Robinson Consultants

Amendment to the Engineer's Report for the Regimbald Municipal Drain

Prepared For:

Ottawa

Prepared By:

Robinson Consultants Inc.
Consulting Engineers

Our Project No. 18002
February 2020

February 27th, 2020

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**
Regimbald Municipal Drain
Cumberland Ward
Our Project No. 18002

Dear Sir:

This Amendment to the Engineer's Report for the Regimbald Municipal Drain, Cumberland Ward, which is respectfully submitted for Council's consideration, was initiated by the City of Ottawa under Section 78 of the Drainage Act, RSO 1990. The purpose of the report is to accommodate a change in land use from rural/agricultural to commercial development for portions of the lands within the drainage area of the Regimbald Municipal Drain. This Report makes modifications to the existing Engineer's Report entitled "Engineer's Report Regimbald Drain", September 4, 1960, by L. A. Doxsee, O.L.S. which was enacted by By-Law No. 1417 of the former Township of Cumberland. All sections of the Regimbald Drain, including the Branch Drain, covered by the September 1960 report by L. A. Doxsee, O.L.S. have been incorporated into this report, therefore, the "Engineer's Report Regimbald Drain", September 4, 1960, by L. A. Doxsee, O.L.S 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 Regimbald Municipal Drain will be assessed to the owners/developers of the lands identified as Block A and Block B on Dwg. No. 18002-A3. Modifications to the Regimbald Municipal Drain will be completed in advance of the development of the lands.

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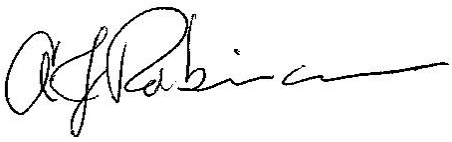
If you have any questions, please feel free to contact the undersigned at 613-592-6060 extension 104 or Lorne Franklin at extension 123.

Yours very truly,

ROBINSON CONSULTANTS INC.



A.J. Robinson, P. Eng.
Drainage Engineer

Lorne Franklin, L.E.T., C.E.T.
Licensed Engineering Technologist
Drainage Services

AJR: plw

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

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1.0 INTRODUCTION

Robinson Consultants Inc. was appointed by the City of Ottawa on December 13, 2017 to complete an Engineer's Report to amend the existing Engineer's Report for the Regimbald Municipal Drain. The Amendment to the Engineer's Report for the Regimbald Municipal Drain was initiated by the City of Ottawa under Section 78 of the Drainage Act at the request of the developers/landowners of the lands within the development area.

1.1 On-Site Meeting

An on-site meeting of the affected landowners and concerned parties was held on June 18, 2018.

2.0 PURPOSE OF THE AMENDMENT REPORT

The City of Ottawa initiated the Amendment to the Engineer's Report under Section 78 of the Drainage Act, RSO 1990, in conjunction with the development of lands within the drainage area. The purpose of the Report is to accommodate the change in land use from rural/agricultural to urban development for the lands identified as Block A and Block B on Dwg. No. 18002-A3.

To accommodate these changes, amendments are required to the existing Engineer's Report, entitled "Engineer's Report Regimbald Drain", September 4, 1960, by L. A. Doxsee, O.L.S. The amendments include modifications to portions of the main drain and the branch drain referred to as Branch No. 1. All sections of the Regimbald Municipal Drain covered by the September 4, 1960 report by L. A. Doxsee, O.L.S. have been incorporated into this report, therefore, the "Engineer's Report Regimbald Drain", September 4, 1960, by L. A. Doxsee, O.L.S. will no longer have any status under the Drainage Act, RSO 1990 once the new by-law for this report is enacted.

Modifications are as detailed in the following sections.

2.1 Modifications – Main Drain

Modifications to the existing Regimbald Municipal Drain include lowering the profile and increasing the cross-section of the drain to accommodate the proposed drainage and stormwater management systems for the development area.

The existing portion of the Main Drain upstream of the Hwy. 417 ROW is to be abandoned by this report, however the proposed modification of the drain allows for a stub to be extended 5m into the adjacent property to allow for the connection of future storm water management facilities (as proposed by the developer). As such, the limit of construction for the proposed drain is at Station 2+575 (end of the proposed stub, five metres south of the southerly property line of Highway 417).

2.2 Modifications – Branch Drain

The existing branch drain (referred to as Branch No. 1 in this report) of the Regimbald Municipal Drain is modified to accommodate the proposed development in Block B. The modifications to Branch No. 1 will include lowering a portion of the profile and increasing the cross-section area as well as replacing culverts as identified to accommodate the proposed drainage and stormwater management system for the development area.

The existing portion of Branch No. 1 upstream of Station 10+946, the westerly road allowance of Frontier Road, is abandoned by this report.

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 Simpson Municipal Drain (Station 1+210.20 on the Simpson Municipal Drain). The modifications to the existing municipal drain governed by this report commence at Station 0+000 and continue upstream for 2,575 metres, terminating five metres south of the southerly property line of Highway 417 at Station 2+575. The remaining portion of the existing main drain upstream of this location is abandoned by this Engineer's Report.

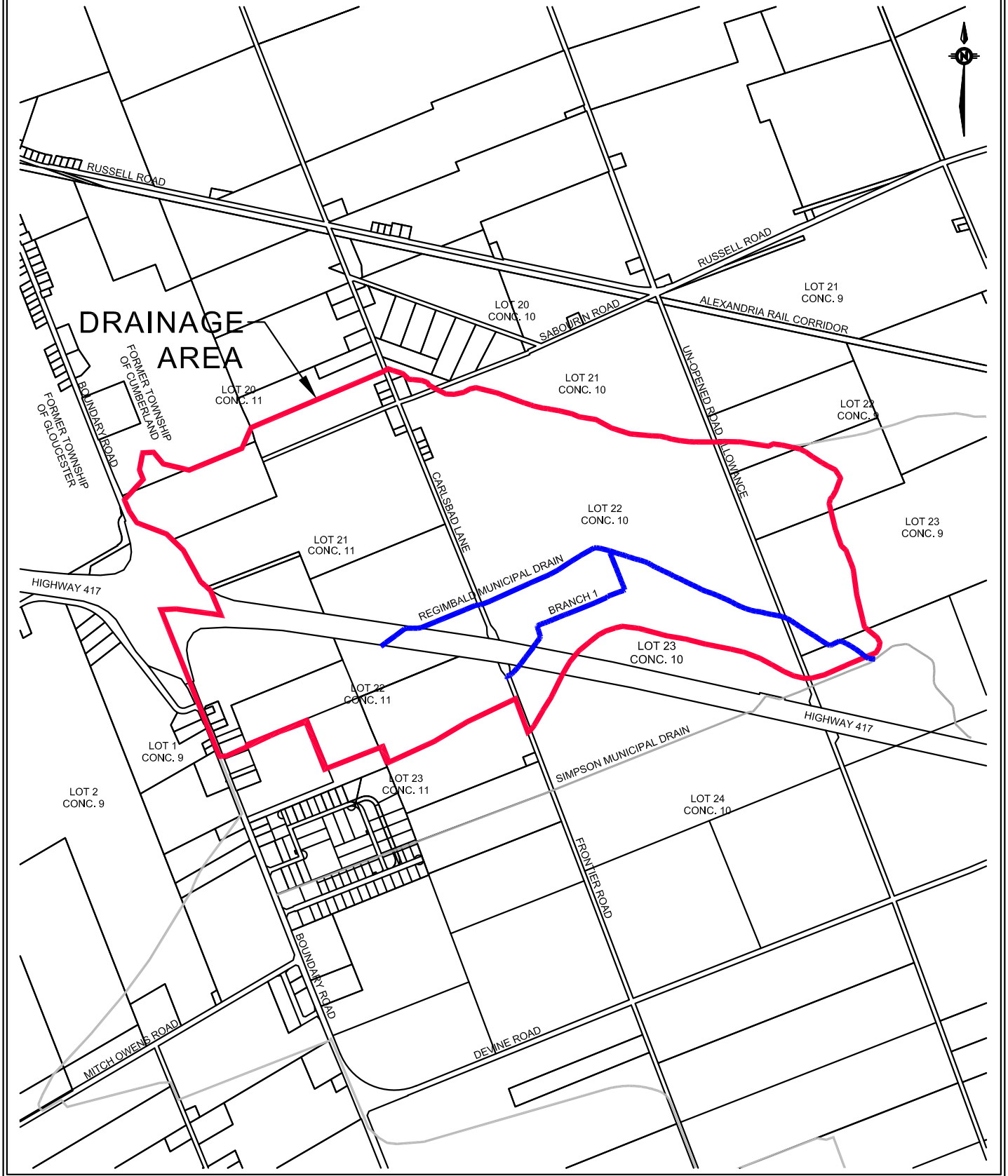
Branch No. 1 of the Regimbald Municipal Drain commences at the confluence with the main drain at Station 1+379.62 of the main drain. Branch No. 1 commences at Station 10+000 and extends upstream 946 metres to the westerly road allowance of Frontier Road at Station 10+946. The remainder of the existing branch drain is abandoned by this Engineer's Report.

The location of the drainage area is shown on the Location Plan - **Figure 3.1**.

3.2 Drainage Basin and Limits

The drainage basin for the Regimbald 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 Lots 22-24 Con. 9, Lots 20-24 Con. 10 and Lots 20-23, Con. 11 in the former Township of Cumberland.

The drainage area of the Regimbald Municipal Drain is approximately 420 hectares (1035 acres). The limits of the drainage boundary (drainage basin) are shown on Dwg. No. 18002-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 and field reconnaissance.



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Title: LOCATION PLAN		Fig. No. 3.1
Project: REGIMBALD MUNICIPAL DRAIN		Job No. 18002
	Scale: NTS	Date: FEBRUARY 2020

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

Drawing No. 18002-A1 shows the drainage area boundary, the proposed drain and identification of the areas that form Blocks A and B.

Drawing No. 18002-A2 shows culverts and the proposed sediment and erosion control plan.

Drawing No. 18002-A3 shows blocks and individual properties that form part of the drainage area indicating an ID number for reference to the Schedule of Assessment for future maintenance, and the area of each property that is within the drainage area.

Drawings No. 18002-P1 thru P8 include a profile for the proposed modifications to the existing drain and branch as well as the sections of drain to be abandoned by this report.

The design cross-sections for the main drain and branch drain are shown of Dwg. No. 18002-C1.

Standard Municipal Drain details are provided on Robinson Consultants Inc. Std. Dwg. 1 through 6 (inclusive) and Dwg. 10.

All above noted drawings are provided in **Appendix A**.

4.0 AREA REQUIRING DRAINAGE

The area requiring drainage under this report for Modifications and Improvements of the Regimbald Municipal Drain includes Blocks A and B as shown on Dwg. No. 18002-A1 and 18002-A3

5.0 DESIGN CONSIDERATIONS

5.1 Proposed Development Areas

The drainage design within Block A was completed by Novatech Engineering Consultants Inc. as the engineer retained for the development of the lands in and was approved by the City of Ottawa and the South Nation River Conservation Authority in conjunction with the development application process. Hydrology, hydraulics and stormwater management associated with Block A, is included in the report entitled "Stormwater Management Report, Boundary Road Distribution Centre 5371 Boundary Road, Ottawa Ontario" prepared by Novatech Engineering Consultants Inc., dated April 12, 2018.

The drainage design within Block B was completed by Golder Associates Ltd., the engineer retained to complete the engineering for the development of the lands in Block B and approved by the City of Ottawa and the South Nation River Conservation Authority. Hydrology, hydraulics and stormwater management associated with Block B is included in the report entitled Appendix A, Stormwater Management System Design Volume IV, Design and Operations Report, Capital Region Resource Recovery Centre" prepared by Golder Associates Ltd., dated December 2014.

5.2 Hydrologic Modeling

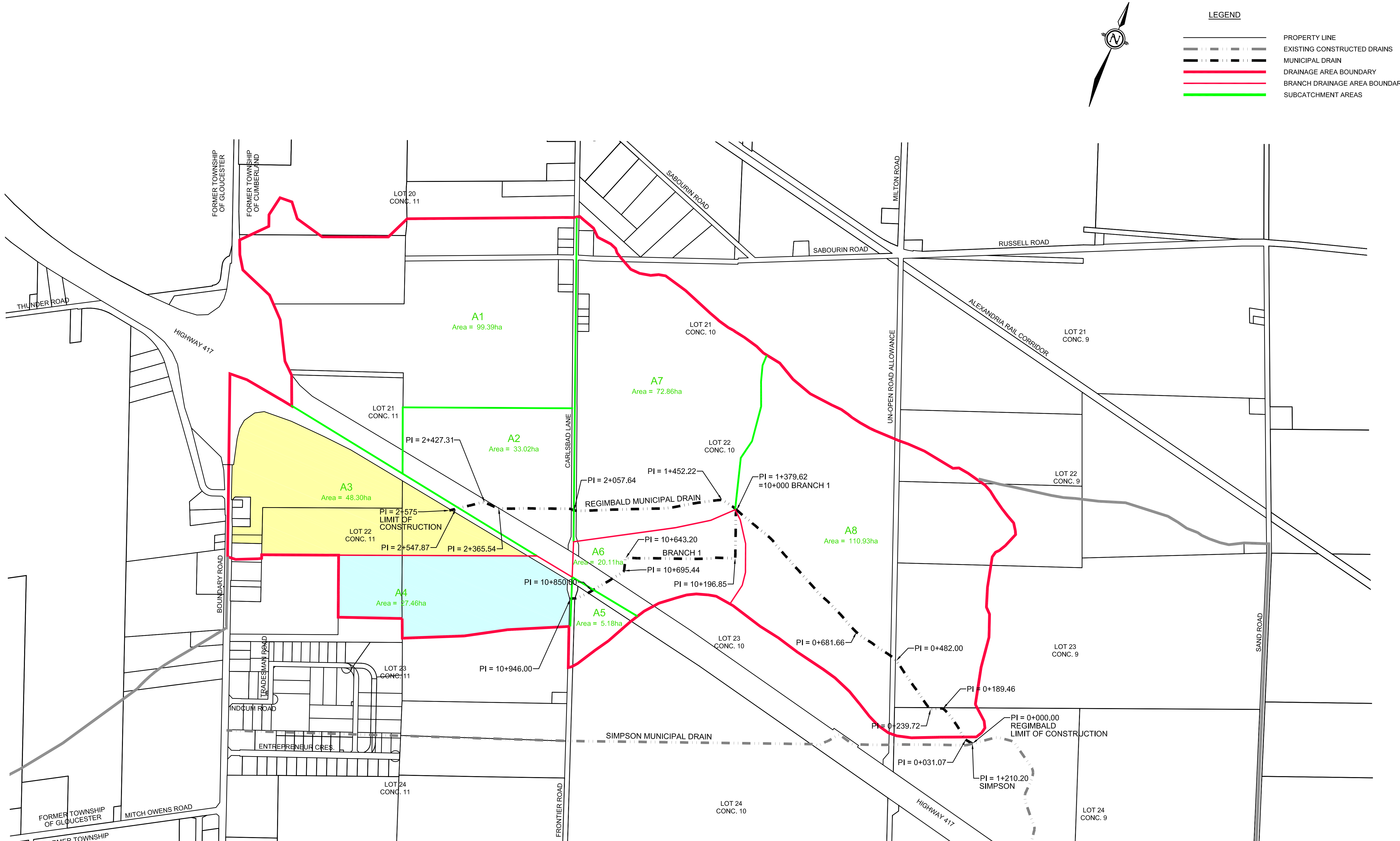
The location of the drainage area and associated sub-catchment areas of the drain are shown on **Figure 5.1**.

The SWMHYMO model was developed to generate runoff rates from rainfall events. The rainfall events used for the generation of these hydrographs are the 2, 5, 10, 25, 50, and 100 years design storms. Rainfall hydrograph ordinates for the various events were calculated using data obtained from the Ottawa International Airport, Atmospheric Environment Service rain gauge. The 12-hour SCS type II storm distribution was used. An average soil moisture condition was assumed for all flow simulations. Other parameters required for hydrograph generation are basin area, initial abstraction, slope, fraction impervious, and soil curve number. For modeling purposes, the watershed was divided into sub-catchments based on the drainage area of tributary drains or branches (sub-divided where required) and areas directly tributary to the main drain. Each sub-catchment (as shown on Figure 5.1), was described by the various hydrologic parameters required by the model. For the purpose of the hydrologic modelling, the sub-catchments were combined into larger effective tributary areas.

The sub-catchments were modeled using the CALIB WILHYD routine that requires three basic parameters; SCS Curve Number (CN), time to peak (TP), and the shape factor K. The CN number is used by the model to transform rainfall inputs into runoff, therefore, the parameter reflects all runoff related phenomena such as infiltration, interception and depression storage.

5.3 Modeling Results

The rainfall-runoff relationship of the Regimbald Municipal Drain was evaluated for existing and proposed land use conditions. This provided flow estimates for the watershed under existing and proposed conditions. The total instantaneous peak flows for various return period design flows for proposed land use conditions at key locations along the Drain are presented in **Table 5.1**. Table 5.1 should be reviewed in conjunction with Figure 5.1 and Dwg. No. 18002-A1, which shows a plan view of the watershed. The flows are calculated at various locations along the main drain and branch drain between Blocks A and B and the Simpson Municipal Drain.



No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

Professional Engineers Ontario — A. J. ROBINSON — 2020/02/27

Professional Engineers Ontario — Licensed Engineering Technologist — Name: L. FRANKLIN — 20/02/27

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CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

SUBCATCHMENT AREAS

PROJECT No. 18002
CONTRACT No.
DATED FEBRUARY 2020
DWG. No:
FIG 5.1

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. 2+575 (A3)	0.151	0.322	0.447	0.636	0.792	0.959
STA 2+060 to STA. 2+575 (A1, A2)	0.602	1.249	1.717	2.419	2.994	3.605
STA. 1+380 to STA. 2+060 (A7)	0.790	1.667	2.306	3.268	4.059	4.904
STA. 1+380 to STA. 0+000 (A8)	1.243	2.629	3.640	5.165	6.421	7.762
Branch						
STA. 10+946 (A4)	0.108	0.215	0.291	0.402	0.492	0.587
STA. 10+850 to STA. 10+946 (A5)	0.130	0.260	0.353	0.489	0.600	0.717
STA. 10+000 to STA 10+850 (A6)	0.175	0.358	0.490	0.686	0.846	1.016

5.4 Additional Culverts

Additional culverts related to the internal development design of Blocks A and B are to be installed as part of the proposed work related to Blocks A and B. The culverts that are internal to the proposed developments do not form part of the Municipal Drain, therefore, no additional culverts are required on the Regimbald Municipal Drain.

5.5 Drain Abandonment

The portion of the existing Regimbald Municipal Drain and Branch No. 1 within Blocks A and B respectively, upstream of Station 2+575 on the main drain and Station 10+946 on the branch drain are abandoned by this report and the resulting By-law.

5.6 Side Slopes (Typical Cross Section)

The side slopes on the various sections of the main drain and branch drain are as shown on Dwg. No. 18002-C1.

To address fisheries concerns a two-stage profile is incorporated into the profile and cross-section at 300mm above the proposed profile. The two-stage profile is described in further detail in Section 5.10 of this Report.

5.7 Capacity of Existing Culverts and Bridges

5.7.1 General

The capacities of existing culverts along the Regimbald 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*	Flow Return Period					
		2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
Main Drain – Roadway Culverts							
Hwy 417 (2+525)	2.200	0.151	0.322	0.447	0.636	0.792	0.959
Carlsbad Ln (2+057)	2.600	0.602	1.249	1.717	2.419	2.994	3.605
Branch – Roadway Culverts							
Frontier Rd (10+946)	0.210	0.108	0.215	0.291	0.402	0.492	0.587
Hwy 417(10+832)	1.300	0.130	0.260	0.353	0.489	0.600	0.717

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.*

5.7.2 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 10 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 the criteria established by the Road Authority. The design return period for each structure depends on its type, location and function. For the Regimbald 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.

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 Regimbald Municipal Drain and Branch No. 1 is to be the responsibility of the property owners of Block A and Block B respectively. 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 access culverts that require replacement to increase capacity are noted in **Table 5.4**. Where the alignment of the drain segments isolates a portion of 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 owners expense.

Table 5.3
Capacity of Roadway Culverts that Require Replacement

Culvert Location	Existing		Proposed	
	Size/Type	Length (m)	Size/Type	Length (m)
Branch – Roadway Culverts				
Frontier Rd (10+936)	500mm CSP	12.4	600mm CSP	15.0

Table 5.4
Capacity of Private and Farm Crossings that Require Replacement

Culvert Location	Existing		Proposed	
	Size/Type	Length (m)	Size/Type	Length (m)
None Required				

5.7.3 Roadway Culvert Sizing

Highway 417 culverts are normally sized to accommodate the 100 year return period flow.

Frontier Road is a rural access road. The typical design standard for culverts associated with rural roads is the 10 year return period flow. However, the selection of the design return period, culvert size and culvert material is to be made by the Road Authority and should also be based on the requirements of the proposed developments in Block A and Block B, but culverts should not be sized to accommodate less than the 10 year return period flow in order to provide satisfactory drainage of the adjacent lands.

5.7.4 Culverts Requiring Lowering

No existing farm crossing or Road Authority culverts require lowering that do not otherwise require replacing.

5.7.5 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.

5.8 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 (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).

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.

5.9 Excavation

The construction of the Regimbald Municipal Main Drain and Branch No.1 will be an open channel with design grades, side slopes and ditch bottom widths as specified on the design profile Dwg. No. 18002-P1 through 18002-P7 (inclusive) and Cross-Section Drawings No. 18002-C1.

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 at areas of bank instability. Erosion control measures will be of an engineering type, primarily rock protection with filter cloth.

To address fisheries concerns a two-stage profile is incorporated into the profile and cross-section at 300mm above the proposed profile. The two-stage profile is described in further detail in Section 5.10 of this Report.

5.10 Fisheries Act and Special Design Considerations

The existing Regimbald Municipal Drain is classified as a "Type F" Municipal Drain (ID No. 96531) 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 that use the drain present. As such, where work is completed within this time frame, there is a limited impact on fish and fish habitat. However, the requirements for authorization are limited to returning the drain to the existing Engineer's plan and profile.

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 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 propose 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:

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 – Std. Dwg 3. or Rock –Std. Dwg 6) will be installed to control sediment movement to downstream areas. Sediment traps will be constructed upstream of the check dams. These excavations are typically 500 mm deep, 15 metres long and the width of the channel as shown on the standard drawings. 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. 18002-A2.

Tree removal will be required to complete the work.

Where possible, excavation will be limited to one side of the drain, leaving the 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. 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. The 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. 18002-A2. 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.

In preliminary consultation and review by the DFO it was recommended that a "low-flow channel" be provided. To make provision for the low-flow channel a two-stage profile was implemented. At the time of the design, the existing channel had been recently maintained and is noted as in general conformance with the proposed profile, however, the cross-sectional width is proposed to be increased by the current construction. Stage 1 of the two-stage channel is provided by the existing section with the bank of the north and/or east side unmodified, bottom maintained as necessary to the proposed profile (but noted as in general conformance) and the first 300mm (in height) of the south and/or west bank unmodified. Additional width excavation then commences from the south and/or west bank at 300mm above the proposed grade to the specified channel width and forms stage 2 of the two-stage profile. The narrower, deeper stage 1 provides the required low-flow channel.

5.11 South Nation Conservation and Department of Fisheries and Oceans Mitigation Measures

Typical measures recommended by the South Nation Conservation Authority (SNCA) 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 and DFO. Where applicable, the permit conditions will be incorporated into the construction contract.

5.12 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 adjacent to the top of bank on the side of the drain specified for construction by the Drainage Engineer. The excavated material shall be spread and shaped to form banks and a flat surface with a maximum 2:1 back slope to the original ground surface. All material shall be spread as described and to a maximum depth of 500mm. Drainage openings shall be constructed wherever required throughout the disposal area including (but not limited to) side ditches, natural swales, low-lying areas, etc. or 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. All disturbed areas shall be seeded as per seeding specifications.

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.

5.13 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 MTO and 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 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.

5.14 Site Access and Access Plan

It is intended that for the purpose of construction, 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. For future maintenance access may be from either side of the drain as required. Equipment may only cross the drain at existing or constructed crossings as shown on the Culvert and Sediment/Erosion Control Plan, Drawing 18002-A2.

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. 18002-A2 and 18002-P1 through 18002-P7 (inclusive), and Standard Drawing No. 1. Rock Protection at tile drain outlets shall be installed at all existing outlets in accordance with Standard Drawing No. 2. Standard Drawings 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
- Rock Protection at significant bends
- Rock Protection at storm sewer outlets

- Rock Protection at tile drain outlets
- Rock Protection at culverts and concrete structures
- Rock Protection at confluence of branch drains
- Rock Protection at areas of current or on-going erosion

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), directly upstream of the flow checks, as per Standard Drawing No. 3, Straw Bale Checks or Standard Drawing No. 6, Rock Checks. Standard Drawings 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 or Rock flow checks shall be installed as indicated in Standard Drawing No. 3 and No. 6 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. 18002-A2, and 18002-P1 through 18002-P7 (inclusive). Standard Drawings 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 the 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

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 Block A and Block B 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 Regimbald Municipal Drain is tributary to the Bear River Municipal Drain.

7.4 Special Benefit/Special Assessment

Special Benefit by definition 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." A Special Benefit Assessment 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 and Block B.

7.5 Assessment Schedules

7.5.1 Initial Construction

All costs associated with this report, the initial design, allowances, injuring liability, other costs and construction are a result of the proposed land use changes to accommodate the proposed developments and will be paid for by the landowners in Block A and Block B. As such, there is no distribution of costs to other landowners for the Engineer's Report, allowances, other costs or initial construction. The Schedule of Assessment for Initial Construction is included in **Appendix B**

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. 18002-A3 and the Schedule of Assessment for Future Maintenance. As part of this Engineer's Report an assessment schedule has been developed for the Regimbald Municipal Drain and Branch No. 1 that reflects a fair and equitable distribution of costs for future maintenance. The Schedules of Assessment for Future Maintenance are 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 Regimbald 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 Regimbald Municipal Drain, as such there are three sections as follows:

- From the outlet of the drain at the Simpson Municipal Drain, Station 0+000 to the location of Branch No. 1 at Station 1+379.62.
- From Station 1+379.62 to Station 2+575 the upstream limit of the main drain at five metres south of the south limit of Highway 417.
- Branch No. 1 from the outlet at the main drain, Station 10+000 to Station 10+946 the upstream limit of Branch No. 1 at the west limit of Frontier Road ROW.

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 Regimbald 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.

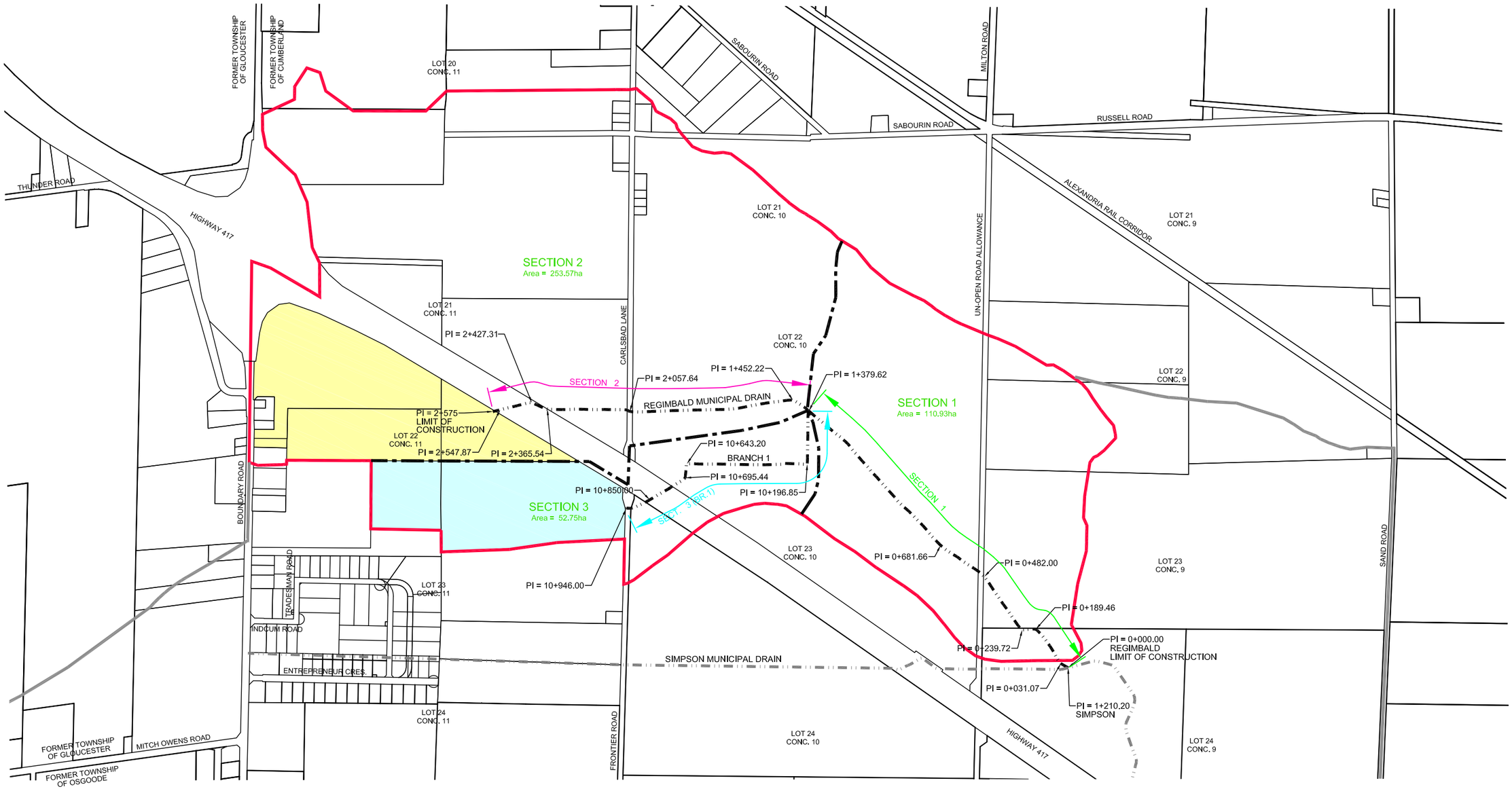
7.7 Land Use Factor

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 land. A value of 2.0 is given to small, non-agricultural lots (rural residential) that are 5 acres (2.0 Ha) or less, and 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 rights-of-way. As per the requirements of the Ontario Ministry of Transportation, a calculated factor based on actual runoff conditions using Table 3 of the Ministry of Transportation Engineering Standards

LEGEND

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

SECTION 1 STA. 0+000.00 - STA. 1+379.62
SECTION 2 STA. 1+379.62 - STA. 2+575.00
SECTION 3 STA. 10+000.00 - STA. 10+946.00



No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

REGISTERED PROFESSIONAL ENGINEER A. J. ROBINSON PROVINCE OF ONTARIO 27/02/20

Professional Engineers Ontario 20/02/27 Licensed Engineering Technologist
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Number: 10050133
Limitations: Providing peer non-technical review of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

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DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

MAINTENANCE SECTIONS and SECTION DRAINAGE AREAS

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG, No:	FIG 7.1

Branch "Summary Report: Runoff Factors for MTO Highway Rights of Way", 2004, for the Hwy. 417 R.O.W. is utilized. The calculated factor of 4.5 is assigned to the Highway corridor.

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 (excluding Hwy. 417) is assessed at four times the rate applied to one hectare of agricultural land. One hectare of Hwy. 417 right-of-way is assessed at 4.5 times the rate applied to agricultural land.

7.8 Distance Factor

A distance factor was developed to take into account 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 from the drain, 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 Assessments

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
- BRANCH DRAINAGE AREA BOUNDARY
- ADJACENT DRAINAGE AREA BOUNDARY
- SECTION 1 DISTANCE FACTORS
- SECTION 2 DISTANCE FACTORS
- SECTION 3 DISTANCE FACTORS

FORMER TOWNSHIP OF GLOUCESTER
FORMER TOWNSHIP OF CUMBERLAND
LOT 20 CONC. 11
SABOURIN ROAD
MILTON ROAD
RUSSELL ROAD
THUNDER ROAD
HIGHWAY 417
LOT 21 CONC. 10
ALEXANDRIA RAIL CORRIDOR
LOT 21 CONC. 9
UN-OPEN ROAD ALLOWANCE
LOT 21 CONC. 11
CARLSBAD LANE
PI = 2+427.31
LOT 22 CONC. 10
PI = 1+452.22
PI = 1+379.62 =10+000 BRANCH 1
PI = 2+057.64
REGIMBALD MUNICIPAL DRAIN
LOT 22 CONC. 9
PI = 2+575 LIMIT OF CONSTRUCTION
LOT 22 CONC. 11
PI = 2+547.87
PI = 2+365.54
PI = 10+643.20
PI = 10+695.44
PI = 10+196.85
PI = 10+850.60 BRANCH 1
BOUNDARY ROAD
LOT 23 CONC. 10
PI = 0+681.66
PI = 0+482.00
LOT 23 CONC. 9
SAND ROAD
TRADESMAN ROAD
LOT 23 CONC. 11
PI = 10+946.00
PI = 0+189.46
INDCUM ROAD
PI = 0+239.72
PI = 0+000.00 REGIMBALD LIMIT OF CONSTRUCTION
SIMPSON MUNICIPAL DRAIN
ENTREPRENEUR CRES.
PI = 0+031.07
PI = 1+210.20 SIMPSON
LOT 24 CONC. 11
FRONTIER ROAD
LOT 24 CONC. 10
HIGHWAY 417
LOT 24 CONC. 9
FORMER TOWNSHIP OF GLOUCESTER
MITCH OWENS ROAD
FORMER TOWNSHIP OF OSGOODE

No.	DATE dd-mm-yy	REVISION	BY
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A. J. ROBINSON — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 20/02/27

Professional Engineers Ontario — Licensed Engineering Technologist — 20/02/27
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DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

DISTANCE FACTORS

PROJECT No.	17042
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	FIG 7.2

For the initial construction an injuring liability assessment is made against the lands in Block A and Block B 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 the volume of runoff resulting from the change in land usage. The Regimbald Municipal Drain and Branch is tributary to the Simpson Municipal Drain and subsequently to Shaws Creek and 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 collected 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 proportional to the amounts identified in the 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 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 and Block B. There is no special assessment for future maintenance.

7.12 Block Assessment

Lands that are located within Block A and Block B as indicated on Dwg. No. 18002-A3 are charged a Block Assessment. Block assessments are also 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 and Block B subject to any internal or third-party agreement in this regard.

At the time of this report, the internal make-up of the individual blocks was unknown. Should the Blocks ultimately be comprised of public lands including roads, utility corridors or other public lands in addition to the private lands, the assessed cost of future maintenance to each block shall be proportioned by the area of private vs. public lands and be distributed accordingly following block assessment principles for the private lands and the proportional distribution to each road authority, utility or public land owner.

7.13 Assessment Schedules

As described in this report, the drain is divided into three 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 Schedules, 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. Injuring Liability is not charged for future maintenance. 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 1+379.62
		Outlet Assessment - 90%
		Benefit Assessment - 10%
Section 2	–	Station 1+379.62 to Station 2+575
		Outlet Assessment - 90%
		Benefit Assessment - 10%
Branch No.1	–	Station 10+000 to Station 10+946
		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 and Block B in conjunction with the development approval process. There is no assessment to the remaining landowners for the initial construction. The property owner of Block A will be responsible for the full cost associated with the main drain between Station 1+379.62 and 2+575. The property owner of Block B will be responsible for the full cost associated with Branch No.1 (Station 10+000 to 10+946). The property owners in Block A and Block B will be responsible for the full cost associated with the main drain between Station 0+000 and 1+379.62 in proportion to the Assessment Schedule percentages for initial construction as shown in **Appendix B.**

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. The allowance for use of the working area and for damage to lands and crops in the working area (Sections 29 & 30) is only on agricultural lands 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 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.

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 and Block B 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 an amount of $10,000.00 for Sections 1 and 2 and

$5,000.00 for Section 3 (Branch No.1) 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. If the private landowner or Road Authority does not complete the maintenance, then the City of Ottawa will complete the maintenance and charge the cost to the landowner or 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 MAINTENACE

A right-of-way or working area must be available on the side of the drain 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 NATURAL RESOURCES AND FORESTRY – SPECIES AT RISK

Pre-Screening of the local area for the proposed Regimbald Municipal Drain was completed by the developer of the upstream lands in conjunction with their site development plans and submitted to the Ministry of Natural Resources and Forestry (MNRF) with regard to the Species at Risk (SAR) Legislation.

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

Subsequent to the initial screening, the Ontario Ministry of Environment Conservation and Parks (MECP) assumed responsibility for the SAR legislation and review.

12.1 Endangered Species

Barn Swallows were indicated with documented occurrences within the vicinity of the Regimbald Municipal Drain as part of the development review.

Other sensitive or endangered species may exist in the area and are typically associated with work on a municipal drain including butternut trees turtles and other aquatic species, however, they were not documented in the development review.

Standard avoidance and mitigation measures for documented and typical species are provided below.

12.2 Butternut Trees – Location and Mitigation

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 Natural Resources and Forestry will be implemented should the removal of a protected tree be required.

12.3 Barn and Bank Swallows – Location and Mitigation

Occurrences of barn swallow have been documented in the general vicinity of the Regimbald Municipal Drain. 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. Should active nests be found additional measures will be implemented.

12.4 Turtles and Aquatic Species at Risk – Location and Mitigation

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.

13.0 SOUTH NATION CONSERVATION AUTHORITY PERMIT

The draft Engineer's Report for the Regimbald 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 – CLASS AUTHORIZATION

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 Draft Engineer's Report consultation was conducted with the DFO to determine suitable mitigation measures such that work may be completed with no net impact on fish and fish habitat. Robinson Consultants proposed the implementation of modified Class Authorization measures, typical of a "Class F" (as per the previous classification). Implementation of these measures will minimize or eliminate the impact on this or adjacent watercourses, fish or endangered species and have been incorporated into this report and the related plans and specifications.

Through consultation with the DFO it was determined that the proposed work could be completed in conformance with the Class Authorization process. All applicable conditions have been addressed by this Report and where applicable, will be incorporated into contract requirements and specifications for the construction of the Regimbald Municipal Drain. A copy of the Class Authorization is provided in **Appendix D** of this report.

15.0 PERMITS AND AUTHORIZATIONS

All required permits and authorizations required for the initial construction, including, but not limited to, Department of Fisheries and Oceans (DFO), and the South Nation Conservation Authority (SNCA) have been applied for in conjunction with the preparation of the Engineer's Report and are included in distribution copies when provided.

Ontario Ministry of Environment Conservation and Parks (MECP) screening for Species at Risk (SAR) was previously completed in conjunction with the development associated with this project.

All of which is respectfully submitted,

ROBINSON CONSULTANTS INC.

A.J. Robinson, P. Eng.
Drainage Engineer

Lorne Franklin, L.E.T, C.E.T.
Licensed Engineering Technologist
Drainage Services

REGISTERED PROFESSIONAL ENGINEER
A. J. ROBINSON
20/02/27
PROVINCE OF ONTARIO

Professional Engineers
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20/02/27
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
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
- Culvert and Sediment and Erosion Control Plan
- Property Plans
- Drain Profiles
- Cross-Sections
- Standard Detail Drawings

LEGEND

- PROPERTY LINE
- EXISTING CONSTRUCTED DRAINS
- MUNICIPAL DRAIN
- ABANDONED DRAIN
- DRAINAGE AREA BOUNDARY
- BRANCH DRAINAGE AREA BOUNDARY
- ADJACENT DRAINAGE AREA BOUNDARY

FORMER TOWNSHIP OF GLOUCESTER
FORMER TOWNSHIP OF CUMBERLAND
LOT 20 CONC. 11
SABOURIN ROAD
MILTON ROAD
RUSSELL ROAD
THUNDER ROAD
HIGHWAY 417
LOT 21 CONC. 10
ALEXANDRIA RAIL CORRIDOR
LOT 21 CONC. 9
UN-OPEN ROAD ALLOWANCE
LOT 21 CONC. 11
CARLSBAD LANE
PI = 2+427.31
TO BE ABANDONED
PI = 2+057.64
PI = 1+452.22
PI = 1+379.62 =10+000 BRANCH 1
LOT 22 CONC. 10
LOT 22 CONC. 9
REGIMBALD MUNICIPAL DRAIN
BLOCK A
PI = 2+575 LIMIT OF CONSTRUCTION
LOT 22 CONC. 11
PI = 2+547.87
PI = 2+365.54
PI = 10+643.20
BRANCH 1
PI = 10+695.44
PI = 10+196.85
BOUNDARY ROAD
BLOCK B
PI = 10+850.00
TO BE ABANDONED
LOT 23 CONC. 10
PI = 0+681.66
PI = 0+482.00
LOT 23 CONC. 9
SAND ROAD
TRADESMAN ROAD
LOT 23 CONC. 11
PI = 10+946.00 END OF DRAIN
PI = 0+189.46
INDUUM ROAD
PI = 0+239.72
PI = 0+000.00 REGIMBALD LIMIT OF CONSTRUCTION
SIMPSON MUNICIPAL DRAIN
ENTREPRENEUR CRES.
PI = 0+031.07
PI = 1+210.20 SIMPSON (TYPICAL)
LOT 24 CONC. 11
FRONTIER ROAD
LOT 24 CONC. 10
HIGHWAY 417
LOT 24 CONC. 9
FORMER TOWNSHIP OF GLOUCESTER
MITCH OWENS ROAD
FORMER TOWNSHIP OF OSGOODE

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

A. J. ROBINSON — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 27/02/20

Professional Engineers Ontario — Licensed Engineering Technologist — 20/02/27
Name: L. FRANKLIN
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DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

DRAINAGE AREA PLAN

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-A1

LEGEND

- DRAINAGE AREA BOUNDARY
- MUNICIPAL DRAIN
- EXISTING CONSTRUCTED DRAINS
- BRANCH DRAINAGE AREA BOUNDARY
- STRAW CHECK DAM
- ROCK CHECK DAM
- ROCK PROTECTION and EROSION CONTROL

FORMER TOWNSHIP OF GLOUCESTER
FORMER TOWNSHIP OF CUMBERLAND
LOT 20 CONC. 11
SABOURIN ROAD
MILTON ROAD
RUSSELL ROAD
THUNDER ROAD
HIGHWAY 417
LOT 21 CONC. 10
UN-OPEN ROAD ALLOWANCE
ALEXANDRIA RAIL CORRIDOR
LOT 21 CONC. 9
LOT 21 CONC. 11
CARLSBAD LANE
PI = 2+427.31
41.4m-1300mmØ CSP @ 0.17%
U/S 74.55
D/S 74.48
12.0m-1400mmØ CSP @ 0.75%
U/S 74.20
D/S 74.11
LOT 22 CONC. 10
LOT 22 CONC. 9
44.5m-1300mmØ CSP @ 0.27%
U/S 74.50
D/S 74.62
PI = 2+057.64
PI = 1+452.22
PI = 1+379.62
=10+000 BRANCH 1
REGIMBALD MUNICIPAL DRAIN
PI = 2+575
LIMIT OF CONSTRUCTION
LOT 22 CONC. 11
PI = 2+547.87
PI = 2+365.54
PI = 10+643.20
BRANCH 1
PI = 10+695.44
PI = 10+196.85
PI = 10+850.00
BOUNDARY ROAD
15.0m-600mmØ CSP @ 0.08%
U/S 75.17
D/S 75.16
LOT 23 CONC. 10
PI = 0+681.66
PI = 0+482.00
LOT 23 CONC. 9
SAND ROAD
6.6m-500mmØ CSP @ 1.36%
U/S 75.30
D/S 75.39
TRADESMAN ROAD
PI = 10+946.00
LOT 23 CONC. 11
12.4m-500mmØ CSP @ 1.30%
U/S 75.35
D/S 75.19
34.6m-1050mmØ CSP @ 0.17%
U/S 74.67
D/S 74.61
PI = 0+189.46
INDCUM ROAD
39.4m-1050mmØ CSP @ 0.74%
U/S 75.12
D/S 74.83
PI = 0+239.72
PI = 0+000.00
REGIMBALD
LIMIT OF CONSTRUCTION
SIMPSON MUNICIPAL DRAIN
ENTREPRENEUR CRES.
PI = 0+031.07
PI = 1+210.20
SIMPSON
LOT 24 CONC. 11
FRONTIER ROAD
LOT 24 CONC. 10
HIGHWAY 417
LOT 24 CONC. 9
FORMER TOWNSHIP OF GLOUCESTER
MITCH OWENS ROAD
FORMER TOWNSHIP OF OSGOODE

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO — A. J. ROBINSON — 20/02/27

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CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

CULVERT and SEDIMENT and EROSION CONTROL PLAN

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-A2

LEGEND

- PROPERTY LINE
- EXISTING CONSTRUCTED DRAINS
- MUNICIPAL DRAIN
- DRAINAGE AREA BOUNDARY
- BRANCH DRAINAGE AREA BOUNDARY
- ADJACENT DRAINAGE AREA BOUNDARY
- (1) PROPERTY ID#

FORMER TOWNSHIP OF GLOUCESTER
FORMER TOWNSHIP OF CUMBERLAND
LOT 20 CONC. 11
SABOURIN ROAD
MILTON ROAD
RUSSELL ROAD
THUNDER ROAD
HIGHWAY 417
ALEXANDRIA RAIL CORRIDOR
LOT 21 CONC. 10
LOT 21 CONC. 9
UN-OPEN ROAD ALLOWANCE
LOT 21 CONC. 11
CARLSBAD LANE
LOT 22 CONC. 10
LOT 22 CONC. 9
LOT 22 CONC. 11
REGIMBALD MUNICIPAL DRAIN
BLOCK A 39.39ha
BLOCK B 26.51ha
BRANCH 1
BOUNDARY ROAD
LOT 23 CONC. 10
LOT 23 CONC. 9
LOT 23 CONC. 11
TRADESMAN ROAD
INDCUM ROAD
SAND ROAD
ENTREPRENEUR CRES.
SIMPSON MUNICIPAL DRAIN
LOT 24 CONC. 11
LOT 24 CONC. 10
LOT 24 CONC. 9
FRONTIER ROAD
FORMER TOWNSHIP OF GLOUCESTER
MITCH OWENS ROAD
FORMER TOWNSHIP OF OSGOODE

(151) 2.08ha	(152) 8.27ha	(153) 0.29ha
(154) 0.22ha	(155) 0.20ha	(157) 0.82ha
(150) 18.42ha	(158) 0.61ha	(156) 0.62ha
(159) 0.19ha	(46) 0.28ha	(63) 53.86ha
(48) 0.14ha	(47) 0.14ha	(49) 0.14ha
(65) 7.43ha	(39) 144.77ha OF 161.97ha TOTAL	(66) 26.02ha
(10) 3.00ha	(11) 11.39ha	(14) 19.01ha
(16) 4.25ha	(39) 17.20ha OF 161.97ha TOTAL	(71) (72) (73) (74)

PI = 2+427.31
PI = 2+057.64
PI = 1+452.22
PI = 1+379.62 =10+000 BRANCH 1
PI = 2+575 LIMIT OF CONSTRUCTION
PI = 2+547.87
PI = 2+365.54
PI = 10+643.20
PI = 10+695.44
PI = 10+196.85
PI = 10+850.00
PI = 10+946.00
PI = 0+681.66
PI = 0+482.00
PI = 0+189.46
PI = 0+239.72
PI = 0+000.00 REGIMBALD LIMIT OF CONSTRUCTION
PI = 0+031.07
PI = 1+210.20 SIMPSON

No.	DATE dd.mm.yy	REVISION	BY
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2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

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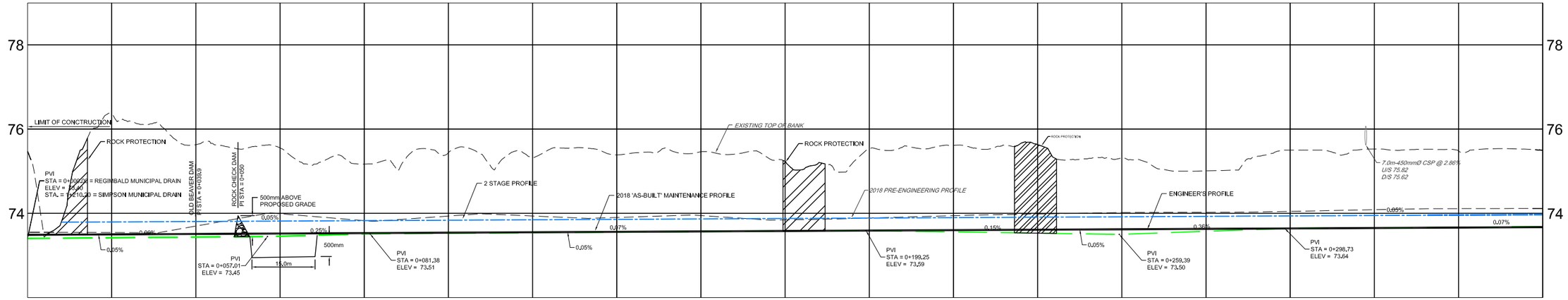
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

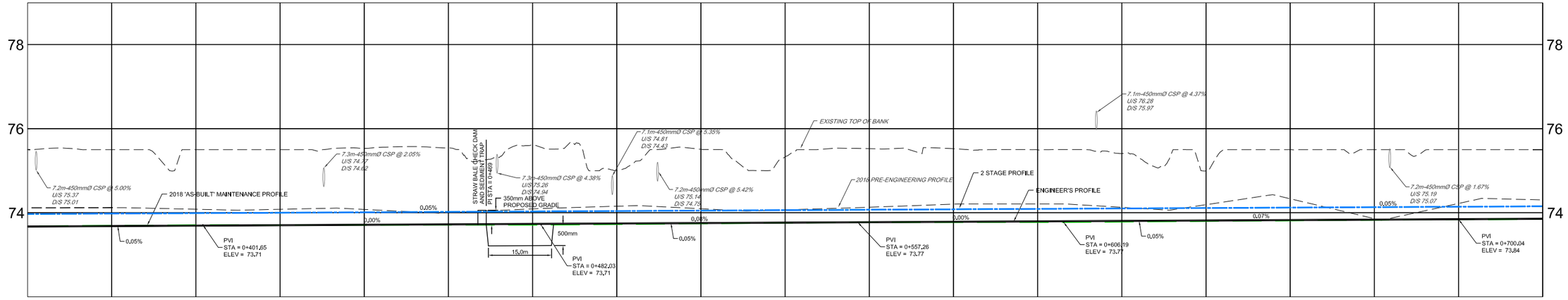
PROPERTY OWNERSHIP PLAN

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-A3



ENGINEER'S GRADE	73,49		73,50		73,51		73,52		73,53		73,54		73,55		73,56		73,57		73,58		73,59		73,60	
AS-BUILT MAINTENANCE GRADE	73,40		73,42		73,44		73,46		73,51		73,52		73,54		73,55		73,56		73,58		73,59		73,56	
PRE-ENGINEERING GRADE	*73,55*		*73,45*		*73,70*		*73,89*		*73,63*		*73,84*		*73,94*		*73,90*		*73,95*		*73,85*		*73,89*		*73,94*	
STATION	0+000		0+020		0+040		0+060		0+080		0+100		0+120		0+140		0+160		0+180		0+200		0+220	

ENGINEER'S GRADE	73,61		73,62		73,63		73,64		73,65		73,66		73,67		73,68		73,69		73,70		73,71		73,72	
AS-BUILT MAINTENANCE GRADE	73,53		73,50		73,57		73,64		73,65		73,67		73,68		73,70		73,71		73,71		73,71		73,71	
PRE-ENGINEERING GRADE	*73,68*		*74,02*		*74,03*		*74,05*		*74,09*		*74,11*		*74,12*		*74,12*		*74,08*		*74,08*		*74,08*		*74,00*	
STATION	0+240		0+260		0+280		0+300		0+320		0+340		0+360		0+380		0+400		0+420		0+440		0+460	



ENGINEER'S GRADE	73,67		73,68		73,69		73,70		73,71		73,72		73,73		73,74		73,75		73,76		73,77		73,78	
AS-BUILT MAINTENANCE GRADE	73,68		73,70		73,71		73,71		73,71		73,71		73,71		73,72		73,74		73,76		73,77		73,77	
PRE-ENGINEERING GRADE	*74,12*		*74,12*		*74,08*		*74,08*		*74,08*		*74,00*		*74,09*		*74,15*		*74,09*		*74,07*		*74,13*		*74,20*	
STATION	0+360		0+380		0+400		0+420		0+440		0+460		0+480		0+500		0+520		0+540		0+560		0+580	

ENGINEER'S GRADE	73,79		73,80		73,82		73,83		73,84		73,85		73,86											
AS-BUILT MAINTENANCE GRADE	73,77		73,78		73,80		73,81		73,83		73,84		73,85											
PRE-ENGINEERING GRADE	*74,21*		*74,13*		*74,19*		*74,33*		*73,86*		*74,22*		*74,30*											
STATION	0+600		0+620		0+640		0+660		0+680		0+700		0+720											

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	13.12.19	ADDED 2 STAGE PROFILE	AJR
4	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
5	27.02.20	ISSUED FOR DISTRIBUTION	AJR

REGISTERED PROFESSIONAL ENGINEER
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27/02/20

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20/02/27

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VERTICAL 0,5 0 1

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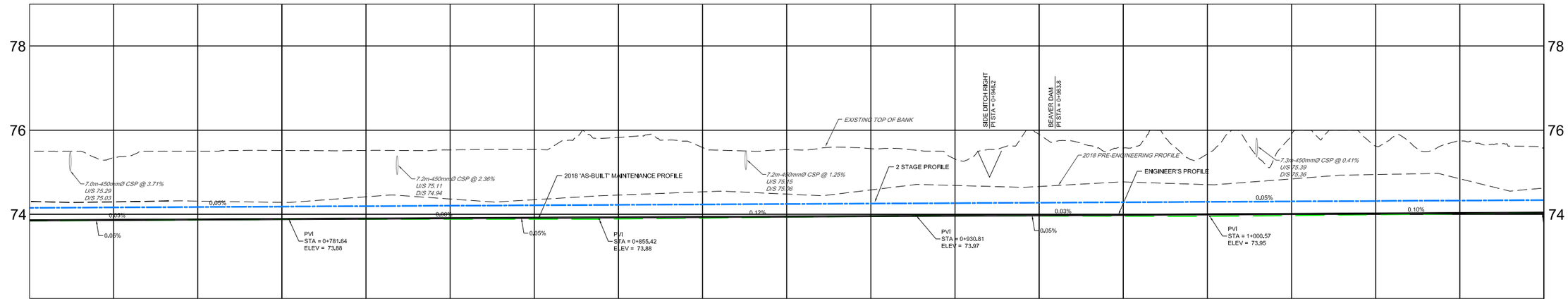
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

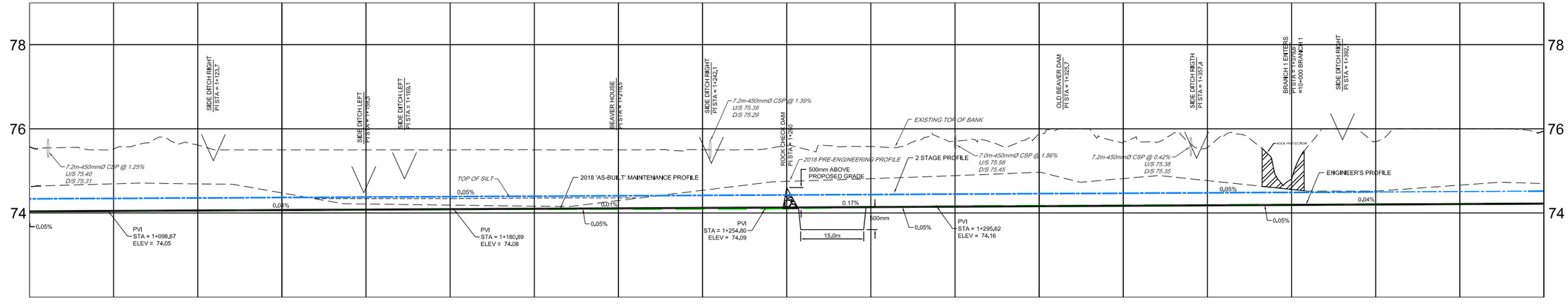
REGIMBALD MUNICIPAL DRAIN

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

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-P1



ENGINEER'S GRADE	73.86	73.87	73.88	73.89	73.90	73.91	73.92	73.93	73.94	73.95	73.96	73.97	73.98	73.99	74.00	74.01	74.02	74.03	74.04	
AS-BUILT MAINTENANCE GRADE	73.85	73.86	73.87	73.88	73.88	73.88	73.88	73.89	73.91	73.93	73.95	73.96	73.96	73.95	73.95	73.97	73.99	74.01	74.03	
PRE-ENGINEERING GRADE	74.30	74.30	74.31	74.28	74.42	74.36	74.35	74.46	74.53	74.48	74.58	74.69	74.66	74.77	74.71	74.84	74.94	74.84	74.62	
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	



ENGINEER'S GRADE	74.04	74.05	74.06	74.07	74.08	74.09	74.10	74.11	74.12	74.13	74.14	74.15	74.16	74.17	74.18	74.19	74.20	74.21	74.22	
AS-BUILT MAINTENANCE GRADE	74.03	74.05	74.06	74.07	74.07	74.08	74.08	74.09	74.09	74.10	74.13	74.16	74.17	74.18	74.19	74.20	74.21	74.21	74.22	
PRE-ENGINEERING GRADE	74.62	74.69	74.69	74.48	74.21	74.19	74.16	74.29	74.54	74.75	74.61	74.89	74.97	74.82	74.77	74.56	74.52	74.66	74.70	
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	

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	13.12.19	ADDED 2 STAGE PROFILE	AJR
4	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
5	27.02.20	ISSUED FOR DISTRIBUTION	AJR

A. J. ROBINSON — 27/02/20 — PROVINCE OF ONTARIO

Professional Engineers Ontario — 20/02/27 — Licensed Engineering Technologist — Name: L. FRANKLIN — Number: 100501131 — Limitations: Providing plan and profile drawings of reports and other non-technical advice for submission under the Ontario Drainage Act. — Association of Professional Engineers of Ontario

SCALES
5 0 10
HORIZONTAL
0.5 0 1
VERTICAL

Robinson Consultants
350 PALLADIUM DRIVE, SUITE 210
OTTAWA, ONTARIO K2V 1A8
(613) 592-6060 rcii.com

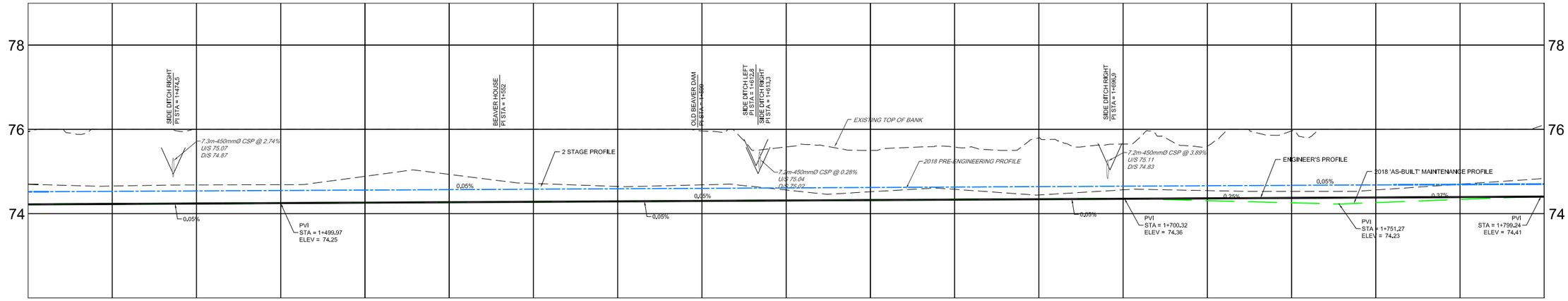
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

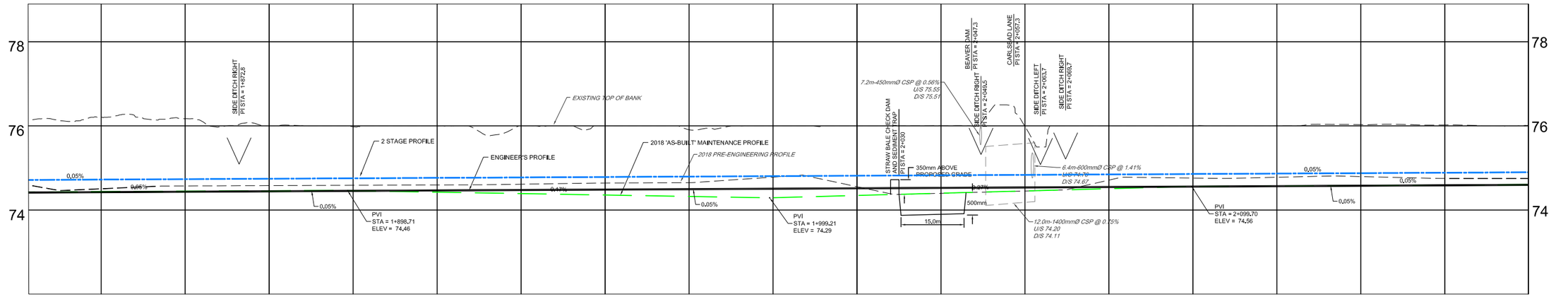
REGIMBALD MUNICIPAL DRAIN

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

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-P2



ENGINEER'S GRADE	74,22	74,23	74,24	74,25	74,26	74,27	74,28	74,29	74,30	74,31	74,32	74,33	74,34	74,35	74,36	74,37	74,38	74,39	74,40	
AS-BUILT MAINTENANCE GRADE	74,22	74,23	74,24	74,25	74,26	74,27	74,28	74,29	74,30	74,32	74,33	74,34	74,35	74,36	74,31	74,26	74,26	74,34	74,41	
PRE-ENGINEERING GRADE	74,70	74,66	74,68	74,69	74,69	74,93	74,72	74,65	74,68	74,56	74,52	74,58	74,44	74,56	74,55	74,53	74,56	74,70	74,83	
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	



ENGINEER'S GRADE	74,40	74,41	74,42	74,43	74,45	74,46	74,47	74,48	74,49	74,50	74,51	74,52	74,53	74,54	74,55	74,56	74,57	74,58	74,59	
AS-BUILT MAINTENANCE GRADE	74,41	74,42	74,43	74,44	74,45	74,46	74,42	74,39	74,36	74,32	74,29	74,35	74,40	74,45	74,51	74,56	74,57	74,58	74,59	
PRE-ENGINEERING GRADE	74,83	74,64	74,60	74,57	74,58	74,59	74,60	74,61	74,64	74,65	74,78	74,55	74,40	74,45	74,71	74,76	74,78	74,79	74,75	
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	

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	13.12.19	ADDED 2 STAGE PROFILE	AJR
4	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
5	27.02.20	ISSUED FOR DISTRIBUTION	AJR

REGISTERED PROFESSIONAL ENGINEER
A. J. ROBINSON
PROVINCE OF ONTARIO
20/02/27

Professional Engineers Ontario
20/02/27
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501331
Limitations: Providing shear, non-technical comment of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

SCALES
5 0 10
HORIZONTAL
0.5 0 1
VERTICAL

Robinson Consultants

350 PALLADIUM DRIVE, SUITE 210
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(613) 592-6060 rcii.com

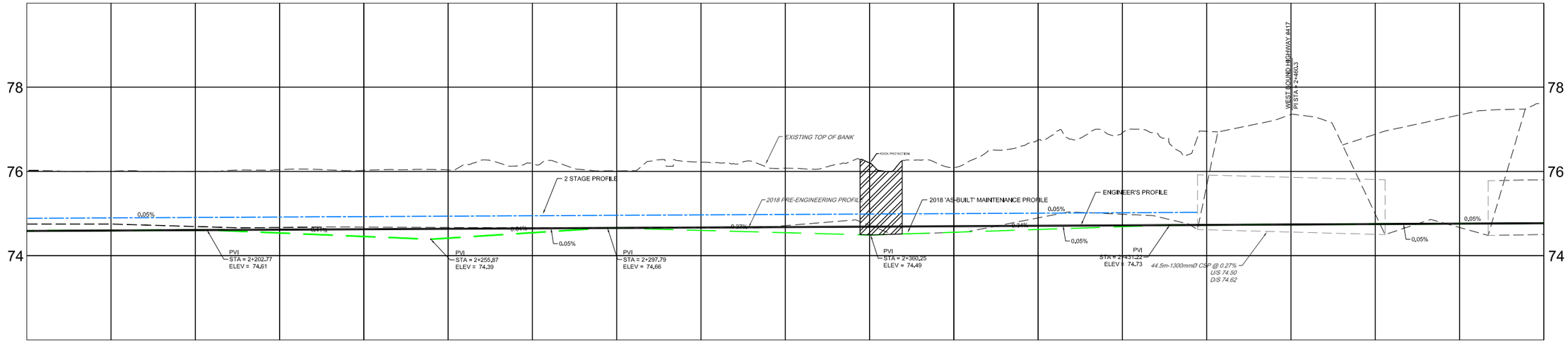
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

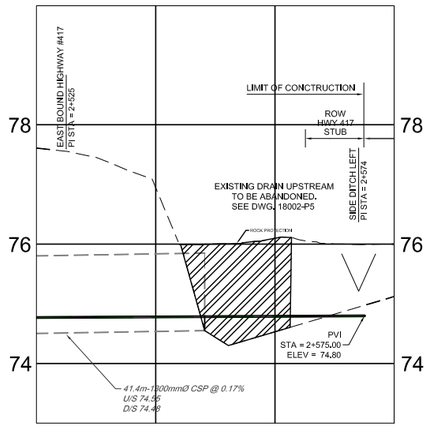
REGIMBALD MUNICIPAL DRAIN

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

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG, No:	18002-P3



ENGINEER'S GRADE	74.59	74.60	74.61	74.62	74.63	74.64	74.65	74.66	74.67	74.68	74.69	74.70	74.71	74.72	74.73	74.74	74.75	74.76	74.77
AS-BUILT MAINTENANCE GRADE	74.59	74.60	74.61	74.54	74.46	74.42	74.55	74.65	74.60	74.55	74.49	74.56	74.62	74.69	74.73	74.74	74.75	74.76	74.77
PRE-ENGINEERING GRADE	74.75	74.75	74.69	74.67	74.68	74.67	74.66	74.66	74.66	74.71	74.72	74.55	74.90	74.98	75.66	77.35	74.99	74.67	77.61
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



ENGINEER'S GRADE	74.77	74.78	74.79	74.80
AS-BUILT MAINTENANCE GRADE	74.77	74.78	74.79	
PRE-ENGINEERING GRADE	77.61	76.95	74.53	75.12
STATION	2+520	2+540	2+560	2+580

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	13.12.19	ADDED 2 STAGE PROFILE	AJR
4	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
5	27.02.20	ISSUED FOR DISTRIBUTION	AJR

REGISTERED PROFESSIONAL ENGINEER
A. J. ROBINSON
27/02/20
PROVINCE OF ONTARIO

Professional Engineers Ontario
20/02/27
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501331
Limitations: Providing plan, non-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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(613) 592-6060 rcii.com

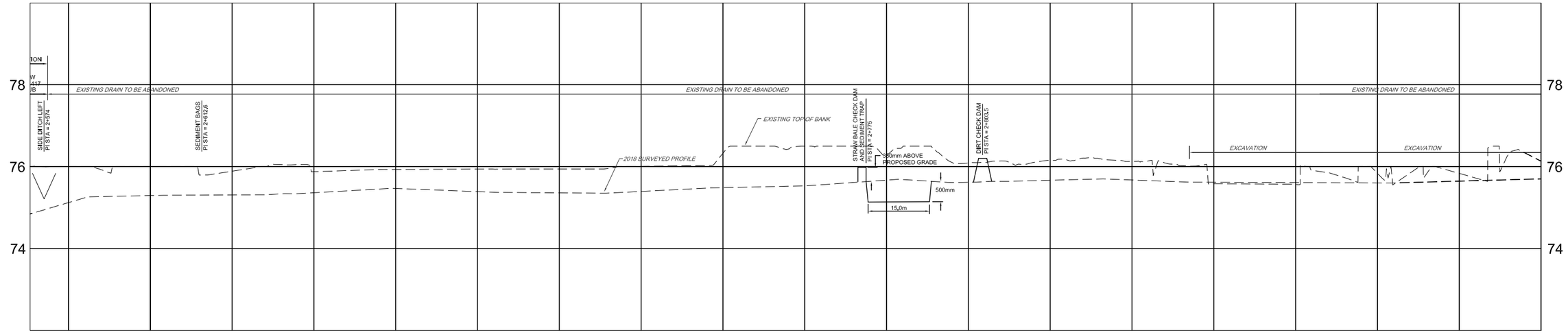
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

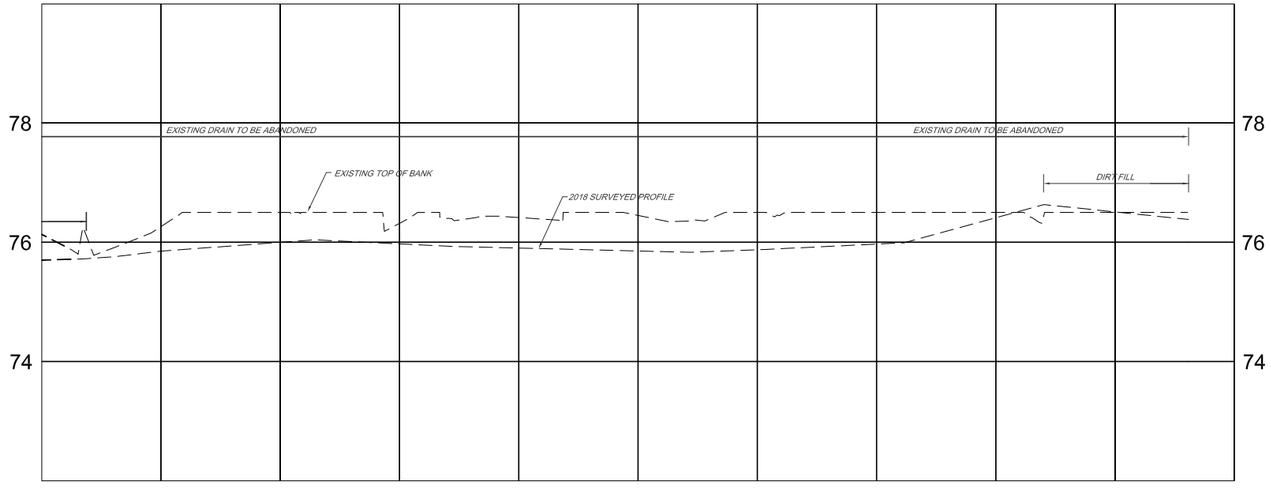
REGIMBALD MUNICIPAL DRAIN

DRAIN PROFILE
STA. 2+160 TO STA. 2+580

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-P4



AS-BUILT MAINTENANCE GRADE																			
PRE-ENGINEERING GRADE	75.12	75.29	75.31	75.36	75.47	75.39	75.36	75.39	75.49	75.53	75.67	75.62	75.67	75.67	75.62	75.61	75.69	75.65	75.70
STATION	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	2+900	2+920	2+940



AS-BUILT MAINTENANCE GRADE										
PRE-ENGINEERING GRADE	75.70	75.65	76.00	75.97	75.90	75.65	75.67	75.87	76.41	76.51
STATION	2+940	2+960	2+980	3+000	3+020	3+040	3+060	3+080	3+100	3+120	3+140

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

A. J. ROBINSON — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 27/02/20

Professional Engineers Ontario — 20/02/27 — Licensed Engineering Technologist — Name: L. FRANKLIN — Number: 100501321 — Limitations: Providing peer review/comment of reports and other non-technical advice for submission under the Ontario Drainage Act. — Association of Professional Engineers of Ontario

SCALES
5 0 10
HORIZONTAL
0.5 0 1
VERTICAL

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DESIGN	LF
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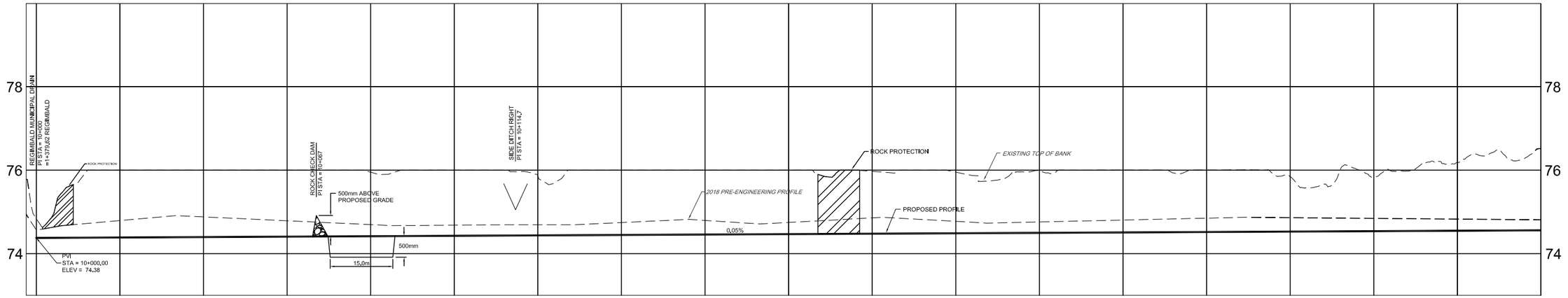
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

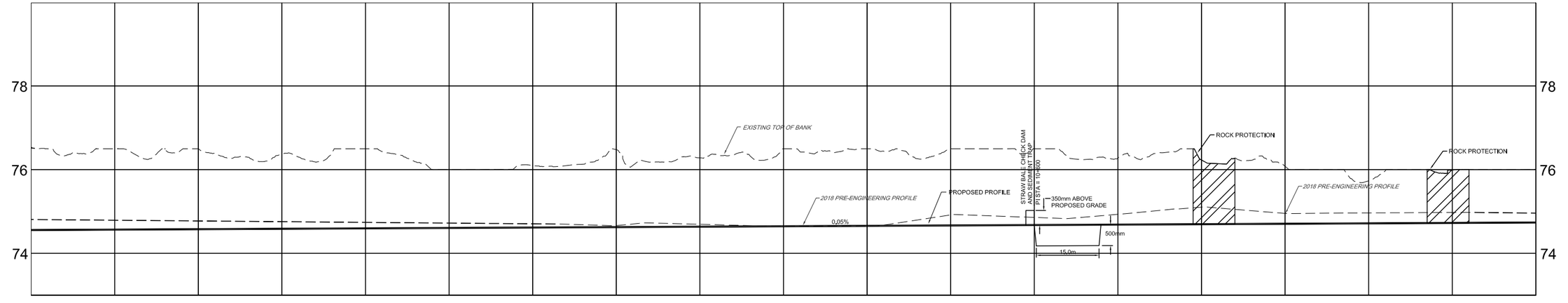
REGIMBALD MUNICIPAL DRAIN

DRAIN ABANDONMENT
STA. 2+580 TO STA. 3+140

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG, No:	18002-P5



AS-BUILT MAINTENANCE GRADE	74.38	74.39	74.40	74.41	74.42	74.43	74.44	74.45	74.46	74.47	74.48	74.49	74.50	74.51	74.52	74.53	74.54	74.55	74.56
PRE-ENGINEERING GRADE	*74.56*	*74.79*	*74.68*	*74.79*	*74.69*	*74.68*	*74.69*	*74.74*	*74.79*	*74.75*	*74.86*	*74.77*	*74.76*	*74.80*	*74.85*	*74.86*	*74.84*	*74.83*	*74.81*
STATION	10+000	10+020	10+040	10+060	10+080	10+100	10+120	10+140	10+160	10+180	10+200	10+220	10+240	10+260	10+280	10+300	10+320	10+340	10+360



AS-BUILT MAINTENANCE GRADE	74.56	74.57	74.58	74.59	74.60	74.61	74.62	74.63	74.64	74.65	74.66	74.67	74.68	74.69	74.70	74.71	74.72	74.73	74.74
PRE-ENGINEERING GRADE	*74.81*	*74.79*	*74.77*	*74.76*	*74.74*	*74.72*	*74.71*	*74.66*	*74.70*	*74.66*	*74.65*	*74.92*	*74.66*	*74.93*	*75.10*	*74.95*	*74.97*	*74.98*	*74.96*
STATION	10+360	10+380	10+400	10+420	10+440	10+460	10+480	10+500	10+520	10+540	10+560	10+580	10+600	10+620	10+640	10+660	10+680	10+700	10+720

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

REGISTERED PROFESSIONAL ENGINEER A. J. ROBINSON PROVINCE OF ONTARIO 27/02/20

Professional Engineers Ontario
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501331
Limitations: Providing plan, non-technical content of reports and other non-technical advice for submission under the Ontario Drainage Act.
Association of Professional Engineers of Ontario
27/02/20

SCALES
5 0 10
HORIZONTAL
0.5 0 1
VERTICAL

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(613) 592-6060 rcii.com

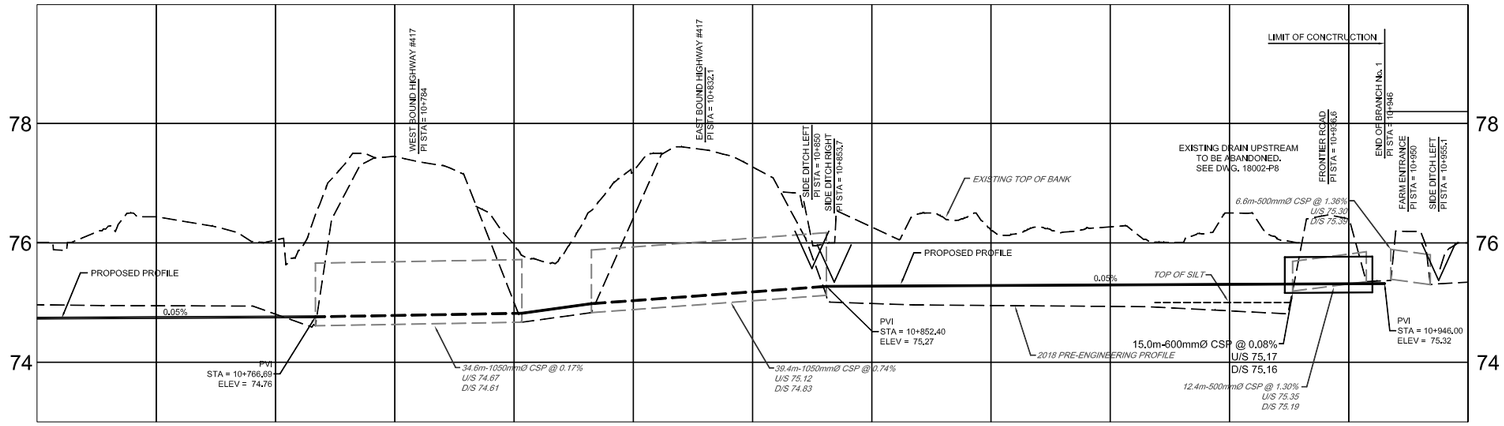
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN
BRANCH 1

BRANCH No. 1
DRAIN PROFILE
STA. 10+000 TO STA. 10+720

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG, No:	18002-P6



STATION	10+720	10+740	10+760	10+780	10+800	10+820	10+840	10+860	10+880	10+900	10+920	10+940	10+960
AS-BUILT MAINTENANCE GRADE	74.74	74.75	74.76	74.78	74.82	75.03	75.18	75.27	75.28	75.29	75.30		
PRE-ENGINEERING GRADE	*74.96*	*74.95*	*74.81*	*77.45*	*75.0*	*76.42*	*77.27*	*74.98*	*74.95*	*74.93*	*74.86*	*76.40*	*75.34*

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

A. J. ROBINSON
20/02/27

Professional Engineers Ontario
20/02/27
Licensed Engineering Technologist
Name L. FRANKLIN
Number 100501335
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

SCALES
5 0 10
HORIZONTAL
0.5 0 1
VERTICAL

Robinson Consultants

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OTTAWA, ONTARIO K2V 1A8
(613) 592-6060 rcii.com

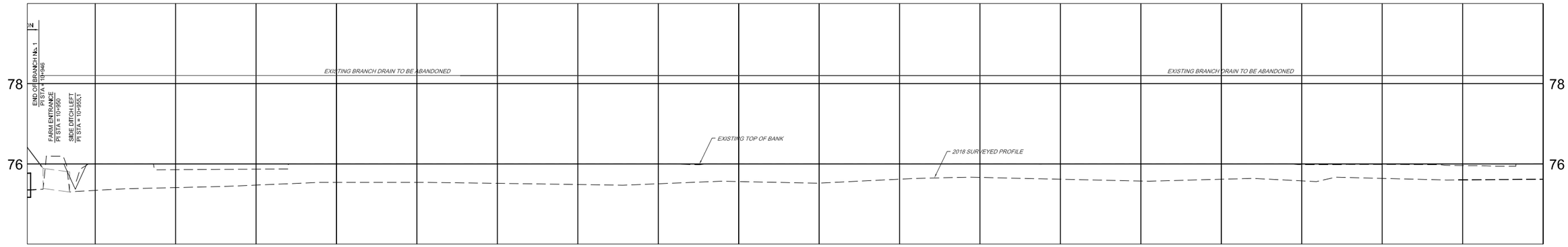
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

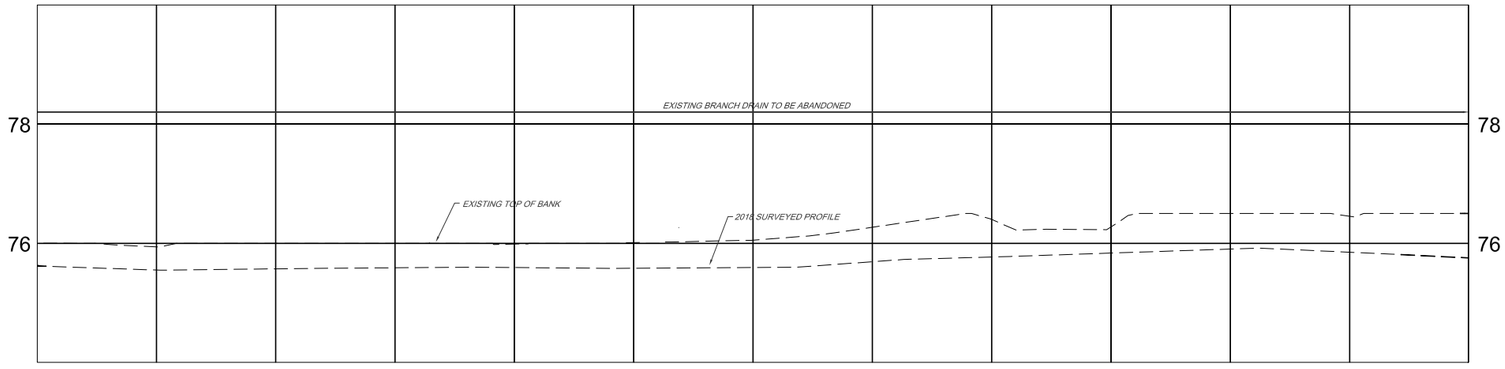
REGIMBALD MUNICIPAL DRAIN
BRANCH 1

BRANCH No. 1
DRAIN PROFILE
STA. 10+720 TO STA. 10+946

PROJECT No. 18002
CONTRACT No.
DATED FEBRUARY 2020
DWG. No: 18002-P7



AS-BUILT MAINTENANCE GRADE																			
PRE-ENGINEERING GRADE	75.34	75.41	75.47	75.54	75.54	75.52	75.49	75.51	75.56	75.52	75.62	75.66	75.62	75.57	75.62	75.58	75.64	75.60	75.62
STATION	10+960	10+980	11+000	11+020	11+040	11+060	11+080	11+100	11+120	11+140	11+160	11+180	11+200	11+220	11+240	11+260	11+280	11+300	11+320



AS-BUILT MAINTENANCE GRADE													
PRE-ENGINEERING GRADE	75.62	75.55	75.57	75.59	75.59	75.58	75.60	75.69	75.77	75.84	75.90	75.85	75.75
STATION	11+320	11+340	11+360	11+380	11+400	11+420	11+440	11+460	11+480	11+500	11+520	11+540	11+560

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
4	27.02.20	ISSUED FOR DISTRIBUTION	AJR

A. J. ROBINSON — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 2020/02/27

Professional Engineers Ontario — Licensed Engineering Technologist — 2020/02/27
Name: L. FRANKLIN
Number: 100501333
Limitations: Providing peer review and comment 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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(613) 592-6060 rcii.com

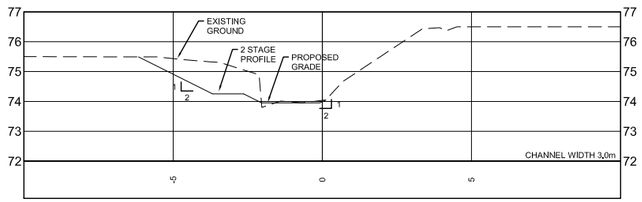
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

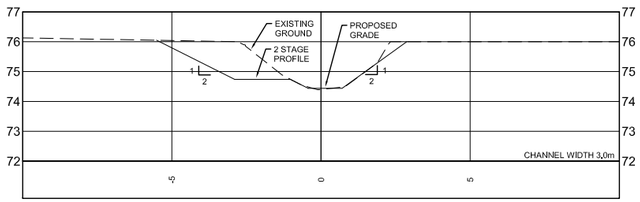
REGIMBALD MUNICIPAL DRAIN
BRANCH 1

DRAIN ABANDONMENT
10+946 TO STA. 11+560

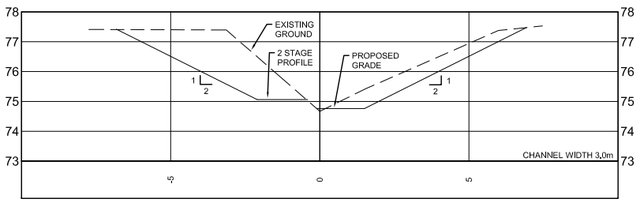
PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG, No:	18002-P8



1+000



2+250



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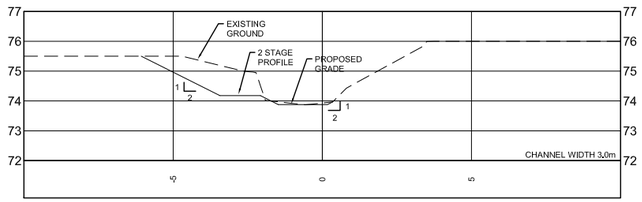

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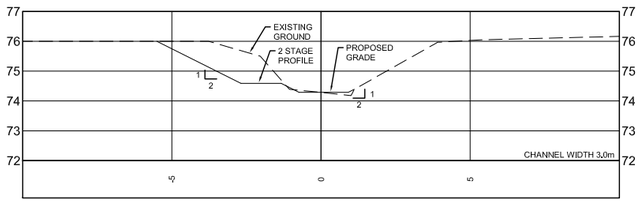

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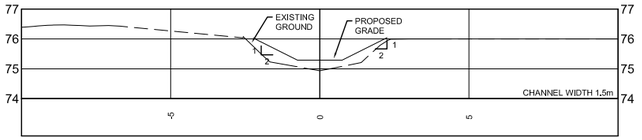

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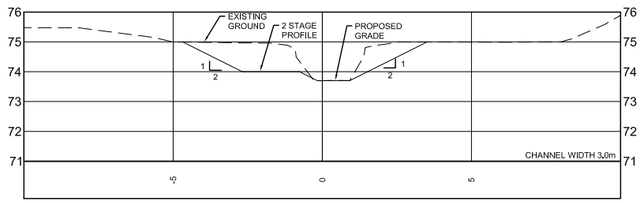

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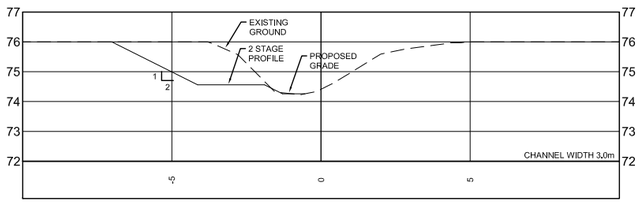

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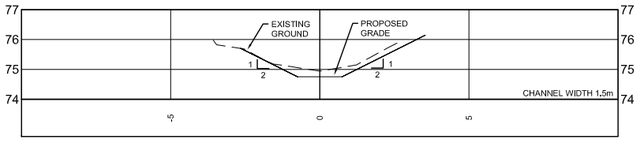

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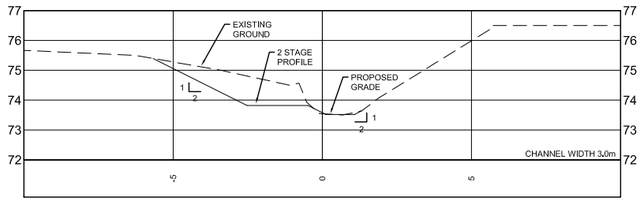

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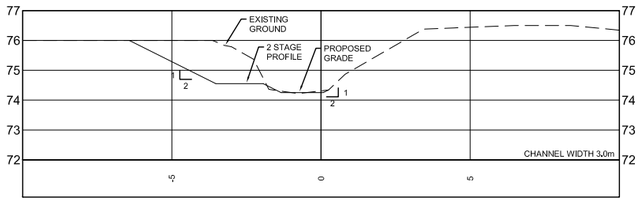

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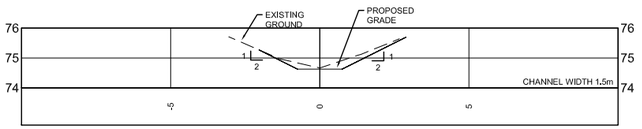

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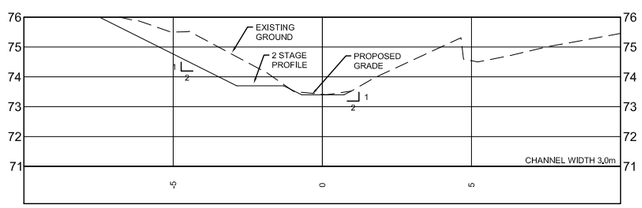
BRANCH 1



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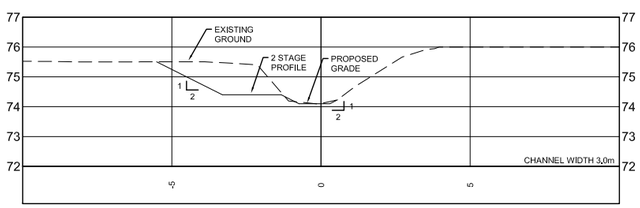

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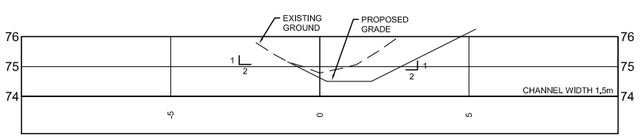


10+250
BRANCH 1

No.	DATE dd.mm.yy	REVISION	BY
1	08.03.19	ISSUED FOR CITY OF OTTAWA REVIEW	AJR
2	19.06.19	ISSUED FOR AGENCY REVIEW	AJR
3	13.12.19	ADDED 2 STAGE PROFILE	AJR
4	15.01.20	ISSUED FOR AGENCY APPROVAL	AJR
5	27.02.20	ISSUED FOR DISTRIBUTION	AJR

PROFESSIONAL ENGINEER — A. J. ROBINSON — PROVINCE OF ONTARIO — 27/02/20

Professional Engineers Ontario — 20/02/27 — Licensed Engineering Technologist — Name: L. FRANKLIN — Association of Professional Engineers of Ontario

SCALES

1 0 2

HORIZONTAL

Robinson Consultants

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

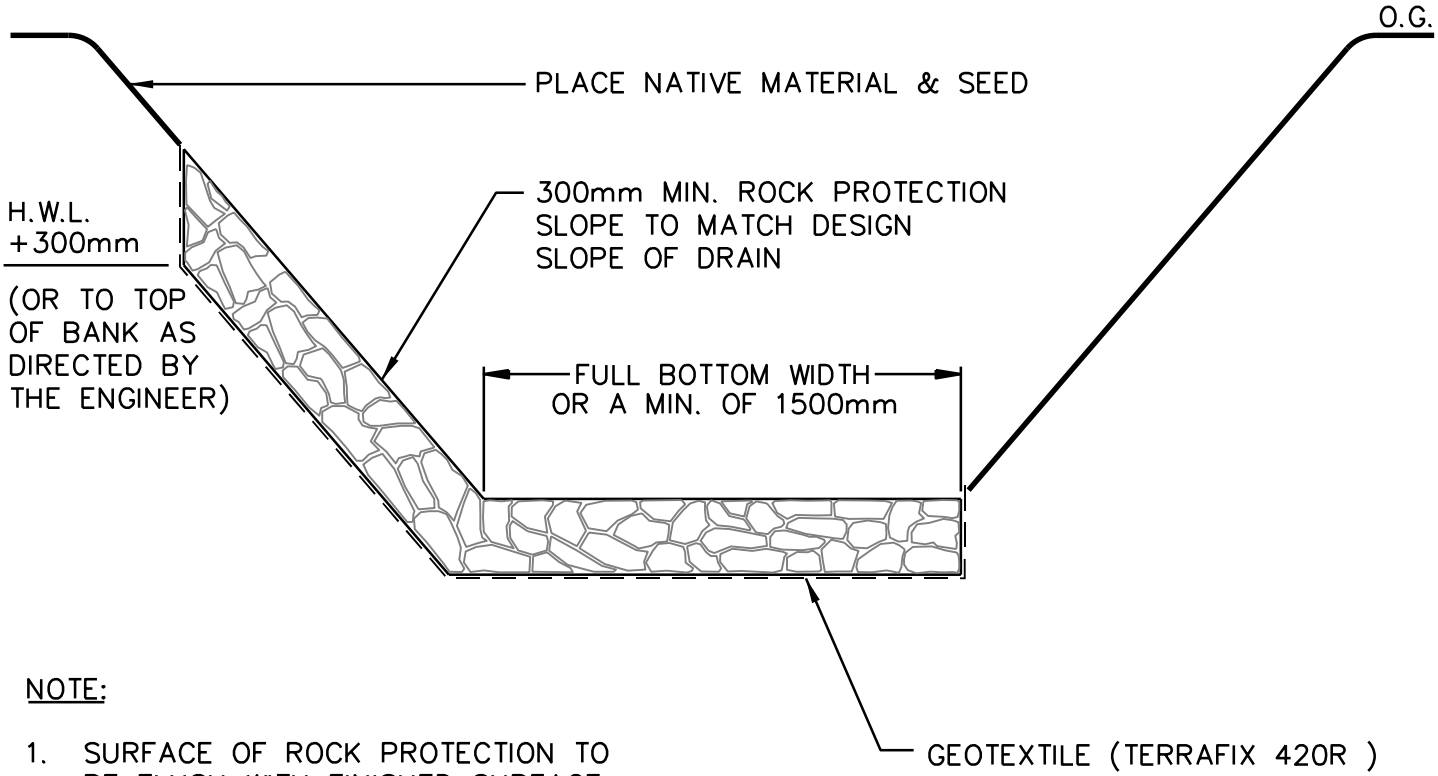
DESIGN	LF
CHECKED	AJR
DRAWN	JHB
CHECKED	LF
APPROVED	AJR

CITY OF OTTAWA

REGIMBALD MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN & BRANCH

PROJECT No.	18002
CONTRACT No.	
DATED	FEBRUARY 2020
DWG. No:	18002-C1



NOTE:

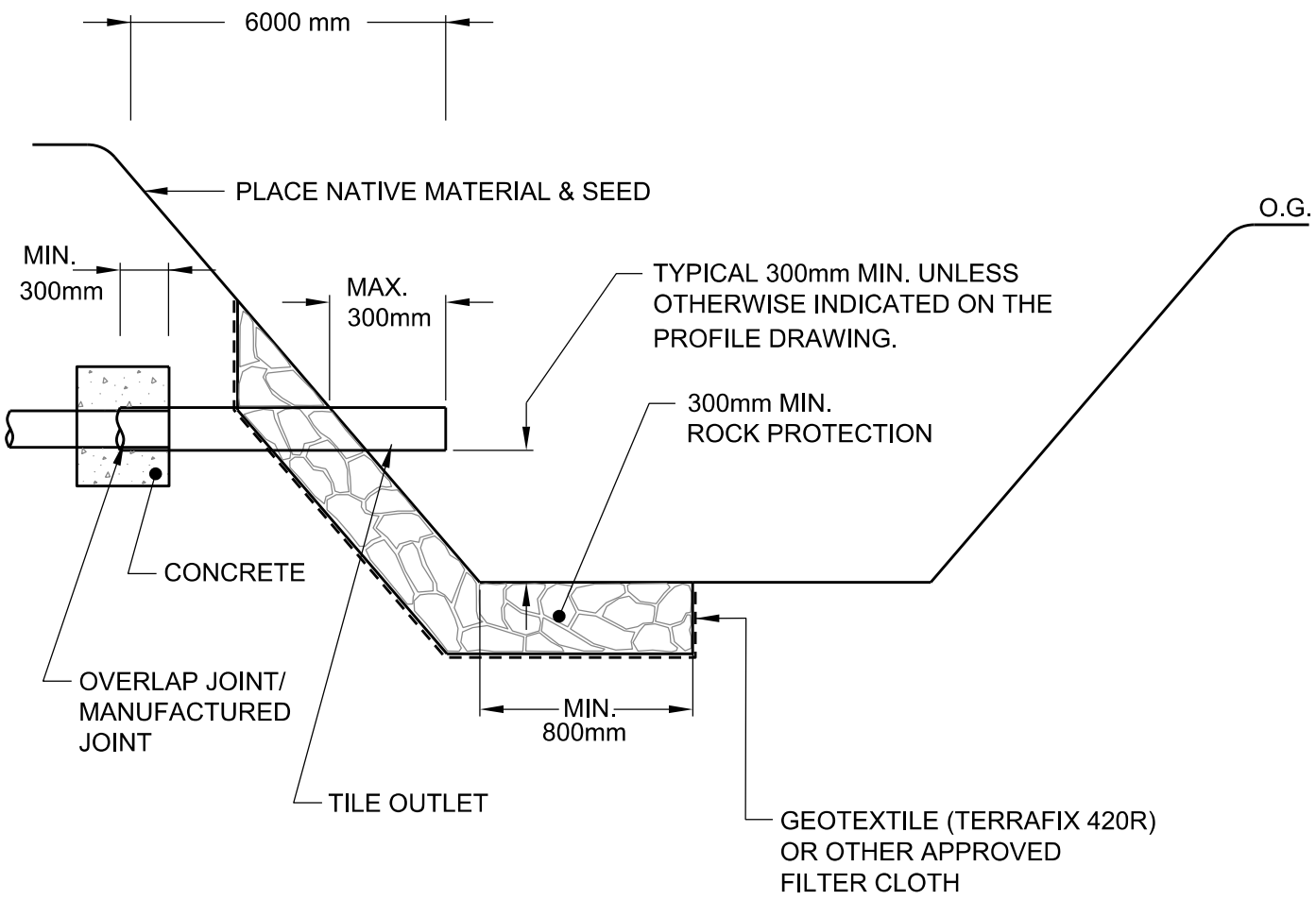
1. SURFACE OF ROCK PROTECTION TO BE FLUSH WITH FINISHED SURFACE OF DRAIN UPSTREAM AND DOWNSTREAM OF THE EROSION CONTROL. MIN. SIDE SLOPE IS 1 VERT TO 1 HOR. OR AS SPECIFIED IN ENGINEER'S REPORT.

2. FOR ROCK PROTECTION, USE R-50 AS PER OPSS 1004.05.05.02 OR ROCK PROTECTION AS PER OPSS 1004.05.05.03.

DATED: AUG/13

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

SCALE	MUNICIPAL DRAIN	PROJECT NO.
HORIZONTAL N.T.S.	TYPICAL ROCK PROTECTION EROSION CONTROL	STD.DWG.No. 1
VERTICAL N.T.S.		



NOTES:

1. OUTLET TO BE CONTINUOUS HDPE (SMOOTHWALL - MIN. STIFFNESS OF 320KPa) AND A MIN. LENGTH OF 6.0m.

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 C.S.P. OUTLET.

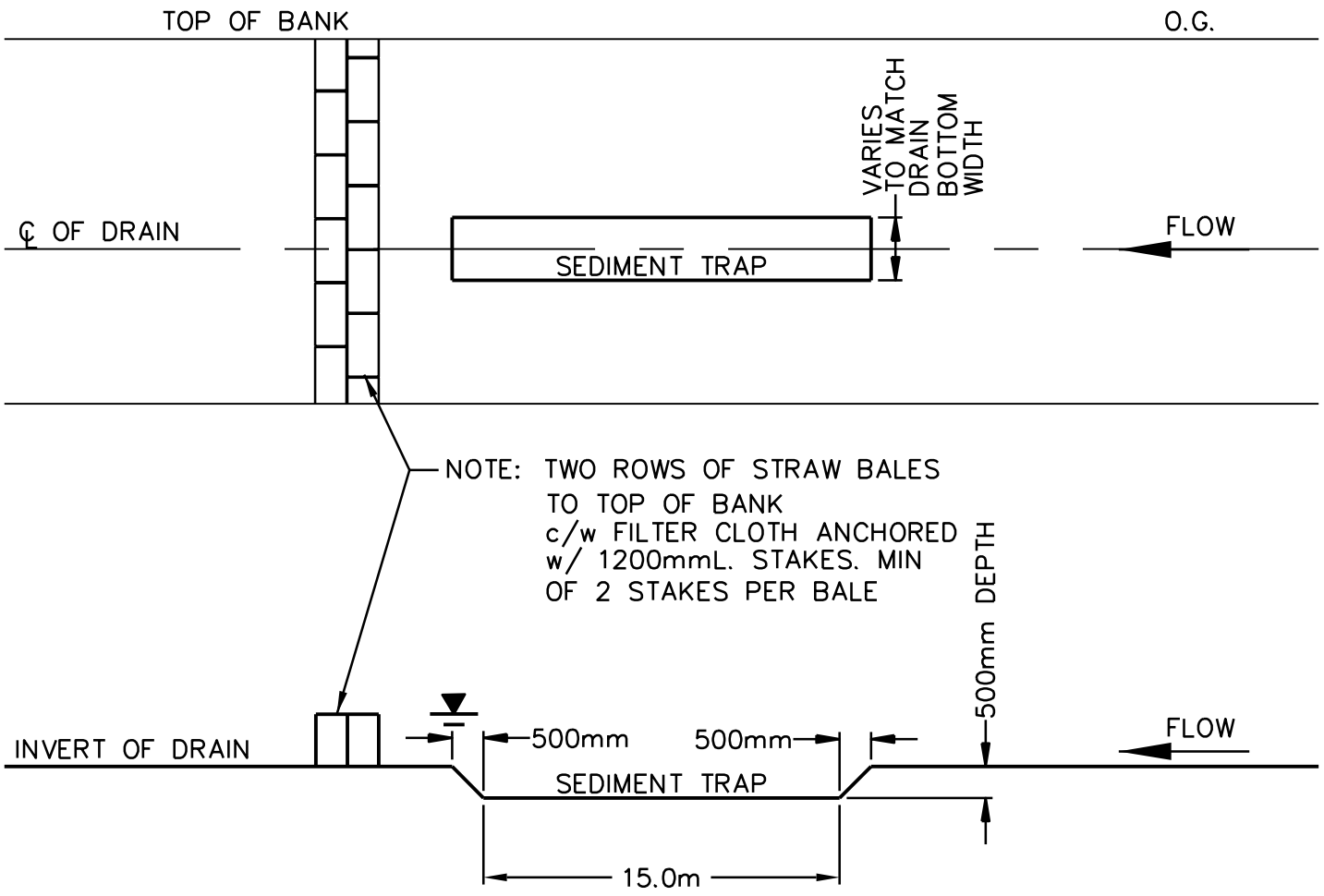
5. MIN. SIDE SLOPE IS 1 VERT TO 2 HOR OR AS SPECIFIED IN ENGINEER'S REPORT.

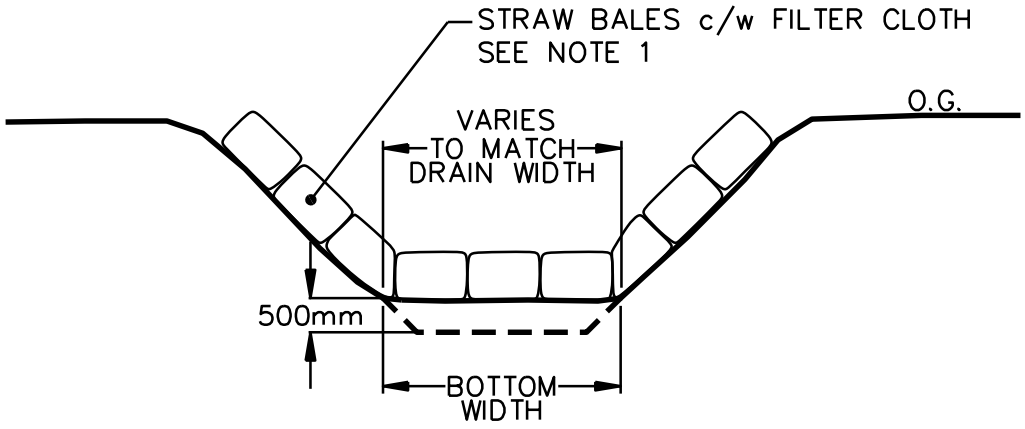
6. FOR ROCK PROTECTION, USE R-50 RIP-RAP AS PER OPSS MUNI 1004.05.05.02

DATED: JUL/17

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

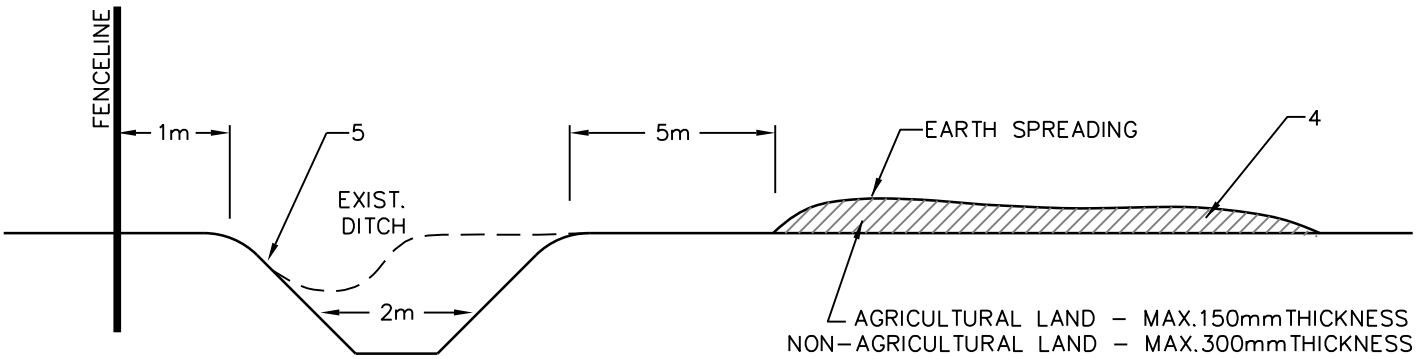
SCALE	MUNICIPAL DRAIN	PROJECT NO.
HORIZONTAL N.T.S.	STANDARD TILE OUTLET	STD.DWG.No. 2
VERTICAL N.T.S.		





DATED: AUG/13

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 STRAW BALE CHECK DAM AND SEDIMENT TRAP	PROJECT NO. STD.DWG.No. 3



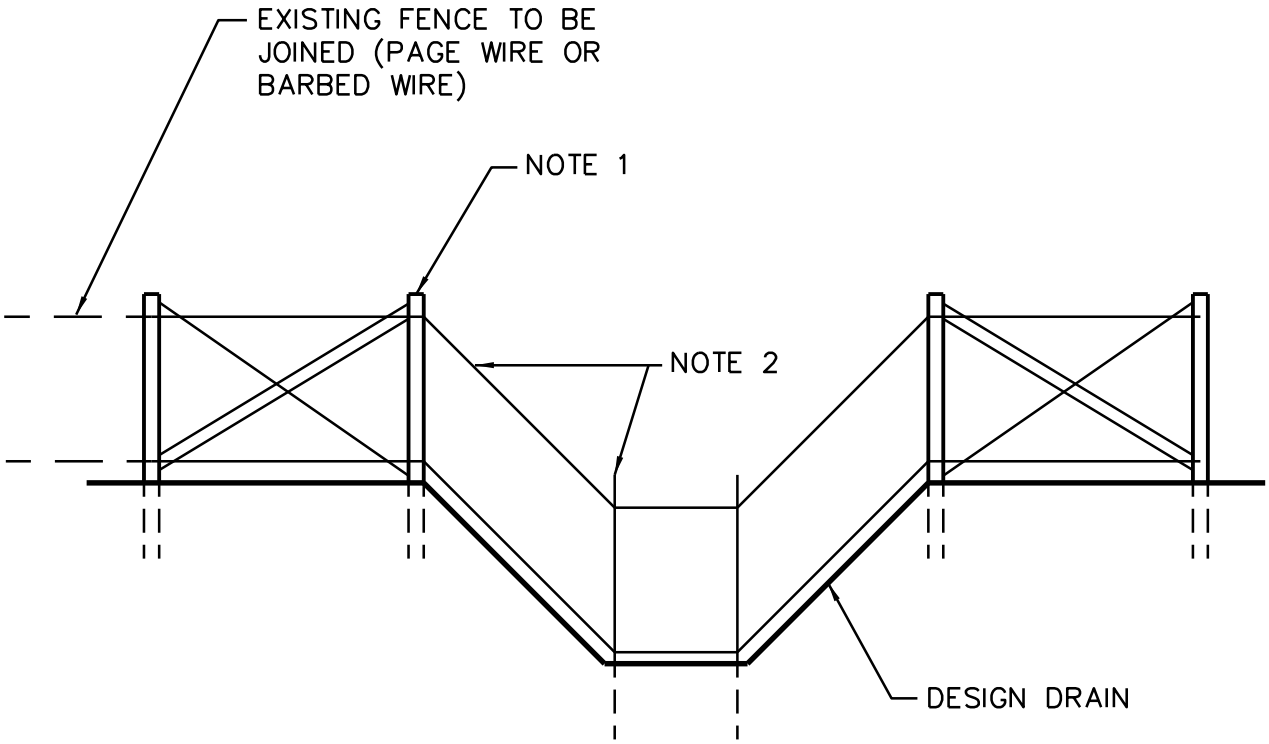
NOTES:

1. NO EXCAVATION WITHIN 1 METRE (3 FEET) OF EXISTING FENCELINE.
2. SIDE SLOPES AND CHANNEL DIMENSIONS AS PER PROFILE DRAWING.
3. NO SPOIL OR SPREADING WITHIN 5 METRES (16 FEET) OF TOP OF BANK.
4. SPOIL THICKNESS, WIDTH, DRAINAGE OPENINGS AND SPREADING LOCATION TO BE AS PER SPECIAL PROVISIONS.
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. SEE ENGINEER'S REPORT FOR DETAILS.

DATED: AUG/13

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

SCALE	MUNICIPAL DRAIN	PROJECT NO.
HORIZONTAL N.T.S.	OPEN CHANNEL SYSTEMS EARTH CUT CHANNEL	STD.DWG.No. 4
VERTICAL N.T.S.		



NOTES:

1. REFER TO OPSD DWG. No. 901.01 FOR BRACE PANEL DETAIL.
2. T-RAILS SHALL BE NEW STEEL, MINIMUM LENGTH 2.4m (8 FEET).
3. CROSS-FENCE WIRE SHALL BE HEAVY GAUGE BARBED WIRE, MINIMUM 6 STRANDS AT EVEN SPACING.

DATED: AUG/13

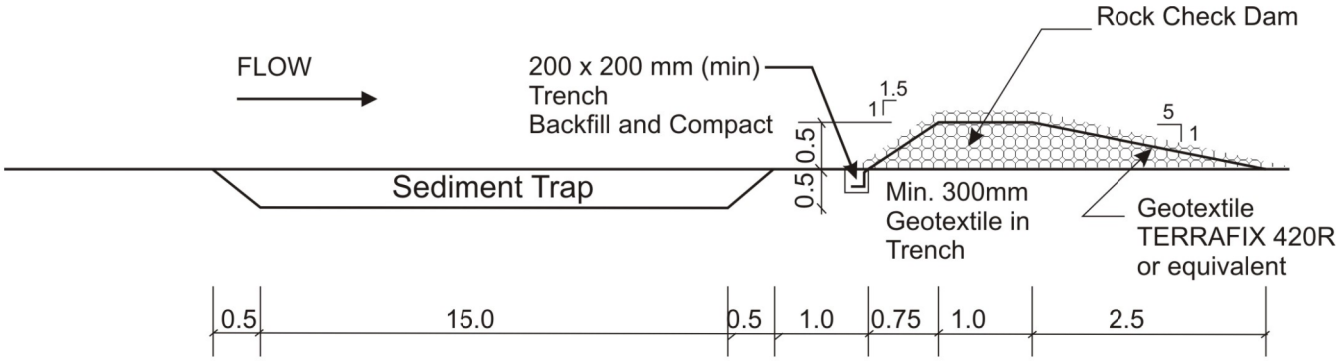
Robinson Consultants
CONSULTING ENGINEERS
350 Palladium Dr.,Suite 210
Kanata, Ontario, K2V 1A8
Telephone (613) 592-6060

SCALE	MUNICIPAL DRAIN	PROJECT NO.
HORIZONTAL N.T.S.	CROSS FENCE DETAIL	STD.DWG.No. 5
VERTICAL N.T.S.		

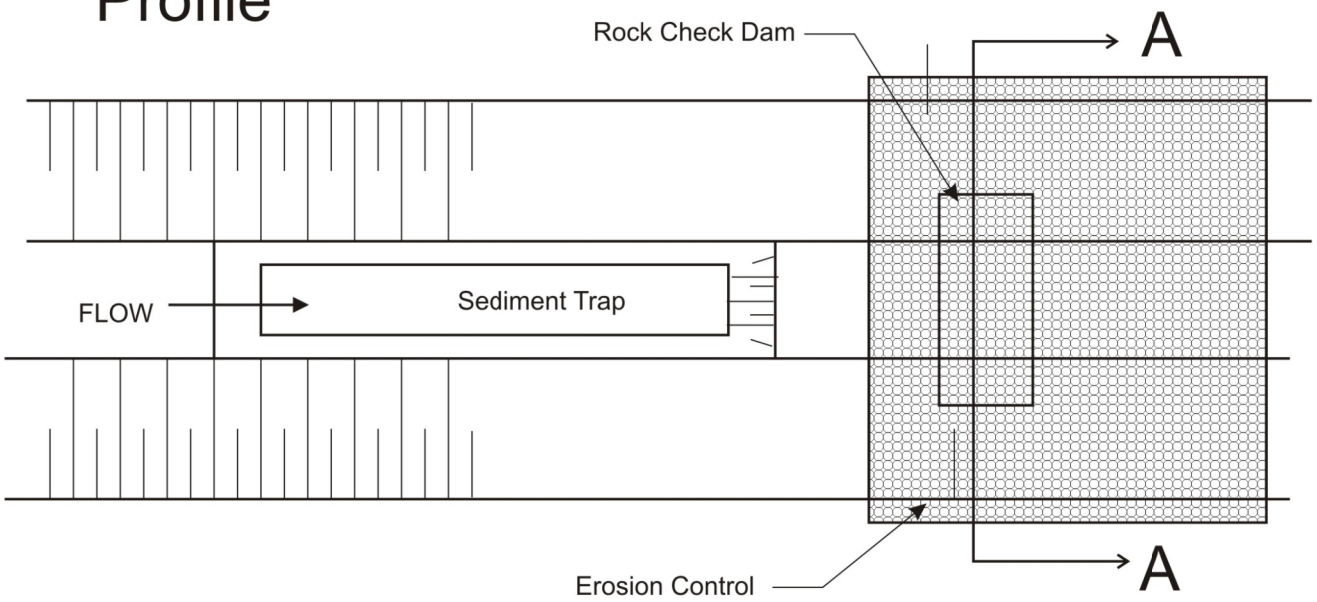
NOTE:

1. FOR ROCK CHECK DAM AND EROSION CONTROL, USE R-50 RIP-RAP AS PER OPSS 1004.05.05.02 OR ROCK PROTECTION AS PER OPSS 1004.05.05.03.

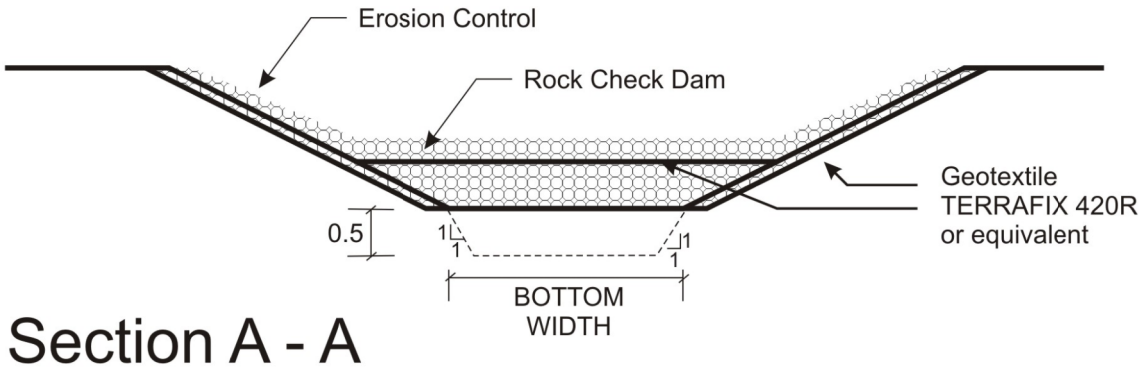
2. REFER TO OPSD 219.211 & 219.220 FOR ADDITIONAL DETAILS



Profile



Plan

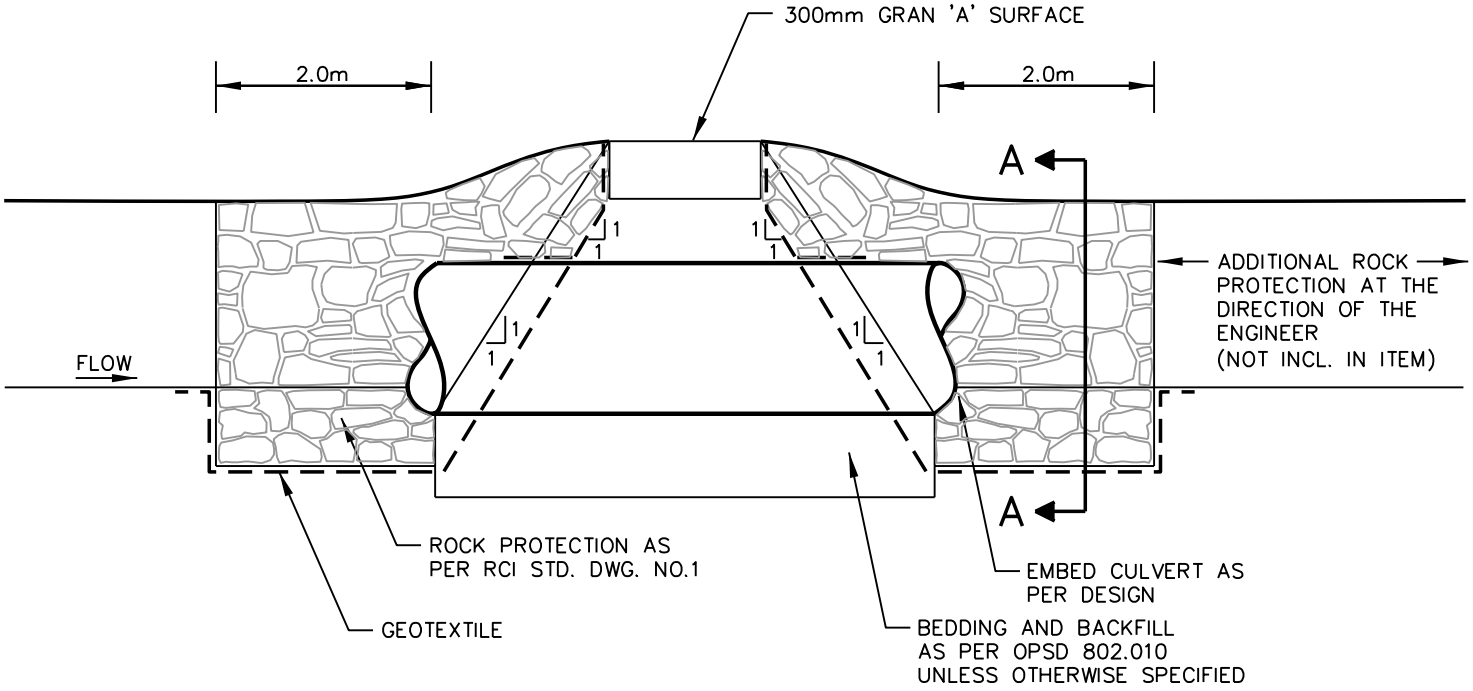


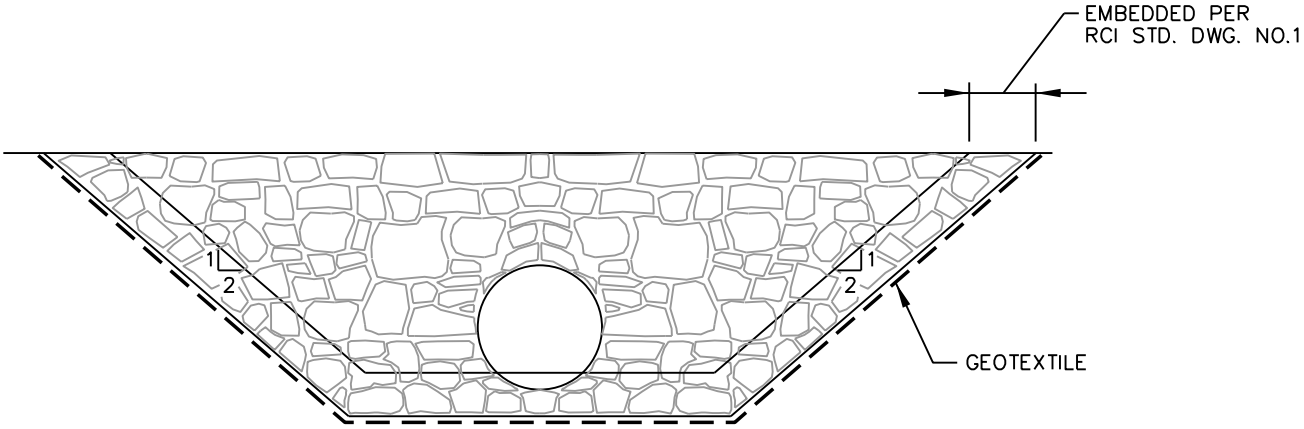
Section A - A

NOTE: All dimensions in metres unless noted

DATED: AUG/13

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 TEMPORARY ROCK CHECK DAM AND SEDIMENT TRAP	PROJECT NO. STD.DWG.No. 6





END SECTION A–A

DATED: OCT/13

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 STANDARD FARM CROSSING AND CULVERT END TREATMENT DETAIL	PROJECT NO. STD.DWG.No. 10

Appendix B

Cost Estimate and Injuring Liability

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

SCHEDULE A1 -- DISTRIBUTION OF COSTS
FOR THE CONSTRUCTION OF
THE REGIMBALD MUNICIPAL DRAIN

PROJECT No.: B18002
DATE: 27-Feb-20

PROPERTY	PERCENT DISTRIBUTION	ESTIMATED TOTAL COST DISTRIBUTION
SECTION 1		***TOTAL: $ 210,485.94***
BLOCK A	58.00%	$ 122,081.84
BLOCK B	42.00%	$ 88,404.10
SECTION 2		***TOTAL: $ 217,335.76***
BLOCK A	100.00%	$ 217,335.76
BLOCK B	0.00%	$ -
SECTION 3		***TOTAL: $ 112,898.44***
BLOCK A	0.00%	$ -
BLOCK B	100.00%	$ 112,898.44
ALL SECTIONS		***TOTAL: $ 540,720.14***
TOTAL BLOCK A		$ 339,417.60
TOTAL BLOCK B		$ 201,302.54

DETAILED COST ESTIMATE
SECTION 1 (Sta 0+000 to Sta 1+386)
THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No: B18002
Date: 27-Feb-20

Type	Item No.	Item	Unit	Cost/Unit	Quantity	Total
Section 1 (Sta 0+000 to Sta 1+386)						**1,386.00m**
		Construction				
Construction		**Site Preparation Activities**				
		Mobilization and Bonding (Max. 2% of Construction Cost)	LS	$ 6,500.00	44%	$ 2,860.00
		Erosion and Sediment Control Plan	LS	$ 10,000.00	44%	$ 4,400.00
		- (2) Rock Check Dam c/w Sediment Trap	each	$ 1,000.00	2.00	$ 2,000.00
		- (1) Straw BaleDam c/w Sediment Trap	each	$ 500.00	1.00	$ 500.00
		- Additional Silt Fence (where required)	m	$ 7.00	1400.00	$ 9,800.00
		Clearing/Grubbing (including individual tree removals)	LS	$ 36,000.00	43%	$ 15,480.00
		Excavation Activities				
		Earth Ex. - Ditch (full construction) - Incl. Spreading	m^3	$ 7.60	5909.00	$ 44,908.40
		2018 Maintenance Cost	LS	$ 31,172.50	50%	$ 15,586.25
		Reinstatement Activities				
		Tile Outlet Restoration/Protection	each	$ 500.00	24.00	$ 12,000.00
		Hand Seeding	m^2	$ 0.50	27720.00	$ 13,860.00
		Rock Protection - Erosion Control	m^2	$ 27.50	150.00	$ 4,125.00
		Sub-Total - Construction Costs				**$ 125,519.65**
		Contingency Allowance - Construction				**$ 12,500.00**
		Total - Construction Costs				**$ 138,019.65**
		Engineering/Administration				
		Engineer's Report (apportioned by Section)	LS	$ 90,000.00	44%	$ 39,600.00
		Contract Administration/Inspection	LS	$ 37,500.00	44%	$ 16,500.00
		Sub-Total - Routine Engineering				**$ 56,100.00**
Total - Engineering/Administration						**$ 56,100.00**
		Other				
		Carrying Cost(s)	L.S	(4% Of Costs Above)		$ 7,764.79
		Allowances	LS	(See Schedule)		$ 8,601.50
Total - Other Costs						**$ 16,366.29**
Sub-Total - Net Costs						**$ 210,485.94**
Total Net Costs - Section 1 (For Distribution to Properties)						**$ 210,485.94**

DETAILED COST ESTIMATE
SECTION 2 (Sta 1+386 to Sta 2+575)
THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No: B18002
Date: 27-Feb-20

Type	Item No.	Item	Unit	Cost/Unit	Quantity	Total
Section 2 (Sta 1+386 to Sta 2+575)						**1,189.00m**
		Construction				
Construction		**Site Preparation Activities**				
		Mobilization and Bonding (Max. 2% of Construction Cost)	LS	$ 6,500.00	37%	$ 2,405.00
		Erosion and Sediment Control Plan	LS	$ 10,000.00	37%	$ 3,700.00
		- (2) Straw BaleDam c/w Sediment Trap	each	$ 500.00	1.00	$ 500.00
		- Additional Silt Fence (where required)	each	$ 7.00	1200.00	$ 8,400.00
		Clearing/Grubbing (including individual tree removals)	LS	$ 36,000.00	37%	$ 13,320.00
		Excavation Activities				
		Earth Ex. - Ditch (full construction) - Incl. Spreading	m^3	$ 7.60	6730.00	$ 51,148.00
		2018 Maintenance Cost	LS	$ 31,172.50	50%	$ 15,586.25
		Reinstatement Activities				
		Tile Outlet Restoration/Protection	each	$ 500.00	8.00	$ 4,000.00
		Hand Seeding	m^2	$ 0.50	23780.00	$ 11,890.00
		Rock Protection - Erosion Control	m^2	$ 27.50	200.00	$ 5,500.00
		Sub-Total - Construction Costs				**$ 116,449.25**
		Contingency Allowance - Construction				**$ 11,000.00**
		Total - Construction Costs				**$ 127,449.25**
		Engineering/Administration				
		Engineer's Report (apportioned by Section)	LS	$ 90,000.00	37%	$ 33,300.00
		Contract Administration/Inspection	LS	$ 18,000.00	37%	$ 6,660.00
		Sub-Total - Engineering				**$ 39,960.00**
Total - Engineering/Administration						**$ 39,960.00**
		Other				
		Bear River Municipal Drain Injuring Liability -- Maintenance	LS	$ 27,337.00		$ 27,337.00
		Bear River Municipal Drain Injuring Liability -- Insufficient Outlet	LS	$ 6,539.00		$ 6,539.00
		Carrying Cost(s)	LS	(4% Of Costs Above)		$ 6,696.37
		Allowances	LS	(See Schedule)		$ 9,354.14
Total - Other Costs						**$ 49,926.51**
Sub-Total - Net Costs						**$ 217,335.76**
Total Net Costs - Section 2 (For Distribution to Properties)						**$ 217,335.76**

DETAILED COST ESTIMATE
BRANCH No. 1 (Sta 10+000 to Sta 10+946)
THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No: B18002
Date: 27-Feb-20

Type	Item No.	Item	Unit	Cost/Unit	Quantity	Total
Branch No. 1 (Sta 10+000 to Sta 10+946)						**946.00m**
		Construction				
Routine Construction		**Site Preparation Activities**				
		Mobilization and Bonding (Max. 2% of Construction Cost)	LS	$ 6,500.00	19%	$ 1,235.00
		Erosion and Sediment Control Plan	LS	$ 10,000.00	19%	$ 1,900.00
		- (1) Rock Check Dam c/w Sediment Trap	each	$ 1,000.00	1.00	$ 1,000.00
		- (1) Straw BaleDam c/w Sediment Trap	each	$ 500.00	1.00	$ 500.00
		- Additional Silt Fence (where required)	each	$ 7.00	950.00	$ 6,650.00
		Clearing/Grubbing (including individual tree removals)	LS	$ 36,000.00	19%	$ 6,840.00
		Excavation Activities				
		Earth Ex. - Ditch (full construction) - Incl. Spreading	m^3	$ 7.60	1935.00	$ 14,706.00
		Roadway Culvert(s) -- 600 dia CSP	m	$ 500.00	15.00	$ 7,500.00
		Reinstatement Activities				
		Hand Seeding	m^2	$ 0.50	14190.00	$ 7,095.00
		Rock Protection - Erosion Control	m^2	$ 27.50	350.00	$ 9,625.00
		Rock Protection - Culvert End Treatments	each	$ 825.00	2.00	$ 1,650.00
		Sub-Total - Construction Costs				**$ 58,701.00**
		Contingency Allowance - Construction				**$ 5,800.00**
		Total - Construction Costs				**$ 64,501.00**
		Engineering/Administration				
		Engineer's Report (apportioned by Section)	LS	$ 90,000.00	19%	$ 17,100.00
		Contract Administration/Inspection	LS	$ 18,000.00	19%	$ 3,420.00
		Sub-Total - Engineering				**$ 20,520.00**
Total - Engineering/Administration						**$ 20,520.00**
		Other				
		Bear River Municipal Drain Injuring Liability -- Maintenance	LS	$ 18,398.00		$ 18,398.00
		Bear River Municipal Drain Injuring Liability -- Insufficient Outlet	LS	$ 4,401.00		$ 4,401.00
		Carrying Cost(s)	LS	(4% Of Costs Above)		$ 3,400.84
		Allowances	LS	(See Schedule)		$ 1,677.60
Total - Other Costs						**$ 27,877.44**
Sub-Total - Net Costs						**$ 112,898.44**
Total Net Costs - Branch 1 (For Distribution to Properties)						**$ 112,898.44**

CALCULATION OF INJURING LIABILITY
BEAR RIVER MUNICIPAL DRAIN
INJURING LIABILITY FOR INSUFFICIENT OUTLET

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

INJURING LIBILITY -- INSUFFICIENT OUTLET: $ 475,000.00

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

1990 Injuring Liability	$	475,000.00
Additional Impact		10%
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 appling 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:		227.30/94.30
2019 Value:	$	114,493.64

For the pupose of estimation a rounded value is utilzied.

USE:	**$**	**120,000.00**

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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	26.51 Ha
		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 to McKinnon's Creek

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

Total Area of Development

EUC & Savage	240 Ha
McKinnon's Creek	300 Ha
Regimbald	65.9 Ha
Simpson	76.55 Ha
Wilson Johnson	39.11 Ha
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 Blocks A, B, C & E-Amazon & CRRRC

Regimbald	Block A	39.39 ($166)	$ 6,538.74	or	$ 6,539
	Block B	26.51 ($166)	$ 4,400.66	or	$ 4,401
Simpson	Block C	76.55 ($166)	$12,707.30	or	$12,707
Wilson Johnson	Block E	39.11 ($166)	$ 6,492.26	or	$ 6,492

February 27, 2020

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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 utilzied.

USE:	**$**	**500,000.00**

February 27, 2020

Robinson Consultants

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

Areas of Development-Amazon & CRRRC

Block A	Amazon Site	Regimbald	39.39 Ha
Block B	CRRRC	Regimbald	26.51 Ha
		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	240 Ha
	McKinnon's Creek	Proposed	300 Ha

Total Area of Development

EUC & Savage	240 Ha
McKinnon's Creek	300 Ha
Regimbald	65.9 Ha
Simpson	76.55 Ha
Wilson Johnson	39.11 Ha
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.

Compensation Contribution Blocks A, B, C & E-Amazon & CRRRC

Regimbald	Block A	39.39 ($694)	$27,336.66	or	$27,337
	Block B	26.51 ($694)	$18,397.96	or	$18,398
Simpson	Block C	76.55 ($694)	$53,125.70	or	$53,126
Wilson Johnson	Block E	39.11 ($694)	$27,142.34	or	$27,142

February 27, 2020

Appendix C

Schedules of Assessment and Allowances

- Schedule of Assessment for Future Maintenance

SCHEDULE A2 - SUMMARY
FOR FUTURE MAINTENANCE OF ALL SECTIONS
OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha)				Benefit Cost	Outlet Cost	Sub-total Costs	Grants	Total Net Costs
		S1	S2	BR 1	Total	Total	Total		Total	Total
City of Ottawa -- Individual Landowners										
10	500301108000000	3.00			3.00	$ -	$ 15.67	$ 15.67	$ -	$ 15.67
11	500301109000000	13.95			13.95	$ -	$ 90.26	$ 90.26	$ -	$ 90.26
14	500301110000000	19.01			19.01	$ 211.27	$ 163.75	$ 375.02	$ -	$ 375.02
16	5003 011 110 00000	4.25			4.25	$ 54.57	$ 42.30	$ 96.87	$ 31.97	$ 64.90
39	500301297000000	73.34	71.43	17.20	161.97	$ 1,460.76	$ 4,890.08	$ 6,350.84	$ 2,095.78	$ 4,255.06
46	500301300000000		0.28		0.28	$ -	$ 11.42	$ 11.42	$ -	$ 11.42
47	500301299000000		0.14		0.14	$ -	$ 5.80	$ 5.80	$ -	$ 5.80
48	500301298000000		0.14		0.14	$ -	$ 6.94	$ 6.94	$ -	$ 6.94
49	500301301000000		0.14		0.14	$ -	$ 7.31	$ 7.31	$ -	$ 7.31
63	500301559000000		53.86		53.86	$ -	$ 1,283.21	$ 1,283.21	$ -	$ 1,283.21
65	500301561500000		7.43		7.43	$ -	$ 232.26	$ 232.26	$ -	$ 232.26
66	500301563000000		26.02		26.02	$ 162.01	$ 837.72	$ 999.73	$ -	$ 999.73
71	500301562000000		0.17		0.17	$ -	$ 8.87	$ 8.87	$ -	$ 376.77
72	500301562000000		0.70		0.70	$ -	$ 72.61	$ 72.61	$ -	$ 40.08
73	PIN 145580392		0.24		0.24	$ -	$ 25.46	$ 25.46	$ -	$ 131.55
74	500301564050000		0.93		0.93	$ -	$ 97.13	$ 97.13	$ -	$ 9.25
150	500301552000000		18.42		18.42	$ -	$ 376.77	$ 376.77	$ -	$ 376.77
151	500301542000000		2.08		2.08	$ -	$ 40.08	$ 40.08	$ -	$ 40.08
152	500301555000000		8.27		8.27	$ -	$ 131.55	$ 131.55	$ -	$ 131.55
153	500301556000000		0.29		0.29	$ -	$ 9.25	$ 9.25	$ -	$ 9.25
154	500301557000000		0.22		0.22	$ -	$ 6.93	$ 6.93	$ -	$ 6.93
155	500301557010000		0.20		0.20	$ -	$ 6.29	$ 6.29	$ -	$ 6.29
156	500301296020000		0.62		0.62	$ -	$ 19.55	$ 19.55	$ -	$ 19.55
157	500301296200000		0.82		0.82	$ -	$ 13.05	$ 13.05	$ -	$ 13.05
158	500301559010000		0.61		0.61	$ -	$ 12.06	$ 12.06	$ -	$ 12.06
159	500301558010000		0.19		0.19	$ -	$ 3.81	$ 3.81	$ -	$ 3.81

SCHEDULE A2 - SUMMARY
FOR FUTURE MAINTENANCE OF ALL SECTIONS
OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha)				Benefit Cost	Outlet Cost	Sub-total Costs	Grants	Total Net Costs
		S1	S2	BR 1	Total	Total	Total		Total	Total
Blocks										
Block A			38.97		38.97	$ -	$ 5,137.36	$ 5,137.36	$ -	$ 5,137.36
Block B				26.97	26.97	$ -	$ 5,261.41	$ 5,261.41	$ -	$ 5,261.41
City of Ottawa -- Roads/Other										
Highway 417			17.78	0.79	18.56	$ 464.90	$ 2,918.66	$ 3,383.56	$ -	$ 3,383.56
Boundary Road			0.56		0.56	$ -	$ 58.53	$ 58.53	$ -	$ 58.53
Frontier Road				0.79	0.79	$ 65.06	$ 221.04	$ 286.10	$ -	$ 286.10
Carlsbad Lane			2.70	0.15	2.85	$ 54.85	$ 351.18	$ 406.02	$ -	$ 406.02
Sabourin Road			1.78		1.78	$ -	$ 121.09	$ 121.09	$ -	$ 121.09
Road Allowance		2.44			2.44	$ 26.58	$ 20.60	$ 47.17	$ -	$ 47.17
TOTAL		115.99	254.96	45.90	416.85	$ 2,500.00	$ 22,500.00	$ 25,000.00	$ 2,127.74	$ 23,225.85

SCHEDULE B2
FOR FUTURE MAINTENANCE OF SECTION 1 OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha) S1 Total	Land Use Factor	Factored Area S1 Total	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor S1	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
City of Ottawa -- Individual Landowners																
10	500301108000000	3.00	1.00	3.00		0.52		$ -	0.52	0.33	0.52	$ 15.67	$ 15.67	0%	$ -	$ 15.67
11	500301109000000	13.95	1.00	13.95		0.65		$ -	0.65	0.33	2.99	$ 90.26	$ 90.26	0%	$ -	$ 90.26
14	500301110000000	19.01	1.00	19.01	Y	0.87	16.45	$ 211.27	0.87	0.33	5.43	$ 163.75	$ 375.02	0%	$ -	$ 375.02
16	5003 011 110 00000	4.25	1.00	4.25	Y	1.00	4.25	$ 54.57	1.00	0.33	1.40	$ 42.30	$ 96.87	100%	$ 31.97	$ 64.90
39	500301297000000	161.97	1.00	161.97	Y	0.75	55.10	$ 707.58	0.75	1.00	121.70	$ 3,670.31	$ 4,377.89	100%	$ 1,444.70	$ 2,933.19
46	500301300000000	0.28	2.00	0.56		0.30		$ -	0.30	1.00	0.17	$ 5.05	$ 5.05	0%	$ -	$ 5.05
47	500301299000000	0.14	2.00	0.28		0.32		$ -	0.32	1.00	0.09	$ 2.65	$ 2.65	0%	$ -	$ 2.65
48	500301298000000	0.14	2.00	0.28		0.46		$ -	0.46	1.00	0.13	$ 3.79	$ 3.79	0%	$ -	$ 3.79
49	500301301000000	0.14	2.00	0.28		0.50		$ -	0.50	1.00	0.14	$ 4.16	$ 4.16	0%	$ -	$ 4.16
63	500301559000000	53.86	1.00	53.86		0.32		$ -	0.32	1.00	17.08	$ 515.05	$ 515.05	0%	$ -	$ 515.05
65	500301561500000	7.43	1.00	7.43		0.30		$ -	0.30	1.00	2.23	$ 67.26	$ 67.26	0%	$ -	$ 67.26
66	500301563000000	26.02	1.00	26.02		0.41		$ -	0.41	1.00	10.75	$ 324.35	$ 324.35	0%	$ -	$ 324.35
71	500301562000000	0.17	2.00	0.34		0.30		$ -	0.30	1.00	0.10	$ 3.08	$ 3.08	0%	$ -	$ 3.08
72	500301562000000	0.70	4.00	2.78		0.30		$ -	0.30	1.00	0.84	$ 25.19	$ 25.19	0%	$ -	$ 25.19
73	PIN 145580392	0.24	4.00	0.98		0.30		$ -	0.30	1.00	0.29	$ 8.83	$ 8.83	0%	$ -	$ 8.83
74	500301564050000	0.93	4.00	3.72		0.30		$ -	0.30	1.00	1.12	$ 33.69	$ 33.69	0%	$ -	$ 33.69
150	500301552000000	18.42	1.00	18.42		0.30		$ -	0.30	1.00	5.52	$ 166.63	$ 166.63	0%	$ -	$ 166.63
151	500301542000000	2.08	1.00	2.08		0.30		$ -	0.30	1.00	0.62	$ 18.82	$ 18.82	0%	$ -	$ 18.82
152	500301555000000	8.27	1.00	8.27		0.30		$ -	0.30	1.00	2.48	$ 74.84	$ 74.84	0%	$ -	$ 74.84
153	500301556000000	0.29	2.00	0.58		0.30		$ -	0.30	1.00	0.17	$ 5.27	$ 5.27	0%	$ -	$ 5.27
154	500301557000000	0.22	2.00	0.44		0.30		$ -	0.30	1.00	0.13	$ 3.94	$ 3.94	0%	$ -	$ 3.94
155	500301557010000	0.20	2.00	0.40		0.30		$ -	0.30	1.00	0.12	$ 3.58	$ 3.58	0%	$ -	$ 3.58
156	500301296020000	0.62	2.00	1.23		0.30		$ -	0.30	1.00	0.37	$ 11.13	$ 11.13	0%	$ -	$ 11.13
157	500301296200000	0.82	1.00	0.82		0.30		$ -	0.30	1.00	0.25	$ 7.43	$ 7.43	0%	$ -	$ 7.43
158	500301559010000	0.61	1.00	0.61		0.30		$ -	0.30	1.00	0.18	$ 5.49	$ 5.49	0%	$ -	$ 5.49
159	500301558010000	0.19	1.00	0.19		0.30		$ -	0.30	1.00	0.06	$ 1.68	$ 1.68	0%	$ -	$ 1.68

SCHEDULE B2
FOR FUTURE MAINTENANCE OF SECTION 1 OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha) S1 Total	Land Use Factor	Factored Area S1 Total	Backs on Drain S1	Distance Factor S1	Benefit Factored Area	Benefit Cost	Distance Factor S1	Sub-Section Factor S1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
Blocks																
Block A		38.97	4.00	155.88		0.30		$ -	0.30	1.00	47.26	$ 1,425.37	$ 1,425.37	0%	$ -	$ 1,425.37
Block B		26.97	4.00	107.88		0.35		$ -	0.35	1.00	37.77	$ 1,139.10	$ 1,139.10	0%	$ -	$ 1,139.10
City of Ottawa -- Roads/Other																
Highway 417		18.56	4.00	74.24		0.38		$ -	0.38	1.00	28.44	$ 857.59	$ 857.59	0%	$ -	$ 857.59
Boundary Road		0.56	4.00	2.24		0.30		$ -	0.30	1.00	0.67	$ 20.30	$ 20.30	0%	$ -	$ 20.30
Frontier Road		0.79	4.00	3.16		0.50		$ -	0.50	1.00	1.58	$ 47.65	$ 47.65	0%	$ -	$ 47.65
Carlsbad Lane		2.85	4.00	11.40		0.44		$ -	0.44	1.00	5.00	$ 150.83	$ 150.83	0%	$ -	$ 150.83
Sabourin Road		1.78	4.00	7.11		0.30		$ -	0.30	1.00	2.13	$ 64.35	$ 64.35	0%	$ -	$ 64.35
Road Allowance		2.44	1.00	2.44	Y	0.85	2.07	$ 26.58	0.85	0.33	0.68	$ 20.60	$ 47.17	0%	$ -	$ 47.17
Total		**416.85**		**696.08**			**77.88**	**$ 1,000.00**			**298.41**	**$ 9,000.00**	**$ 0,000.00**		**$ 1,476.67**	**$ 8,523.33**

SCHEDULE C2
FOR FUTURE MAINTENANCE OF SECTION 2 OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha) S2 Total	Land Use Factor	Factored Area S2 Total	Backs on Drain S2	Distance Factor S2	Benefit Factored Area	Benefit Cost	Distance Factor S2	Sub-Section Factor S2	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
City of Ottawa -- Individual Landowners																
39	500301297000000	71.43	1.00	71.43	Y	0.75	53.44	$ 384.93	0.75	0.67	35.80	$ 1,219.76	$ 1,604.70	100%	$ 529.55	$ 1,075.15
46	500301300000000	0.28	2.00	0.56		0.50		$ -	0.50	0.67	0.19	$ 6.37	$ 6.37	0%	$ -	$ 6.37
47	500301299000000	0.14	2.00	0.28		0.50		$ -	0.50	0.67	0.09	$ 3.15	$ 3.15	0%	$ -	$ 3.15
48	500301298000000	0.14	2.00	0.28		0.50		$ -	0.50	0.67	0.09	$ 3.15	$ 3.15	0%	$ -	$ 3.15
49	500301301000000	0.14	2.00	0.28		0.50		$ -	0.50	0.67	0.09	$ 3.15	$ 3.15	0%	$ -	$ 3.15
63	500301559000000	53.86	1.00	53.86		0.56		$ -	0.56	0.75	22.55	$ 768.16	$ 768.16	0%	$ -	$ 768.16
65	500301561500000	7.43	1.00	7.43		0.65		$ -	0.65	1.00	4.84	$ 165.00	$ 165.00	0%	$ -	$ 165.00
66	500301563000000	26.02	1.00	26.02	Y	0.86	22.49	$ 162.01	0.86	0.67	15.07	$ 513.38	$ 675.39	0%	$ -	$ 675.39
71	500301562000000	0.17	2.00	0.34		0.50		$ -	0.50	1.00	0.17	$ 5.79	$ 5.79	0%	$ -	$ 5.79
72	500301562000000	0.70	4.00	2.78		0.50		$ -	0.50	1.00	1.39	$ 47.42	$ 47.42	0%	$ -	$ 47.42
73	PIN 145580392	0.24	4.00	0.98		0.50		$ -	0.50	1.00	0.49	$ 16.63	$ 16.63	0%	$ -	$ 16.63
74	500301564050000	0.93	4.00	3.72		0.50		$ -	0.50	1.00	1.86	$ 63.43	$ 63.43	0%	$ -	$ 63.43
150	500301552000000	18.42	1.00	18.42		0.33		$ -	0.33	1.00	6.17	$ 210.15	$ 210.15	0%	$ -	$ 210.15
151	500301542000000	2.08	1.00	2.08		0.30		$ -	0.30	1.00	0.62	$ 21.26	$ 21.26	0%	$ -	$ 21.26
152	500301555000000	8.27	1.00	8.27		0.30		$ -	0.30	0.67	1.66	$ 56.71	$ 56.71	0%	$ -	$ 56.71
153	500301556000000	0.29	2.00	0.58		0.30		$ -	0.30	0.67	0.12	$ 3.99	$ 3.99	0%	$ -	$ 3.99
154	500301557000000	0.22	2.00	0.44		0.30		$ -	0.30	0.67	0.09	$ 2.99	$ 2.99	0%	$ -	$ 2.99
155	500301557010000	0.20	2.00	0.40		0.30		$ -	0.30	0.67	0.08	$ 2.71	$ 2.71	0%	$ -	$ 2.71
156	500301296020000	0.62	2.00	1.23		0.30		$ -	0.30	0.67	0.25	$ 8.42	$ 8.42	0%	$ -	$ 8.42
157	500301296200000	0.82	1.00	0.82		0.30		$ -	0.30	0.67	0.17	$ 5.62	$ 5.62	0%	$ -	$ 5.62
158	500301559010000	0.61	1.00	0.61		0.47		$ -	0.47	0.67	0.19	$ 6.57	$ 6.57	0%	$ -	$ 6.57
159	500301558010000	0.19	1.00	0.19		0.50		$ -	0.50	0.67	0.06	$ 2.12	$ 2.12	0%	$ -	$ 2.12

SCHEDULE C2
FOR FUTURE MAINTENANCE OF SECTION 2 OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (ha) S2 Total	Land Use Factor	Factored Area S2 Total	Backs on Drain S2	Distance Factor S2	Benefit Factored Area	Benefit Cost	Distance Factor S2	Sub-Section Factor S2	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
Blocks																
Block A		38.97	4.00	155.88		0.70		$ -	0.70	1.00	108.96	$ 3,711.99	$ 3,711.99	0%	$ -	$ 3,711.99
City of Ottawa -- Roads/Other																
Highway 417		17.78	4.00	71.10	Y	0.78	55.28	$ 398.21	0.78	1.00	55.28	$ 1,883.32	$ 2,281.52	0%	$ -	$ 2,281.52
Boundary Road		0.56	4.00	2.24		0.50		$ -	0.50	1.00	1.12	$ 38.22	$ 38.22	0%	$ -	$ 38.22
Carlsbad Lane		2.70	4.00	10.78	Y	0.71	7.61	$ 54.85	0.71	0.67	5.10	$ 173.80	$ 228.65	0%	$ -	$ 228.65
Sabourin Road		1.78	4.00	7.11		0.35		$ -	0.35	0.67	1.67	$ 56.74	$ 56.74	0%	$ -	$ 56.74
Total		**254.96**		**448.10**			**138.83**	**$ 1,000.00**			**264.18**	**$ 9,000.00**	**$ 10,000.00**		**$ 529.55**	**$ 9,470.45**

SCHEDULE D2
FOR FUTURE MAINTENANCE OF BRANCH No. 1 OF THE REGIMBALD MUNICIPAL DRAIN

Robinson Consultants

Project No.: B18002
Date: 27-Feb-20

ID	Roll No.	Area (Ha) BR 1 Total	Land Use Factor	Factored Area BR 1 Total	Backs on Drain BR 1	Distance Factor BR 1	Benefit Factored Area	Benefit Cost	Distance Factor BR 1	Sub-Section Factor BR 1	Outlet Factored Area	Outlet Cost	Sub-Total Cost	ADIP Eligibility	1/3 Grant	Total Net Cost
City of Ottawa -- Individual Landowners																
39	500301297000000	17.20	1.00	17.20	Y	0.99	17.08	$ 368.25	0.99	0.00	0.00	$ -	$ 368.25	100%	$ 121.52	$ 246.73
Blocks																
Block B		26.97	4.00	107.88		0.70		$ -	0.70	0.95	71.75	$ 4,122.32	$ 4,122.32	0%	$ -	$ 4,122.32
City of Ottawa -- Roads/Other																
Highway 417		0.79	4.00	3.14	Y	0.99	3.09	$ 66.69	0.99	1.00	3.09	$ 177.75	$ 244.44	0%	$ -	$ 244.44
Frontier Road		0.79	4.00	3.16	Y	0.96	3.02	$ 65.06	0.96	1.00	3.02	$ 173.39	$ 238.45	0%	$ -	$ 238.45
Carlsbad Lane		0.15	4.00	0.62		0.75		$ -	0.75	1.00	0.46	$ 26.54	$ 26.54	0%	$ -	$ 26.54
Total		**45.90**		**132.00**			**23.19**	**$ 500.00**			**78.33**	**$ 4,500.00**	**$ 5,000.00**		**$ 121.52**	**$ 4,878.48**

Appendix D

Authorization and Permits

- SNCA -- Letter of Permission
- DFO – Class Authorization

SOUTH NATION CONSERVATION
DE LA NATION SUD

February 27, 2020 **Permit No.** 2020-CUM-R026

City of Ottawa
2155 Roger Stevens Drive
Ottawa (North Gower), ON K0A 2T0
Attention: Dave Ryan, P.Geo., Drainage Superintendent

Interference to a Watercourse (Regimbald Municipal Drain)
Lot 21-23, Concession 9-11, Ottawa
Formerly Cumberland

Dear Mr. Ryan,

The South Nation River Conservation Authority, herein referred to as South Nation Conservation (SNC), is a corporation created under the Conservation Authorities Act of Ontario and funded and directed by the municipalities that make up the South Nation River Watershed. It is the obligation of SNC to implement Ontario Regulation 170/06 (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses). As a result, a permit is required from this office to undertake the above noted project.

Upon completion of its review of this proposal, SNC staff has determined that this project is allowable under Ontario Regulation 170/06, and SNC hereby grants you permission to undertake the above noted project.

SNC's understanding of the work to be done is as follows:

- The above noted watercourse will be modified to include improvements related to maintenance and width adjustments of the Regimbald Municipal Drain.
- The specifics of the works will be as per the plans/details provided within the report noted in the following section.
- A site-specific erosion and sediment control plan including any dewatering is to be provided to SNC prior to work commencement. The plan will:
    a) Identify who is responsible to install inspect, maintain and remove the control measures.
    b) Identify the inspection and maintenance record (when, how, how often i.e. daily/weekly/annually)
    c) Indicate which control measures are proposed, their location and corresponding OPSD number.
    d) Indicate that it is to be considered a "Living Document" which may be modified in the event the control measures are insufficient.

The details of your project are outlined in the following documents forwarded to our office and will proceed accordingly:

- South Nation Conservation Application Form – Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation 170/06 dated February 20, 2020, signed by Robinson Consultants Inc. Lorne Franklin L.E.T, C.E.T., rcca, CISEC .
- Amendment to the Engineer's Report for the Regimbald Municipal Drain For Agency Approvals, Prepared by: Robinson Consulting Inc., signed, stamped and dated January 15, 2020 by A. J. Robinson.
- Letter of authorization from the City of Ottawa, dated February 20, 2020, signed by Dave Ryan, P.Geo., Drainage Superintendent.
- Email from Lorne Franklin with applications forms for permitting and detailing the minor changes in the final printing of the report noted above, dated February 20, 2020.

SNC requests that the following concerns will be addressed:
Sediment and Erosion Control

- Sediment and erosion control measures should be implemented prior to work, and maintained during the work phase, to prevent entry of sediment into the water or the movement of re-suspended sediment.
- All disturbed areas should be stabilized and re-vegetated as required upon completion of work and restored to a pre-disturbed state or better.
- Sediment and erosion control measures should be left in place until all disturbed areas have been stabilized.
- **SNC may visit the site at any time after the application submittal through to the expiry date of the permit. During this time SNC will indicate any deficiencies observed in the sediment and erosion control methods on site. The applicant, by signing this permit, agrees that any directives in regard to these matters will be followed without delay.**
- The applicant by signing the permit has agreed to be responsible for ensuring the sediment and erosion control measures are effective and will be inspected and maintained throughout the work phase and finally until the work site has re-vegetated to a pre-disturbed state.

In the event of unexpected rainfall, any fill that is removed from the site and placed on the shore (above the high water mark) should be properly stabilized through the implementing of appropriate sediment and erosion control measures. This will prevent entry of sediment into the watercourse.

This permit does not relieve you of your responsibility for obtaining other documents or permits that may be required from the Government of Canada, the Government of Ontario or the municipality in which the land is located, including landowner permission. A copy of this document should be kept at the worksite.

If you have any questions concerning this permit or should there be any changes to the proposed work please contact our office.

This permit is valid for 24 months from the date of issuance and is not transferable to other land owners.
South Nation Conservation reserves the right to enter the site during or post construction through to 6 months past the expiry date of the permit.

South Nation Conservation assumes no responsibility or liability for flood, erosion or slope failure damage that may occur to this property, or any activity undertaken by you affecting the property interests of adjacent landowners.

Any deviation from the approved criteria without written approval from South Nation Conservation will constitute a violation of the approved permit. This could result in the permit being revoked.

Geoff Owens,
Regulations Officer

February 27, 2020
Date

Note: This letter of permission does not come into full force until the attached copy of this letter is returned to the SNC office in Finch, signed and dated, which return shall be taken as indicating the acceptance of the conditions of SNC approval.

Name: _____ (please print)

Signed: _____ Date: _____

Fisheries and Oceans Canada | Pêches et Océans Canada

Central & Arctic Region
Fish and Fish Habitat
Protection Program
867 Lakeshore Road
Burlington, ON L7S 1A1

Région du Centre et de l'Arctique
Programme de la protection
du poisson et de son habitat
867 Lakeshore Road
Burlington, ON L7S 1A1

March 2, 2020

Our file *Notre référence*

19-HCAA-00801 and 19-HCAA-00802

City of Ottawa
David Ryan, Drainage Superintendent
2155 Roger Stevens Drive
Ottawa, ON KOA 2TO

Subject: Regimbald and Simpson Drain Maintenance, Carlsbad Springs ON - Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Mr. Ryan:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on June 28, 2019. We understand that you propose to:

- Regimbald (Class F) municipal drain
  - Conduct a bottom only cleanout to remove accumulated sediments and vegetation obstructing flow
  - Widen channel by cutting into the existing bank creating a stepped 2nd stage flow channel over 1200 linear meters
  - Brushing on south side of drain for 2900 linear m
- Modify the existing Simpson Municipal Drain (Class F that outlets just below Regimbald Drain) –
  - Maintenance dredge to the original design profile, adjusting the cross-section to provide 2:1 side slopes (3564 linear m of the drain)
  - Incorporate an existing drainage channel upstream of the Simpson Drain (2400 linear m)
  - Install 2 culverts to accommodate the proposed drainage.

Our review considered the following information:

- Request for review and supporting documents received by email on June 28, 2019
- Correspondence between DFO and Lorne Franklin (Robinson Consultants) from November 22, 2019 and February 11, 2020.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*;

- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the Species at Risk Act;

The aforementioned impacts are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures outlined in your plan, in addition to the following listed below:

- Conduct work outside the spring and fall timing windows (i.e. no in-water work between March 15 to July 1)
- Conduct work in low or no flow

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal will not require an authorization under the *Fisheries Act* or the *Species at Risk Act*.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act*, and to avoid prohibited effects on listed aquatic species at risk, any part of their critical habitat or the residences of their individuals.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the 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).

We recommend that you notify this office at least 10 days before starting your project and that a copy of this letter be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

If you have any questions with the content of this letter, please contact Luke Ridgway at 905 336-4723 or by email at luke.ridgway@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Chris Strand
A/Senior Biologist

CC: Lorne Franklin, Robinson Consulting
Brent Harbers, SNCA

Appendix E

Special Provisions

SPECIAL PROVISIONS

INDEX

SP1.0 WORKING AREA

A working area of 40 metres from the top-of-bank is designated along both sides of the drain.

The designated working area shall be deemed to include an 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 Dwg. No. 18002-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).

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 Regimbald 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. 18002-P1 through 18002-P7 (inclusive), and 18002-C1. The Main Branch Regimbald Municipal Drain will be located between Station 0+000 and Station 2+575 and Branch No. 1 between Station 10+000 and 10+946.

To accommodate fisheries concerns a two-stage profile is implemented by the proposed construction. At the time of the design, the existing channel had been recently maintained and is noted as in general conformance with the proposed profile, however, the cross-sectional width is proposed to be increased by the current construction. Stage 1 of the two-stage channel is provided by the existing section with the bank of the north and/or east side unmodified, bottom maintained as necessary to the proposed profile (but noted as in general conformance) and the first 300mm (in height) of the south and/or west bank unmodified. Additional width excavation then commences from the south and/or west bank at 300mm above the proposed grade to the specified channel width and forms stage 2 of the two-stage profile.

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 excavation areas, all suitable material(s) will be placed adjacent to the top of bank on the side of the drain specified for construction by the Drainage Engineer. The excavated material shall be spread and shaped to form banks and flat surface with a maximum 2:1 back slope to the original ground surface. All material shall be spread as described and to a maximum depth of 500mm. Drainage openings shall be constructed wherever required throughout the disposal area including (but not limited to) side ditches, natural swales, low-lying areas, etc. or 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. All disturbed areas shall be seeded as per seeding specifications.

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 make arrangements 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 for excavation and spreading 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 make arrangements 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 150mm 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. 10. The standard length for supplied culverts shall be 10 meters, unless otherwise specified.

SP4.2 Culvert Location

Culverts that must be installed or lowered and reinstalled are shown on Drawing No. 18002-A2 and 18002-P1 through 18002-P7 (inclusive).

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 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 reseeding 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 Standard Drawing. Rock protection shall be installed in accordance with Standard Drawing No. 1 and No. 2 (provided in **Appendix A**).

SP7.1 Rock Protection Erosion Control Location

Refer to Drawing Nos. 18002-A2, and 18002-P1 through 18002-P7 (inclusive) 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 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 the Standard Drawing to prevent sediment passage from the upstream to the downstream side of the flow check, and shall be installed at all specified locations on Drawing Nos. 18002-A2, and 18002-P1 through 18002-P7 (inclusive), all in accordance with Standard Drawing No. 3 (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 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 Standard Drawing No. 6. 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 Standard Drawing No. 6 (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 Standard Drawing No. 2 (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 Standard Drawing No. 2.

SP11.0 CULVERT END TREATMENTS

Culvert End Treatments shall be installed as indicated in the Standard Drawing 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 Drawing No. 18002-A2, all in accordance with Standard Drawing No. 10 (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 Standard Drawing No. 10.

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 NATURAL RESOURCES AND FORESTRY – SPECIES AT RISK

Pre-Screening of the local area for the proposed Regimbald Municipal Drain was completed by the developer of the upstream lands in conjunction with their site development plans and submitted to the Ministry of Natural Resources and Forestry (MNRF) with regard to the Species at Risk (SAR) Legislation.

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

The contractor must be aware that the SAR Act and 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.

Subsequent to the initial screening, the Ontario Ministry of Environment Conservation and Parks assumed responsibility for the SAR legislation.

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 with regard to barn swallow 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 with regard to 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 with regard to the "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses" (O.Reg. 175/06) for works to be completed on the Regimbald Municipal Drain by SNCA is contained in **Appendix D** of the Engineer's Report. The Contractor shall insure that any conditions are adhered to.

SP15.0 DEPARTMENT OF FISHERIES AND OCEANS – CLASS AUTHORIZATION

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