

Engineer's Report
Branch No. 4
Wilson-Johnston
Municipal Drain

Prepared For:



Prepared By:

Robinson Consultants Inc.
Consulting Engineers

Our Project No. 18004
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: **Engineer's Report for Branch No. 4**
 Wilson-Johnston Municipal Drain
 Cumberland Ward
 Our Project No. 18004

Dear Sir:

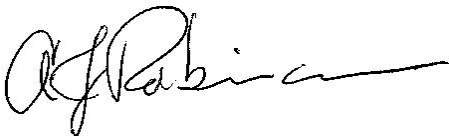
This Engineer's Report for Branch No. 4 of the Wilson-Johnston Municipal Drain, Cumberland Ward, which is respectfully submitted for Council's consideration, was initiated by the City of Ottawa under Section 4 of the Drainage Act, RSO 1990 in response to a petition from property owners. The purpose of 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 Wilson-Johnston Municipal Drain and to add a new branch from the existing drain to the west side of Frontier Road. This Report makes modifications to the Engineer's Report entitled "Wilson-Johnston Drainage Scheme", April, 1977, Revised November 1977 by McNeely Engineering Limited which was enacted by By-Law No. 2229 of the former Township of Cumberland. All sections of the Wilson-Johnston Drain not modified by this report will continue to be governed by the November 1977 McNeely Engineering Limited report.

All costs associated with this Engineer's Report and identified improvements to the Wilson-Johnston Municipal Drain will be assessed to the owners/developers of the lands identified as Block E on Dwg. No. 18004-A3. Modifications to the Wilson-Johnston Municipal Drain will be completed in advance of the development of the lands.

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

Yours very truly,

ROBINSON CONSULTANTS INC.



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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 under Section 78 to complete modifications to the existing Engineer's Report for the Wilson-Johnston Municipal Drain and on September 12, 2018 under Section 4 as a result of a petition by the property owners within the proposed development area for an extension of the drain to the limit of the development area. This Engineer's Report for Branch No. 4 to the extend the Wilson-Johnston Municipal Drain was petitioned by the landowners under Section 4 of the Drainage Act.

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 4 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 commercial/industrial development for the lands identified as Block E on Dwg. No. 18004-A3.

To accommodate these land use changes, an amendment to establish a new branch is required to the existing Engineer's Report, entitled "Wilson-Johnston Drainage Scheme", April 1977, Revised November 1977 by McNeely Engineering Limited. The McNeely report was adopted by By-law 2229 of the Township of Cumberland. The amendments in this current report include construction of a new branch to extend the drain to the limit of the proposed development lands. All sections of the Wilson-Johnston Municipal Drain covered by the April/November, 1977 report that are not altered by this report and accompanying by-law will continue to be governed by the 1977 report.

Modifications are as detailed in the following sections.

2.1 Modifications – Existing Branch No. 2

Modifications to the existing Branch No. 2 of the Wilson-Johnston Municipal Drain downstream of the connection of the new Branch No. 4 include maintenance to the original design profile and adjusting the cross-section to provide 2:1 side slope on the drain.

2.2 New Branch Drain

In conjunction with the change in land use a new branch drain (Branch No. 4) is required between the existing Branch No. 2 and the limit of the proposed development land at the western ROW limit of Frontier Road (Road Allowance between Con. X and Con. XI former Township of Cumberland).

3.0 EXISTING CONDITIONS

3.1 Location of the Drain

Branch No. 4 as identified by this report commences at Station 3+580.17 at the confluence with Branch No. 2 of the Wilson-Johnston Municipal Drain and continues to Station 2+000, at the westerly ROW of Frontier Road (Road Allowance between Concessions 10 and 11). The maintenance of Branch No. 2 of the existing municipal drain commences at Station 36+50 (1+112.5 m) and continues downstream to Station 61+34 (1+869.6 m) at the Main Drain or approximately 757 metres. The Stationing for Branch No. 2 refers to the locations in the Wilson-Johnston Drainage Scheme Report by McNeely Engineering Ltd., November 1977.

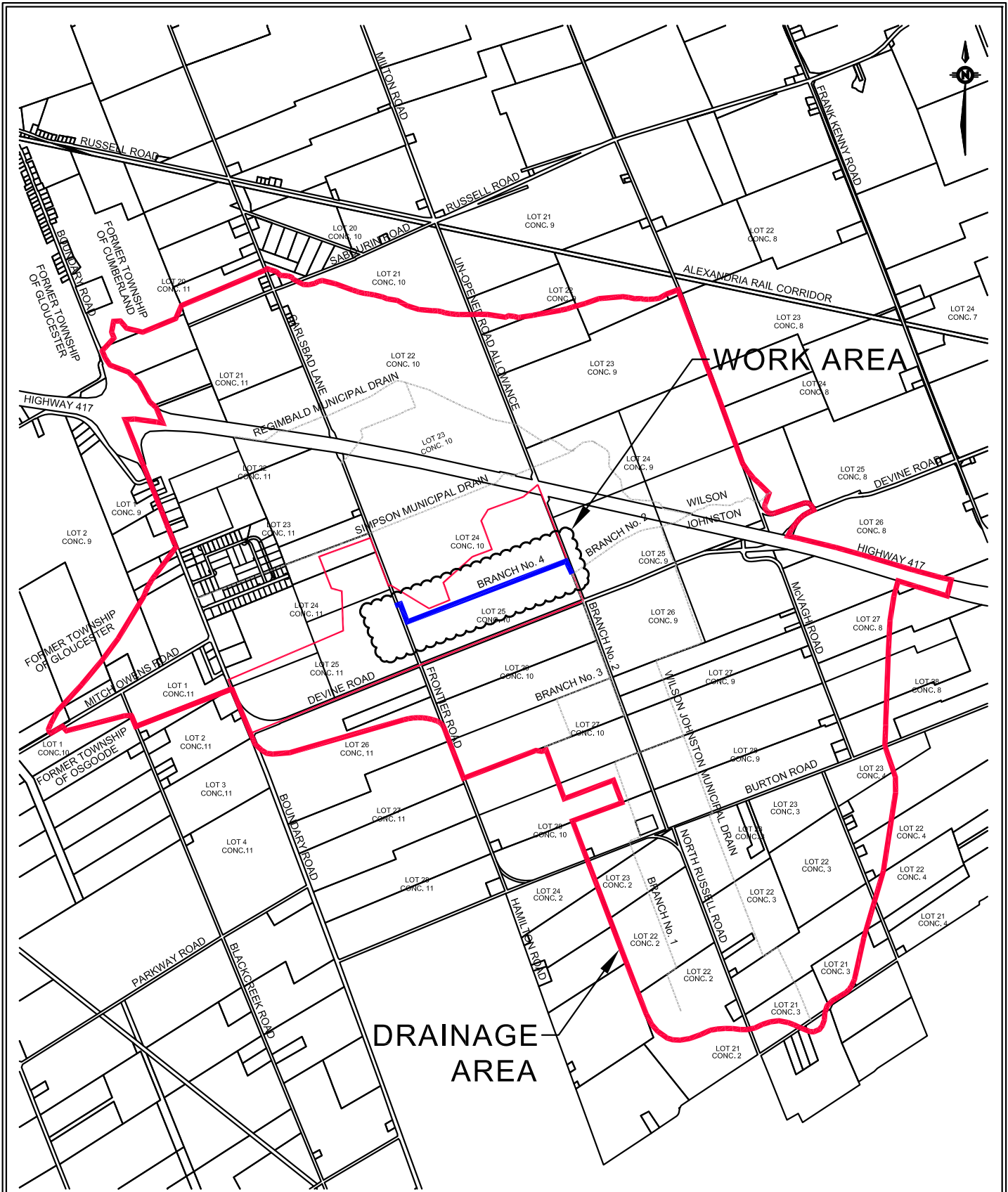
The location of the drain is shown on the Location Plan - **Figure 3.1**.

3.2 Drainage Basin and Limits

The drainage basin for Branch No. 4 of the Wilson-Johnston 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 24 and 25 in Concessions 10 and parts of lots 24 and 25 in Concession 11 in the former Township of Cumberland.

The drainage area of proposed Branch No. 4 of the Wilson-Johnston Municipal Drain is approximately 172 hectares (425 acres). The limits of the drainage boundary (drainage basin) are shown on Dwg. No. 18004-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.

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.



Robinson
Consultants

| | | | |
|---------|-------------------------------------------------|---------------|----------|
| Title | LOCATION PLAN | | Fig. No. |
| | | | 3.1 |
| Project | BRANCH No. 4 WILSON-JOHNSTON MUNICIPAL DRAIN | Job No. | 18004 |
| | Scale | Date | |
| | NTS | FEBRUARY 2020 | |

3.3 Drawings Forming Part of the Engineer's Report

Dwg. No. 18004-A1 has been prepared showing the drainage area boundary and the proposed drain.

Dwg. No. 18004-A2 shows existing and proposed culverts as well as minimum required sediment and erosion control measures.

Dwg. No. 18004-A3 has been prepared showing individual properties and blocks that form part of the drainage area indicating Blocks E and an ID number for other (individual) properties for reference to the Schedule of Assessment for future maintenance, and the area of each property that is within the drainage area.

Dwg. No. 18004-P1 through P3 (inclusive) provides a new profile for the proposed Branch No. 4 between Station 2+000 and 3+580.17.

The design cross-sections for the Branch No. 4 drain are shown of Dwg. No. 18004-C1.

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

4.0 AREA REQUIRING DRAINAGE

The area requiring drainage under this report for Branch No. 4 and Improvements to Branch No. 2 of the Wilson-Johnston Municipal Drain is Block E as shown on Dwg. No. 18004-A3.

5.0 DESIGN CONSIDERATIONS

5.1 Proposed Development Areas

The drainage design within Block E was completed by Golder Associates Ltd., the engineer retained to complete the engineering for the development of the lands in Block E, and approved by the City of Ottawa, the South Nation River Conservation Authority (SNCA), Ministry of Natural Resources and Forestry (MNRF) and Department of Fisheries and Oceans (DFO). Hydrology, hydraulics and stormwater management associated with Block E 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.

Subsequent to the initial review, the Ontario Ministry of Environment Conservation and Parks (MECP) assumed responsibility for development review and Species at Risk (SAR) – previously completed by the Ministry of Natural Resources and Forestry (MNRF).

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 modeling, 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

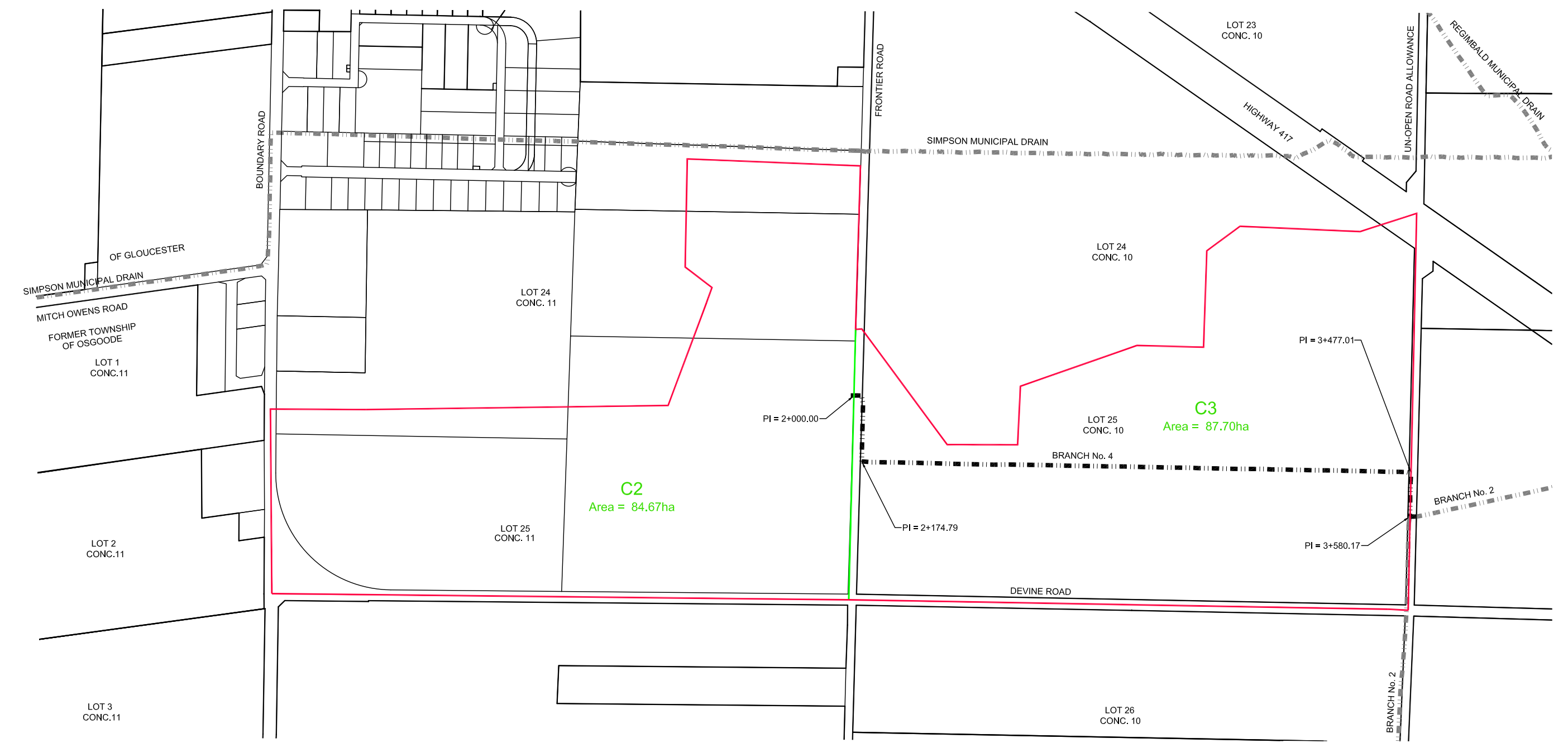
The rainfall-runoff relationship of Branch No. 4 of the Wilson-Johnston Municipal Drain was evaluated for existing land use conditions. This provided flow estimates for the watershed under existing and proposed conditions. The total instantaneous peak flow for various return period design flows at key locations along the Drain is presented in Table 5.1. Table 5.1 should be reviewed in conjunction with Figure 5.1 and Dwg. No. 18004-A1, which shows a plan view of the watershed. The flows are calculated at the various locations along the main drain.

Table 5.1
Peak Flow Estimates

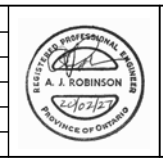
| Locations | Peak Flow m ³ /s | | | | | |
|--------------------------|-----------------------------|-------|-------|-------|-------|--------|
| | 2 Yr | 5 Yr | 10 Yr | 25 Yr | 50 Yr | 100 Yr |
| Branch No. 4 | | | | | | |
| STA 2+000 | 0.134 | 0.289 | 0.403 | 0.576 | 0.719 | 0.873 |
| STA. 2+000 to STA. 3+580 | 0.441 | 0.869 | 1.172 | 1.618 | 1.980 | 2.362 |



| LEGEND | |
|--------|-------------------------------------|
| | PROPERTY LINE |
| | EXISTING CONSTRUCTED DRAINS |
| | MUNICIPAL DRAIN |
| | BRANCH No. 4 DRAINAGE AREA BOUNDARY |
| | SUBCATCHMENT AREAS |



| No. | DATE | REVISION | BY |
|-----|----------|----------------------------|-----|
| 1 | 19.06.19 | ISSUED FOR AGENCY REVIEW | AJR |
| 2 | 20.12.19 | ISSUED FOR AGENCY APPROVAL | AJR |
| 3 | 17.01.20 | ISSUED FOR REVIEW | AJR |
| 4 | 27.02.20 | ISSUED FOR DISTRIBUTION | AJR |



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 Limitations: Providing professional engineering services for submission under the Ontario Drainage Act.
 Association of Professional Engineers of Ontario

| SCALES | |
|------------|-----|
| 150 | 300 |
| HORIZONTAL | |

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| | |
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| DESIGN | LF |
| CHECKED | AJR |
| DRAWN | JHB |
| CHECKED | LF |
| APPROVED | AJR |

CITY OF OTTAWA
 BRANCH No. 4
 WILSON-JOHNSTON
 MUNICIPAL DRAIN

SUBCATCHMENT AREAS

| | |
|--------------|---------------|
| PROJECT No. | 18004 |
| CONTRACT No. | |
| DATED | FEBRUARY 2020 |
| DWG. No. | FIG. 5.1 |

5.4 Additional Culverts

Additional culverts related to the internal development design of Block E are to be installed as part of the proposed work related to Block E. 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 Wilson-Johnston Municipal Drain.

5.5 Side Slopes (Typical Cross Section)

The side slopes on the various sections of Branch 4 are as shown on Dwg. No. 18004-C1.

5.6 Capacity of Existing Culverts and Bridges

5.6.1 General

The capacities of existing culverts along the Wilson-Johnston 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 |
| Branch No. 4 – Culverts | | | | | | | |
| Frontier Rd (2+000) | 1.190 | 0.134 | 0.289 | 0.403 | 0.576 | 0.719 | 0.873 |

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

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

5.6.2 Culverts Requiring Replacement

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

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

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

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

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

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

The private farm and residential culverts that require replacement to increase capacity or added for access are noted in **Table 5.4**. Where the alignment of the drain segments a property, each landowner is entitled to the installation (or replacement where required) of one standard access crossing (up to 10 meters in length). Additional crossings (existing or otherwise), or non-standard crossings (additional length, decorative headwalls, etc.) will be installed or replaced at the individual owner's expense.

The cost of replacing private culverts identified in this report is to be paid through the assessed cost to the property owners of Block E as part of the Modifications of the Wilson-Johnston Municipal Drain. No private culverts, other than those noted in **Table 5.4**, will be replaced or added as part of these improvements.

Table 5.3
Roadway Culverts that Require Replacement

| Culvert Location | Existing | | Proposed | |
|-----------------------|-------------|------------|-------------|------------|
| | Size/Type | Length (m) | Size/Type | Length (m) |
| Frontier Road (2+010) | 1000 mm CSP | 12.3 | 1000 mm CSP | 16 |

The Frontier Road culvert is being replaced at a lower elevation to accommodate the drain profile.

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

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

5.6.3 Roadway Culvert Sizing

Frontier Road is a rural access road. The typical design standard for culverts associated with rural roads is the 10 years return period flow, however, because of the proposed development of lands upstream of Frontier Road the culvert should be sized to accommodate the 25 years return period flow at a minimum. The selection of the design return period, culvert size and culvert material are to be made by the Road Authority but must also be based on the requirements of the proposed development in Block E.

5.6.4 Culverts Requiring Lowering

The Frontier Road culvert requires lowering to accommodate the profile of the drain.

5.6.5 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.

5.7 Clearing

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

5.8 Excavation

The construction of Branch No. 4 of the Wilson-Johnston Municipal Drain will be an open channel with design grades, side slopes and ditch bottom widths as specified on the design profile Dwg. No. 18004-P1 through 18004-P3 (inclusive) and Cross-Section Drawings No. 18004-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 areas of bank instability. Erosion control measures will be of an engineering type, primarily rock protection with filter cloth.

5.9 Fisheries Act and Special Design Considerations

The existing Wilson-Johnston Municipal Drain is classified as a "Type F" Municipal Drain (ID No. 96532) 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 construction of the drain.

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

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

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

Construction 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. 18004-A2.

Tree removal will be required to complete the work.

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

Following construction, the disturbed areas (excluding spread areas on agricultural fields outside of the scheduled buffer area) will be seeded with a seed mix composed of perennial rye, white clover, red top, creeping red fescue and Canada bluegrass, as detailed in Section 6.1 of the Engineer's Report. 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. 18004-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.

5.10 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 work of this nature 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.

5.11 Disposal of Excavated Materials

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

In excavation areas, all suitable material(s) will be placed outside the required buffer area, on the side of the drain that is best suited for the owner and/or where clearing is not required for disposal. The excavated material shall be spread and seeded (except in areas of tilled agricultural fields). All material shall be spread on the adjacent lands no closer than 5 metres to the top of slope (buffer strip) and to a maximum depth of 150mm for agricultural fields, and 300 mm for non-agricultural areas. Drainage openings shall be constructed wherever required throughout the disposal area at a maximum spacing of 50 meters for agricultural land and 100 meters for non-agricultural land. All drainage openings shall be maintained, and the soil spread to accommodate these drainage openings to ensure that the drainage from adjacent land is not impeded. Any non-suitable material, such as rock, boulders, hard-pan or garbage/debris, shall be disposed of on the adjacent property, in an area of the property designated by the owner.

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

5.12 Permit Requirements and Underground Utilities

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

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

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

5.13 Site Access and Access Plan

It is intended that for the purpose of construction and future maintenance, the drain be accessed from adjacent roads with equipment moving along the side of the drain scheduled for construction, within the designated work area as specified in SP1.0, and designated future Drain Right-of-Way. Equipment may only cross the drain at existing or constructed crossings as shown on the Culvert and Sediment/Erosion Control Plan, Drawing 18004-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. 18004-A2 and 18004-P1 through 18004-P3 (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. 18004-A2, and 18004-P1 through 18004-P3 (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 E 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 Wilson-Johnston 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 E.

7.5 Assessment Schedules

7.5.1 Initial Construction

All costs associated with this report, the initial design, allowances, other costs and construction are a result of the proposed land use changes to accommodate the proposed development and will be paid for by the landowners in Block E. 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. 18004-A3 and the Schedule of Assessment for Future Maintenance. As part of this Engineer's Report an assessment schedule has been developed for Branch No. 4 of the Wilson-Johnston Municipal Drain that reflects a fair and equitable distribution of costs for future maintenance. The Schedule of Assessment for Future Maintenance is provided in **Appendix C**.

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

Because of the length of Branch No.4 the drain has not been subdivided into separate maintenance sections. Therefore, there is only one section on this Branch as follows:

- From the outlet of the drain at Branch No. 2 of the Wilson-Johnston Municipal Drain, Station 3+580.17 to Station 2+000 at the western ROW of Frontier Road.

The location of the section is shown on **Figure 7.1**. The area that is tributary to the section has been determined based on the sub-drainage basins. In calculating the outlet assessment for the Branch No. 4 of the Wilson-Johnston Municipal Drain indicated in the previous paragraph, the 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.

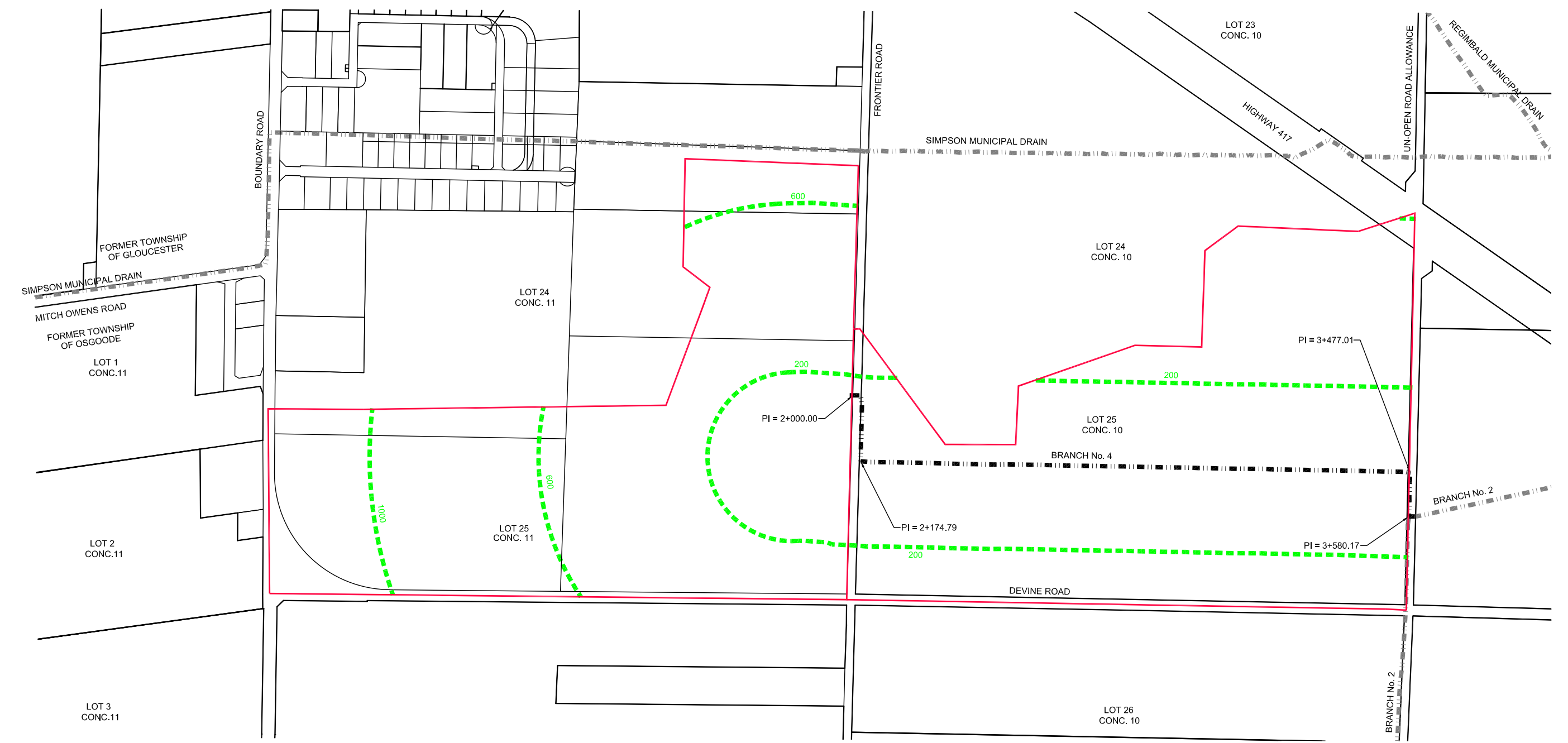
7.7 Land Use Factor

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 (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.

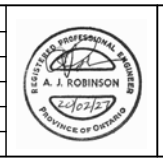
The area of each parcel of land within the drainage basin is multiplied by the land use factor to arrive at a factored area that in turn is used to determine the final benefit and outlet assessment. Therefore, one hectare of road right-of-way is assessed at four times the rate applied to one hectare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



| LEGEND | |
|--------|-------------------------------------|
| | PROPERTY LINE |
| | EXISTING CONSTRUCTED DRAINS |
| | MUNICIPAL DRAIN |
| | BRANCH No. 4 DRAINAGE AREA BOUNDARY |
| | BRANCH No. 4 DISTANCE FACTORS |



| No. | DATE | REVISION | BY |
|-----|----------|----------------------------|-----|
| 1 | 19.06.19 | ISSUED FOR AGENCY REVIEW | AJR |
| 2 | 20.12.19 | ISSUED FOR AGENCY APPROVAL | AJR |
| 3 | 17.01.20 | ISSUED FOR REVIEW | AJR |
| 4 | 27.02.20 | ISSUED FOR DISTRIBUTION | AJR |



Professional Engineers Ontario
 Licensed Engineering Technologist
 Name: L. FRANKLIN
 Number: 10004133
 Limitations: Providing a professional seal of reports and other non-technical data for submission under the Ontario Drainage Act.
 Association of Professional Engineers of Ontario

| SCALES | |
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| 50 | 0 100 |
| HORIZONTAL | |

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| DESIGN | LF |
| CHECKED | AJR |
| DRAWN | JHB |
| CHECKED | LF |
| APPROVED | AJR |

CITY OF OTTAWA
 BRANCH No. 4
 WILSON-JOHNSTON
 MUNICIPAL DRAIN

MAINTENANCE SECTION
 AND DISTANCE FACTORS

| | |
|--------------|---------------|
| PROJECT No. | 18004 |
| CONTRACT No. | |
| DATED | FEBRUARY 2020 |
| DWG. No. | FIG 7.1 |

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, 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 7.1**.

7.9 Outlet and Injuring Liability Assessment

7.9.1 Outlet Assessment

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

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

7.9.2 Injuring Liability Assessment

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

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

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

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

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

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

The maintenance funds collected under this Engineer's Report will be deposited in an account with the City of Ottawa to be used to complete maintenance of the Bear River Municipal Drain as partial compensation to owners of the 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.

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

7.10 Benefit Assessment

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

7.11 Special Benefit Assessment

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

7.12 Block Assessment

Lands that are located within Block E as indicated on Dwg. No. 18004-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 E.

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

7.13 Assessment Schedules

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

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

Summary Schedule of Assessment

| | | |
|-----------|---|-----------------------------------|
| Section 1 | – | Station 2+000 to Station 3+580.17 |
| | | 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 E in conjunction with the development approval process. There is no assessment to the remaining landowners for the initial construction of Branch No.4 or maintenance of

Branch No. 2. The property owners of Block E will be responsible for the initial full cost associated with Branch No. 4 and the maintenance of Branch No.2 downstream of Branch No. 4. A detailed cost estimate is included 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 construction or 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. Because the full cost of the initial construction is being paid for by the owners of the land in Block E, the City of Ottawa shall collect the amount of allowances from the owners of Block E and pay the amount to the respective landowners who are due allowances.

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

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

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

9.0 CHANGING THE SCOPE OF THE WORK

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

10.0 MAINTENANCE

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

The cost of future maintenance is to be assessed in proportion to the Schedule(s) of Assessment for Future Maintenance. The schedule(s) for this drain, as well as a schedule of distribution for properties within Block E 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, Outlet and Special Benefits 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 \$5,000.00 of maintenance work on the branch drain. However, the actual value of the maintenance undertaken will be used in determining the amount to be assessed in proportion to the schedule when maintenance is undertaken.

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

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

11.0 WORKING SPACE – FUTURE MAINTENANCE

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

12.0 MINISTRY OF NATURAL RESOURCES AND FORESTRY – SPECIES AT RISK

Pre-Screening of the local area for the proposed Branch No. 4 of the Wilson-Johnston 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 review, the Ontario Ministry of Environment Conservation and Parks (MECP) assumed responsibility for development review and Species at Risk (SAR) – previously completed by the Ministry of Natural Resources and Forestry (MNRF).

12.1 Documented Endangered Species

Barn Swallows were indicated with documented occurrences within the vicinity of the Wilson-Johnston 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, 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 Wilson-Johnston 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 Wilson-Johnston 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) provides 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". 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.

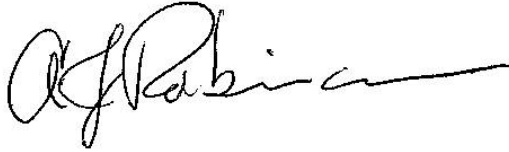
Through consultation with the DFO it was determined that the proposed work could be completed in conformance with the Class Authorization process. All applicable conditions have been addressed by this Report and where applicable, will be incorporated into contract requirements and specifications for the construction of Branch No.4 of the Wilson-Johnston 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), Ministry of Natural Resources and Forestry – Species at Risk (MNRF-SAR), the South Nation Conservation Authority (SNCA) and Ontario Ministry of the Environment Conservation and Parks (MECP) have been applied for in conjunction with the preparation of the Engineer's Report.

All of which is respectfully submitted,

ROBINSON CONSULTANTS INC.



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



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



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Number: 100501335

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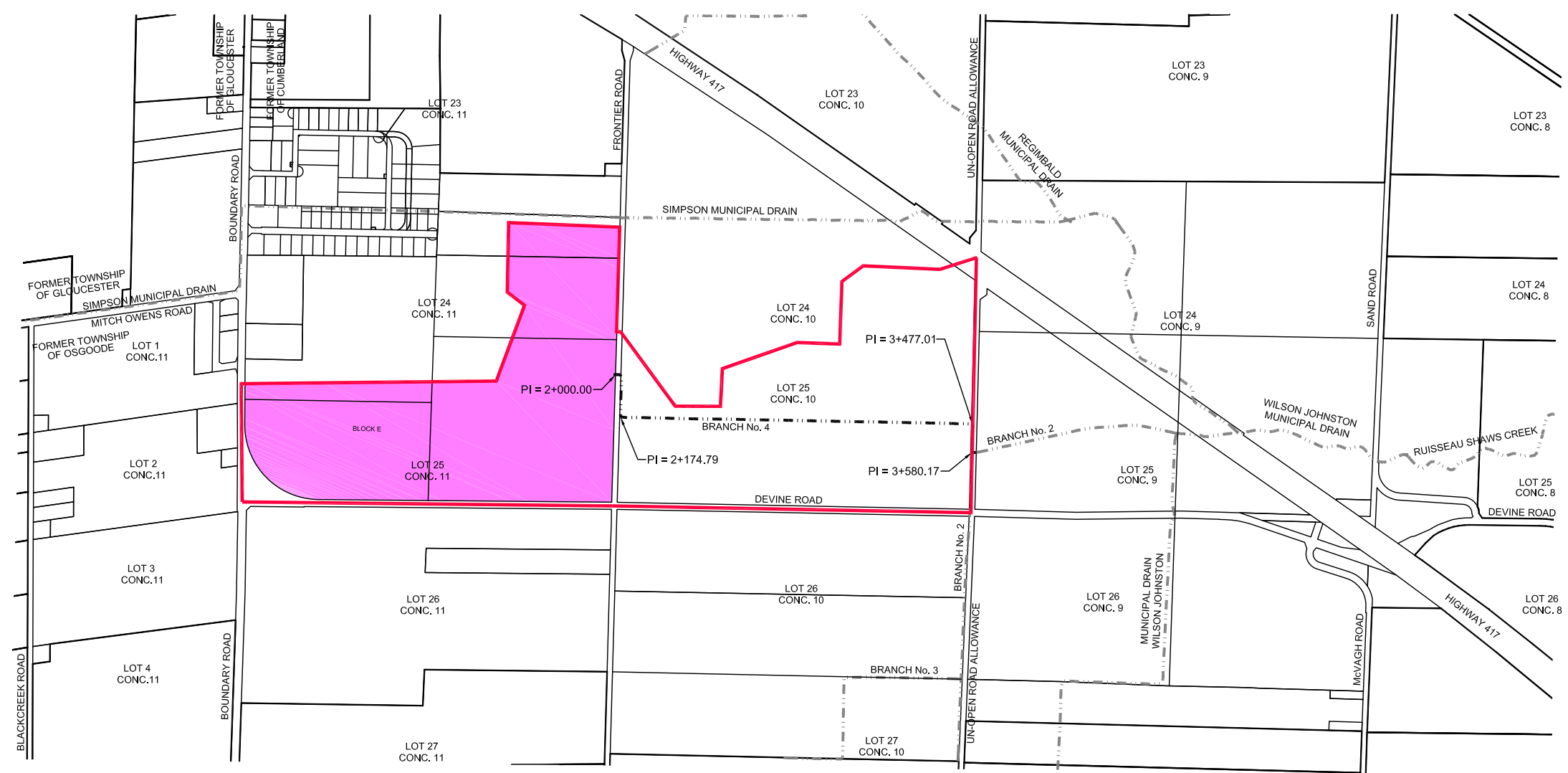
Appendix A

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 | |
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| | PROPERTY LINE |
| | BRANCH No. 4 DRAINAGE AREA BOUNDARY |
| | MUNICIPAL DRAIN |
| | EXISTING CONSTRUCTED DRAINS |
| | ADJACENT DRAINAGE AREA BOUNDARY |



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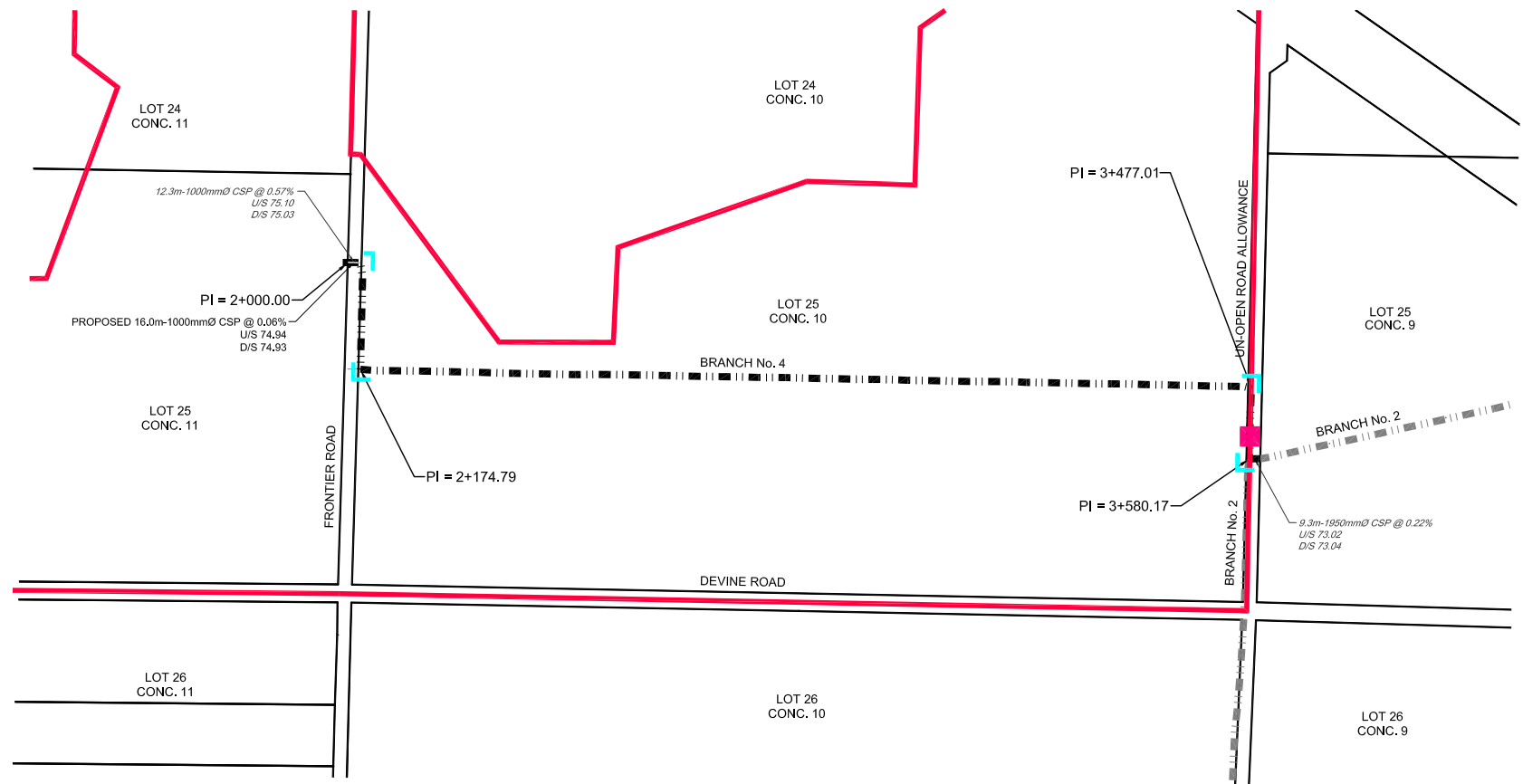
CITY OF OTTAWA
BRANCH No. 4
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DRAINAGE AREA PLAN

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| CONTRACT No. | |
| DATED | FEBRUARY 2020 |
| DWG. No. | 18004-A1 |



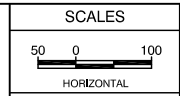
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| | EXISTING CONSTRUCTED DRAINS |
| | ADJACENT DRAINAGE AREA BOUNDARY |
| | STRAW CHECK DAM |
| | ROCK CHECK DAM |
| | ROCK PROTECTION and EROSION CONTROL |



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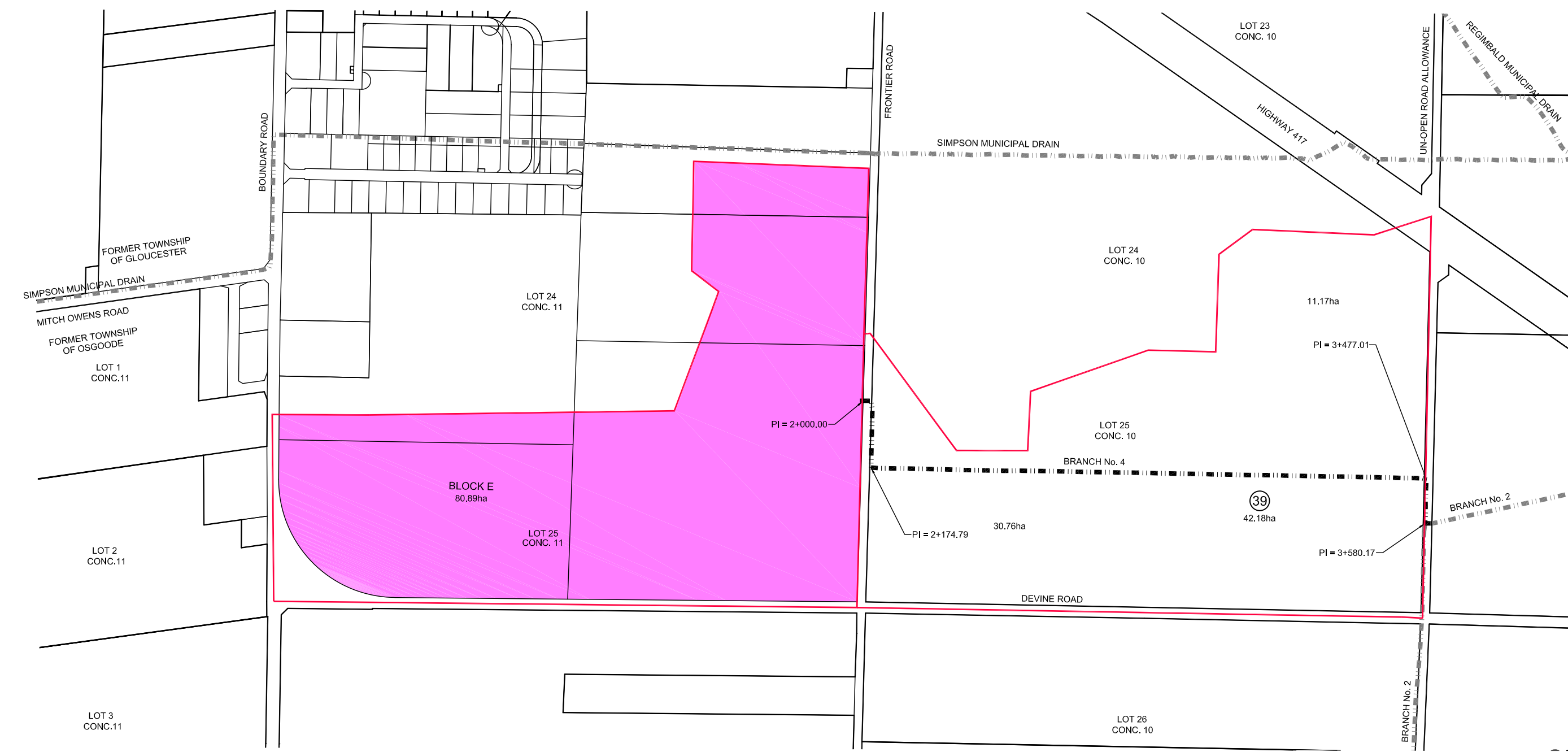
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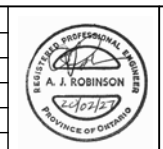
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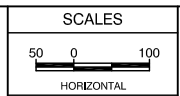
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- EXISTING CONSTRUCTED DRAINS
- MUNICIPAL DRAIN
- BRANCH No. 4 DRAINAGE AREA BOUNDARY
- ADJACENT DRAINAGE AREA BOUNDARY
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Member: 1020127
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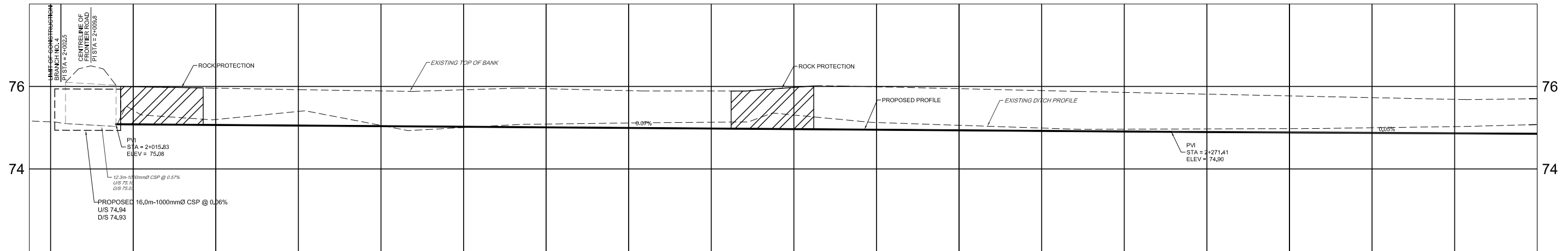
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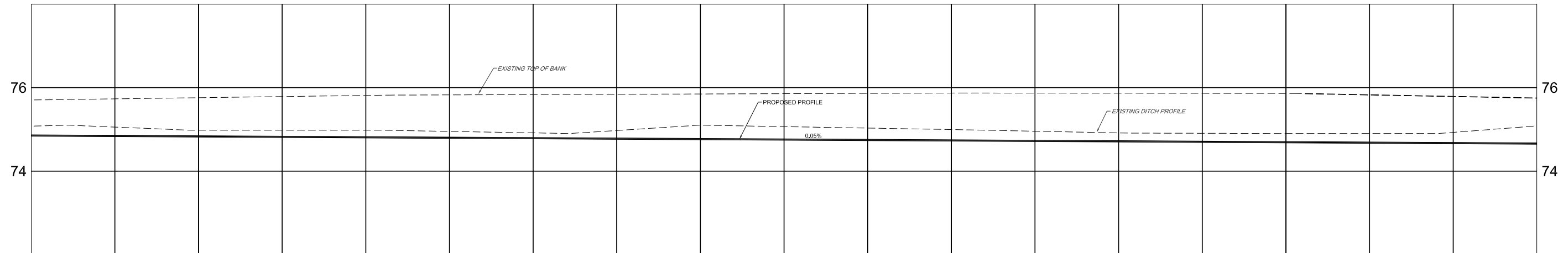
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MUNICIPAL DRAIN

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| DATED | FEBRUARY 2020 |
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| PROPOSED GRADE | | 75.08 | 75.07 | 75.05 | 75.04 | 75.02 | 75.01 | 74.99 | 74.98 | 74.97 | 74.95 | 74.94 | 74.92 | 74.91 | 74.90 | 74.88 | 74.87 | 74.85 | 74.85 |
| EXISTING FIRM BOTTOM | 75.14 | 75.42 | 75.20 | 75.39 | 75.06 | 75.00 | 75.09 | 75.11 | 75.13 | 75.31 | 75.13 | 75.06 | 74.89 | 74.86 | 74.97 | 74.86 | 75.00 | 75.00 | 75.08 |
| STATION | 2+000 | 2+020 | 2+040 | 2+060 | 2+080 | 2+100 | 2+120 | 2+140 | 2+160 | 2+180 | 2+200 | 2+220 | 2+240 | 2+260 | 2+280 | 2+300 | 2+320 | 2+340 | 2+360 |

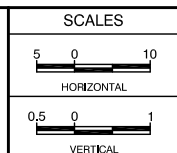


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| EXISTING FIRM BOTTOM | 75.08 | 75.05 | 74.86 | 74.86 | 74.86 | 74.85 | 74.82 | 74.87 | 75.10 | 75.06 | 75.03 | 74.89 | 74.86 | 74.82 | 74.81 | 74.80 | 74.80 | 74.80 | 74.83 |
| STATION | 2+360 | 2+380 | 2+400 | 2+420 | 2+440 | 2+460 | 2+480 | 2+500 | 2+520 | 2+540 | 2+560 | 2+580 | 2+600 | 2+620 | 2+640 | 2+660 | 2+680 | 2+700 | 2+720 |

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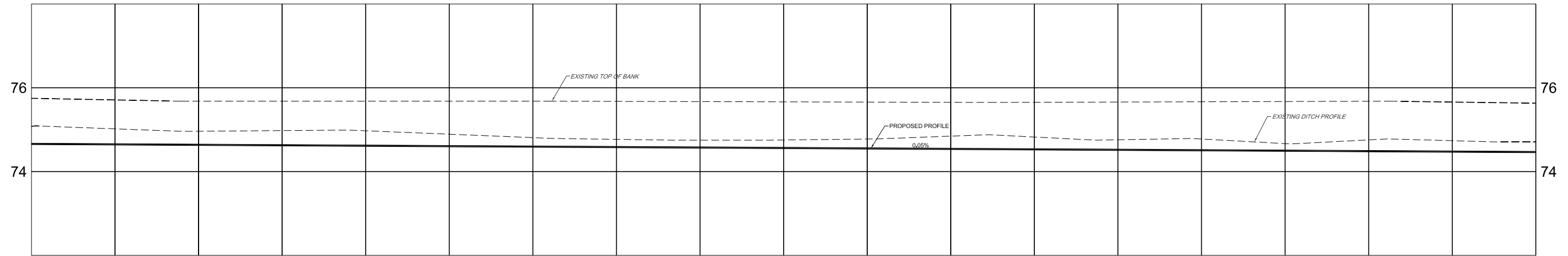
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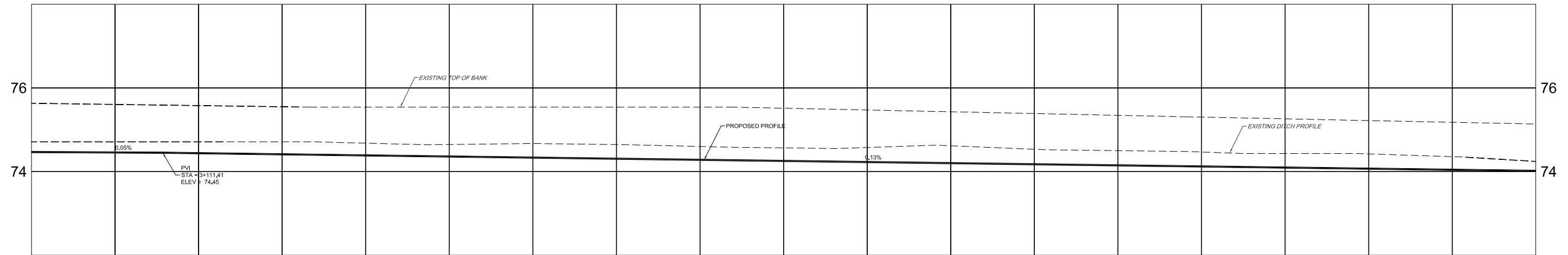
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BRANCH NO. 4 PROFILE
 STA 2+000 TO STA 2+720

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| EXISTING FIRM BOTTOM | 74.71 | 74.71 | 74.71 | 74.71 | 74.68 | 74.65 | 74.67 | 74.64 | 74.60 | 74.57 | 74.59 | 74.62 | 74.53 | 74.50 | 74.47 | 74.43 | 74.42 | 74.36 | 74.24 |
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| SCALES | |
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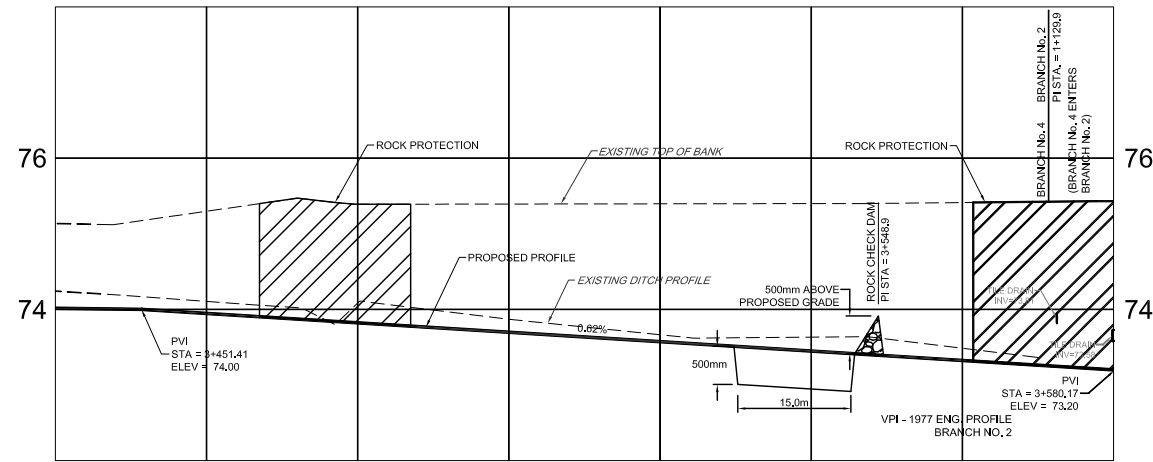
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WILSON-JOHNSTON
MUNICIPAL DRAIN

BRANCH NO. 4 PROFILE
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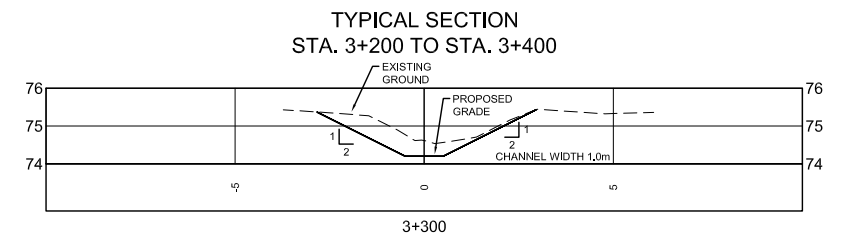
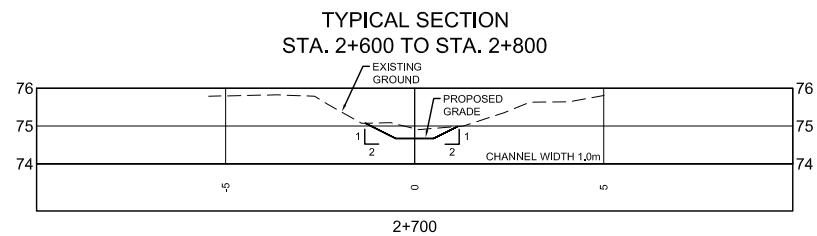
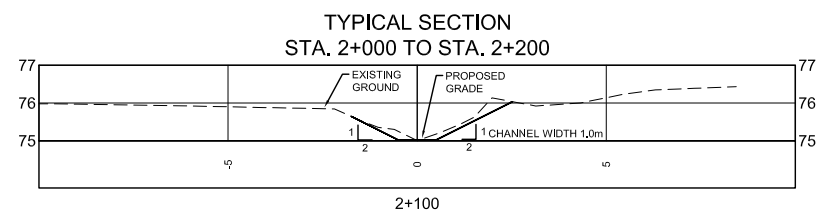
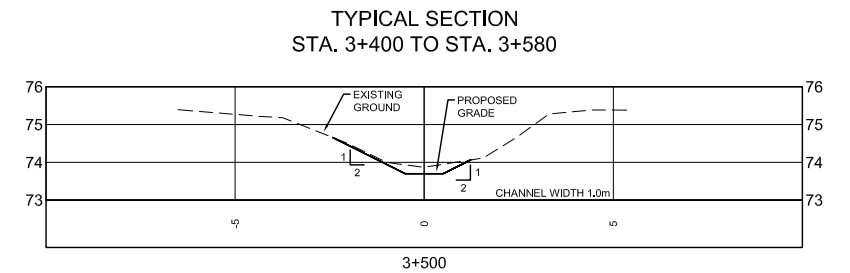
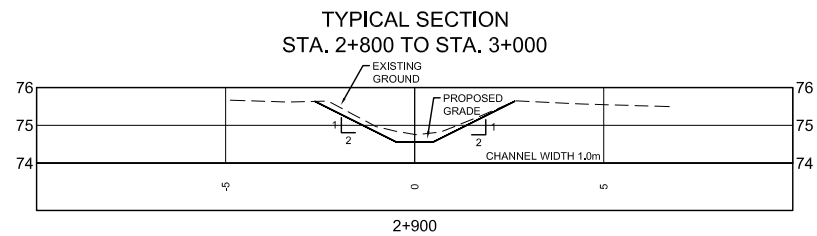
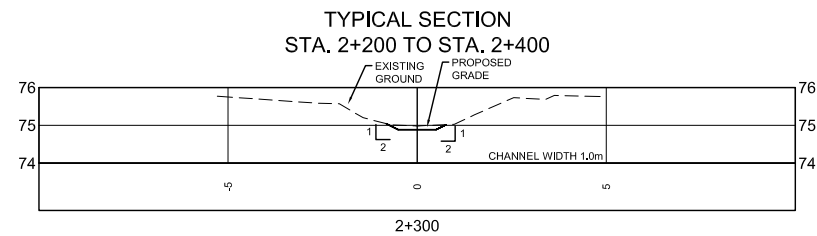
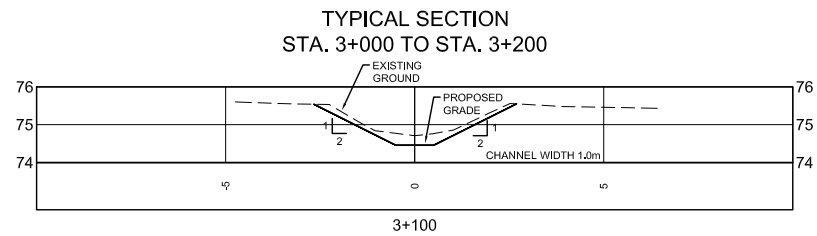
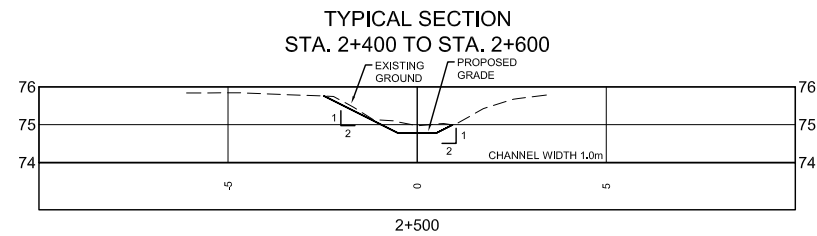
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| CHECKED | AJR |
| DRAWN | JHB |
| CHECKED | LF |
| APPROVED | AJR |

CITY OF OTTAWA

BRANCH No. 4
WILSON-JOHNSTON
MUNICIPAL DRAIN

BRANCH NO. 4 PROFILE
STA. 3+440 TO STA. 3+580

| | |
|--------------|---------------|
| PROJECT No. | 18004 |
| CONTRACT No. | |
| DATED | FEBRUARY 2020 |
| DWG. No. | 18004-P3 |



| No. | DATE | REVISION | BY |
|-----|----------|----------------------------|-----|
| 1 | 19.06.19 | ISSUED FOR AGENCY REVIEW | AJR |
| 2 | 20.12.19 | ISSUED FOR AGENCY APPROVAL | AJR |
| 3 | 17.01.20 | ISSUED FOR REVIEW | AJR |
| 4 | 27.02.20 | ISSUED FOR DISTRIBUTION | AJR |



Professional Engineers
Ontario
20/02/21
Licensed Engineering Technologist
Name: L. FRANKLIN
Number: 100501335
Limitations: Providing professional engineering services under the Ontario Drainage Act.
Association of Professional Engineers of Ontario

| SCALES |
|---------------------|
| 1 0 2 HORIZONTAL |

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Consultants

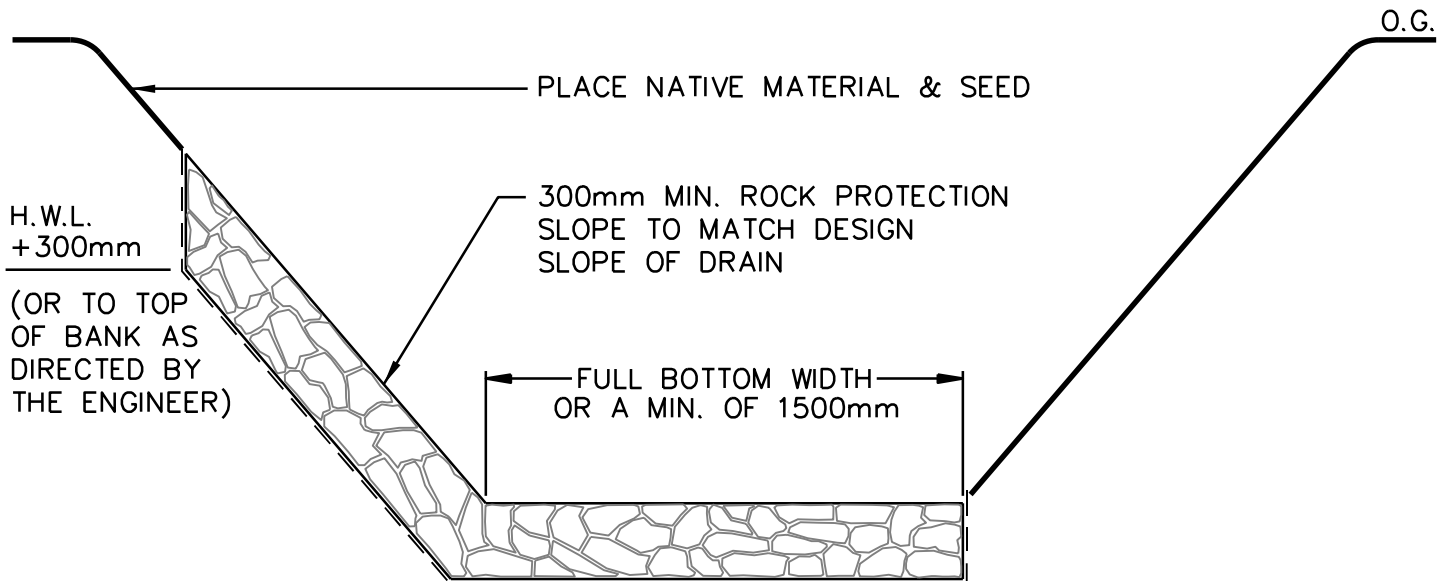
350 Palladium Drive, Suite 210
Ottawa, ON K2V 1A8
(613) 592-6060 rcll.com

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|----------|-----|
| DESIGN | LF |
| CHECKED | AJR |
| DRAWN | JHB |
| CHECKED | LF |
| APPROVED | AJR |

CITY OF OTTAWA
BRANCH No. 4
WILSON-JOHNSTON
MUNICIPAL DRAIN

CROSS SECTIONS
MAIN DRAIN

| | |
|--------------|---------------|
| PROJECT No. | 18004 |
| CONTRACT No. | |
| DATED | FEBRUARY 2020 |
| DWG. No. | 18004-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.

GEOTEXTILE (TERRAFIX 420R)
OR OTHER APPROVED
FILTER CLOTH

DATED: AUG/13

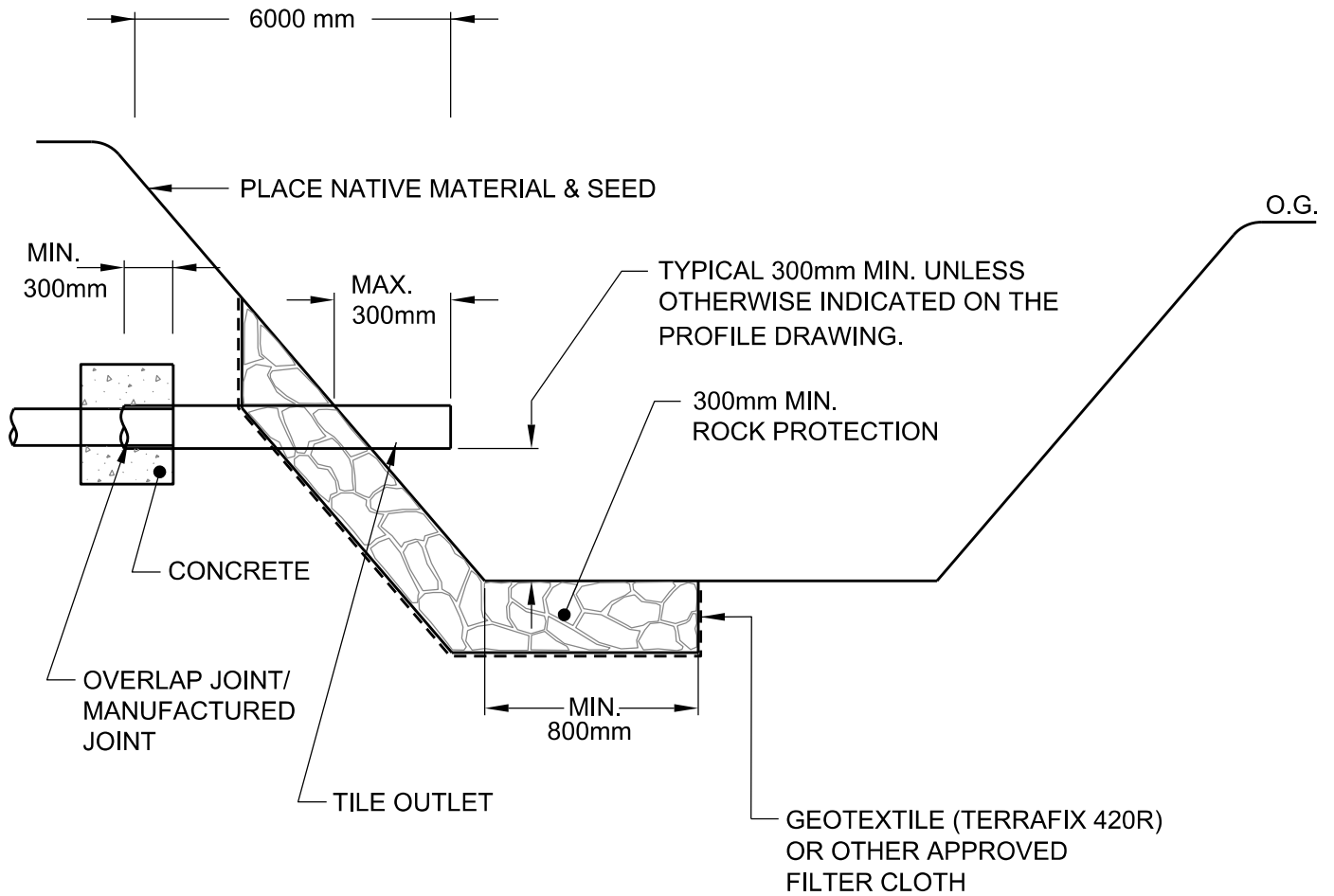
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Kenora, Ontario, K2V 1A8
Telephone (613) 592-6060

| |
|------------|
| SCALE |
| HORIZONTAL |
| N.T.S. |
| VERTICAL |
| N.T.S. |

| |
|--------------------------------------------|
| MUNICIPAL DRAIN |
| TYPICAL ROCK PROTECTION EROSION CONTROL |

| |
|-------------|
| PROJECT NO. |
| STD.DWG.No. |
| 1 |



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

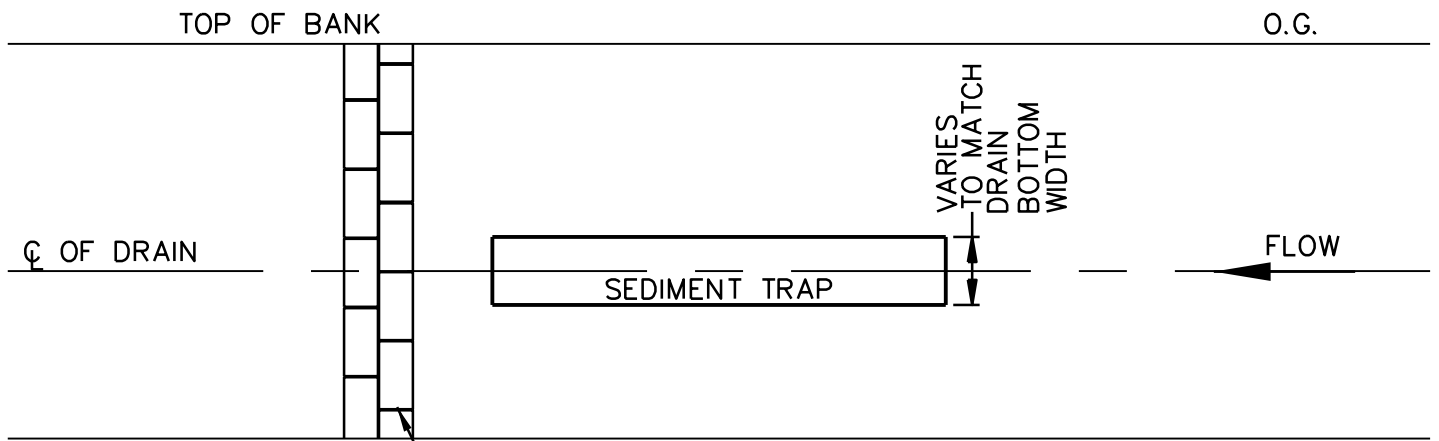
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Kanata, Ontario, K2V 1A8
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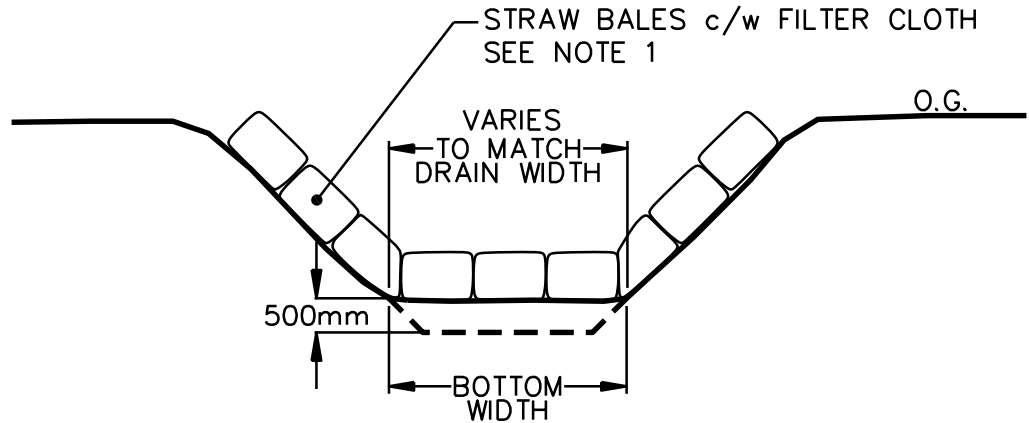
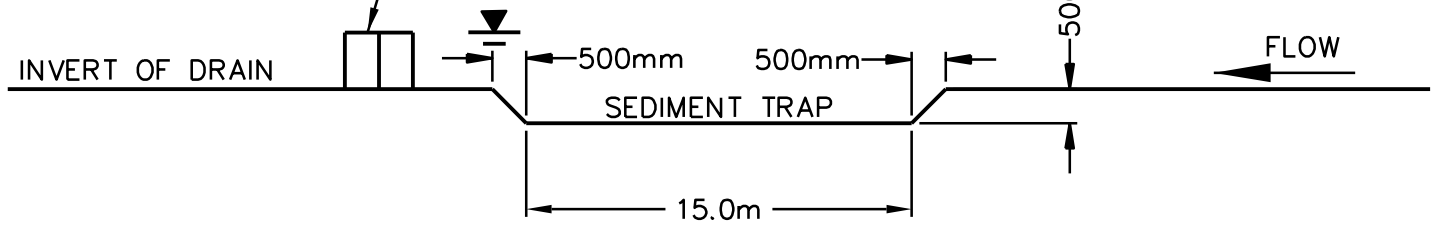
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| SCALE |
| HORIZONTAL N.T.S. |
| VERTICAL N.T.S. |

| |
|----------------------|
| MUNICIPAL DRAIN |
| STANDARD TILE OUTLET |

| |
|-------------------------|
| PROJECT NO. |
| STD.DWG.No. 2 |



NOTE: TWO ROWS OF STRAW BALES TO TOP OF BANK c/w FILTER CLOTH ANCHORED w/ 1200mmL. STAKES. MIN OF 2 STAKES PER BALE



DATED: AUG/13

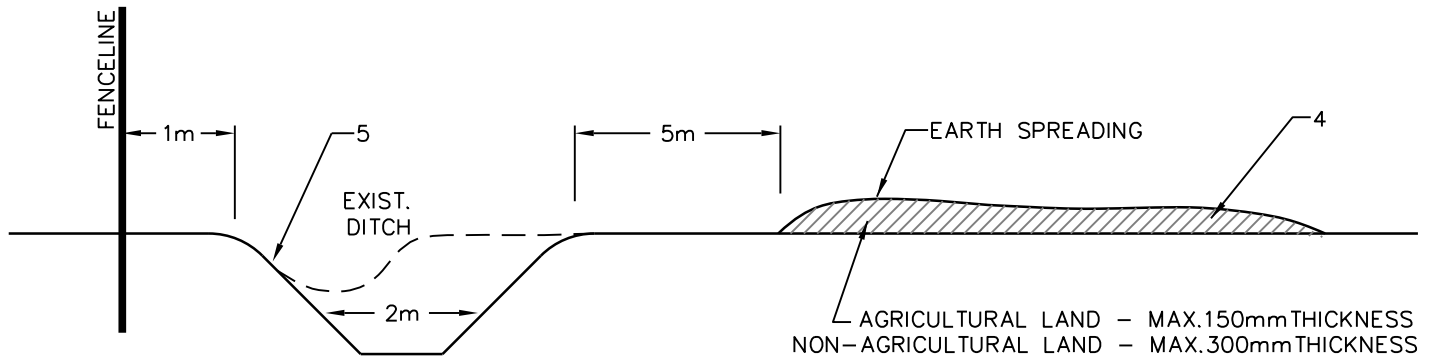
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Telephone (613) 592-6060

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

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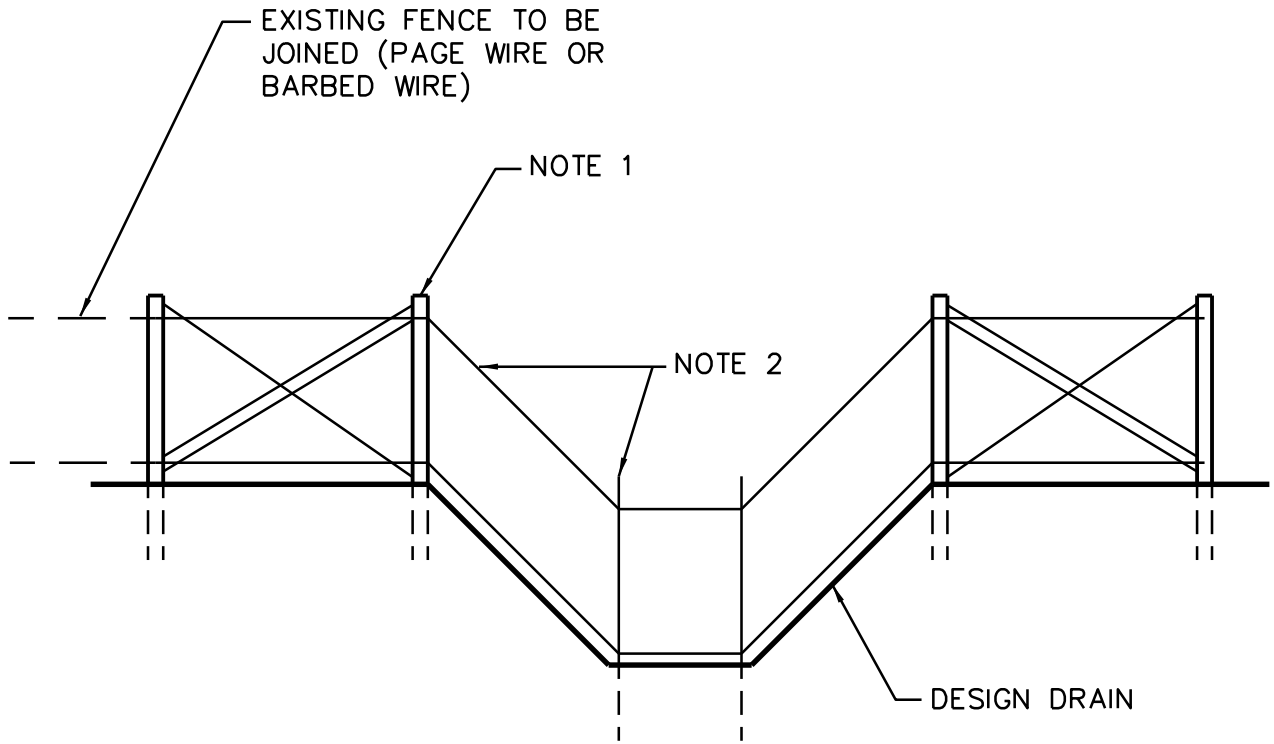
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| SCALE |
| HORIZONTAL N.T.S. |
| VERTICAL N.T.S. |

MUNICIPAL DRAIN
OPEN CHANNEL SYSTEMS
EARTH CUT CHANNEL

PROJECT NO.

STD. DWG. No.

4



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

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Telephone (613) 592-6060

| |
|----------------------|
| SCALE |
| HORIZONTAL N.T.S. |
| VERTICAL N.T.S. |

| |
|--------------------|
| MUNICIPAL DRAIN |
| CROSS FENCE DETAIL |

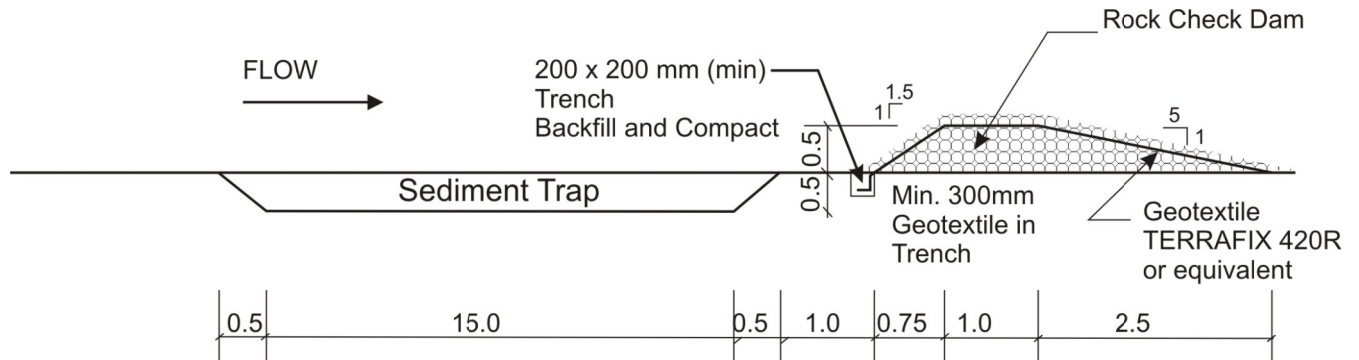
PROJECT NO.

STD.DWG.No.

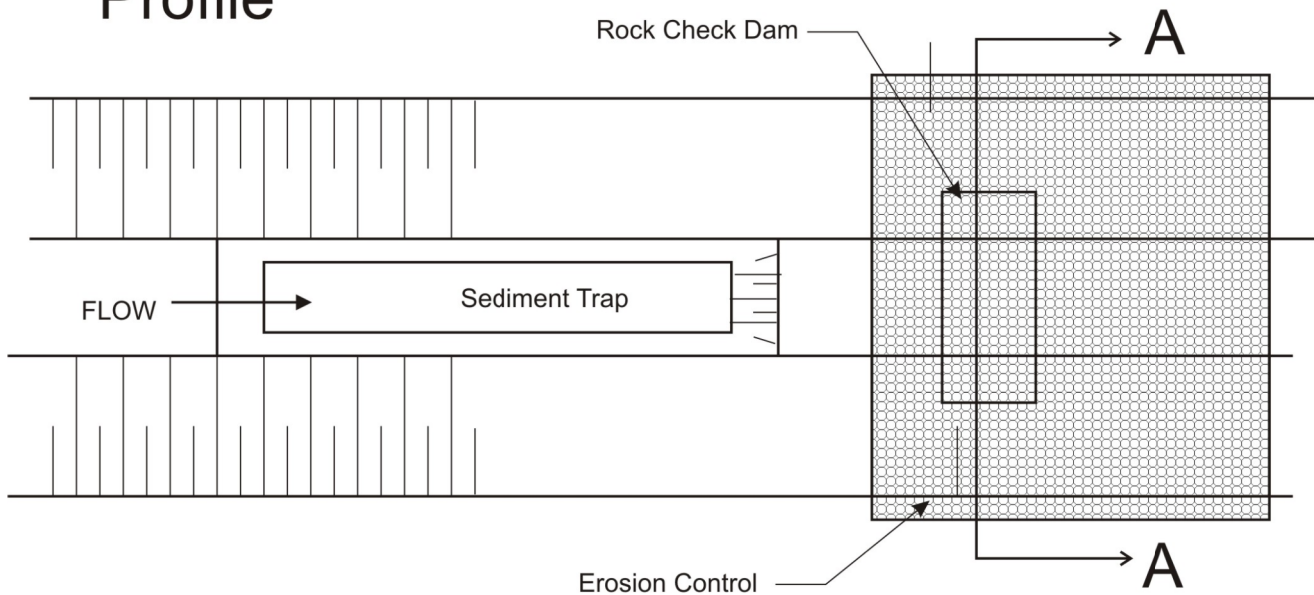
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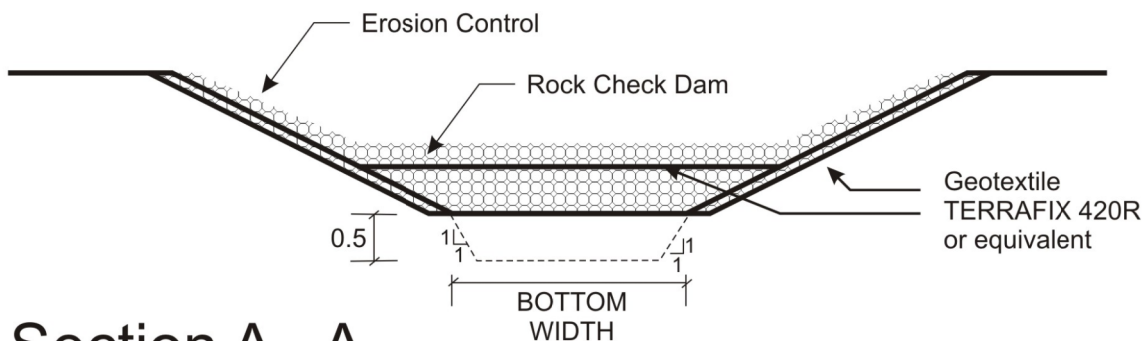
- FOR ROCK CHECK DAM AND EROSION CONTROL, USE R-50 RIP-RAP AS PER OPSS 1004.05.05.02 OR ROCK PROTECTION AS PER OPSS 1004.05.05.03.
- REFER TO OPSD 219.211 & 219.220 FOR ADDITIONAL DETAILS



Profile



Plan



Section A - A

NOTE: All dimensions in metres unless noted

DATED: AUG/13

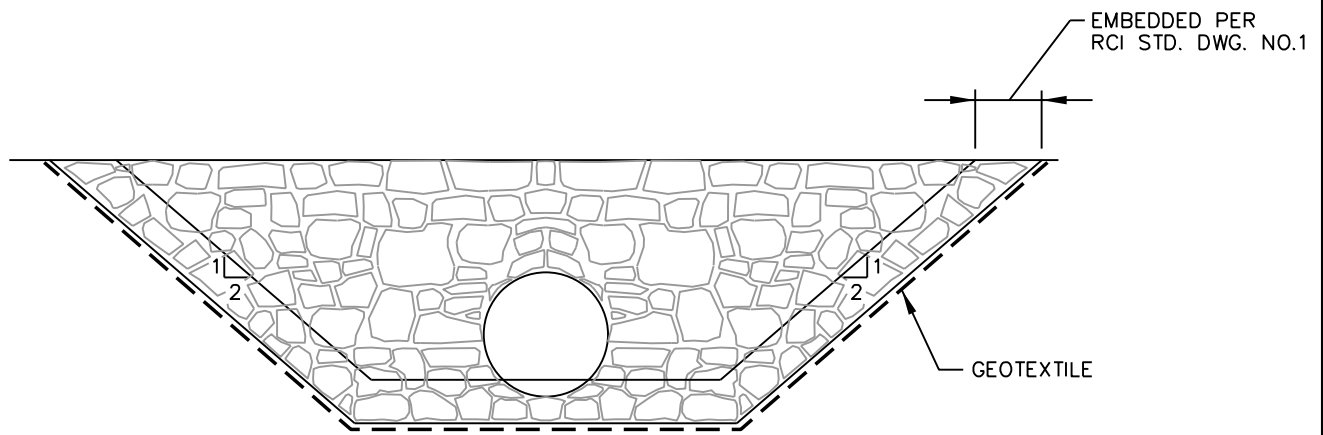
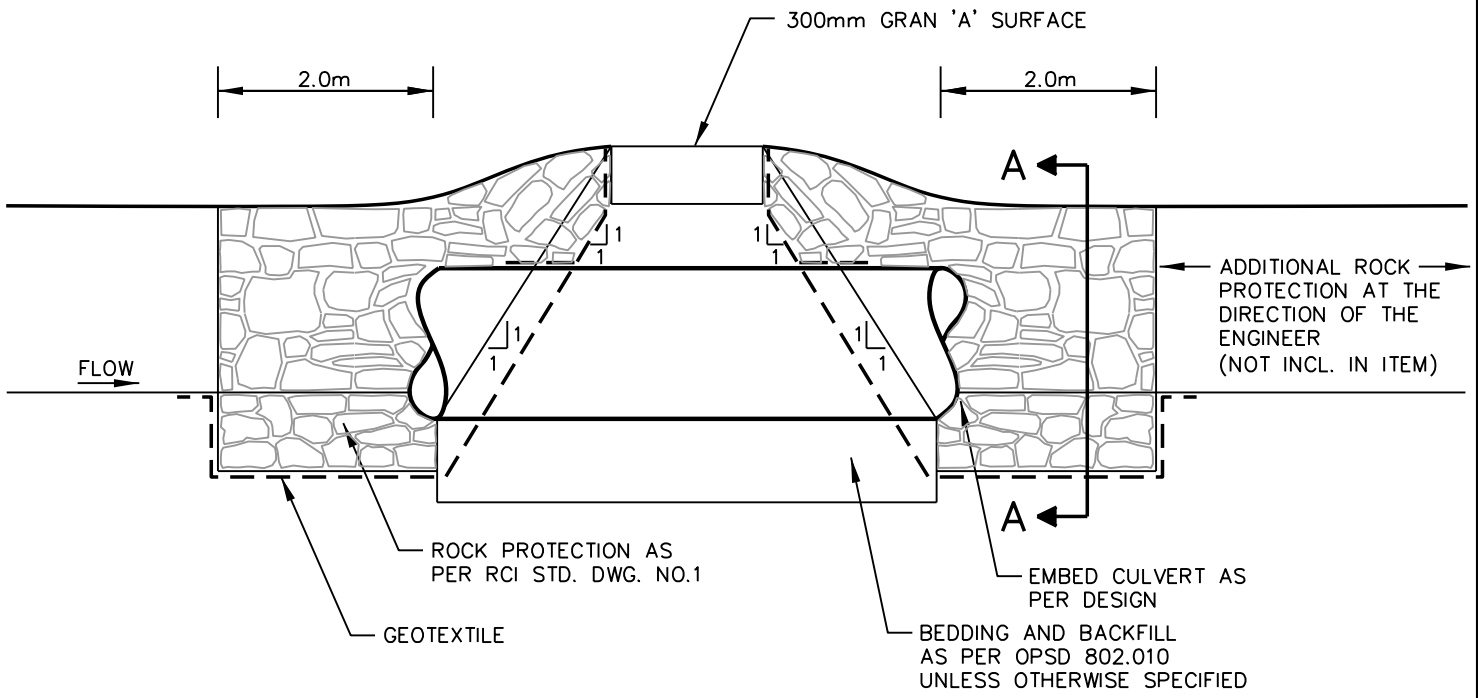
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Telephone (613) 592-6060

| |
|------------|
| 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 Kono, Ontario, K2V 1A8 Telephone (613) 592-6060 | SCALE | MUNICIPAL DRAIN STANDARD FARM CROSSING AND CULVERT END TREATMENT DETAIL | PROJECT NO. |
| | HORIZONTAL N.T.S. | | STD.DWG.No. 10 |
| | VERTICAL N.T.S. | | |

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 WILSON-JOHNSTON MUNICIPAL DRAIN**

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

| PROPERTY | PERCENT DISTRIBUTION | ESTIMATED TOTAL COST DISTRIBUTION |
|---------------------|----------------------|-----------------------------------------|
| Branch No. 4 | | TOTAL: \$ 138,446.30 |
| BLOCK E | 100.00% | \$138,446.30 |

**DETAILED COST ESTIMATE
BRANCH 4
THE WILSON JOHNSON MUNICIPAL DRAIN**



Project No: B18004
Date: 27-Feb-20

| Type | Item No. | Item | Unit | Cost/Unit | Quantity | Total | |
|--------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------|----------------|---------------------|----------|----------------------|---------------------|
| Branch 4 (Sta 2+000 to Sta 3+580) | | | | | | 1,580.00m | |
| Construction | | | | | | | |
| Construction | Site Preparation Activities | | | | | | |
| | | Mobilization | LS | \$ 3,750.00 | 1.00 | \$ 3,750.00 | |
| | | Erosion and Sediment Control Plan | LS | \$ 2,000.00 | 1.00 | \$ 2,000.00 | |
| | | Erosion and Sediment Control Measures -- Minimum as Follows: | | | | \$ - | |
| | | - (1) Rock Check Dam c/w Sediment Trap | each | \$ 1,000.00 | 1.00 | \$ 1,000.00 | |
| | | - Additional Silt Fence (where required) | m | \$ 11.00 | 100.00 | \$ 1,100.00 | |
| | | Clearing/Grubbing (including individual tree removals) | LS | \$ 1,000.00 | 1.00 | \$ 1,000.00 | |
| | Excavation Activities | | | | | | |
| | | Earth Ex. - Ditch (full construction) - Incl. Spreading | m ³ | \$ 5.25 | 581.00 | \$ 3,050.25 | |
| | | Maintenance of Branch No.2 from Branch No.4 to Main Drain | m | \$ 5.50 | 758.00 | \$ 4,169.00 | |
| | | Roadway Culvert(s) -- 1000mm dia CSP | m | \$ 325.00 | 16.00 | \$ 5,200.00 | |
| | Reinstatement Activities | | | | | | |
| | | Tile Outlet Restoration/Protection | each | \$ 500.00 | 3.00 | \$ 1,500.00 | |
| | | Hand Seeding | m ² | \$ 0.50 | 1172.00 | \$ 586.00 | |
| | | Rock Protection - Erosion Control | m ² | \$ 27.50 | 172.00 | \$ 4,730.00 | |
| | | Rock Protection - Culvert End Treatments | each | \$ 825.00 | 2.00 | \$ 1,650.00 | |
| | | Sub-Total - Construction Costs | | | | | \$ 29,735.25 |
| | | Contingency Allowance - Construction | | | | | \$ 5,000.00 |
| | | Total - Construction Costs | | | | | \$ 34,735.25 |
| | Engineering/Administration | | | | | | |
| | | Engineer's Report (apportioned by Section) | LS | \$ 60,000.00 | 1.00 | \$ 60,000.00 | |
| | | Contract Administration/Inspection | LS | \$ 5,000.00 | 1.00 | \$ 5,000.00 | |
| | | Sub-Total - Routine Engineering | | | | \$ 65,000.00 | |
| Total - Engineering/Administration | | | | | | \$ 65,000.00 | |
| Other | | | | | | | |
| | | Carrying Cost(s) | LS | (4% OF Costs Above) | | \$ 3,989.41 | |
| | | Bear River Municipal Drain Injuring Liability -- Maintenance | LS | \$ 27,142.00 | | \$ 27,142.00 | |
| | | Bear River Municipal Drain Injuring Liability -- Insufficient Outlet | LS | \$ 6,492.00 | | \$ 6,492.00 | |
| | | Allowances | LS | (See Schedule) | | \$ 1,087.64 | |
| Total - Other Costs | | | | | | \$ 38,711.05 | |
| Sub-Total - Net Costs | | | | | | \$ 138,446.30 | |
| Total Net Costs - Branch 4 (For Distribution to Properties) | | | | | | \$ 138,446.30 | |

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

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

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

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

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

RS Means Cost Index

| | |
|-----------------|--------|
| Cost Index 1990 | 94.30 |
| Cost Index 2019 | 227.40 |

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

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

For the purpose of estimation a rounded value is utilized.

USE: \$ 120,000.00

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

Areas of Development-Amazon & CRRRC

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

Area Tributary to East Savage Drain (EUC) and 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 | <u>39.11 Ha</u> |
| Total Proposed | 721.56 Ha |
| Total Rounded | 721 Ha |

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

Insufficient Outlet Compensation Contribution 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 |

**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 Connstruction 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 applying 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: | | <u>227.30/94.30</u> |
| 2019 Value: | \$ | 438,281.64 |

For the pupose of estimation a rounded value is utilized.

| | | |
|------|----|-------------------|
| USE: | \$ | 500,000.00 |
|------|----|-------------------|

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

Areas of Development-Amazon & CRRRC

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

Area Tributary to East Savage Drain (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 | <u>39.11 Ha</u> |
| Total | 721.56 Ha |
| Total Rounded | 721 Ha |

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

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

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 |

**SCHEDULE B1
ALLOWANCES FOR LANDS USED IN THE CONSTRUCTION
OF BRANCH No. 4
WILSON JOHNSON MUNICIPAL DRAIN**

Project No.: B18004

Date: 27-Feb-20

| ID | Roll No. | Land Allowance | | Total Value |
|------------------------------------------------|--------------------|----------------|--------------------|--------------------|
| | | S1 | | |
| | | Area | Value | |
| <i>City of Ottawa -- Individual Landowners</i> | | | | |
| 39 | 5003 012 970 00000 | 0.04 | \$ 1,087.64 | \$ 1,087.64 |
| Total | | 0.04 | \$ 1,087.64 | \$ 1,087.64 |

Appendix C

Schedules of Assessment

- Schedule of Assessment for Future Maintenance

**SCHEDULE A1
FOR THE FUTURE MAINTENANCE OF BRANCH No. 4 OF THE WILSON-JOHNSTON MUNICIPAL DRAIN**



Project No.: B18004
Date: 27-Feb-20

| ID | Roll No. | Area | Land Use Factor | Factored Area | Backs on Drain | Distance Factor | Benefit Factored Area | Benefit Cost | Distance Factor | Sub-Section Factor | Outlet Factored Area | Outlet Cost | Sub-Total Cost | ADIP Eligibility | Special Benefit & Utilities | 1/3 Grant | Total Net Cost |
|------------------------------------------------|--------------------|---------------|-----------------|---------------|----------------|-----------------|-----------------------|------------------|-----------------|--------------------|----------------------|--------------------|--------------------|------------------|-----------------------------|------------------|--------------------|
| | | BR 4 Total | | BR 4 Total | BR 4 | BR 4 | | BR 4 | BR 4 | BR 4 | | | | | | | |
| <i>City of Ottawa -- Individual Landowners</i> | | | | | | | | | | | | | | | | | |
| 39 | 5003 012 970 00000 | 84.17 | 1.00 | 84.17 | | 0.75 | | \$ - | 0.75 | 0.33 | 20.83 | \$ 1,197.90 | \$ 1,197.90 | 100% | \$ - | \$ 395.31 | \$ 802.60 |
| <i>Blocks</i> | | | | | | | | | | | | | | | | | |
| Block E | | 80.93 | 1.00 | 80.93 | Y | 0.67 | 54.27 | \$ 490.31 | 0.67 | 1.00 | 54.27 | \$ 3,120.47 | \$ 3,610.78 | 0% | \$ - | \$ - | \$ 3,610.78 |
| <i>City of Ottawa -- Roads/Other</i> | | | | | | | | | | | | | | | | | |
| Highway 417 | | 0.33 | 1.00 | 0.33 | | 0.73 | | \$ - | 0.73 | 0.33 | 0.08 | \$ 4.62 | \$ 4.62 | 0% | \$ - | \$ - | \$ 4.62 |
| Boundary Road | | 2.35 | 1.00 | 2.35 | | 0.30 | | \$ - | 0.30 | 1.00 | 0.71 | \$ 40.61 | \$ 40.61 | 0% | \$ - | \$ - | \$ 40.61 |
| Frontier Road | | 1.18 | 1.00 | 1.18 | Y | 0.91 | 1.07 | \$ 9.69 | 0.91 | 1.00 | 1.07 | \$ 61.70 | \$ 71.39 | 0% | \$ - | \$ - | \$ 71.39 |
| Devine Road | | 3.81 | 1.00 | 3.81 | | 0.62 | | \$ - | 0.62 | 0.50 | 1.18 | \$ 67.61 | \$ 67.61 | 0% | \$ - | \$ - | \$ 67.61 |
| Road Allowance | | 0.43 | 1.00 | 0.43 | | 0.87 | | \$ - | 0.87 | 0.33 | 0.12 | \$ 7.09 | \$ 7.09 | 0% | \$ - | \$ - | \$ 7.09 |
| Total | | 173.21 | | 173.21 | | | 55.34 | \$ 500.00 | | | 78.26 | \$ 4,500.00 | \$ 5,000.00 | | \$ - | \$ 395.31 | \$ 4,604.69 |

Appendix D

Authorization and Permits

- SNCA – Letter of Permission
- DFO – Class Authorization



February 27, 2020

Permit No. 2020-CUM-R028

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

**Interference to a Watercourse (Branch No. 4 Wilson-Johnston Municipal Drain)
Lot 25, Concession 10, 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 Branch No. 4 Wilson-Johnston 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 Branch No. 4 Wilson-Johnston Municipal Drain For Agency Approvals, Prepared by: Robinson Consulting Inc., signed, stamped and dated January 17, 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 dated February 20, 2020, with application forms for permitting and detailing the minor changes in the final printing of the report noted above.

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.

February 27, 2020

Geoff Owens,
Regulations Officer

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: Dave Ryan (please print)

Signed:

Date: February 28, 2020



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

4 September 2019

Your file *Votre référence*

Our file *Notre référence*

19-HCAA-00803

David Ryan
Drainage Superintendent
City of Ottawa
2155 Roger Stevens Drive
Ottawa, ON
K0A 2T0

**Subject: New Drain Branch, Wilson-Johnston Drain, Carlsbad Springs –
Implementation of Measures to Avoid and Mitigate the Potential for
Prohibited Effects to Fish and Fish Habitat**

Dear David Ryan:

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

- Widen and add a private ditch to Branch 4 of Wilson-Johnston Drain;
- Install temporary and permanent erosion control;
- Seed banks; and
- Work in low or no flow

Our review considered the following information:

- Request for review form submitted June 28th, 2019; and
- Draft Engineer's Report Branch No. 4 Wilson-Johnston Municipal Drain.

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*; and
- 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 listed below:

- Plan in-water works, undertakings and activities to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed and migrate.
- Develop and implement an Sediment Control Plan to minimize sedimentation of the waterbody during all phases of the work, undertaking or activity
 - Conduct in-water undertakings and activities during periods of low or no flow
 - Dispose of, and stabilize all excavated material above the High Water Mark or top of bank of nearby waterbodies and ensure sediment re-entry to the watercourse is prevented
 - Schedule work to avoid wet, windy and rainy periods (and heed weather advisories) that may result in high flow volumes and/ or increase erosion and sedimentation
- Limit impacts on riparian vegetation to those approved for the work, undertaking or activity
 - Re-vegetate the disturbed area with native species suitable for the site
- Develop and implement a response plan to avoid a spill of deleterious substances.
 - Stop work, contain sediment-laden water and other deleterious substances and prevent their further migration into the watercourse
 - Keep an emergency spill kit on site during the work, undertaking or activity
 - Report any spills of sewage, oil, fuel or other deleterious material, whether near or directly into a water body
 - Maintain all machinery on site in a clean condition and free of fluid leaks
 - Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water

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 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>).

Please notify this office at least 10 days before starting your project. A copy of this letter should 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 Sheeva Nakhaie at our Burlington office at 905-315-5270, or by email at Sheeva.Nakhaie@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,



Sara Eddy
Team Leader, Triage and Planning

Appendix E

Special Provisions

SPECIAL PROVISIONS

INDEX

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

SP1.0 WORKING AREA

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

The designated working area shall be deemed to include 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. 18004-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 disposed of at a location agreed to by the owner or shall be removed from the site at the Contractor's expense (note restrictions may apply with regard to Ash – Emerald Ash Borer).

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.

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 Wilson-Johnston 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. 18004-P1 through 18004-P3 (inclusive), and 18004-C1. The Wilson-Johnston Municipal Drain will be located between Station 2+000 and Station 3+580.17.

SP3.2 Disposal of Excavated Earth Material

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

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

Property owners who wish to pay the Contractor to have the Contractor dispose of the excavated material off-site which would otherwise be spread or deposited on the property may 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 to excavate and spread the spoil in the manner described previously.

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

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

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

Property owners who wish to pay the Contractor to have the Contractor dispose of the excavated material off-site which would otherwise be spread or deposited on the property may 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. 18004-A1 and 18004-P1 through 18004-P3 (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 Branch 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. 18004-A2, and 18004-P1 through 18004-P3 (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. 18004-A2, and 18004-P1 through 18004-P3 (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 centre 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. 18004-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 Wilson-Johnston 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.

Subsequent to the initial review, the Ontario Ministry of Environment Conservation and Parks (MECP) assumed responsibility for development review and Species at Risk (SAR) – previously completed by the Ministry of Natural Resources and Forestry (MNRF).

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.

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 regarding 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 regarding 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 Wilson-Johnston 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 Wilson-Johnston 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.