 3.16
123	5003 013 950 00000	0.52	2.00	1.04	N	0.30		\$ -	0.30	1.00	0.31	\$ 4.84	\$ 4.84	0%	\$ -	\$ 4.84
124	5003 013 980 00000	0.37	2.00	0.74	N	0.30		\$ -	0.30	1.00	0.22	\$ 3.44	\$ 3.44	100%	\$ 1.14	\$ 2.31
125	5003 013 990 00000	0.34	2.00	0.68	N	0.30		\$ -	0.30	1.00	0.20	\$ 3.16	\$ 3.16	0%	\$ -	\$ 3.16
126	600215047020000	0.13	2.00	0.26	Y	0.30		\$ -	0.30	1.00	0.08	\$ 1.20	\$ 1.20	0%	\$ -	\$ 1.20
127	600215048000000	0.14	2.00	0.29	N	0.30		\$ -	0.30	1.00	0.09	\$ 1.33	\$ 1.33	0%	\$ -	\$ 1.33
128	6002 150 720 00000	7.30	4.00	29.21	N	0.30		\$ -	0.30	1.00	8.76	\$ 135.89	\$ 135.89	0%	\$ -	\$ 135.89
129	600220091020000	0.19	2.00	0.37	N	0.30		\$ -	0.30	1.00	0.11	\$ 1.73	\$ 1.73	0%	\$ -	\$ 1.73
130	600220091030000	0.19	2.00	0.37	N	0.30		\$ -	0.30	1.00	0.11	\$ 1.73	\$ 1.73	0%	\$ -	\$ 1.73
131	600220091010000	0.19	2.00	0.37	N	0.30		\$ -	0.30	1.00	0.11	\$ 1.73	\$ 1.73	0%	\$ -	\$ 1.73
132	5003 014 350 00000	0.17	2.00	0.34	N	0.30		\$ -	0.30	1.00	0.10	\$ 1.58	\$ 1.58	0%	\$ -	\$ 1.58
133	5003 014 350 00000	0.06	2.00	0.12	N	0.30		\$ -	0.30	1.00	0.04	\$ 0.56	\$ 0.56	0%	\$ -	\$ 0.56
134	5003 014 750 00000	0.24	2.00	0.48	N	0.30		\$ -	0.30	1.00	0.14	\$ 2.23	\$ 2.23	0%	\$ -	\$ 2.23
135	5003 014 130 00000	0.18	4.00	0.72	N	0.30		\$ -	0.30	1.00	0.22	\$ 3.35	\$ 3.35	0%	\$ -	\$ 3.35
136	5003 014 290 00000	0.15	4.00	0.60	N	0.30		\$ -	0.30	1.00	0.18	\$ 2.79	\$ 2.79	0%	\$ -	\$ 2.79
137	5003 014 280 00000	0.17	2.00	0.33	N	0.30		\$ -	0.30	1.00	0.10	\$ 1.54	\$ 1.54	0%	\$ -	\$ 1.54
138	5003 014 270 00000	0.58	4.00	2.32	N	0.30		\$ -	0.30	1.00	0.70	\$ 10.81	\$ 10.81	0%	\$ -	\$ 10.81
139	5003 014 270 00000	0.02	2.00	0.03	N	0.30		\$ -	0.30	1.00	0.01	\$ 0.14	\$ 0.14	0%	\$ -	\$ 0.14
140	5003 014 260 00000	0.65	4.00	2.60	N	0.30		\$ -	0.30	1.00	0.78	\$ 12.08	\$ 12.08	0%	\$ -	\$ 12.08
141	5003 014 250 00000	0.42	2.00	0.83	N	0.30		\$ -	0.30	1.00	0.25	\$ 3.86	\$ 3.86	0%	\$ -	\$ 3.86
142	5003 014 240 00000	0.82	2.00	1.65	N	0.30		\$ -	0.30	1.00	0.49	\$ 7.66	\$ 7.66	0%	\$ -	\$ 7.66
143	5003 014 230 00000	0.11	2.00	0.21	N	0.30		\$ -	0.30	1.00	0.06	\$ 0.99	\$ 0.99	0%	\$ -	\$ 0.99
144	5003 014 210 00000	0.08	2.00	0.16	N	0.30		\$ -	0.30	1.00	0.05	\$ 0.74	\$ 0.74	0%	\$ -	\$ 0.74
145	5003 014 200 00000	0.14	2.00	0.28	N	0.30		\$ -	0.30	1.00	0.08	\$ 1.30	\$ 1.30	0%	\$ -	\$ 1.30
146	5003 014 790 00000	0.18	4.00	0.73	N	0.30		\$ -	0.30	1.00	0.22	\$ 3.41	\$ 3.41	0%	\$ -	\$ 3.41

**SCHEDULE B2
FOR THE FUTURE MAINTENANCE OF
SECTION 1 OF THE EAST SAVAGE MUNICIPAL DRAIN**



Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S1 Total		S1					S1							
147	5003 014 840 00000	0.21	2.00	0.43	N	0.30		\$ -	0.30	1.00	0.13	\$ 1.98	\$ 1.98	0%	\$ -	\$ 1.98
148	5003 014 870 10000	0.41	2.00	0.82	N	0.30		\$ -	0.30	1.00	0.25	\$ 3.82	\$ 3.82	0%	\$ -	\$ 3.82
149	5003 014 870 20000	0.19	2.00	0.38	N	0.30		\$ -	0.30	1.00	0.11	\$ 1.78	\$ 1.78	0%	\$ -	\$ 1.78
150	5003 014 870 30000	0.40	4.00	1.62	N	0.30		\$ -	0.30	1.00	0.48	\$ 7.52	\$ 7.52	0%	\$ -	\$ 7.52
151	5003 014 920 00000	26.30	0.50	13.15	N	0.39		\$ -	0.39	1.00	5.13	\$ 79.58	\$ 79.58	0%	\$ -	\$ 79.58
152	5003 012 600 00000	0.36	2.00	0.72	N	0.30		\$ -	0.30	0.40	0.09	\$ 1.34	\$ 1.34	0%	\$ -	\$ 1.34
153	5003 012 610 00000	0.36	2.00	0.72	N	0.30		\$ -	0.30	0.40	0.09	\$ 1.34	\$ 1.34	0%	\$ -	\$ 1.34
154	5003 012 630 00000	0.35	2.00	0.70	N	0.30		\$ -	0.30	0.40	0.08	\$ 1.30	\$ 1.30	0%	\$ -	\$ 1.30
155	5003 012 640 00000	0.36	2.00	0.72	N	0.30		\$ -	0.30	0.40	0.09	\$ 1.34	\$ 1.34	0%	\$ -	\$ 1.34
156	5003 010 730 40000	0.38	2.00	0.76	N	0.30		\$ -	0.30	0.40	0.09	\$ 1.42	\$ 1.42	0%	\$ -	\$ 1.42
157	5003 010 730 30000	0.27	2.00	0.54	N	0.30		\$ -	0.30	0.40	0.06	\$ 1.00	\$ 1.00	0%	\$ -	\$ 1.00
158	5003 010 730 10000	0.36	2.00	0.71	N	0.30		\$ -	0.30	0.40	0.09	\$ 1.33	\$ 1.33	0%	\$ -	\$ 1.33
159	5003 010 750 00000	0.24	2.00	0.47	N	0.30		\$ -	0.30	0.40	0.06	\$ 0.88	\$ 0.88	0%	\$ -	\$ 0.88
160	500301279010000	0.19	2.00	0.37	N	0.75		\$ -	0.75	0.55	0.15	\$ 2.37	\$ 2.37	0%	\$ -	\$ 2.37
161	500301483000000	14.68	1.00	14.68	N	0.39		\$ -	0.39	1.00	5.68	\$ 88.16	\$ 88.16	0%	\$ -	\$ 88.16
Blocks																
Block A		82.48	3.85	317.56	N	0.30		\$ -	0.30	1.00	95.27	\$ 1,477.46	\$ 1,477.46	0%	\$ -	\$ 1,477.46
Block B		11.96	1.86	22.27	N	0.30		\$ -	0.30	1.00	6.68	\$ 103.61	\$ 103.61	0%	\$ -	\$ 103.61
Block C		3.64	2.58	9.38	N	0.30		\$ -	0.30	1.00	2.81	\$ 43.62	\$ 43.62	0%	\$ -	\$ 43.62
Block D		6.45	0.70	4.52	N	0.50		\$ -	0.50	1.00	2.26	\$ 35.08	\$ 35.08	0%	\$ -	\$ 35.08
Block E		19.80	0.70	13.86	N	0.44		\$ -	0.44	1.00	6.16	\$ 95.60	\$ 95.60	0%	\$ -	\$ 95.60
Block F		11.77	1.67	19.65	N	0.30		\$ -	0.30	1.00	5.90	\$ 91.43	\$ 91.43	0%	\$ -	\$ 91.43
Block G		4.93	2.78	13.70	N	0.30		\$ -	0.30	1.00	4.11	\$ 63.72	\$ 63.72	0%	\$ -	\$ 63.72
Block H		6.94	3.27	22.69	N	0.30		\$ -	0.30	1.00	6.81	\$ 105.57	\$ 105.57	0%	\$ -	\$ 105.57
Block I		21.32	2.00	42.65	N	0.30		\$ -	0.30	0.45	5.76	\$ 89.29	\$ 89.29	0%	\$ -	\$ 89.29
Block J		24.70	1.66	41.01	N	0.30		\$ -	0.30	0.45	5.54	\$ 85.87	\$ 85.87	0%	\$ -	\$ 85.87
Block K		4.71	2.00	9.43	N	0.30		\$ -	0.30	1.00	2.83	\$ 43.86	\$ 43.86	0%	\$ -	\$ 43.86
Block L		2.14	2.00	4.28	N	0.30		\$ -	0.30	1.00	1.28	\$ 19.91	\$ 19.91	0%	\$ -	\$ 19.91
Block M		18.55	1.68	31.10	N	0.30		\$ -	0.30	1.00	9.33	\$ 144.68	\$ 144.68	0%	\$ -	\$ 144.68
City of Ottawa -- Roads/Other																
Mer-Bleue Road		5.16	4.00	20.64	N	0.30		\$ -	0.30	1.00	6.19	\$ 96.03	\$ 96.03	0%	\$ -	\$ 96.03
Renaud Road		1.21	4.00	4.84	N	0.30		\$ -	0.30	1.00	1.45	\$ 22.52	\$ 22.52	0%	\$ -	\$ 22.52
Navan Road		8.06	4.00	32.24	N	0.30		\$ -	0.30	1.00	9.67	\$ 150.00	\$ 150.00	0%	\$ -	\$ 150.00
Tenth Line Road		5.76	4.00	23.06	N	0.61		\$ -	0.61	1.00	14.18	\$ 219.89	\$ 219.89	0%	\$ -	\$ 219.89
Smith Road		4.93	4.00	19.72	N	0.51		\$ -	0.51	1.00	10.11	\$ 156.86	\$ 156.86	0%	\$ -	\$ 156.86
Milton Road		6.78	4.00	27.12	N	0.50		\$ -	0.50	0.15	2.02	\$ 31.26	\$ 31.26	0%	\$ -	\$ 31.26
Public Utilities/Authorities																
VIA Rail		13.52	4.00	54.06	N	0.30		\$ -	0.30	1.00	16.22	\$ 251.52	\$ 251.52	0%	\$ -	\$ 251.52
Total		1206.73	317.24	1737.59			399.34	\$ 1,000.00			580.32	\$ 9,000.00	\$ 10,000.00		\$ 1,085.24	\$ 8,914.76

**SCHEDULE C2
FOR THE FUTURE MAINTENANCE OF
SECTION 2 OF THE EAST SAVAGE MUNICIPAL DRAIN**

Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain	Distance Factor	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S2 Total		S2 Total		S2			S2	S2						
City of Ottawa -- Individual Landowners																
3	500301387020000	0.53	4.00	2.12	N	1.00		\$ -	1.00	1.00	2.12	\$ 26.64	\$ 26.64	0%	\$ -	\$ 26.64
4	500301387010000	0.82	4.00	3.28	N	1.00		\$ -	1.00	1.00	3.28	\$ 41.22	\$ 41.22	100%	\$ 13.60	\$ 27.62
5	Unknown	2.68	1.00	2.68	N	1.00		\$ -	1.00	1.00	2.68	\$ 33.68	\$ 33.68	0%	\$ -	\$ 33.68
6	500301388000000	4.07	1.00	4.07	N	1.00		\$ -	1.00	1.00	4.07	\$ 51.15	\$ 51.15	0%	\$ -	\$ 51.15
7	500301393000000	5.75	1.00	5.75	N	1.00		\$ -	1.00	1.00	5.75	\$ 72.26	\$ 72.26	0%	\$ -	\$ 72.26
8	500301403000000	6.44	1.00	6.44	N	1.00		\$ -	1.00	1.00	6.44	\$ 80.94	\$ 80.94	0%	\$ -	\$ 80.94
9	500301397000000	5.00	1.00	5.00	N	1.00		\$ -	1.00	1.00	5.00	\$ 62.84	\$ 62.84	0%	\$ -	\$ 62.84
10	600215047000000	12.27	1.00	12.27	Y	1.00	12.27	\$ 67.66	1.00	1.00	12.27	\$ 154.14	\$ 221.80	0%	\$ -	\$ 221.80
11	600215052000000	1.96	1.00	1.96	Y	1.00	1.96	\$ 10.82	1.00	1.00	1.96	\$ 24.65	\$ 35.46	0%	\$ -	\$ 35.46
12	600215072100000	0.75	1.00	0.75	N	1.00		\$ -	1.00	0.90	0.68	\$ 8.48	\$ 8.48	0%	\$ -	\$ 8.48
13	600215058000000	0.13	1.00	0.13	N	1.00		\$ -	1.00	0.90	0.12	\$ 1.47	\$ 1.47	0%	\$ -	\$ 1.47
14	600220093000000	0.16	1.00	0.16	N	1.00		\$ -	1.00	0.90	0.14	\$ 1.81	\$ 1.81	0%	\$ -	\$ 1.81
15	600220091000000	12.14	1.00	12.14	Y	1.00	12.14	\$ 66.97	1.00	0.90	10.93	\$ 137.32	\$ 204.28	0%	\$ -	\$ 204.28
16	600220091000000	1.87	1.00	1.87	Y	1.00	1.87	\$ 10.33	1.00	0.90	1.69	\$ 21.19	\$ 31.52	0%	\$ -	\$ 31.52
17	500301440010000	3.74	4.00	14.96	Y	1.00	14.96	\$ 82.52	1.00	0.67	10.02	\$ 125.97	\$ 208.49	0%	\$ -	\$ 208.49
18	500301438010000	0.24	2.00	0.48	Y	1.00	0.48	\$ 2.65	1.00	0.67	0.32	\$ 4.05	\$ 6.71	0%	\$ -	\$ 6.71
19	500301438020000	0.24	2.00	0.48	N	1.00		\$ -	1.00	0.67	0.32	\$ 4.06	\$ 4.06	0%	\$ -	\$ 4.06
20	500301439000000	0.23	2.00	0.46	N	1.00		\$ -	1.00	0.67	0.30	\$ 3.83	\$ 3.83	0%	\$ -	\$ 3.83
21	500301440010000	0.21	2.00	0.42	Y	1.00	0.42	\$ 2.29	1.00	0.67	0.28	\$ 3.50	\$ 5.80	0%	\$ -	\$ 5.80
22	500301438000000	1.17	1.00	1.17	Y	1.00	1.17	\$ 6.45	1.00	0.67	0.78	\$ 9.85	\$ 16.31	0%	\$ -	\$ 16.31
23	500301437000000	2.17	1.00	2.17	N	1.00		\$ -	1.00	0.67	1.45	\$ 18.27	\$ 18.27	0%	\$ -	\$ 18.27
24	500301437010000	0.27	2.00	0.53	N	1.00		\$ -	1.00	0.67	0.36	\$ 4.48	\$ 4.48	0%	\$ -	\$ 4.48
25	500301410000000	0.92	1.00	0.92	N	1.00		\$ -	1.00	0.67	0.62	\$ 7.75	\$ 7.75	0%	\$ -	\$ 7.75
26	500301412000000	3.89	1.00	3.89	N	1.00		\$ -	1.00	0.67	2.61	\$ 32.76	\$ 32.76	0%	\$ -	\$ 32.76
27	500301435000000	4.81	1.00	4.81	N	1.00		\$ -	1.00	0.67	3.22	\$ 40.50	\$ 40.50	100%	\$ 13.37	\$ 27.14
28	500301434000000	0.80	4.00	3.20	N	1.00		\$ -	1.00	0.67	2.14	\$ 26.95	\$ 26.95	0%	\$ -	\$ 26.95
29	500301434000000	0.35	4.00	1.39	N	1.00		\$ -	1.00	0.67	0.93	\$ 11.69	\$ 11.69	0%	\$ -	\$ 11.69
30	500301433010000	2.65	1.00	2.65	N	1.00		\$ -	1.00	0.67	1.78	\$ 22.31	\$ 22.31	0%	\$ -	\$ 22.31
31	500301433000000	0.18	2.00	0.36	N	1.00		\$ -	1.00	0.67	0.24	\$ 3.00	\$ 3.00	0%	\$ -	\$ 3.00
32	500301432000000	2.46	1.00	2.46	N	1.00		\$ -	1.00	0.67	1.65	\$ 20.71	\$ 20.71	100%	\$ 6.84	\$ 13.88
33	500301430000000	4.47	1.00	4.47	N	1.00		\$ -	1.00	0.67	2.99	\$ 37.63	\$ 37.63	100%	\$ 12.42	\$ 25.21
34	500301414000000	0.15	1.00	0.15	N	1.00		\$ -	1.00	0.67	0.10	\$ 1.25	\$ 1.25	0%	\$ -	\$ 1.25
35	500301417000000	0.88	1.00	0.88	N	1.00		\$ -	1.00	0.67	0.59	\$ 7.45	\$ 7.45	100%	\$ 2.46	\$ 4.99
36	500301418000000	1.49	1.00	1.49	N	1.00		\$ -	1.00	0.67	1.00	\$ 12.56	\$ 12.56	0%	\$ -	\$ 12.56

**SCHEDULE C2
FOR THE FUTURE MAINTENANCE OF
SECTION 2 OF THE EAST SAVAGE MUNICIPAL DRAIN**

Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain	Distance Factor	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S2 Total		S2 Total		S2			S2	S2						
37	500301419000000	1.35	1.00	1.35	N	1.00		\$ -	1.00	0.67	0.90	\$ 11.34	\$ 11.34	0%	\$ -	\$ 11.34
38	500301427050000	3.17	1.00	3.17	N	1.00		\$ -	1.00	0.67	2.12	\$ 26.68	\$ 26.68	0%	\$ -	\$ 26.68
39	500301466000000	2.61	1.00	2.61	Y	1.00	2.61	\$ 14.40	1.00	0.67	1.75	\$ 21.98	\$ 36.37	100%	\$ 12.00	\$ 24.37
40	500301467000000	17.22	1.00	17.22	Y	1.00	17.22	\$ 94.99	1.00	0.85	14.64	\$ 183.95	\$ 278.94	0%	\$ -	\$ 278.94
41	500301422000000	4.45	1.00	4.45	Y	1.00	4.45	\$ 24.55	1.00	0.67	2.98	\$ 37.47	\$ 62.02	0%	\$ -	\$ 62.02
42	500301468010000	1.02	1.00	1.02	N	1.00		\$ -	1.00	0.67	0.68	\$ 8.59	\$ 8.59	100%	\$ 2.83	\$ 5.75
43	500301468010000	0.04	2.00	0.09	N	1.00		\$ -	1.00	0.67	0.06	\$ 0.74	\$ 0.74	100%	\$ 0.24	\$ 0.50
44	500301469000000	0.10	2.00	0.20	N	1.00		\$ -	1.00	0.67	0.13	\$ 1.68	\$ 1.68	0%	\$ -	\$ 1.68
45	500301470000000	0.12	2.00	0.24	N	1.00		\$ -	1.00	0.67	0.16	\$ 2.02	\$ 2.02	0%	\$ -	\$ 2.02
46	500301471000000	4.17	1.00	4.17	N	1.00		\$ -	1.00	0.67	2.79	\$ 35.11	\$ 35.11	0%	\$ -	\$ 35.11
47	500301474000000	2.53	1.00	2.53	N	1.00		\$ -	1.00	0.67	1.70	\$ 21.30	\$ 21.30	0%	\$ -	\$ 21.30
48	500301475010000	2.20	1.00	2.20	N	1.00		\$ -	1.00	0.67	1.47	\$ 18.52	\$ 18.52	0%	\$ -	\$ 18.52
49	500301476020000	2.01	1.00	2.01	N	1.00		\$ -	1.00	0.67	1.34	\$ 16.90	\$ 16.90	0%	\$ -	\$ 16.90
50	500301476010000	0.29	2.00	0.58	N	1.00		\$ -	1.00	0.67	0.39	\$ 4.90	\$ 4.90	0%	\$ -	\$ 4.90
51	500301476000000	0.58	2.00	1.16	N	1.00		\$ -	1.00	0.67	0.77	\$ 9.71	\$ 9.71	0%	\$ -	\$ 9.71
52	500301472000000	15.17	1.00	15.17	Y	1.00	15.17	\$ 83.68	1.00	0.67	10.16	\$ 127.74	\$ 211.42	0%	\$ -	\$ 211.42
53	500301477000000	9.02	1.00	9.02	N	1.00		\$ -	1.00	0.67	6.04	\$ 75.91	\$ 75.91	0%	\$ -	\$ 75.91
54	500301477050000	4.05	1.00	4.05	N	1.00		\$ -	1.00	0.67	2.71	\$ 34.07	\$ 34.07	0%	\$ -	\$ 34.07
55	500301478000000	4.05	1.00	4.05	N	1.00		\$ -	1.00	0.67	2.71	\$ 34.08	\$ 34.08	0%	\$ -	\$ 34.08
56	500301481000000	2.85	1.00	2.85	N	1.00		\$ -	1.00	0.67	1.91	\$ 24.02	\$ 24.02	0%	\$ -	\$ 24.02
57	500301483000000	63.68	1.00	63.68	Y	1.00	63.68	\$ 351.29	1.00	0.50	31.84	\$ 400.18	\$ 751.46	0%	\$ -	\$ 751.46
58	500301489050000	4.01	1.00	4.01	N	1.00		\$ -	1.00	0.33	1.32	\$ 16.61	\$ 16.61	0%	\$ -	\$ 16.61
59	500301489000000	4.80	1.00	4.80	Y	1.00	4.80	\$ 26.46	1.00	0.33	1.58	\$ 19.89	\$ 46.35	0%	\$ -	\$ 46.35
60	500301489070000	1.21	2.00	2.41	N	1.00		\$ -	1.00	0.33	0.80	\$ 10.00	\$ 10.00	0%	\$ -	\$ 10.00
61	500301489010000	2.43	1.00	2.43	N	1.00		\$ -	1.00	0.33	0.80	\$ 10.07	\$ 10.07	0%	\$ -	\$ 10.07
119	5003 013 860 90000	0.35	2.00	0.70	N	1.00		\$ -	1.00	1.00	0.70	\$ 8.80	\$ 8.80	0%	\$ -	\$ 8.80
120	5003 013 900 00000	0.34	2.00	0.68	N	1.00		\$ -	1.00	1.00	0.68	\$ 8.55	\$ 8.55	0%	\$ -	\$ 8.55
121	5003 013 900 20000	0.14	2.00	0.28	N	1.00		\$ -	1.00	1.00	0.28	\$ 3.52	\$ 3.52	0%	\$ -	\$ 3.52
122	5003 013 920 00000	0.34	2.00	0.68	N	1.00		\$ -	1.00	1.00	0.68	\$ 8.55	\$ 8.55	0%	\$ -	\$ 8.55

**SCHEDULE C2
FOR THE FUTURE MAINTENANCE OF
SECTION 2 OF THE EAST SAVAGE MUNICIPAL DRAIN**

Project No.: B16002
Date: 10-Sep-21

ID	Roll No.	Area	Land Use Factor	Factored Area	Backs on Drain	Distance Factor	Benefit Factored Area	Benefit Cost	Distance Factor	Sub-Section Factor	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
		S2 Total		S2 Total					S2	S2						
123	5003 013 950 00000	0.52	2.00	1.04	N	1.00		\$ -	1.00	1.00	1.04	\$ 13.07	\$ 13.07	0%	\$ -	\$ 13.07
124	5003 013 980 00000	0.37	2.00	0.74	N	1.00		\$ -	1.00	1.00	0.74	\$ 9.30	\$ 9.30	100%	\$ 3.07	\$ 6.23
125	5003 013 990 00000	0.34	2.00	0.68	N	1.00		\$ -	1.00	1.00	0.68	\$ 8.55	\$ 8.55	0%	\$ -	\$ 8.55
126	600215047020000	0.13	2.00	0.26	Y	1.00	0.26	\$ 1.42	1.00	1.00	0.26	\$ 3.24	\$ 4.67	0%	\$ -	\$ 4.67
127	600215048000000	0.14	2.00	0.29	N	1.00		\$ -	1.00	1.00	0.29	\$ 3.59	\$ 3.59	0%	\$ -	\$ 3.59
128	6002 150 720 00000	7.30	4.00	29.21	N	1.00		\$ -	1.00	1.00	29.21	\$ 367.08	\$ 367.08	0%	\$ -	\$ 367.08
129	600220091020000	0.19	2.00	0.37	N	1.00		\$ -	1.00	0.90	0.33	\$ 4.21	\$ 4.21	0%	\$ -	\$ 4.21
130	600220091030000	0.19	2.00	0.37	N	1.00		\$ -	1.00	0.90	0.33	\$ 4.21	\$ 4.21	0%	\$ -	\$ 4.21
131	600220091010000	0.19	2.00	0.37	N	1.00		\$ -	1.00	0.90	0.33	\$ 4.21	\$ 4.21	0%	\$ -	\$ 4.21
132	5003 014 350 00000	0.17	2.00	0.34	N	1.00		\$ -	1.00	0.67	0.23	\$ 2.86	\$ 2.86	0%	\$ -	\$ 2.86
133	5003 014 350 00000	0.06	2.00	0.12	N	1.00		\$ -	1.00	0.67	0.08	\$ 1.01	\$ 1.01	0%	\$ -	\$ 1.01
134	5003 014 750 00000	0.24	2.00	0.48	N	1.00		\$ -	1.00	0.67	0.32	\$ 4.04	\$ 4.04	0%	\$ -	\$ 4.04
135	5003 014 130 00000	0.18	4.00	0.72	N	1.00		\$ -	1.00	0.67	0.48	\$ 6.06	\$ 6.06	0%	\$ -	\$ 6.06
136	5003 014 290 00000	0.15	4.00	0.60	N	1.00		\$ -	1.00	0.67	0.40	\$ 5.05	\$ 5.05	0%	\$ -	\$ 5.05
137	5003 014 280 00000	0.17	2.00	0.33	N	1.00		\$ -	1.00	0.67	0.22	\$ 2.78	\$ 2.78	0%	\$ -	\$ 2.78
138	5003 014 270 00000	0.58	4.00	2.32	N	1.00		\$ -	1.00	0.67	1.56	\$ 19.57	\$ 19.57	0%	\$ -	\$ 19.57
139	5003 014 270 00000	0.02	2.00	0.03	N	1.00		\$ -	1.00	0.67	0.02	\$ 0.25	\$ 0.25	0%	\$ -	\$ 0.25
140	5003 014 260 00000	0.65	4.00	2.60	N	1.00		\$ -	1.00	0.67	1.74	\$ 21.86	\$ 21.86	0%	\$ -	\$ 21.86
141	5003 014 250 00000	0.42	2.00	0.83	N	1.00		\$ -	1.00	0.67	0.56	\$ 6.99	\$ 6.99	0%	\$ -	\$ 6.99
142	5003 014 240 00000	0.82	2.00	1.65	N	1.00		\$ -	1.00	0.67	1.10	\$ 13.86	\$ 13.86	0%	\$ -	\$ 13.86
143	5003 014 230 00000	0.11	2.00	0.21	N	1.00		\$ -	1.00	0.67	0.14	\$ 1.79	\$ 1.79	0%	\$ -	\$ 1.79
144	5003 014 210 00000	0.08	2.00	0.16	N	1.00		\$ -	1.00	0.67	0.11	\$ 1.35	\$ 1.35	0%	\$ -	\$ 1.35
151	5003 014 920 00000	26.30	0.50	13.15	Y	1.00	13.15	\$ 72.55	1.00	0.50	6.58	\$ 82.65	\$ 155.19	0%	\$ -	\$ 155.19
161	500301483000000	14.68	1.00	14.68	Y	1.00	14.68	\$ 80.98	1.00	0.00	0.00	\$ -	\$ 80.98	0%	\$ -	\$ 80.98
Blocks																
Block A		82.48	3.85	317.56	N	1.00		\$ -	1.00	1.00	317.56	\$ 3,990.97	\$ 3,990.97	0%	\$ -	\$ 3,990.97
Block B		11.96	1.86	22.27	N	1.00		\$ -	1.00	1.00	22.27	\$ 279.86	\$ 279.86	0%	\$ -	\$ 279.86
Block C		3.64	2.58	9.38	N	1.00		\$ -	1.00	1.00	9.38	\$ 117.84	\$ 117.84	0%	\$ -	\$ 117.84
Block D		6.45	0.70	4.52	N	1.00		\$ -	1.00	1.00	4.52	\$ 56.74	\$ 56.74	0%	\$ -	\$ 56.74
Block E		19.80	0.70	13.86	N	1.00		\$ -	1.00	1.00	13.86	\$ 174.19	\$ 174.19	0%	\$ -	\$ 174.19
Block F		11.77	1.67	19.65	N	1.00		\$ -	1.00	1.00	19.65	\$ 246.96	\$ 246.96	0%	\$ -	\$ 246.96
Block M		18.55	1.68	31.10	N	1.00		\$ -	1.00	1.00	31.10	\$ 390.81	\$ 390.81	0%	\$ -	\$ 390.81
City of Ottawa -- Roads/Other																
Mer-Bleue Road		5.16	4.00	20.64	N	1.00		\$ -	1.00	1.00	20.64	\$ 259.40	\$ 259.40	0%	\$ -	\$ 259.40
Renaud Road		1.21	4.00	4.84	N	1.00		\$ -	1.00	1.00	4.84	\$ 60.83	\$ 60.83	0%	\$ -	\$ 60.83
Navan Road		8.06	4.00	32.24	N	1.00		\$ -	1.00	1.00	32.24	\$ 405.19	\$ 405.19	0%	\$ -	\$ 405.19
Tenth Line Road		5.76	4.00	23.06	N	1.00		\$ -	1.00	0.45	10.38	\$ 130.40	\$ 130.40	0%	\$ -	\$ 130.40
Public Utilities/Authorities																
VIA Rail		13.52	4.00	54.06	N	1.00		\$ -	1.00	1.00	54.06	\$ 679.42	\$ 679.42	0%	\$ -	\$ 679.42
Total		1206.73		1737.59			181.29	\$ 1,000.00			716.12	\$ 9,000.00	\$ 10,000.00		\$ 66.83	\$ 9,933.17

**SCHEDULE D2
DISTRIBUTION OF COSTS BY LAND USE WITHIN BLOCKS
EAST SAVAGE MUNICIPAL DRAIN**

Project No.:
Date:

B16002
10-Sep-21

PROPERTY TYPE	% TOTAL (FOR DISTRIBUTION)	ASSESSED TO
BLOCK A		
Individual Properties	75.21%	Landowners
City of Ottawa -- Roads	24.79%	City of Ottawa -- Roads
BLOCK B		
Individual Properties	100.00%	Landowners
City of Ottawa -- Roads	0.00%	City of Ottawa -- Roads
BLOCK C		
Individual Properties	100.00%	Landowners
City of Ottawa -- Roads	0.00%	City of Ottawa -- Roads
BLOCK D		
Individual Properties	82.17%	Landowners
City of Ottawa -- Roads	17.83%	City of Ottawa -- Roads
BLOCK E		
Individual Properties	80.15%	Landowners
City of Ottawa -- Roads	19.85%	City of Ottawa -- Roads
BLOCK F		
Individual Properties	95.58%	Landowners
City of Ottawa -- Roads	4.42%	City of Ottawa -- Roads
BLOCK G		
Individual Properties	100.00%	Landowners
City of Ottawa -- Roads	0.00%	City of Ottawa -- Roads
BLOCK H		
Individual Properties	100.00%	Landowners
City of Ottawa -- Roads	0.00%	City of Ottawa -- Roads
BLOCK I		
Individual Properties	91.56%	Landowners
City of Ottawa -- Roads	8.44%	City of Ottawa -- Roads
BLOCK J		
Individual Properties	89.88%	Landowners
City of Ottawa -- Roads	10.12%	City of Ottawa -- Roads
BLOCK K		
Individual Properties	92.36%	Landowners
City of Ottawa -- Roads	7.64%	City of Ottawa -- Roads
BLOCK L		
Individual Properties	100.00%	Landowners
City of Ottawa -- Roads	0.00%	City of Ottawa -- Roads
BLOCK M		
Individual Properties	92.56%	Landowners
City of Ottawa -- Roads	7.44%	City of Ottawa -- Roads

Appendix D

Authorization and Permits

- SNCA - Letter of Permission
- DFO - Class Authorization
- MECP - SAR Advise
- MECP - Environmental Compliance Approval



PERMISSION FOR INTERFERENCE WITH A WATERCOURSE
Ontario Regulation 170/06 made pursuant to
Section 28 of the *Conservation Authorities Act*, R.S.O. 1990, c. C.27



Permit Holder: City of Ottawa
c/o Robinson Consultants
210-350 Palladium Dr.
Kanata, ON
K2V 1A8

Attention: Lorne Franklin

Decision: **Approved (subject to conditions)**

Issued: March 10, 2021
Expires: March 10, 2023

Work Description: Municipal Drain Improvement (East Savage)
Location: Lots 7-17, Concessions 10-11, City of Ottawa

The attached Schedules form part of this permit for the approved work and must be implemented in accordance with the stated conditions. A copy of this permit must be kept at the worksite.

The Permit Holder, by acceptance and in consideration of the issuance of this permit, agrees to the permit conditions.

Dated at Finch Ontario, March 10, 2021.

Geoff Owens,
Regulations Officer
gowens@nation.on.ca



SCHEDULE A: WORK DESCRIPTION

SNC understands the following work will be completed (the “Work”):

1. Work for the Municipal Drain Improvement will take place at the above noted location.
2. Work consists of widening, deepening, and extending an existing municipal drain (East Savage) regulated under the Ontario Drainage Act.
3. The purpose of the work is to accommodate a change in land use from rural/agricultural to urban development.
4. The work will occur on portions of the lands within the drainage area of the East Savage Municipal Drain and to the location of the proposed Stormwater Management Pond.
5. Modifications to the East Savage Municipal Drain will be completed in advance to the development of the lands.

The details of the Work are outlined in the following documents forwarded to SNC:

1. South Nation Conservation Application Form: Ontario Regulation 170/06 Development, Interference with Wetlands and Alteration to Shorelines and Watercourses – Received April 8, 2020, signed by Robinson Consultants - Lorne Franklin.
2. Authorization Letter: Re: East Savage Municipal Drain – Cumberland Ward, signed by City of Ottawa – Dave Ryan, P. Geo., April 8, 2020.
3. Draft report titled “Amendment to the Engineer’s Report for the East Savage Municipal Drain” prepared by Robinson Consultants Inc., Project No. 16002, dated April 2020.
4. EAST SAVAGE MUNICIPAL DRAIN HEC-RAS MODEL REVISIONS TECHNICAL MEMORANDUM, February 8, 2021, prepared by Robinson Consultants Inc., Subject: East Savage Municipal Drain SNC HEC-RAS Model Revisions, signed by Cody Newton, P. Eng. and Barbara St-Aubin, M.A.Sc., P.Eng.



SCHEDULE B: CONDITIONS

SNC requires completion of the following conditions for permit compliance:

1. Sediment and Erosion Control

- a) The Permit Holder is responsible to ensure that no sediment released by the Work enters a watercourse or waterbody.
- b) **The Permit Holder must submit an appropriate sediment and erosion control plan to SNC to be implemented prior to and during the Work.**
- c) In the event of unexpected rainfall, any fill that is removed from the site and placed on the shore (above the high-water mark) is to be properly stabilized as required through the implementing of appropriate sediment and erosion control measures.
- d) SNC may visit the Work location anytime from application submittal through to the expiration of the permit to inspect the implementation of sediment and erosion control measures on site. SNC shall give reasonable notice of the entry to the Permit Holder or occupier of the property.
- e) Disturbed areas must be stabilized and revegetated as required upon completion of work and restored to a pre-disturbed state or better.



SCHEDULE C: ADDITIONAL COMMENTS

SNC makes the following additional comments:

1. The proposed work consists of deepening and widening portions of East Savage municipal drain. In addition, a portion of the drain (Sta. 7+501 to Sta. 8+047) is to be realigned.
2. As per the memo noted above, spread material will be placed outside of a 5 m buffer from top of bank of the channel and to a maximum depth of 150 mm.
3. All culverts will also be replaced along the drain as part of the scope of work.
4. Appropriate erosion protection will be placed as per the report drawings and in areas where the model noted velocity increases.



SCHEDULE D: GENERAL CONDITIONS

1. Term

This permit is valid for 24 months from the date of issuance. No notice will be issued on expiration and it is the responsibility of the Permit Holder to ensure a valid permit is in effect at the time the Work is occurring.

SNC may consider reissuing the permit upon request and payment of an administrative fee. A permit may be reissued where site conditions and plans remain the same as the date of the initial permit.

2. Other Permits and Permissions

This permit does not relieve the Permit Holder of the responsibility to obtain any other documents or permits that the Work may require from the Government of Canada, the Government of Ontario, or the municipality.

It is the responsibility of third-party agents to secure property owner permission to undertake the Work.

3. Transferable

The Permit Holder may transfer the permit to another individual or corporate entity upon payment of an administrative fee to SNC so long as site conditions and plans remain unchanged from the date the permit was issued.

4. Right to Hearing

Every Permit Holder whose permit is refused will be granted the opportunity to present their position in a hearing before the SNC Board of Directors. Please contact our office for further details.

5. Property Entry

SNC may request entry to the worksite at the time of work through to six months past the expiry date of the permit. SNC shall give reasonable notice of the entry to the Permit Holder or occupier of the property.



6. Cancellation of Permit

SNC may cancel a permit or change the permit conditions if:

- a) false information was submitted as part of the permit application; or
- b) the Work deviates from the conditions of the permit without SNC's prior written approval.

7. Liability

The Permit Holder acknowledges that the sole function of this permit is to confirm that the Work is consistent with Ontario Regulation 170/06 and SNC policies. SNC makes no representations or warranties regarding any other aspect of the Work.

By accepting this permit, the Permit Holder agrees:

- a) to indemnify and save harmless, SNC and its officers, employees, and agents, from and against all damage, injury, loss, costs, claims, demands, actions and proceedings, arising out of or resulting from any act or omission of the Permit Holder or of any of their agents, employees, or contractors relating to any of the particular terms or conditions of this permit; and
- b) that this permit shall not release the permit holder from any legal liability or obligation and remains in force subject to all limitations, requirements, and liabilities imposed by law.

SNC assumes no responsibility or liability for flood, erosion, or slope failure damage that may occur to this property nor any activity undertaken by the Permit Holder affecting the property interests of adjacent landowners.



Ontario and Prairie Region
Fish and Fish Habitat Protection Program
867 Lakeshore Road
Burlington, Ontario
L7S 1A1

Région région de l'Ontario et des Prairies
Programme de protection du poisson et de son habitat
867 chemin Lakeshore
Burlington, Ontario
L7S 1A1

June 29, 2021

Our file Notre référence
20-HCAA-00595

Robinson Consultants
Attention: Lorne Franklin
350 Palladium Drive, Suite 210
Ottawa, Ontario
K2V 1A8

Dear Mr. Franklin:

Subject: *Fisheries Act* Authorization

Pursuant to paragraphs 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*, the Minister of Fisheries and Oceans Canada authorizes the carrying on of your proposed work, undertaking or activity that results in death of fish and harmful alteration, disruption or destruction of fish habitat arising from maintenance activities in East Savage Municipal Drain, a Class F Municipal Drain designated under the Ontario *Drainage Act*. For the purpose of this *Fisheries Act* Authorization, the proposed works are representative of a Class E Authorization. A paragraphs 34.4(2)(b) and 35(2)(b) *Fisheries Act* authorization is attached.

A class authorization protects you from being liable under the *Fisheries Act* provided the specified conditions included in the authorization are adhered to. These include, in part, the requirement to complete a “Notification of Municipal Drain Maintenance Work” form for each drain being maintained, adherence to timing windows (when work may be undertaken), the use of sediment and erosion controls and other mitigation and offsetting measures.

Please note that this Class Authorization is being issued for a Class E Municipal Drain that contains species requiring aquatic vegetation for spring spawning. As per the Authorization, **vegetation clearing may only occur on one bank.**

Failure to comply with any of the terms or conditions of the attached Authorization may lead to prosecution under the *Fisheries Act*.

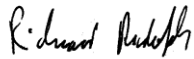
A copy of this Authorization should be kept on site while the work is in progress and upon request be provided to relevant federal or provincial officials. Work crews should be familiar with, and able to adhere to, the conditions.

Note: None of the foregoing should be taken to imply Authorization of this undertaking in accordance with any Section of the *Fisheries Act* **other** than Sections 34 and 35. Also note that an Authorization issued under the *Fisheries Act* does not release the proponent from the requirements of any other federal, provincial or municipal legislation.

Please note the 2019 amended *Fisheries Act* (FA) contains a provision requiring DFO to have a public-facing Registry (the FA Registry) to provide public access to *Fisheries Act* authorizations. This work supports the Government's goals around transparency, access and accountability in federal decision-making. Project-specific information related to this project will be posted to the Open Government Registry portal (<http://www.dfo-mpo.gc.ca/pnw-ppe/registry-registre-eng.html>) and linked from the Department's website. Any disclosure of information will be conducted in accordance with the *Access to Information Act* and the *Privacy Act*. Should you have any documents that contain sensitive or proprietary information that you believe should be protected from public disclosure, **please contact us within 5 business days** to discuss whether and how the information may be protected.

If you or anyone conducting work on your behalf has any questions please contact Scott Blair at (365) 292-2751 or by email at Scott.Blair@dfo-mpo.gc.ca.

Yours sincerely,



Rich Rudolph
Team Leader Coastal and Marine

Copy:
Scott Blair – DFO
Angela Jonkman – Robinson Consultants
Andy Robinson – Robinson Consultants

ATTACHMENTS:
Class E1 Authorization
Signed Notification of Drain Maintenance or Repair Form



PARAGRAPHS 34.4(2)(B) AND 35(2)(B) FISHERIES ACT AUTHORIZATION

Authorization issued to

Drainage Superintendent or other municipal representative in Ontario as identified as, the Contact Name and Municipality on the “*Notification of Municipal Drain Maintenance Work*” form submitted for this work (hereafter referred to as the “Proponent”).

Location of Proposed Project

Class E Drainage Systems in Ontario established under the authority of a municipal by-law under the *Drainage Act* in Ontario.

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

- Routine maintenance of an existing ‘Class E Municipal Drain’ to facilitate drainage activities, including bottom clean-out, brushing activities, bank stabilization and culvert replacement. ²¹⁻⁰²⁻²⁶
S.Eddy

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in the death of fish by other means than fishing:

The work(s), undertaking(s), or activity(ies) associated with the proposed project described above, that are likely to result in the death of fish by other means than fishing, are:

- Drain maintenance and repair activities as outlined in the proponent’s Drain Maintenance and Notification Form.
- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as “drainage works” under the Ontario Drainage Act and classified as Class “E” by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class E Municipal Drains have permanent flow and fish species that are sensitive to drain maintenance).

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in the harmful alteration, disruption or destruction of fish habitat:

The work(s), undertaking(s), or activity(ies) associated with the proposed project described above, that are likely to result in the harmful alteration, disruption or destruction of fish habitat, are:

- Drain maintenance and repair activities, **including bottom clean out and brushing/vegetation removal**, ^{21-02-26 S.Eddy} as outlined in the proponent’s Drain Maintenance and Notification Form.
- This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as “drainage works” under the Ontario Drainage Act and classified as Class “E” by Fisheries and Oceans Canada through the Agricultural Drain Classification Process. (Class E Municipal Drains have permanent flow and fish species that are sensitive to drain maintenance).

The authorized work(s), undertaking(s), or activity(ies) are likely to result in the following impacts to fish and fish habitat:

- Incidental death of fish through dredging activities associated with drain maintenance works.
- Harmful alteration, disruption or destruction of fish habitat in Class E Municipal Drains, as a result of a full bottom cleanout and vegetation clearing from one bank only.
- Type and sensitivity of fish habitat to be permanently altered or destroyed is defined as a ‘Class E Municipal Drain’ have permanent flow and spring spawning fish species that are sensitive to drain maintenance.
- Quantity of habitat impacted will vary depending on specific project location. **In addition to the measures listed in this authorization, the length of drain impacted, and the duration of the work and specific activities, measures and offsetting**, as outlined in the form: Notification of Municipal Drain Maintenance and Repair (Notification Form) ^{21-02-26 S.Eddy} **are the conditions of this authorization.**

Conditions of Authorization

The above described work, undertaking or activity must be carried on in accordance with the following conditions.

1. Conditions that relate to the period during which the work, undertaking or activity can be carried on

The work, undertaking or activity that is/are authorized to be carried on during the following period:

From	To
August 28, 2019 March 15, 2021	March 14, 2024 ^{21-02-26 S.Eddy}

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the above time period.

The periods during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate impacts to fish and fish habitat**

- 2.1 This *Fisheries Act* Class Authorization is restricted to be applicable only to drains as defined as “drainage works” under the Ontario Drainage Act and classified as Class “E” (defined above) by Fisheries and Oceans Canada.
- 2.2 Plan in-water works, undertakings and activities to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed and migrate. No in-stream work or construction activity shall occur within the following dates, without the specific written permission of DFO:
- **Northern Region: April 1 to July 15**
 - **Southern Region: March 15 to July 15**
- 2.3 Develop and implement an erosion and sediment control plan avoid the introduction of sediment into any waterbody during all phases of the work, undertaking or activity.
- 2.3.1 Inspect and maintain regularly the erosion and sediment control measures and structures during all phases of the project
- 2.3.2 Dispose and stabilize all dredged material above the high water mark of nearby waterbodies to prevent entry in the water
- 2.4 Work in water shall not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods. Schedule work to avoid wet, windy and rainy periods (and heed weather advisories) that may result in high flow volumes and/ or increase erosion and sedimentation.

Bottom clean-out activities:

- 2.5 The finished channel shall be as narrow and deep as possible within the specifications of the most recent Engineer’s Report (Municipal Bylaw).
- 2.6 A bottom clean-out involving bank reshaping shall include the following:
- 2.6.1 One bank slope shall be graded to a slope that will maintain bank stability. This value may vary depending on local conditions.
- 2.6.2 Any bends in the channel shall be stabilized, to prevent erosion as required.
- 2.6.3 **Removal of gravel substrate shall be avoided.** ^{21-02-26 S.Eddy}

Vegetation Removal:

- 2.7. One side of the bank slope and the top of the bank is to remain intact and is considered a No Work Zone.
- 2.7 Where vegetation on top of the bank must be removed/altered (root system remains) on one side, the shade producing side of the drain shall remain unaltered. Limit impacts on riparian vegetation to those approved for the work, undertaking or activity.
- 2.8 Where riparian and bank vegetation has been removed on the top of the bank and/or the bank slope, the proponent shall stabilize the banks to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

Culvert removal/replacement activities:

- 2.9 The site shall be isolated using impervious barriers. Conduct all in-water works, undertakings or activities in isolation of open or flowing water to reduce the introduction of sediment into the watercourse.
- 2.9.1 Maintain the natural flow regime for any diversion works.
- 2.9.2 Use the code of practice for cofferdams: <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/cofferdams-batardeaux-eng.html>.
- 2.10 Where water is pumped from the watercourse for any purpose, pump intakes shall be screened in accordance with DFO's Code of Practice: <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html>. Each hose outlet shall have a diffuser or be placed in a location that is not subject to erosion from the outflow. Screen intake pipes to prevent entrainment or impingement of fish
- 2.11 A fish salvage shall be completed within all isolated areas prior to any in-water works and/or dewatering activities. All fish shall be live released downstream of the project site. Capture, relocate and monitor for fish trapped within isolated, enclosed, or dewatered areas
- 2.11.1 Dewater gradually to reduce the potential for stranding fish
- 2.12 Install the culvert so that it is embedded into the streambed and ensure that the culvert remains passable by fish.

Bank Stabilization:

- 2.13 Rip rap, river stone, and rock utilized in the project shall:
- 2.13.1 Be clean and free of fine materials and debris prior to placement and shall be of sufficient size to resist displacement during design flood events;
- 2.13.2 Not be obtained from area below the high water mark of any fish-frequented waterbodies; and

2.13.3 Not be placed/positioned in a manner that prevents fish passage under low flow conditions. Avoid obstructing and interfering with the movement and migration of fish.

3. Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate impacts to fish and fish habitat

3.1 Monitoring of avoidance and mitigation measures: The Proponent shall monitor the implementation of avoidance and mitigation measures referred to in section 2 of this authorization and report to DFO and indicate whether the measures and standards to avoid and mitigate impacts to fish were conducted according to the conditions of this authorization.

3.2 The Proponent shall undertake monitoring and report to DFO, within 60 days after the work has been completed, whether measures and standards to avoid and mitigate death of fish and harmful alteration, disruption or destruction of fish habitat were conducted according to the conditions of this Authorization.

3.2.1 Upon request, the proponent shall provide dated photographs, a site sketch, and inspection reports to demonstrate effective implementation and functioning of mitigation measures and standards described above to limit the death of fish and harmful alteration, disruption or destruction of fish habitat what is covered by this authorization.

3.2.2 Provide details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

4. Conditions that relate to offsetting

4.1 Offsetting measures shall be carried out according to the Notification Form approved by DFO and attached to the authorization.

4.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria as described in the proponent's plan.

4.3 If the results of monitoring, as required in condition 5, indicate that the offsetting measures are not completed and/or are not functioning according to the above criteria, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and/or functioning as required by this authorization.

4.4 Offsetting measures shall function as intended, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

5. Conditions that relate to monitoring and reporting of implementation of offsetting measures (described in section 4):

5.1 The Proponent shall conduct monitoring, within 60 days after the work has been completed, to demonstrate that offsetting measures were conducted according to the conditions of this Authorization.

5.1.1 Upon request, the proponent shall provide the monitoring report to DFO with dated photographs, and a site sketch to demonstrate effective implementation and functioning of offsetting measures.

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this authorization and for all design, safety and workmanship aspects of all the works associated with this authorization.

The holder of this authorization is hereby authorized under the authority of Paragraph(s) 34.4(2)(b) and 35(2)(b) of the *Fisheries Act*. R.S.C., 1985, c.F-14, to carry on the work(s), undertaking(s) and/or activity(ies) that are likely to result in impacts to fish and fish habitat as described herein.

This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This authorization does not permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

This authorization does not permit the killing, harming, harassment, capture or taking of individuals of any aquatic species listed under the *Species at Risk Act* (SARA) (s. 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).

At the date of issuance of this authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities.


It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the unauthorized death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to (<http://www.dfo-mpo.gc.ca/pnw-ppe/CONTACT-eng.html>).

The failure to comply with any condition of this authorization constitutes an offence under Paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under said Act. ^{21-02-26 S.Eddy}

A copy of this authorization should be kept on site while the work is in progress and upon request be provided to relevant federal or provincial officials. The authorization holder is responsible for ensuring work crews are familiar with, and able to adhere to, the conditions.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: March 8th, 2021

Approved by: 

C. Thomas Hoggarth
Regional Director Aquatic Ecosystems
Ontario and Prairie Region
Fisheries and Oceans Canada

NOTIFICATION OF DRAIN MAINTENANCE OR REPAIR SUBJECT TO:

- Federal *Fisheries Act*, s. 35 & 36 (Serious Harm & Deposit of Deleterious Substances - Sediment)
- Federal *Species at Risk Act* (SARA), s. 32 (Individual Organisms), s. 33 (Residences) and s. 58 (Critical Habitat)
- *Ontario Conservation Authorities Act*, s. 28 "Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses" regulations.

Version: May 23, 2017

See the guidance document, "How to Complete the Notification of Drain Maintenance or Repair Form", for more information about completing this form. Please send this form separately to each applicable reviewing agency. This notification form may be updated periodically to reflect current legislative requirements.

Reviewing agency use only.

Reviewing agency: File number:

Section 1: Contact Information, Location and Dates for Proposed Works

Municipality:	Ottawa					
Contact Name:	Lorne Franklin, Robinson Consultants					
Mailing Address:	350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8					
Phone#:	613-592-6060 x 123	Fax#:		Email:	lfranklin@rcii.com	
Drain Name: (as referred to in the Engineer's Report adopted by by-law)	East Savage Municipal Drain			Geographic Township:	Cumberland	
Location: (please attach a location map)	Ottawa			By-Law No.:		
Work Zone ¹	FROM	Lot:	Conc:	TO	Lot:	Conc:
		1	4		17	10
Impact Zone ²	FROM	Lot:	Conc:	TO	Lot:	Conc:
		17	10		17	9
Geographic Location ³	Latitude (Y):	45.38198° N		UTM Y:		
	Longitude (X):	75.42644° W		UTM X:		
Start of Proposed Work	Day:	<input type="text" value=""/>	Month:	<input type="text" value="July"/>	Year:	<input type="text" value="2022"/>
Completion of Proposed Work	Day:	<input type="text" value=""/>	Month:	<input type="text" value="September"/>	Year:	<input type="text" value="2023"/>

Section 2: Drain Classification (<http://www.omafra.gov.on.ca/english/landuse/gis/portal.htm>)

Drain Class	Work Zone ¹	Length (m)	Impact Zone ²	Drain Type	
A	<input type="checkbox"/>		<input type="checkbox"/>	Drainage Act Section	<input type="text" value="Channel"/>
B	<input type="checkbox"/>		<input type="checkbox"/>	Specify disposal of material, if applicable (e.g., location, method):	<input type="text" value="Section 77 - Deepen/Widen/Extend"/>
C	<input type="checkbox"/>		<input type="checkbox"/>		
D	<input type="checkbox"/>		<input type="checkbox"/>		
E	<input type="checkbox"/>		<input checked="" type="checkbox"/>		
F ⁴	<input checked="" type="checkbox"/>	8231	<input type="checkbox"/>		
Unrated	<input type="checkbox"/>		<input type="checkbox"/>		
Total Work Zone		8231			
Natural Watercourse			<input type="checkbox"/>		
SAR Present ⁵	<input type="text" value="NO"/>		<input type="text" value=""/>		

¹Work Zone = part of the drain where the work is actually occurring
²Impact Zone = linear length of watercourse extending 1 km downstream of the bottom end of the Work Zone
³Geographic Location = Approximate location of the drain using Geographic Coordinates (Lat/Long is preferred over UTM)
⁴No offsetting measures required - see page 2
⁵Species At Risk Act maps: <http://www.dfo-mpo.gc.ca/species-especies/fpp-ppp/index-eng.htm>

Section 3: Maintenance and Repair Activities (Select all proposed activities)

Activity (Select from drop-down menu)	Description	Additional Information
Culvert Replacement	Replacement of existing road or private access culverts (like-for-like replacement) on all drain types without SAR. On C Drains only, this can also include replacements with extensions and end walls for the purposes of providing the property or road with safe access. The increase in permanent footprint impact must be no greater than 250 m2 below the high water mark.	7 Culverts to be replaced, equal to or greater than existing sizes
Bank Repair or Stabilization and Pipe Outlet Repair	Restoration of bank slopes to the original design in the Engineer's Report and localized activities to prevent bank failure, such as the placement of rip rap, seeding the bank, and the use of geotextile materials.	Armouring at channel bends and tile outlets
Channel deepening	Increase depth to meet new grade under the updated Engineer's Report, covering approximately 8231 linear metres.	
Bank grading	Working from one bank only, grading will be completed to establish a stable slope on the working side of the channel. The working side will avoid existing mature vegetation and use existing corridors where possible.	
Channel alignment / creation	A new/defined channel will be constructed either adjacent to or within the footprint of an existing swale next to the trail/rail allowance for approximately 800 linear metres. Existing wetted areas including channels, swales or wetlands in the vicinity will not be infilled.	

Section 4: Other Considerations for Review Agencies (Please specify):

--

Section 5: Sediment and Erosion Control Measures to be Used (Fisheries Act Avoidance, Mitigation, and Offsetting measures)

Section 5a) Avoidance measures: Select the avoidance measures that shall be used.

Method	Description	Details and/or approximate dimensions
<input type="checkbox"/> Maintain Meanders		
<input type="checkbox"/> Maintain Natural Features/ Coarse Substrate		
<input type="checkbox"/> Maintain Pools and Riffles		
<input type="checkbox"/> Spot Cleanout	Cleanout of isolated sediment build-up; not continuous along the drain	
<input type="checkbox"/> Staged Cleanout	See definition, Drainage Act and CA Act Protocol	
<input checked="" type="checkbox"/> Two-Stage /Low-Flow Channel	See definition and diagram, Drainage Act and CA Act Protocol, Appendix III	See 'Offsetting - Low Flow Channel'
<input checked="" type="checkbox"/> Work in Low or No Flow		

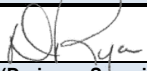
Section 5b) Mitigation measures: - Select the mitigation measures that shall be used.

Method	Notes	Details and/or approximate dimensions
<input type="checkbox"/> Erosion Control Mats (temporary)		
<input type="checkbox"/> Erosion Control Mats (permanent)		
<input type="checkbox"/> Silt Curtain	E.g. non-woven filter fabric, with weighted bottom used to isolate work area	
<input type="checkbox"/> Silt Fence Barrier (light-duty)	See OPSD 219.110	
<input type="checkbox"/> Silt Fence Barrier (heavy-duty)	See OPSD 219.130	
<input type="checkbox"/> Straw Bale Barrier (light duty)	See OPSD 219.100	
<input checked="" type="checkbox"/> Straw Bale Flow Check Dam	See OPSD 219.180	As per updated drainage report
<input type="checkbox"/> Silt Fence Check Dam	See OPSD 219.190	
<input checked="" type="checkbox"/> Rock Flow Check Dam, V-ditch	See OPSD 219.210	As per updated drainage report
<input type="checkbox"/> Rock Flow Check Dam, Flat-Bottom Ditch	See OPSD 219.211	
<input type="checkbox"/> Other Temporary Measures		

Section 5c) Offsetting Measures (Permanent): Under the *Fisheries Act*, offsetting measures must be implemented for Class A, B, C, D, and E Drains. Select the offsetting measures that shall be used.

Method	Notes	Details and/or approximate dimensions
<input type="checkbox"/> Bank Stabilization	See the Notification Form Guide for guidance.	
<input checked="" type="checkbox"/> Creation of a Low Flow Channel	See the Notification Form Guide for guidance.	2-stage channel to be created throughout the work area, as per updated report received March 12, 2021
<input type="checkbox"/> Culvert Removal/Replacement	See the Notification Form Guide for guidance.	
<input type="checkbox"/> Newbury Weir/Rock Flow Check Dam, V-Ditch	See the Notification Form Guide for guidance.	
<input checked="" type="checkbox"/> Refugia Pools/Sediment Traps	See the Notification Form Guide for guidance.	One pool/trap approximately every 1000m
<input checked="" type="checkbox"/> Reseeding and/or Planting	See the Notification Form Guide for guidance.	Planting list included in new report.
<input type="checkbox"/> Riffle Habitat	See the Notification Form Guide for guidance.	
<input type="checkbox"/> Rock Flow Check Dam, Flat-Bottom Ditch	See the Notification Form Guide for guidance.	
<input type="checkbox"/> Other Permanent Measures (please specify):		

I, the undersigned, representing the above named municipality, hereby declare my intention to carry out the works or undertakings described above in the classified drain in accordance with the municipal by-law and the *Drainage Act*. I request that I be provided with the appropriate authorizations under the *Fisheries Act and the Conservation Authorities Act*. I will carry out all activities relating to the project within the designated time frames and conditions as specified in the authorizations provided.

Signature:  Date: June 3, 2021
(Drainage Superintendent)

CONSERVATION AUTHORITY: Receipt of notification form is acknowledged and will be assessed under the appropriate Conservation Authorities Act S. 28 regulation and the Drainage Act and Conservation Authorities Act Protocol. Signature of this form does not constitute permission under a Conservation Authorities Act S.28 regulation. SIGNED: _____ DATE: _____
Conservation Authority

FISHERIES AND OCEANS CANADA: Receipt of notification form and verification of the drain classification is confirmed. A Class Authorization for a Class _____ Drain is issued pursuant to § 35(2) of the Fisheries Act. SIGNED:  DATE: 6/4/2021
Fisheries and Oceans Canada
1-855-852-8320 - FisheriesProtection@dfo-mpo.gc.ca

E (F)

Lorne Franklin

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: February-26-20 2:26 PM
To: Lorne Franklin
Subject: 2020-02-26_Response_SAR Screening East Savage Municipal Drain
Attachments: DRAFT-Proponents Guide to Preliminary Screening-May 2019.pdf

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

Hi Lorne,

Have you completed a preliminary screening for this project using the guide attached?

The following occurrences of species at risk exist in the vicinity of your project location:

- Common Nighthawk
- Barn Swallow
- Bobolink
- Eastern Meadowlark
- Chimney Swift
- Blanding's Turtle
- Butternut
- Snapping Turtle
- Wood Thrush
- Spotted Turtle
- Bank Swallow
- Peregrine Falcon
- Short-eared Owl
- Monarch
- Species at risk Bats (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat)
- Eastern Whip-poor-will

Please note it remains the clients responsibility to:

- Carry out preliminary screening for their project,
- Obtain the best available information from all applicable information sources,
- Conduct necessary field studies or inventories to identify and confirm the presence or absence of species at risk or their habitat,
- Consider any potential impacts to species at risk that a proposed activity might cause, and
- Comply with the Endangered Species Act (ESA).

Additionally, while this data represents MECP's best current available information, it is important to note that a lack of information for a site does not mean that species at risk or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in more remote parts of the province. On-site assessments can better verify site conditions, identify and confirm presence of species at risk and/or their habitats. It is the

responsibility of the proponent to ensure that species at risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the activities carried out on the site.

If you have any questions please feel free to contact me directly.

Best,

Carolyn Hann

Management Biologist | Permissions and Compliance Section | Ontario Ministry of Environment, Conservation and Parks | 10-1 Campus Drive, Kemptville, Ontario, K0G 1J0 | PH: 613.355.7312 | Email: carolyn.hann@ontario.ca

From: Lorne Franklin <lfranklin@rcii.com>

Sent: January-09-20 1:25 PM

To: Species at Risk (MECP) <SAROntario@ontario.ca>

Cc: Andy Robinson <ajrobinson@rcii.com>; 'David.Ryan@ottawa.ca' <David.Ryan@ottawa.ca>; Cryderman, Eric <Eric.Cryderman@ottawa.ca>; 'erinjennifer.moore@ottawa.ca' <erinjennifer.moore@ottawa.ca>

Subject: SAR Screening

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Please see the attached drawing for the East Savage Municipal Drain. By this e-mail we are requesting that MECP provide screening of the area impacted by the drain with regard to Species at Risk.

We note that this system incorporates an existing Municipal Drain and private ditch system. The proposed work makes required improvements to capacity but does not alter flow patterns in the area. Existing and proposed conditions bypass the adjacent Mer Bleu PSW. As such, there may be significant SAR in the general vicinity of the drain, but with no direct impact on the SAR or Habitat related to this work/work area. Therefore, we request that screening and identified species be limited to the proposed work area or direct influence of the proposed work where possible.

Should you have any questions or concerns, please contact us.

Sincerely,

Lorne Franklin, L.E.T., C.E.T., rcca, CISEC | Drainage Services

Robinson Consultants 350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8
T.(613) 592-6060 ext. 123 | rcii.com

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Lorne Franklin

From: Zarkovich, Aide (MECP) <Aide.Zarkovich@ontario.ca>
Sent: January-20-21 2:14 PM
To: Lorne Franklin
Subject: RE: East Savage Municipal Drain

"CAUTION: External Sender"

Good afternoon Lorne,

The Species at Risk Branch (SARB) of the Ministry of the Environment, Conservation and Parks (MECP) has conducted review of the East Savage Municipal Drain study area (provided) and the areas adjacent to it and did not detect any additional Species at Risk (SAR) occurrences that were not already identified in the email below. In addition, SARB has confirmed the presence of those SAR listed in the attached request.

While this review represents MECP's best currently available information, it is important to note that a lack of information for an area does not mean that SAR or their habitat are not present. There are many areas where the Government of Ontario does not currently have information, especially in areas where surveys have not been performed.

The project as currently described is not likely to impact SAR and their habitat, however if any of the proposed work parameters change please provide those changes for review.

It is the responsibility of the proponent to ensure that SAR are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through future activities to be carried out on the site. If the future activities can not avoid impacting protected species and their habitats then the proponent will need to apply for an authorization under the Endangered Species Act.

Thank you and have a nice day,

Aide Zarkovich
A/Management Biologist - Permissions & Compliance
Species at Risk Branch
Land & Water Division
Ministry of the Environment, Conservation & Parks
aide.zarkovich@ontario.ca
T: 705-492-7452

From: Lorne Franklin <lfranklin@rcii.com>
Sent: November 19, 2020 8:06 AM
To: Zarkovich, Aide (MECP) <Aide.Zarkovich@ontario.ca>
Cc: Cryderman, Eric <Eric.Cryderman@Ottawa.ca>; Ryan, David W <David.Ryan@Ottawa.ca>; erinjennifer.moore@ottawa.ca; Andy Robinson <ajrobinson@rcii.com>
Subject: RE: East Savage Municipal Drain

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Aide,

With regard to the species list as provided Carolyn Hann we have updated Section 12 of our Report. Please see the attached (updated) pages from the report for SAR information.

We trust this to be satisfactory and await your further review. Should you have any questions or concerns, please contact us.

Sincerely,

Lorne Franklin, L.E.T, C.E.T., rcca, CISEC | Drainage Services

Robinson Consultants 350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8
T.(613) 592-6060 ext. 123 | rcii.com

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From: Zarkovich, Aide (MECP) <Aide.Zarkovich@ontario.ca>
Sent: October 21, 2020 5:03 PM
To: Lorne Franklin <lfranklin@rcii.com>
Cc: Cryderman, Eric <Eric.Cryderman@Ottawa.ca>; Ryan, David W <David.Ryan@Ottawa.ca>; erinjennifer.moore@ottawa.ca; Andy Robinson <ajrobinson@rcii.com>
Subject: RE: East Savage Municipal Drain

"CAUTION: External Sender"

Good afternoon Lorne,

Thank you for your submission to MECP regarding the East Savage Municipal Drain, could you address the discrepancies found between the SAR occurrences outlined in the report and those that were identified by Carolyn Hann in the attached e-mail?

Have you performed species targeted surveys all the identified species and found them to be absent? If so, please submit them to me for review.

Otherwise all the species and their habitat, outlined in the correspondence with Carolyn H. are to be thought as present for which:

- a. targeted species surveys are suggested
- b. IGF and AAF be submitted to address the potential impacts to the listed species and their habitat.

Please let me know if you have any questions.

Sincerely,

Aide Zarkovich

A/Management Biologist - Permissions & Compliance

Species at Risk Branch

Land & Water Division

Ministry of the Environment, Conservation & Parks

From: Lorne Franklin <lfranklin@rcii.com>
Sent: Monday, April 20, 2020 3:14 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Eric.Cryderman <Eric.Cryderman@Ottawa.ca>; Ryan, David W <David.Ryan@Ottawa.ca>;
'erinjennifer.moore@ottawa.ca' <erinjennifer.moore@ottawa.ca>; Andy Robinson <ajrobinson@rcii.com>
Subject: FW: East Savage Municipal Drain

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MECP SAR SCREENING REQUEST

Please find attached, a DRAFT of the East Savage Municipal Drain Engineer's Report for MECP SAR review and Consideration.

The document is provided in DRAFT such that any MECP SAR concerns may be addressed. We ask that you provided any MECP advise/permit conditions such that the may be incorporated into the final document. When complete, it is anticipated that the final document will incorporate any MECP advice.

Should you have any questions or concerns, please contact us.

Sincerely,

Lorne Franklin, L.E.T, C.E.T., rcca, CISEC | Drainage Services

Robinson Consultants 350 Palladium Drive, Suite 210, Ottawa ON, K2V 1A8
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***MECP - Environmental Compliance Approval
NOT RECEIVED AT THE TIME OF DISTRIBUTION
TO BE APPENDED TO THE REPORT***

Appendix E

Special Provisions

SPECIAL PROVISIONS

INDEX

SP 1.0	Working Area
SP 2.0	Clearing
SP 3.0	Excavation and Disposal
SP 4.0	Private Culverts
SP 5.0	Fencing
SP 6.0	Seeding
SP 7.0	Rock Protection Erosion Control
SP 8.0	Utilities
SP 9.0	Flow Checks & Sediment Traps
SP 10.0	Tile Outlet Protection
SP 11.0	Culvert End Treatments
SP 12.0	Guaranteed Maintenance
SP 13.0	Ministry of Environment Conservation and Parks - Species at Risk
SP 14.0	South Nation Conservation Permission (O. Reg. 175/06)
SP 15.0	Department of Fisheries and Oceans Class Authorization – Fisheries Act

SP1.0 WORKING AREA

A working area of 40 metres is designated along both sides of the drain.

The designated working area shall be deemed to include area for spreading of excavated material, access roads for fuel and service and material haul routes, as approved by the Drainage Engineer. These access points to the designated working area should be along existing farm lanes or access points where possible and are to be approved by the Drainage Engineer. It is the contractor's responsibility to obtain final approval for access locations and to reinstate the access to original condition or better, at the contractor's expense.

SP1.1 Alignment

The constructed channel alignment shall be in general conformity with the existing alignment and extension shown on Dwg. No. 16002-A1. Where necessary, the alignment shall be set out by the Drainage Engineer prior to the commencement of construction on this project.

SP2.0 CLEARING AND GRUBBING

Clearing and grubbing shall consist of the removal of all trees, brush and windfalls within the top of slopes for the drain and the area required for machine access, for clean out of the drain and spreading of excavated material. All dead trees located near the drain that would in time fall into the drain are to be removed. When clearing is undertaken in an area of tillable land all stumps shall be removed and in all other areas, stumps shall be cut flush with the ground.

Brush removal (grubbing) shall include the removal of brush which has grown up in previously cleared areas.

SP2.1 Disposal of Material

Landowners are advised that the Contractor will clear only those trees, which may affect its operation within the working area. All trees having a diameter of 150 mm or greater shall be cleared of limbs and cut in reasonable lengths (to a maximum of 5m) and neatly piled clear of the drain so that the wood may be salvaged by the property owners.

All brush, limbs and other debris resulting from the clearing operation shall be chipped and buried beneath spread excavated materials except in agricultural fields where chipped materials are to be disposed of off-site at a location provided by the contractor and approved by the Drainage Engineer and at the Contractor's expense (note restrictions may apply with regard to Ash – Emerald Ash Borer).

In areas of forested lands stumps shall be cut flush and buried below excavated materials.

Large stones, stumps, tree roots and other debris shall also be disposed of at a location on the property chosen by the owner and approved by the Drainage Engineer. For future maintenance, all material shall be disposed of on the property at a location chosen by the owner and approved by the Drainage Superintendent.

SP2.2 Payment

The cost of all labour, materials and equipment for clearing and grubbing and disposing of material as discussed herein shall be deemed to have been included in the lump sum or unit price tendered for this item.

SP3.0 EXCAVATION AND DISPOSAL

SP3.1 Excavation

The construction of the East Savage Municipal Drain will be an open channel drain with side slopes and ditch bottom widths as specified on the design profiles and cross-sections Drawing No. 16002-P1 through 16002-P12 and 16002-C1 and 16002-C2. The East Savage Municipal Drain will be located between Station 0+000 and Station 8+218.48.

SP3.2 Disposal of Excavated Earth Material

The excavation of the drain shall be completed along all sections as previously described and all materials including silt, debris, etc. shall be removed from the drain. In the non-agricultural land all material shall be spread on the adjacent lands no closer than 5 meters to the top of slope and to a maximum depth of 300 mm. Drainage openings shall be constructed wherever required throughout the disposal area but at a maximum spacing of 100 meters. All drainage openings shall be maintained, and the soil spread to accommodate these drainage openings to ensure that the drainage from adjacent land is not impeded.

In areas of agricultural land, all suitable earth material shall be spread no closer than 5 m to the top of the slope and to a maximum depth of 150 mm on the adjacent land with drainage openings provided wherever required, but at a maximum spacing of 50 meters.

Property owners who wish to pay the Contractor to have the Contractor dispose of the excavated material off-site which would otherwise be spread or deposited on the property may arrange directly with the Contractor, subject to approval by the Drainage Engineer.

SP3.3 Hardpan Excavation and Disposal

All unsuitable material and debris including boulders, hardpan, etc. shall be disposed of by the contractor on the adjacent property, in an area of the property designated by the owner and as approved by the Drainage Engineer.

SP3.4 Rock Excavation & Disposal

The Contractor is required to excavate rock and dispose of the material off the site at a location arranged for by the Contractor and agreed to by the Drainage Engineer.

SP3.5 Payment

Payment for earth excavation shall be by the unit price tendered per cubic meter or linear meter and shall be full compensation for all work required to excavate and spread the spoil in the manner described previously.

For the purpose of excavation, hardpan shall be considered as earth excavation, shall be by the unit price tendered per cubic metre (for excavation) and shall be full compensation for all work required to excavate and dispose of the material in the manner described previously.

Where incurred, payment for rock excavation shall be by the unit price tendered per cubic metre and shall be full compensation for all work required to excavate, remove off-site and dispose of the material in the manner described previously. Measurement for payment shall be from the calculated quantity using the surveyed top of rock (as exposed) to the theoretical trench width and proposed channel grade.

SP3.6 Disposal Off-Site at Property Owner's Expense

Property owners who wish to pay the Contractor to have the Contractor dispose of the excavated material off-site which would otherwise be spread or deposited on the property may arrange directly with the Contractor, subject to approval by the Drainage Engineer.

SP4.0 PRIVATE CULVERTS

SP4.1 Supply and Placement or Lowering of Private Farm Culverts

The culverts shall be installed so that the culvert invert is embedded 150mm below the invert of the drain for culverts with a height or diameter up to 1500 mm. For culverts with a height or diameter greater than 1500 mm the culvert shall be embedded by 10% of the height or diameter below the invert of the drain. The farm culvert bedding, backfill, surface course and rock protection end-treatment shall be as shown on Robinson Consultants Std. Dwg. C. The standard length for supplied culverts shall be 10 meters, unless otherwise specified.

To the extent possible, culvert replacement shall follow the Department of Fisheries and Oceans (DFO) Best Management Practices (BMP), entitled "Best Management Practices – Culvert Replacements in Municipal Drains" (Kavanagh et. Al. 2017). A copy of this BMP is provided in **Appendix A**.

SP4.2 Culvert Location

Culverts that must be installed or lowered and reinstalled are shown on Drawing No. 16002-A2 and 16002-P1 through 16002-P12.

SP4.3 Payment

Payment at the per metre or lump-sum unit price bid for each culvert shall include for all excavation and disposal of materials and for the supply and installation of a new culvert or the reinstallation of the old culvert respectively and shall include backfill and Granular "A" material for the driving surface.

Payment at the unit price bid for removing existing structures shall include for all excavation and disposal of materials.

Rock protection with filter cloth at both ends of the culvert shall be paid under the item for culvert end treatments by the item unit price.

SP5.0 FENCING

Where fences are encountered or for access to the drain, it will be the Contractor's responsibility to remove the existing fence and re-erect the fence in a condition equal to or better than the condition of the fence prior to the commencement of the work.

SP5.1 Fencing - Replacement

Where fences are encountered or for access to the drain, where it is the determination of the on-site representative of the Drainage Engineer that the fence is not in a reasonable condition for the Contractor to remove the existing fence and re-erect the fence in a suitable condition, the Contractor shall supply and install similar fence to the OPSD that governs that type of fence, and/or to the satisfaction of the Drainage Engineer.

SP5.2 Payment

SP5.2.1 Payment – Fences in Good Condition

Fences encountered, which are in reasonable condition, are to be reinstalled in a condition equal to or better than the condition of the fence prior to the commencement of the work, at the Contractor's expense.

SP5.2.1 Payment – Fences Poor Condition (to be replaced)

Payment for fences to be replaced (as per SP 5.1) will be made, as per the tendered amount for the Provisional Item, on a per location basis.

SP6.0 SEEDING

SP6.1 Main Drain Seeding

All disturbed banks shall be hand seeded within 48 hours of construction. Additionally, the "buffer zone" (the first 5m from the top of bank) must be seeded following the completion of access activities in the area. Any spread areas outside of agricultural fields must also be seeded, except where spreading occurs in a forest/bush area.

The minimum sow rate will be 100 kg/ha and the following seed mixture, or an alternate mixture presented by the contractor and approved by the Drainage Engineer shall be used.

Creeping Red Fescue	60%
Canada Bluegrass	20%
White Clover	3%
Perennial Rye	12%
Red Top	5%

Perennial rye will encourage quick establishment of a ground cover, while red fescue provides deeper rooting vegetation that is shade and water tolerant with limited requirement for seed bed preparation, white clover provides quick cover and produces nitrogen to aid in the establishment of other vegetation and red top's root system is well suited for holding soils on wetlands, waterways and ditch banks. Any proposed alternative mix should make accommodation for all attributes described above.

SP6.2 Timing Restrictions

Seed shall not be placed from November 1st through April 30. Where excavation occurs between November 1st and April 30, seeding shall be completed as soon as possible after April 30, or as directed by the Drainage Engineer.

The Contractor is required to ensure a seed catch and may be required to re-seed areas as directed by the Drainage Engineer.

SP6.3 Measurement for Payment

Measurement for payment for the placement of the seed shall be by the square metre in place on the prescribed areas seeded. Payment will not be made for any area seeded beyond the prescribed area unless approved by the Drainage Engineer prior to placing the seed. The Contractor will not be paid for reinstatement of other areas disturbed by construction activities.

SP6.4 Payment

Payment for seeding shall be by the unit price tendered and shall be full compensation for all labour, materials and equipment required to complete the work as described above, and for any required reseeded during the maintenance period.

SP7.0 ROCK PROTECTION EROSION CONTROL

Rock Protection Erosion Control shall consist of quarried rock fragments which meet the standards as specified in the OPSS 1004.05.05.02 for R-50 Rip-Rap, and/or the standards for Rock Protection, OPSS 1004.05.05.03.

Fieldstones will not be accepted for rock protection unless they are enclosed in gabion baskets or other materials to be approved by the Drainage Engineer, at no extra cost to the drain or project.

Excavated rock from the site which meets the standards as specified above, and is approved by the Drainage Engineer for use, may, at the contractor's discretion, be used in place of imported Rock Protection.

The rock protection shall be inset into the bank and the bed of the drain so that the finished surface will be of the same cross-section and will be flush with upstream and downstream sections. The rock protection shall be placed on a geotextile Terrafix 420R (or approved equivalent) as indicated on the Std. Dwg. Rock protection shall be installed in accordance with Std. Dwg. D (provided in **Appendix A**).

SP7.1 Rock Protection Erosion Control Location

Refer to Dwg. Nos. 16002-A2, and 16002-P1 through 16002-P12 for Rock Protection locations. Other locations may be identified in the field during construction.

SP7.2 Measurement for Payment

Measurement for placement of rock protection with filter cloth shall be by the square metre and measurement shall be made in place. Payment will only be made for the area of rock protection agreed to in advance by the Drainage Engineer.

SP7.3 Payment

Payment for rock protection shall be by the unit price tendered and shall be full compensation for all labour, material and equipment required to complete the work as described above.

SP8.0 UTILITIES

The Contractor shall be required to arrange with all utilities to mark all underground cables or pipelines in the field prior to commencing construction and shall be responsible for protecting the utilities during construction and repair of any damaged utilities.

SP9.0 FLOW CHECKS & SEDIMENT TRAPS

SP9.1 Straw Bale Flow Check

SP9.1.1 Straw Bales

Straw bales shall be in conformance with OPSD 219.180 and consist of oat or wheat straw, shall be dry, firm, tightly tied in at least two places, show no evidence of straw or tie decay, and be free of sediment. They shall be of standard agricultural rectangular conformation and dimensions, approximately 600 mm x 600 mm x 1200 mm.

SP9.1.2 Stakes

Stakes shall be of sufficient strength to satisfy straw bale flow check performance and maintenance requirements and shall be a minimum of 1200 mm in length and each bale shall be firmly anchored in place by two stakes spaced and driven firmly 150 mm from each end of each bale.

SP9.1.3 Installation

Straw bale flow checks shall be installed as indicated in OPSD 219.180 to prevent sediment passage from the upstream to the downstream side of the flow check and shall be installed at all specified locations on Dwg. Nos. 16002-A2, and 16002-P1 through 16002-P12 (inclusive), all in accordance with OPSD 219.180 (provided in **Appendix A**).

Straw bale flow checks shall consist of a double row of bales in compliance with the following:

- a) The two rows of bales shall be butted tightly beside one another without gaps.
- b) The bales in the two rows shall be uniformly staggered, so that the ends of the upstream row of bales are adjacent to the centres of the downstream row of bales.
- c) The upstream row of bales shall be one bale longer than the downstream row.

SP9.2 Rock Flow Checks

SP9.2.1 Rock

The rock flow check shall be constructed in conformance with OPSD 219.211 using clean quarried rock fragments which meet the standards as specified in the OPSS 1004.05.05.02 for R-50 Rip-Rap, and/or the standards for Rock Protection, OPSS 1004.05.05.03.

SP9.2.2 Geotextile

Geotextile shall be placed under the rock protection on the banks of the drain and over the rock check as shown on OPSD 219.211. The geotextile over the rock check is to permit drainage while filtering sediments and must be covered with a layer of rock.

SP9.2.3 Installation

Rock flow checks shall be installed as shown on OPSD 219.211 (provided in **Appendix A**).

SP9.3 Excavation

Sediment trap excavation shall be 15 m in length and 500 mm below the proposed grade (drain bottom), for the full width of the channel directly upstream of the straw bale or rock flow checks.

SP9.4 Sediment Removal

Accumulated sediment in the sediment trap shall be removed as necessary to affect maintenance repairs and immediately prior to the removal of the flow check.

SP9.5 Flow Check Removal

The straw bale and rock flow checks shall be removed after all construction is complete on the drainage works.

SP9.6 Measurement for Payment

Measurement will be by the number of sediment trap and straw bale or rock flow checks installed. Alternatively, erosion and sediment control items including flow checks may be combined into an overall lump-sum item for an all-inclusive erosion and sediment control plan and implementation item within the final contract.

SP9.7 Payment

Payment at the Contract price for the tender item "Sediment Traps" shall be full compensation for all labour, equipment and material required to complete the installation and removal of the sediment traps and straw bale or rock flow checks and sediment removal from the traps upon completion of the project. Alternatively, erosion and sediment control items including flow checks may be combined into an overall lump-sum item for an all-inclusive erosion and sediment control plan and implementation item within the final contract.

SP10.0 TILE OUTLET PROTECTION

Existing tile outlets shall be located by the Contractor and protected during construction. Where existing tile outlets are affected by the construction, they shall be restored by installing a CSP outlet pipe complete with a rodent grate (or alternative approved product). Rock protection, complete with geotextile filter cloth, shall be installed at the tile outlet to prevent erosion

Restoration of the tile outlets shall be completed in accordance with Std. Dwg. F (provided in **Appendix A**).

SP10.1 Material Specification

Rock protection and geotextile materials shall be in accordance with the specification for rock protection in these Special Provisions.

SP10.2 Measurement for Payment

Measurement will be by the unit price for each tile outlet restoration completed.

SP10.3 Payment

Payment for tile outlet restoration shall include for all materials, excavation and installation, including CSP end piece, rodent grate, rock protection and geotextile in accordance with Std. Dwg. F.

SP11.0 CULVERT END TREATMENTS

Culvert End Treatments shall be installed as indicated in the Std. Dwg. to prevent erosion and scour from the upstream and downstream culvert ends. End treatments shall be installed on the upstream and downstream end of each culvert shown on Dwg. No. 16002-A2, all in accordance with Std. Dwg. C (provided in **Appendix A**).

SP11.1 Payment

Payment for culvert end treatments shall include for all materials, excavation and installation, including rock protection and geotextile in accordance with Std. Dwg. C.

SP12.0 GUARANTEED MAINTENANCE

Upon completion of the work the Contractor will be required to post a guaranteed maintenance security for a period of 12 months, in the amount of 10% of the value of the work completed.

This amount will guarantee workmanship of such items as fencing, rock protection, seeding and culvert installation.

Should the Contractor schedule the work during months when seeding cannot be carried out, or should a seed catchment not be satisfactorily established, then subsequent repair of sloughed areas and excavation of the drains due to erosion of unseeded or inadequately seeded banks shall be carried out by the Contractor without any extra payment for such repair work.

SP13.0 MINISTRY OF ENVIRONMENT CONSERVATION AND PARKS – SPECIES AT RISK

The draft Engineer's Report for the East Savage Municipal Drain was circulated to Ministry of Environment Conservation and Parks (MECP) for review and screening for Species at Risk (SAR). The MECP provides documentation for SAR in the general vicinity of the drain and may require specific permissions/authorizations where the proposed work has direct impact on SAR or their habitat.

Where provided, a copy of the MECP Letter of Advice including conditions is attached and included in Appendix D.

The contractor must be aware that the SAR Act and that the individual species at risk are dynamic and subject to change. The contractor is responsible to ensure all necessary measures are taken to ensure no harm to any SAR or its habitat (if protected).

No specific species were noted for this project. However, Butternut Trees, and Barn Swallows may exist in the local vicinity.

Turtles and Aquatic SAR may also exist in the area, however, are not anticipated to be impacted where working in dry conditions.

The general procedures to be followed are outlined in the following sections. However, the contractor is advised that following these procedures may not eliminate the possibility of harm to a protected species. The contractor is responsible to ensure all necessary measures are taken to ensure no harm to any SAR or its habitat (if protected). Following these procedures and/or any additional required measures implemented by the contractor are to be performed at the contractor's expense, except as otherwise noted.

SP13.1 Species at Risk - Procedures (Barn Swallow)

Barn swallows have been documented in general/greater area of this site and typical habitats may exist adjacent to the proposed works. For work within the specified working area, it is not anticipated that barn swallow will be encountered, however, the contractor shall avoid unnecessarily disturbing structures and a sweep of all culverts to be removed (especially larger diameter or box culverts) shall be completed. Where barn swallows are found, all work that would directly affect the habitat (i.e. removal of the structure) shall stop, and the sighting be reported to the contract administrator.

SP13.2 Species at Risk – Procedures (Turtles and Aquatic Species)

Turtles and Aquatic SAR may also exist in the area, however, are not anticipated to be impacted where working in dry conditions.

13.4.1 Species at Risk – Payment (Barn Swallow)

Following the procedures as noted for barn swallows shall be considered part of the normal procedures with no additional payment made.

It is not anticipated that additional tasks shall be required in this regard, however, any additional specific task assigned to the contractor will, upon notice of intent to claim by the contractor, be considered for additional payment as per the General Conditions of the Contract.

13.4.2 Species at Risk – Payment (Turtles and Aquatic Species)

Following the procedures as noted for turtles shall be considered part of the normal excavation procedure with no additional payment made.

It is not anticipated that additional tasks shall be required in this regard, however, any additional specific task assigned to the contractor will, upon notice of intent to claim by the contractor, be considered for additional payment as per the General Conditions of the Contract.

SP14.0 SOUTH NATION CONSERVATION AUTHORITY – PERMISSION (O.REG. 175/06)

The Permit related to the “Development, Interference with Wetlands and Alterations to Shorelines and Watercourses” (O.Reg. 175/06) for works to be completed on the East Savage Municipal Drain by SNCA is contained in **Appendix D** of the Engineer’s Report. The Contractor shall ensure that any conditions are adhered to.

SP15.0 DEPARTMENT OF FISHERIES AND OCEANS – CLASS AUTHORIZATION

The class authorization letter and associated advice related to the Fisheries Act for works to be completed on the East Savage Municipal Drain by the Department of Fisheries and Oceans (DFO) is contained in **Appendix D** of the Engineer’s Report. The Contractor shall ensure that any advice/conditions are adhered to.

SP16.0 MINISTRY OF ENVIRONMENT CONSERVATION AND PARKS ENVIRONMENTAL CERTIFICATE OF APPROVAL

The Ministry of Environment Conservation and Parks – Environmental Compliance Approval (ECA) for works to be completed on the East Savage Municipal Drain is contained in **Appendix D** of the Engineer’s Report. The Contractor shall ensure that any advice/conditions are adhered to.

Appendix F

HEC-RAS Model Revisions Technical Memorandum

DETAILS

DATE: February 8th, 2021
TO: Andy Robinson, P. Eng.
FROM: Cody Newton, P. Eng.

SUBJECT: East Savage Municipal Drain SNC HEC-RAS Model Revisions

1.0 INTRODUCTION

As part of the East Savage Municipal Drain project, the South Nation Conservation Authority (SNC) requested a comparison of the existing model with the proposed geometry updates to the drain due to the spreading of excavated material from the drain within the flood plain.

The following activities were undertaken as part of assignment:

- Update the existing model geometry with surveyed structure data.
- Input proposed channel sections at each cross section.
- Modify existing overbanks at each cross section with proposed spread material.
- Input proposed structures.
- Compare water elevations for the existing and proposed models at the 100 year event.

This Technical Memorandum describes the methods and assumptions that were used to complete this assignment.

2.0 EXISTING HEC-RAS MODEL

An existing HEC-RAS model was provided by SNC for the East Savage/McKinnon's Creek drainage basins. The design peak flows used by SNC were reviewed and selected as the design peak flows to be used for this assignment. The geometry of the drain was reviewed and the SNC cross sections were used with modifications made to the structures based on field survey data.

As part of the East Savage Municipal Drain project a full detailed survey of the drain was completed and with this, up to date structure details for each crossing. This information included the inverts of the structures as well as dimensions including span, rise, and length. This data was used to update the existing geometry. The model was run with the modified geometry file and existing design peak flows to obtain the baseline water elevations and velocities through the drain.

The profile of the channel in the existing model was found to be higher than the surveyed profile along the entire drain. The difference ranges between 0.40 m and 1.10 m.

The stationing in the HEC-RAS model differs from the design stationing shown on the drawings. This is because the model terminates the East Savage Municipal Drain at the confluence with the Richard Clark Municipal Drain. On the design drawings the East Savage Municipal Drain is terminated at the Bear River Municipal Drain which is approximately 230 m downstream from the confluence with the Richard Clark Municipal Drain. Therefore, to find equivalent stationing between the model and design drawings 230 m has been subtracted from the design stationing.

3.0 PROPOSED DRAIN MODIFICATIONS

3.1 Channel Cross Sections

A new profile for the drain was selected which included a new cross section for the channel. These cross sections were designed to contain the 5 year design event at a minimum. The side slopes are 2:1 throughout the drain and the channel bottom width varies from 2.0 m to 4.5 m.

The profile has been designed as a two stage profile to improve the base flow channel for fish habitat. This two stage profile includes a 300 mm raised section ranging from 1.0 m to 2.0 m in width.

A portion of the drain (Sta. 7+501 to Sta. 8+047) is to be realigned. From the end of the existing East Savage Municipal Drain (Sta. 7+008) to the end of the realignment (Sta. 8+047), the existing cross sections were replaced with the proposed sections through this portion of the drain. The realignment cross section layout is shown in the figure appended to this memorandum. The existing cross sections elsewhere in the drain were updated with the proposed channel sections. The proposed cross-sections are presented in drawings 16002-C1 and 16002-C2 appended to this memorandum.

3.2 Spread Material

In order to construct the proposed profile and cross sections material needs to be excavated from the drain. For a municipal drain project the excess material is typically spread on the adjacent lands of the drain. The material is placed outside of a 5 m buffer from top of bank of the channel and to a maximum depth of 150 mm.

The required width of the spread material was determined by calculating the excavated material volumes between specific stations and then dividing by the maximum fill depth of 150 mm. The spread length was kept to a maximum of 50 m from the buffer strip.

The cross sections in the model were then modified by increasing the existing points outside of the 5 m buffer strip up to the required spread length by 150 mm to account for the change in elevation through these areas.

3.3 Structures

It is proposed to replace all culverts along the drain as part of the scope of work. The proposed structures were sized based on the appropriate design event and the design peak flows were taken from the HEC-RAS model. These proposed structures were updated in the model for the proposed conditions.

4.0 RESULTS

The existing conditions model and proposed conditions model were both run with the 100 year design event flows (1D+2D flows) and the results are attached to this memorandum. The final (after improvements) water levels along the entire drain are equal to or below the existing conditions. For more frequent design events more of the water volume is captured and maintained within the design channel due to the proposed profile and cross section modifications.

The velocities are comparable between the existing and proposed conditions with a minimal increase under proposed conditions. In a few select locations the velocities appear to have increased significantly (Sta. 7544, Sta. 6975), these locations fall within the proposed realignment of the drain. The reason for the increased velocities is that the proposed cross sections have a defined

channel which captures most of the flow. This has decreased the cross-sectional area significantly which has increased the velocities. Through the realigned section of the drain erosion protection measures (rock protection) are proposed at all bends.

Prepared by:

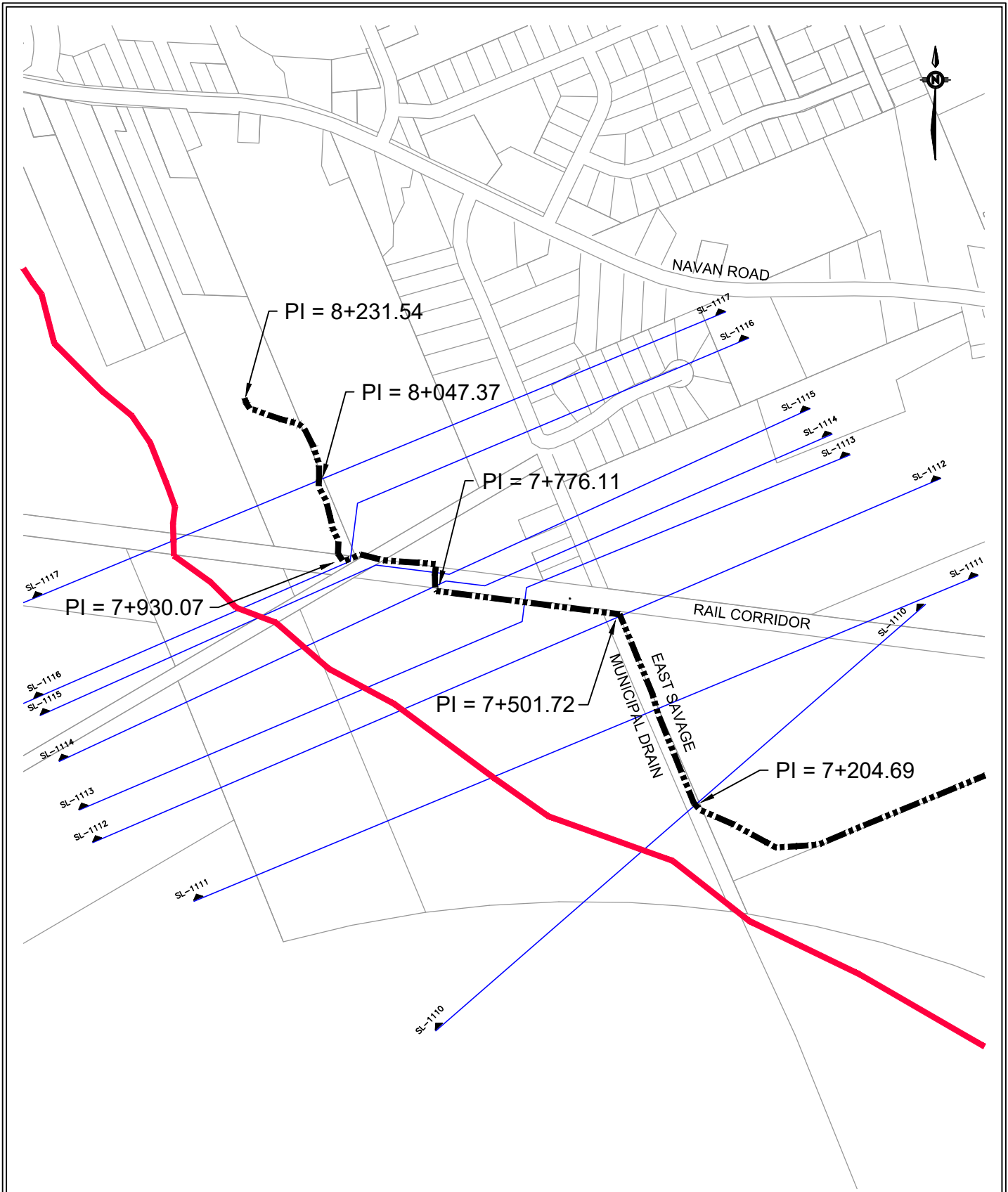


Cody Newton, P. Eng.

Reviewed by:

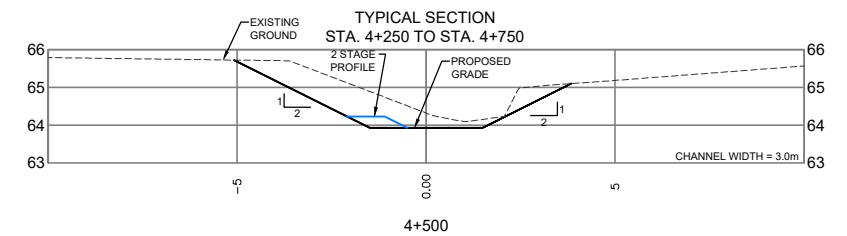
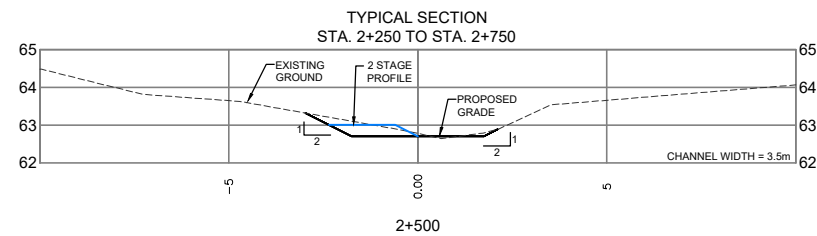
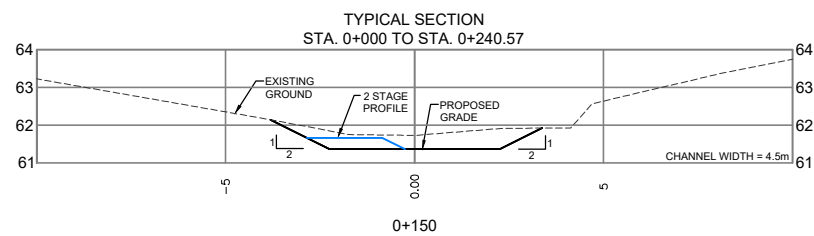
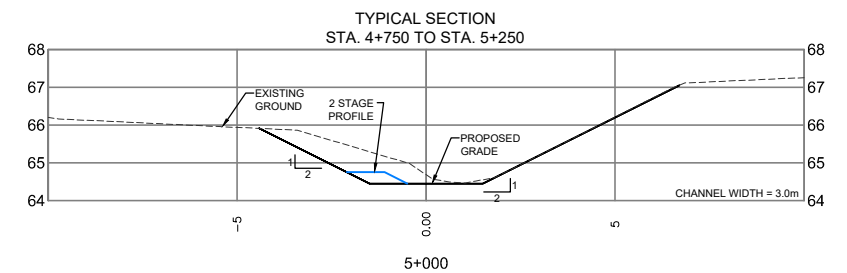
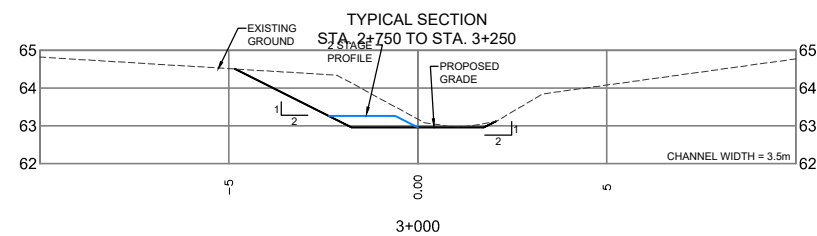
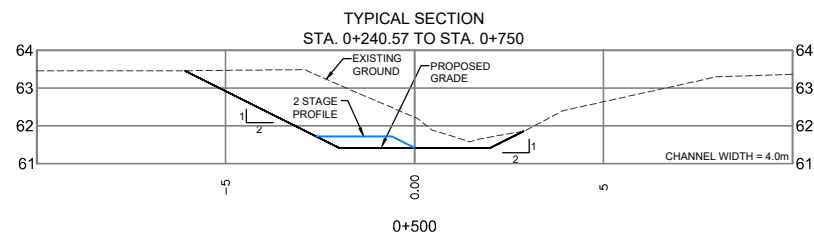
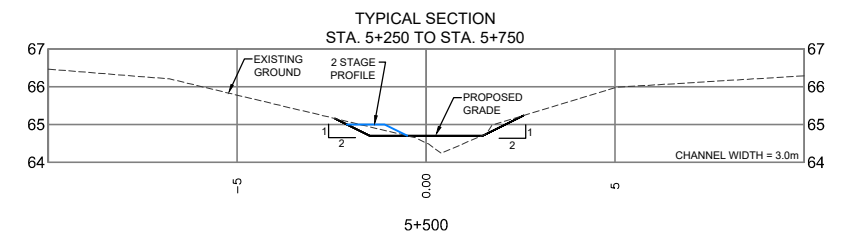
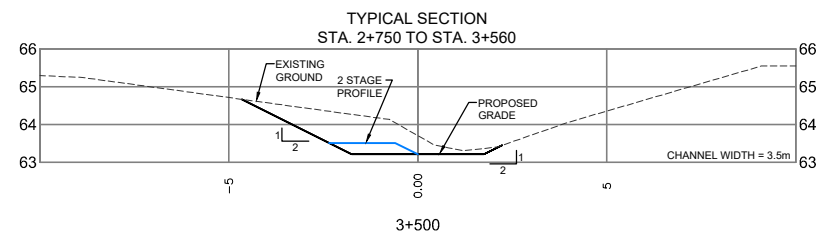
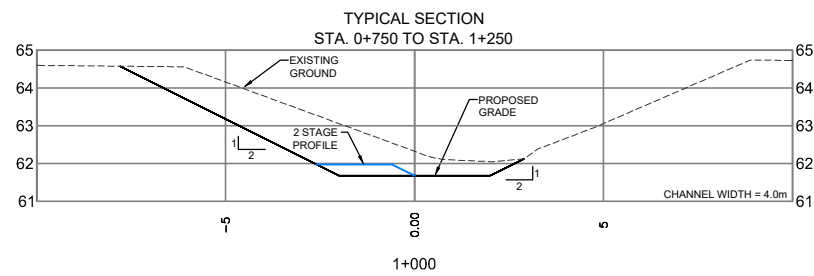
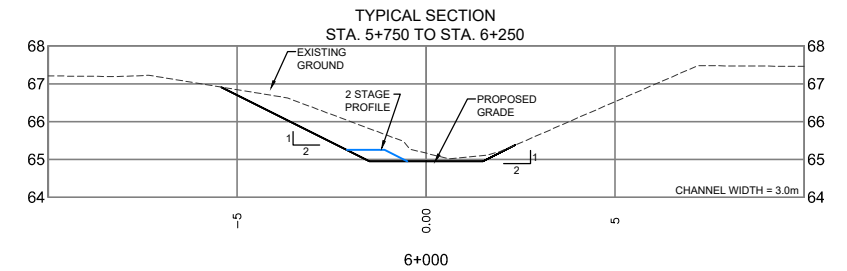
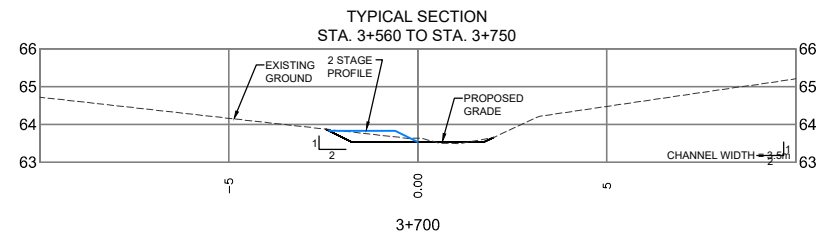
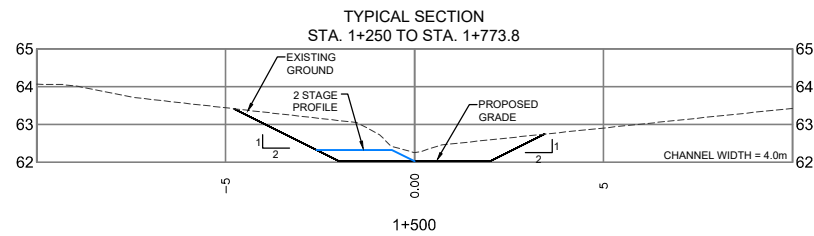
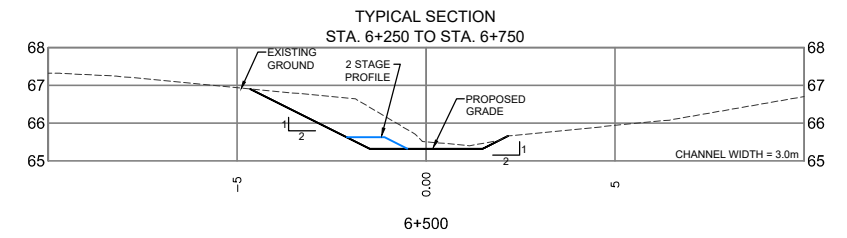
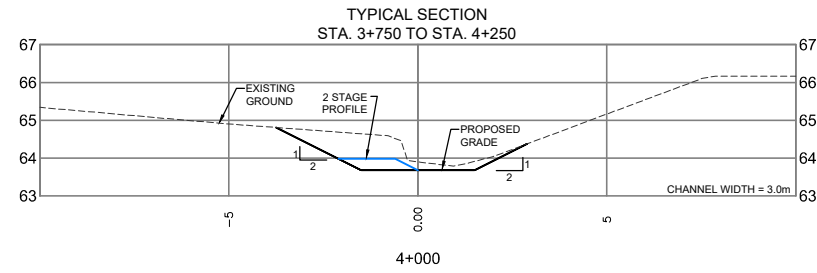
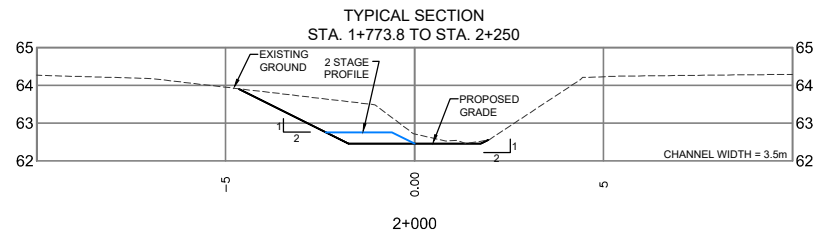


Barbara St-Aubin, M.A.Sc., P. Eng.

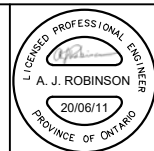


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Title HEC-RAS GEOMETRY REALIGNMENT LAYOUT		Fig. No. HR
Project EAST SAVAGE MUNICIPAL DRAIN		Job No. 16002
Scale	Date DEC 2020	

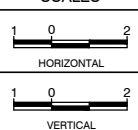


No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
2	11.06.20	ISSUED FOR MECP ECA APPLICATION	AJR



Professional Engineers
Ontario
20106/11
Licensed Engineering Technologist
Name: L. PRINCE
Number: 105601333
Limitations: Providing para. non-technical content of reports and other non-technical devices for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

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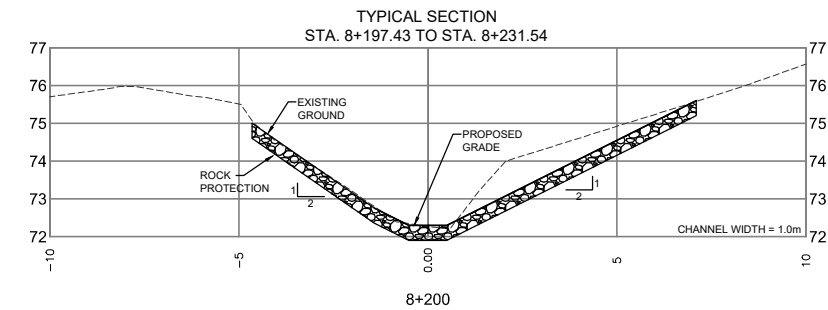
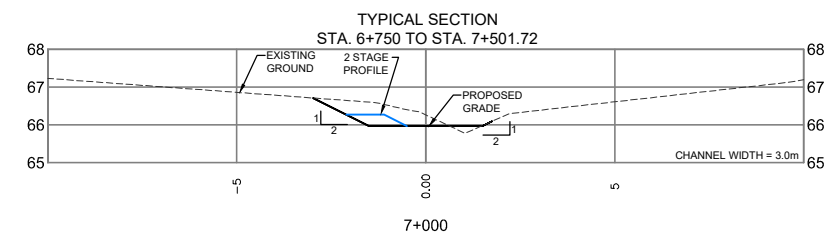
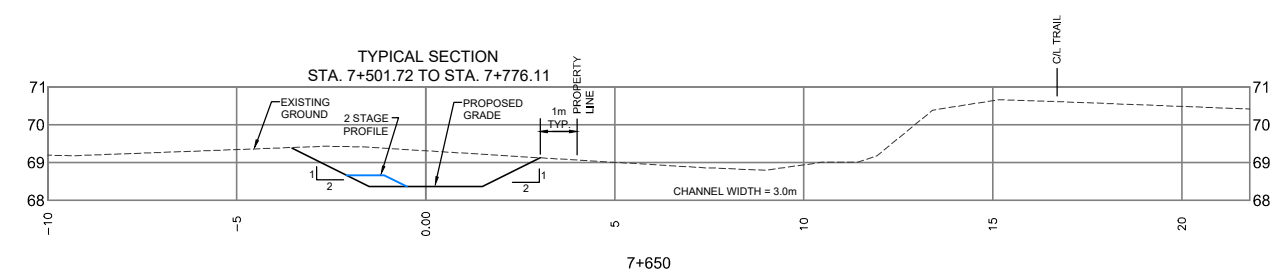
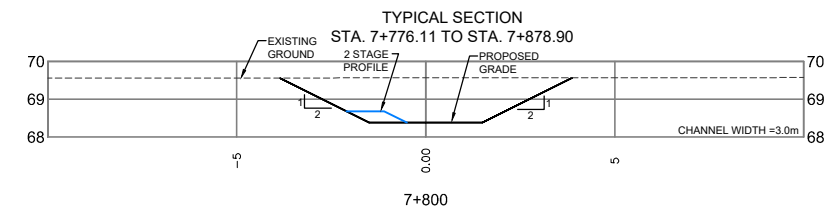
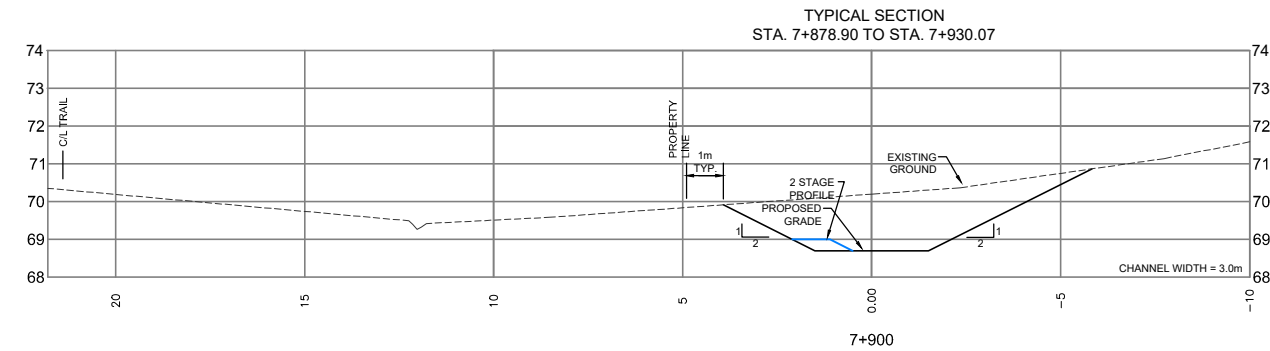
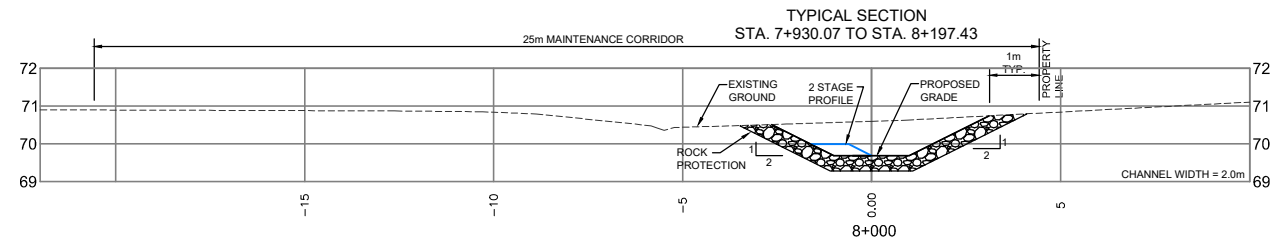
DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

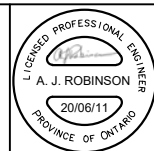
EAST SAVAGE MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN

PROJECT No.	16002
CONTRACT No.	
DATED	JUNE 2020
DWG. No.	16002-C1



No.	DATE	REVISION	BY
1	15.04.20	ISSUED FOR MUNICIPAL REVIEW	AJR
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Professional Engineers
Ontario
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Licensed Engineering Technologist
Name: L. PRINCE/LE
Number: 10560333
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SCALES	
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DESIGN	LF
CHECKED	AJR
DRAWN	LG
CHECKED	LF
APPROVED	AJR

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EAST SAVAGE MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN

PROJECT No.	16002
CONTRACT No.	
DATED	JUNE 2020
DWG. No.	16002-C2

Existing East Savage HEC-RAS Model Results

HEC-RAS Plan: SNC Profile: Q100

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chi
Creek US	8687	Q100	11.40	80.43	85.64	81.49	85.64	0.000009	0.25	138.06	123.91	0.04
Creek US	8681	Q100	11.40	80.28	85.64	81.96	85.64	0.000007	0.22	150.38	118.95	0.03
Creek US	8657		Culvert									
Creek US	8629	Q100	11.40	78.79	80.44	80.44	81.15	0.012246	3.94	3.16	9.00	1.03
Creek US	8624	Q100	11.40	78.87	80.00	80.00	80.36	0.013505	3.35	5.13	7.11	1.05
Creek US	8561	Q100	11.40	78.21	79.46		79.55	0.002076	1.42	10.08	12.55	0.42
Creek US	8556	Q100	11.40	77.78	79.32	79.12	79.50	0.005066	2.07	7.14	10.24	0.62
Creek US	8552		Bridge									
Creek US	8548	Q100	11.40	78.07	79.29	79.02	79.45	0.004138	1.82	7.10	9.27	0.58
Creek US	8540	Q100	11.40	78.09	79.28		79.40	0.003321	1.75	9.41	13.47	0.53
Creek US	8403	Q100	11.40	76.89	79.30		79.31	0.000172	0.57	29.80	23.16	0.13
Creek US	8398	Q100	11.40	76.54	79.29	78.24	79.30	0.000359	0.71	23.52	24.84	0.17
Creek US	8389		Culvert									
Creek US	8378	Q100	11.40	76.22	77.99	77.99	78.75	0.015417	4.21	3.12	6.66	1.02
Creek US	8373	Q100	11.40	76.26	77.32	77.32	77.64	0.015236	2.53	4.51	7.06	1.01
Creek US	8235	Q100	11.40	74.13	75.23	75.16	75.51	0.008734	2.58	5.74	9.07	0.84
Creek US	8135	Q100	11.40	73.50	74.56	74.56	74.72	0.008454	2.17	8.74	24.14	0.78
Creek US	7935	Q100	11.40	71.94	72.85	72.75	72.95	0.008063	2.11	9.34	19.22	0.77
Creek US	7761	Q100	11.40	70.35	70.69	70.69	70.75	0.022901	1.63	12.84	97.00	1.08
Creek US	7580	Q100	11.40	69.42	70.71	69.74	70.71	0.000003	0.05	452.11	979.78	0.01
Creek US	7572	Q100	11.40	69.33	70.71	70.64	70.71	0.000003	0.05	461.96	812.15	0.02
Creek US	7565		Culvert									
Creek US	7558	Q100	11.40	69.33	70.64	70.64	70.64	0.000002	0.05	463.12	612.04	0.01
Creek US	7553	Q100	11.40	69.30	69.91	69.87	69.94	0.004895	1.28	22.92	147.42	0.57
Creek US	7434	Q100	11.40	68.73	69.27	69.27	69.29	0.005480	0.90	24.40	167.54	0.54
Creek US	7034	Q100	16.20	67.83	68.16		68.17	0.004492	0.74	54.62	203.65	0.48
Creek US	6634	Q100	16.20	67.26	68.10	67.24	68.10	0.000037	0.11	168.04	238.64	0.05
Creek US	6482	Q100	13.45	66.54	67.69	67.69	68.05	0.015363	2.64	5.09	7.20	1.00
Creek US	6234	Q100	13.45	65.85	67.37		67.38	0.000447	0.58	66.83	325.21	0.19
Creek US	6087	Q100	13.45	65.79	67.32		67.32	0.000558	0.59	63.51	337.58	0.20
Creek US	6081	Q100	13.45	65.76	67.31	67.05	67.32	0.000381	0.64	67.69	331.35	0.18
Creek US	6075		Culvert									
Creek US	6070	Q100	13.45	65.73	67.31	67.15	67.32	0.000534	0.56	64.51	305.43	0.20
Creek US	6065	Q100	13.45	65.70	67.31		67.32	0.000544	0.59	64.75	307.34	0.20
Creek US	5934	Q100	13.45	65.61	67.24		67.24	0.000483	0.51	63.86	282.28	0.18
Creek US	5656	Q100	13.45	65.37	67.07		67.08	0.000726	0.71	62.23	317.62	0.23
Creek US	5234	Q100	13.45	65.16	66.86		66.86	0.000385	0.49	97.76	472.98	0.17
Creek US	4981	Q100	7.93	65.07	66.65	65.94	66.71	0.001611	1.08	7.37	7.10	0.34
Creek US	4534	Q100	7.93	64.68	66.43		66.44	0.000297	0.47	37.60	152.81	0.15
Creek US	4134	Q100	7.93	64.74	66.20		66.23	0.001033	0.82	25.11	144.66	0.27
Creek US	3734	Q100	7.93	64.41	65.79	65.08	65.83	0.001010	0.88	9.05	8.77	0.28
Creek US	3434	Q100	9.03	64.02	65.76		65.76	0.000077	0.24	106.41	516.83	0.08
Creek US	3391	Q100	9.03	64.02	65.76	65.19	65.76	0.000091	0.24	104.06	525.71	0.08
Creek US	3387		Culvert									
Creek US	3383	Q100	9.03	64.23	65.76	65.51	65.76	0.000175	0.31	90.00	500.89	0.11
Creek US	3377	Q100	9.03	63.90	65.75		65.76	0.000108	0.26	94.53	507.76	0.09
Creek US	3234	Q100	9.03	64.08	65.74		65.74	0.000085	0.24	92.34	338.51	0.08
Creek US	3081	Q100	9.03	64.29	65.74		65.74	0.000016	0.10	206.37	575.66	0.03
Creek US	3076	Q100	9.03	63.93	65.74	65.16	65.74	0.000015	0.11	208.12	565.79	0.03
Creek US	3071		Culvert									
Creek US	3067	Q100	9.03	63.78	65.74	64.96	65.74	0.000013	0.09	217.78	639.14	0.03
Creek US	3062	Q100	9.03	63.96	65.74		65.74	0.000013	0.09	221.99	624.16	0.03
Creek US	2721	Q100	9.03	63.45	65.74		65.74	0.000008	0.09	218.42	632.46	0.03
Creek US	2716	Q100	9.03	63.51	65.74	64.69	65.74	0.000007	0.08	230.33	641.09	0.02
Creek US	2710		Culvert									
Creek US	2705	Q100	9.03	63.42	65.73	64.72	65.73	0.000005	0.08	263.28	713.41	0.02
Creek US	2700	Q100	9.03	63.45	65.73		65.73	0.000005	0.08	277.16	769.38	0.02
Creek US	2535	Q100	9.03	63.72	65.73		65.73	0.000003	0.05	369.53	778.45	0.02
Creek US	2235	Q100	9.03	63.27	65.73		65.73	0.000001	0.03	575.36	852.78	0.01
Creek US	1935	Q100	9.03	63.30	65.73		65.73	0.000001	0.03	583.74	1002.98	0.01
Creek US	1736	Q100	9.03	63.51	65.73		65.73	0.000001	0.03	723.42	1099.61	0.01
Creek DS	1530	Q100	8.36	63.18	65.73	64.13	65.73	0.000000	0.03	915.24	1295.95	0.01
Creek DS	1327	Q100	8.36	63.09	65.73		65.73	0.000000	0.02	1078.61	1377.72	0.00
Creek DS	1322	Q100	8.36	62.97	65.73	64.04	65.73	0.000000	0.02	1104.81	1379.31	0.00
Creek DS	1316		Culvert									
Creek DS	1310	Q100	8.36	62.97	65.73	64.00	65.73	0.000000	0.02	1139.80	1399.08	0.00
Creek DS	1305	Q100	8.36	62.91	65.73		65.73	0.000000	0.02	1194.96	1397.94	0.00
Creek DS	1036	Q100	8.36	62.91	65.73		65.73	0.000000	0.01	1380.95	1411.82	0.00
Creek DS	644	Q100	8.36	62.67	65.73		65.73	0.000000	0.01	1934.72	1681.99	0.00
Creek DS	637	Q100	8.36	62.70	65.73	63.80	65.73	0.000000	0.01	1969.68	1691.72	0.00
Creek DS	632		Culvert									
Creek DS	625	Q100	8.36	62.30	65.73	63.38	65.73	0.000000	0.01	2011.54	1706.75	0.00
Creek DS	620	Q100	8.36	62.49	65.73		65.73	0.000000	0.01	2040.76	1701.94	0.00
Creek DS	432	Q100	8.36	62.97	65.73		65.73	0.000000	0.01	2227.41	1578.11	0.00
Creek DS	232	Q100	19.12	62.43	65.73		65.73	0.000000	0.02	2042.45	1207.84	0.00
Creek DS	40	Q100	19.12	62.19	65.73		65.73	0.000002	0.06	569.23	382.56	0.01
Creek DS	35	Q100	19.12	62.19	65.73	63.49	65.73	0.000001	0.07	573.42	379.02	0.01
Creek DS	19		Culvert									
Creek DS	2	Q100	35.94	62.25	65.71	64.25	65.71	0.000013	0.16	405.80	337.47	0.04

HEC-RAS Plan: SNC Profile: Q100 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Creek DS	0	Q100	35.94	62.22	65.71	63.52	65.71	0.000005	0.13	548.18	338.27	0.02

HEC-RAS Plan: SNC Profile: Q100 (Continued)

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Creek DS	2	Q100	35.94	61.36	65.71	63.39	65.71	0.000011	0.18	415.92	337.47	0.03
Creek DS	0	Q100	35.94	61.36	65.71	62.97	65.71	0.000005	0.13	549.60	338.27	0.02