

RICHMOND DRAIN

5th Concession Road Bank Repair

Geographic Township of Colchester South



TOWN OF ESSEX
33 Talbot Street South
ESSEX, Ontario N8M 1A8
519-776-7336

Rood Engineering Inc.

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9 Nelson Street

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519-322-1621

REI Project 2016D016

2020-03-30

March 30th, 2020

Mayor and Municipal Council
Corporation of the Town of Essex
33 Talbot Street South
Essex, Ontario
N8M 1A8

Mayor Snively and Members of Council:

RICHMOND DRAIN
5th Concession Road Bank Repair
Geographic Twp. of Colchester South
Project REI2016D016
Town of Essex, County of Essex

I. INTRODUCTION

In accordance with the instructions confirmed by letter of May 4th, 2016 from the Town Manager, Legislative Services/Clerk, Robert Auger, we have made the necessary survey, examination, etcetera of that portion of the Richmond Drain along the south side of the 5th Concession Road east of the concrete bridge crossing, and prepared the following letter of opinion report that provides for repair and improvements of the open drain north bank along the south side of the road together with ancillary work. The Richmond Drain comprises of an open drain commencing at the Shepley Drain on the south side of County Rd 20; then it runs north across the County Road to the middle of Concession 5 and turns east between Pt. Lot 7 and 8, where it continues east through Concession 5 until turning southeast at Lot 11 to the 5th Concession Road; it then continues east along the north side of the road, crossing under the road to the south side in Lot 13 and outletting into Cedar Creek at Pt. Lot 14 Concession 4, in the geographic township of Colchester South, Town of Essex. A plan showing the Richmond Drain affected portion, is included herein as part of the report.

Our appointment and the works relative to the repair and improvements to the Richmond Drain, proposed under this report, is in accordance with Section 77.(3) of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010". This section of the Drainage Act provides as follows:

Written opinion in lieu of report

(3) Where the relocation of a drainage works or part thereof referred to in subsection (2) is to be effected within the lands under the jurisdiction of the road authority, the engineer may prepare a written opinion instead of a report. R.S.O. 1990, c. D.17, s. 77 (3).

We have performed all of the necessary survey, investigations, etcetera, for the proposed repairs and improvements to the drain to protect the road, and we report thereon as follows.

II. BACKGROUND

From our review of the information provided from the Town's drainage files we have established the following reports that we utilized as reference for carrying out this project:

| | | | |
|----|--------------------|--------------------------------------|---|
| 1) | July 25th, 1978 | Richmond Drain Plan and Profile | Maurice Armstrong, P.Eng. |
| 2) | April 27th, 1995 | Richmond Drain Emergency Work Plans | Gerard Rood, P.Eng. Nick Peralta, P.Eng. |
| 3) | October 31st, 1995 | Richmond Drain Emergency Work Report | Nick Peralta, P.Eng. Gerard Rood, P.Eng. |
| 4) | August 1st, 1996 | Richmond Drain Geotechnical Report | Golder Associates |

The 1995 report by Nick Peralta and Gerard Rood provided for emergency repairs and improvements to the drain section immediately east of the road bridge crossing and has the latest profile for the grading of the drain.

III . PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the drainage information provided by the Town, we arranged with the former Town Drainage Superintendent Dan Boudreau, to schedule an on-site meeting for May 25th, 2017. The following people were in attendance at said meeting: Al Diemer (Town Public Works), Paul McCormick, Albert Catherwood, Manuel Mendes, Dan Boudreau (Town Drainage Superintendent), Norm Nussio (Assistant Drainage Superintendent), Kory Snelgrove (Rood Engineering) and Gerard Rood (Rood Engineering). Details of the drain bank problems were discussed, and the primary concern was some serious bank slumping and erosion and risk to the road surface collapsing. Once the work scope is confirmed, a final report is then prepared and submitted to Council and goes through the Drainage Act process.

The previous work on the drain bank entailed regrading of the slope and additional rock being placed to try and stabilize the bank. Some shifting of the bank occurred after the work was done and further touch ups were required. The 1996 report from Golder Associates suggested that there is a layer of unstable soil approximately 2.4m below the surface that is allowing for the bank to shift and slump. The Town has attempted to repair the slumping along the new problem area, but stability has not been achieved. Based on the past information and current observations, the alternatives that will be considered include a steel sheet pile wall or precast concrete block wall at the toe of the slope, and regrading and protection of the slope behind the wall with rip rap on filter cloth to achieve a more stable cross section. The drain bottom will be cleared to achieve the original design bottom width and grade to restore the design capacity of the drain. An owner asked about shifting the roadway to the north away from the drain bank. It was pointed out that this would involve land acquisition from private lands, would impact the existing drainage along the north side of the road, and create a road curvature that would have safety concerns. This alternative would fail to address the obstruction in the drain caused by the slumping that has occurred and is likely to continue unless addressed.

It was discussed that all trees within the drain cross section from top of bank to top of bank will be removed to prevent obstruction of drainage along the affected portion. The south side of the

drain will be basically cleared for access to carry out the work and dispose of material; however, some mature trees may be able to be saved if the Contractor can work around them.

IV. FIELD SURVEY AND INVESTIGATIONS

Subsequent to the on-site meeting we arranged for a topographic survey of the affected drain and road section to be completed. Preliminary plans were prepared, and repair options investigated.

The Town made initial submissions to the Essex Region Conservation Authority (E.R.C.A.) regarding their requirements or any D.F.O. (Department of Fisheries and Oceans) requirements for work that would be proposed to be carried out on the Richmond Drain. The Town must apply for a permit from E.R.C.A. and follow standard mitigation requirements. We also reviewed the Town maps for fish and mussel species at risk and find that there are no species indicated in the vicinity of this project. A copy of the concerns and requirements to satisfy E.R.C.A. and D.F.O. is included in **Appendix "REI-A"** of this report.

Former Ministry of Natural Resources & Forestry (M.N.R.F.) agreements are replaced with new legislation provisions under Ontario Regulation 242/08, Section 23.9, administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.), which allows repairs, maintenance and improvements to be conducted by the Municipality within existing municipal drains. These works are exempt from Sections 9 and 10 of the Endangered Species Act provided that the rules in the regulations are followed by the Municipality and their contractor. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system. A review of the former Agreement plans indicate that snake species are a concern for this work area and although turtles are not indicated, they are mobile and could be encountered. The Agreement includes mitigation measures to be followed as outlined in "Schedule C Mitigation Measures" of the former agreement document and a copy of same as it relates to turtles and snakes is included herein in **Appendix "REI-B"**.

V. INVESTIGATIONS

As part of our investigations, we prepared preliminary designs for the steel sheet pile wall and precast concrete block wall installation at the toe of the slope. Cost estimates were determined for these options as well as for simple regrading of the slope and rock on filter cloth installation. These details were provided to the Town Road Department for review and consideration. Based on their observations over time, it was deemed that simply regrading and trying to protect the slope with rock is unlikely to address the problem of the drain bank and road shoulder stability. Based on their investigations for long term stability of the drain bank and road, the decision was made to proceed with the steel sheet pile wall option.

VI. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the 1976 report plans by engineer Maurice Armstrong provides a good fit to the existing profile of the affected portion of the drain, as utilized in the 1995 emergency work.

Based on our detailed survey, investigations, examinations, and input from the Town Road Department, we would recommend that drain improvement works be carried out as follows:

- a) We recommend that all drain improvements, be carried out in accordance with the requirements established by E.R.C.A. and D.F.O. as set out in the documents within **Appendix "REI-A"** attached to this report.
- b) As this is an existing Municipal drain, and conditions have not changed and there is no information to indicate any new species concerns, the repair and improvement can be carried out based on the provisions included within the former Agreement that the Municipality had with M.N.R.F. and the mitigation measures included within same. A copy of said mitigation measures is included in **Appendix "REI-B"** within this report. We recommend that any work being completed shall be carried out in accordance with the **Schedule "C" Mitigation Plan** of the former agreement as included in **Appendix "REI-B"** for reference by the land owners, the Town of Essex, and the Contractor who will be conducting the works.
- c) We find that portions of the open drain have significant accumulation of silt and debris along the affected portion of the drain and we recommend that these be cleaned out as set out further in this report and shown on the plans.
- d) We recommend that the section of the drain bank experiencing slumping be stabilized by installation of a steel sheet pile wall at the toe of the slope. The wall shall include a channel iron cap secured to the sheets, clear stone backfill with filter cloth separation from the native fill, along with weep holes in the wall face to relieve any water pressure behind the wall.
- e) We further recommend that the north bank of the drain behind the proposed steel wall be regraded and protected with quarried limestone rip rap on non-woven filter cloth and all necessary auxiliary works be completed to provide a stable and secure installation.

We recommend that the Richmond Drain be repaired and improved, in accordance with this letter of opinion report, the attached specifications and the accompanying drawings, and that all works associated with same be carried out pursuant to Section 77. (3) of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

VII. ALLOWANCES

We have provided that all of the work will generally be completed from the road side of the drain. Access will be provided along the top of the south bank utilizing the corridor provided in past drainage reports for maintenance work including brushing and clearing the drain bank and restoring the bank slope as shown on the cross sections. The Contractor will be required to restore any existing grassed buffer and driveway areas damaged by the work. We recommend that any materials removed from the open drain be hauled away and disposed of by the Contractor to a site arranged by them. Based on all of the above we find that no allowances for damages are payable pursuant to Sections 29 and 30 of the Drainage Act.

VIII. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **TWO HUNDRED SEVENTY EIGHT THOUSAND ONE HUNDRED DOLLARS (\$278,100.00)**, made up as follows:

CONSTRUCTION

| | | | |
|---------|---|----|------------|
| Item 1) | <u>Station 0+236.2 to Station 0+336.2;</u> supply and install "Z55" or equal steel sheet piling cantilever front wall and wing walls including channel iron cap bolted or welded to the sheets and weep holes in the front face, approximately <u>108</u> lineal metres at <u>\$1,500.00</u> per lineal metre, complete. | \$ | 162,000.00 |
| Item 2) | <u>Station 0+236.2 to Station 0+336.2;</u> supply and install 300mm thick quarried limestone rip rap on non-woven filter cloth behind steel wall including all slope preparation and grading and at road pipe outlet, approximately <u>830</u> tonnes at <u>\$60.00</u> per tonne, complete. | \$ | 49,800.00 |
| Item 3) | <u>Station 0+236.2 to Station 0+336.2;</u> Supply and install approximately <u>730</u> square metres of synthetic filter mat for general erosion protection, at <u>\$5.00</u> per square metre, complete. | \$ | 3,650.00 |
| Item 4) | <u>Station 0+236.2 to Station 0+336.2;</u> supply and install Granular "A" to restore road shoulder between asphalt and rock protection including preparation, grading and compaction, approximately <u>40</u> tonnes at <u>\$25.00</u> per tonne, complete. | \$ | 1,000.00 |
| Item 5) | <u>Station 0+236.2 to Station 0+336.2;</u> supply and install 300mm thick clear stone on non-woven filter cloth behind steel wall above drain bottom elevation to top of wall for drainage including all preparation and placement, approximately <u>135</u> tonnes at <u>\$25.00</u> per tonne, complete. | \$ | 3,375.00 |
| Item 6) | <u>Station 0+236.2 to Station 0+336.2;</u> clear and dispose of all trees and brush, approximately <u>100</u> lineal metres at <u>\$15.00</u> per metre, complete. | \$ | 1,500.00 |
| Item 7) | <u>Station 0+236.2 to Station 0+336.2;</u> excavate drain cross section as shown on the plans including all loading, hauling and disposal, approximately <u>270</u> cubic metres at <u>\$10.00</u> per cubic metre, complete. | \$ | 2,700.00 |
| Item 8) | Clean up and restoration including seed and mulch on disturbed drain banks and work areas, complete. | | |
| | Lump Sum | \$ | 1,500.00 |

Report - Richmond Drain
5th Concession Road Bank Repair
Town of Essex - REI2016D016

2020-03-30

| | | | | |
|-------------------------------|--------------------------------------|----------|----|----------------------|
| Item 9) | Contingency amount for construction. | Lump Sum | \$ | 10,000.00 |
| | | | | <hr/> |
| TOTAL FOR CONSTRUCTION | | | | \$ 235,525.00 |
| | | | | <hr/> |

INCIDENTALS

| | | | | |
|---|---|--|----|----------------------|
| 1) | Report, Estimate, & Specifications | | \$ | 10,000.00 |
| 2) | Survey, Assistants, Expenses, and Drawings | | \$ | 15,000.00 |
| 3) | Duplication Cost of Report and Drawings | | \$ | 500.00 |
| 4) | Estimated Cost of Letting Contract | | \$ | 1,000.00 |
| 5) | Estimated Cost of Layout and Staking | | \$ | 1,200.00 |
| 6) | Estimated Cost of Full-Time Supervision and Inspection During Construction (based on 2 week duration) | | \$ | 12,500.00 |
| 7) | Net H.S.T. on Incidental Items Above (1.76%) | | \$ | 708.00 |
| 8) | Estimated Cost of E.R.C.A. permit | | \$ | 150.00 |
| 9) | Contingency Allowance | | \$ | 1,517.00 |
| | | | | <hr/> |
| TOTAL FOR INCIDENTALS | | | | \$ 42,575.00 |
| TOTAL FOR CONSTRUCTION (brought forward) | | | | \$ 235,525.00 |
| | | | | <hr/> |
| TOTAL ESTIMATE | | | | \$ 278,100.00 |
| | | | | <hr/> |

IX. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the drain bank repair and improvements. The design drawings show the subject improvement locations and the details of the work, as well as the approximate location within the watershed area. The drain design drawings are attached to the back of this report and are labelled **Appendix "REI-E"**.

Report - Richmond Drain
5th Concession Road Bank Repair
Town of Essex - REI2016D016

2020-03-30

Also attached, we have prepared Specifications which set out the required construction details for the drain repair and improvements, which also include Standard Specifications labelled therein as **Appendix "REI-C"**.

X. SCHEDULE OF ASSESSMENT

We would recommend that the Total Cost for construction of this project, including incidental costs, be charged against the 5th Concession Road, Town of Essex. This reflects that the work required to be done is for the preservation of the roadway and public safety and in general accordance with Section 77 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

XI. FUTURE MAINTENANCE

When maintenance work is carried out in the future on the open drain portion, the cost for said future maintenance shall be assessed in accordance with the current drainage report assessment schedule for work on the open drain.

When maintenance work is carried out on the bank protection installed under this letter of opinion report, the full cost of same shall be assessed to the 5th Concession Road, Town of Essex.

We further recommend that the maintenance cost sharing as set out above shall remain as aforesaid until otherwise determined and re-established under the provisions of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

All of which is respectfully submitted.

Rood Engineering Inc.



Gerard Rood, P.Eng.



att.

Rood Engineering Inc.

Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
RICHMOND DRAIN BANK REPAIR
(Geographic Township of Colchester South)
TOWN OF ESSEX

3. MUNICIPAL LANDS:

| <u>Tax Roll No.</u> | <u>Con. or Plan No. & Lot or Part</u> | <u>Hectares Afft'd</u> | <u>Acres Afft'd</u> | <u>Owner's Name</u> | <u>Value of Benefit</u> | <u>Value of Outlet</u> | <u>Value of Special Benefit</u> | <u>TOTAL VALUE</u> |
|--------------------------------------|---|------------------------|---------------------|---------------------|-------------------------|------------------------|---------------------------------|----------------------|
| | 5th Concession Road | | | Town of Essex | \$ 274,800.00 | \$ 3,300.00 | \$ - | \$ 278,100.00 |
| Total on Municipal Lands..... | | | | | \$ 274,800.00 | \$ 3,300.00 | \$ - | \$ 278,100.00 |
| TOTAL ASSESSMENT | | | | | \$ 274,800.00 | \$ 3,300.00 | \$ - | \$ 278,100.00 |

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1 Hectare = 2.471 Acres
Project No. REI2016D016
March 30th, 2020

SPECIFICATIONS**RICHMOND DRAIN****5th Concession Road Bank Repair****(Geographic Township of Colchester South)****TOWN OF ESSEX****I. GENERAL SCOPE OF WORK**

The Richmond Drain comprises of an open drain generally located commencing at the Shepley Drain on the south side of County Road 20, then running north across to the middle of Concession 5 and turns east between Pt. Lot 7 and 8, where it then continues east along Concession 5 until turning southeast at Lot 11 and proceeds to the 5th Concession Road; it then continues east along the north side of the road, crossing under the road at Lot 13 and outletting into Cedar Creek at Pt. Lot 14 Concession 4, in the geographic township of Colchester South, Town of Essex. The work on the drain generally comprises of stabilizing the north drain bank on the south side of the 5th Concession Road in the Richmond Drain just east of the concrete bridge roadway crossing.

All work shall be carried out in accordance with these specifications and the plans forming part of this drainage project. The bank stabilization shall be of the size, type, depth, etcetera, as is shown in the accompanying drawings, as determined from the Benchmarks, and as may be further laid out at the site at the time of construction. All work carried out under this project shall be completed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

II. E.R.C.A. AND D.F.O. CONSIDERATIONS

The Contractor will be required to implement stringent erosion and sedimentation controls during the course of the work to help minimize the amount of silt and sediment being carried downstream into Cedar Creek. It is intended that work on this project be carried out during relatively dry weather to ensure proper site and drain conditions and to avoid conflicts with sediment being deposited into the outlet drainage system. All disturbed areas shall be restored as quickly as possible with grass seeding and mulching installed to ensure a protective cover and to minimize any erosion from the work site subsequent to construction. The Contractor may be required to provide temporary silt fencing and straw bales as outlined further in these specifications.

All of the work shall be carried out in accordance with any permits or authorizations issued by the Essex Region Conservation Authority (E.R.C.A.) or the Department of Fisheries and Oceans (D.F.O.), copies of which will be provided, if available, and the notes in **Appendix "REI-A"**. The Contractor is advised that no work may be carried out in the existing drain from March 15th to June 30th of any given year because the drain is directly connected to a downstream area that is classified as sensitive to impacts on aquatic life and habitat by E.R.C.A. and D.F.O.

As part of its work, the Contractor will implement the following measures that will ensure that any potential adverse effects on fish and fish habitat will be mitigated:

- a) As per standard requirements, work will not be conducted at times when flows in the drain are elevated due to local rain events, storms, or seasonal floods. Work will be done in the dry.

- b) All disturbed soils on the drain banks and within the channel, including spoil, must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better condition to what existed prior to the works. The spoil material must be hauled away and disposed of at a suitable site, or spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.
- c) To prevent sediment entry into the Drain, in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with related Ontario Provincial Standards. It is incumbent on the proponent and their Contractors to ensure that sediment and erosion control measures are functioning properly and are maintained and upgraded as required.
- d) Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.
- e) All activities including maintenance procedures should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicular refuelling and maintenance should be conducted away from the water.

III. M.N.R.F. - M.E.C.P. CONSIDERATIONS

The Contractor is to note that the Ministry of Natural Resources and Forestry (M.N.R.F.) screening process by way of a Species at Risk (S.A.R.) review of the M.N.R.F. “Endangered Species Act, 2007” (E.S.A.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. now administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.) prior to construction. This Section allows the Town to conduct eligible works of repair, maintenance and improvement to existing municipal drains under the Drainage Act, and exemptions from Sections 9 and 10 of the E.S.A., provided that the requirements are followed in accordance with Ontario Regulation 242/08. The results of the review will be provided to the Contractor and copies of the mitigation measures, habitat protection and identification sheets will be included within **Appendix “REI-B”**.

The Contractor is to review **Appendix “REI-B”** in detail and is required to comply in all regards with the contents of said M.N.R.F. measures, and follow the special requirements therein included during construction. Throughout the course of construction, the Contractor will be responsible to ensure that all necessary provisions are undertaken to protect all species at risk and their habitats. If a threatened or sensitive species is encountered, the Contractor shall notify the Town and M.N.R.F. and provide all the equipment and materials stipulated by the mitigation requirements for handling the species and cooperate fully with the Town and M.N.R.F. staff in the handling of the species.

Notwithstanding the above, the Contractor is advised that the Town had a signed Agreement with the Ministry of Natural Resources and Forestry (M.N.R.F.) regarding the maintenance operations on Municipal drains and the Endangered Species Act, 2007 (E.S.A.). The Drainage Superintendent has reviewed the endangered species maps and any concerns will be provided in **Appendix “REI-B”**. Certain species such as turtles and snakes are mobile and may be encountered during construction. Therefore, the “**SCHEDULE C MITIGATION PLAN**” of the former **Agreement** (pages 13 through 23) has been included in **Appendix “REI-B”** in its entirety along with a timing window chart for further information and use by the Contractor.

The Contractor shall contact the Drainage Superintendent if an endangered species is encountered during construction. The Contractor shall be responsible for providing the necessary equipment and materials outlined in the “**SCHEDULE C MITIGATION PLAN**” to address the handling of any endangered species encountered during the course of the construction work. The Contractor shall cooperate fully and assist the Drainage Superintendent or M.N.R.F. –

M.E.C.P. staff in the proper handling of the endangered species as outlined in the “**MITIGATION PLAN**”, and as may be further directed by the Drainage Superintendent or the M.N.R.F. - M.E.C.P., and shall govern all its operations accordingly.

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the north side of the Richmond Drain on the 5th Concession Road. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works as well. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the driveways and along the south top of bank as necessary to construct the new bank stabilization, brushing, and drain excavation as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the work to carry out the required construction of the new structure installation and ancillary work.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close the 5th Concession Road for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the Essex Works Department.

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the grass areas of the properties. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

Where there is any brush, trees or rubbish along the course of the drainage works, including the full width of the work access, all such brush, trees or rubbish shall be close cut and grubbed out, and the whole shall be chipped up for recycling, burned or otherwise satisfactorily disposed of by the Contractor. The brush and trees removed along the course of the work are to be put into piles by the Contractor in locations where they can be safely chipped and disposed of, or burned by it, or hauled away and disposed of by the Contractor to a site to be obtained by it at its expense. Prior to and during the course of any burning operations, the Contractor shall comply with the guidelines prepared by the Air Quality Branch of the Ontario Ministry of the Environment, and shall ensure that the Environmental Protection Act is not violated. The Contractor will be required to notify the local fire authorities to obtain any permits and co-operate with them in the carrying out of any work. The removal of brush and trees shall be carried out in close consultation with the Town Drainage Superintendent or Consulting Engineer to ensure that no decorative trees or shrubs are disturbed by the operations of the Contractor that can be saved. It is the intent of this project to save as many trees and bushes as practical within the roadway allowances and on private lands. Where decorative trees or shrubs are located directly over drainage pipes, the Contractor shall carefully extract same and turn them over to

the Owner when requested to do so, and shall cooperate with the Owner in the reinstallation of same if required.

The Contractor shall protect all other trees, bushes, and shrubs located along the length of the drainage works except for those trees that are established, in consultation with the Town Drainage Superintendent, the Consulting Engineer, and the Owners, to be removed as part of the works. The Contractor shall note that protecting and saving the trees may require the Contractor to carry out hand work around the trees, bushes, and shrubs to complete the necessary final site grading and restoration.

Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.

The Contractor shall remove all deleterious materials and rubbish along the course of the open drain in the location of the work areas and any other such materials located in the immediate area while carrying out its cleaning of same. All such deleterious materials and rubbish shall be loaded up and hauled away by the Contractor to a site to be obtained by it at its cost.

VI. FENCING

Where it is necessary to take down any fence to proceed with the work, the same shall be done by the Contractor across or along that portion of the work where such fence is located. The Contractor will be required to exercise extreme care in the removal of any fencing so as to cause a minimum of damage to same. The Contractor will be required to reinstall any fence that is taken down in order to proceed with the work, and the fence shall be reinstated in a neat and workmanlike manner. The Contractor will not be required to procure any new materials for rebuilding the fence provided that it has used reasonable care in the removal and replacement of same. When any fence is removed by the Contractor, and the Owner thereof deems it advisable and procures new material for replacing the fence so removed, the Contractor shall replace the fence using the new materials and the materials from the present fence shall remain the property of the Owner.

VII. DETAILS OF OPEN DRAIN WORK

The open drain shall be excavated to the lines, levels, grades and cross-sections as shown on the accompanying drawings, or as may be further established by the Town Drainage Superintendent or the Engineer at the time of the work. The drain shall be carefully excavated so as not to disturb the existing banks, rock protection and vegetation, except for those portions of the drain where widening or restoration of a stable drain bank configuration is required. The bottom width of the drain and the sideslopes of the excavation shall conform to the dimensions given on the drawings.

The drain shall be of the size, type, depth, etcetera as shown on the accompanying drawings. When completed, the drain shall have a uniform and even bottom and in no case shall such bottom project above the grade line, as shown on the accompanying drawings, and as determined from the Benchmarks. The finished side slopes of the drain shall be as shown on the plans.

The excavated material and any refuse or other materials removed from the drain shall be hauled away by the Contractor and disposed of at a site to be obtained by it at its expense.

Where the drain crosses any lawn, garden, orchard, roadway or driveway, etcetera, the excavated material for the full width of the above-mentioned areas shall be hauled away by the

Contractor and disposed of to a site to be obtained by the Contractor at its expense. All work at the disposal site shall be established between the Contractor and the site owner. The Contractor shall be responsible for any permits required and shall provide copies of same to the Town and Consulting Engineer when requested.

Where there is any brush or rubbish in the course of the drain, including both side slopes of the drain, all such brush or rubbish shall be close cut and grubbed out. Where there is any brush or rubbish where the earth is to be spread, or on that strip of land between where the earth is to be spread and the edge of the drain, all such brush or rubbish shall be close cut and grubbed out. The whole is to be burned, chipped or otherwise satisfactorily disposed of by the Contractor as outlined above.

VIII. DETAILS OF THE DRAIN AND BANK WORK

The Contractor shall provide all material, labour and equipment to repair and improve the drain bank in the Richmond Drain requiring work, along with the other improvements as noted. Any fill that is placed shall be compacted in maximum 300mm thick lifts utilizing a hoe pack or other suitable equipment. All areas that that require rip rap rock on filter cloth fabric placement shall be compacted with a hoe pack or equivalent equipment prior to placement of the filter fabric and rip rap protection.

The bank stabilization installation on this project shall be set to the grades as shown on the plans or as otherwise established herein and the Town Drainage Superintendent or the Consulting Engineer may make minor changes to the alignment as they deem necessary to suit the site conditions. All work shall be carried out in general accordance with the plans provided.

IX. STEEL SHEET PILING INSTALLATION

The new steel sheet piling to be installed on this project is required to be provided in the specified lengths with allowance for any damage caused during the driving installation. The finished wall and wingwalls shall not be less than 5.0 metres in length upon completion. The walls shall be installed in accordance with the manufacturer's recommendations. The steel sheeting shall be cut to a uniform top elevation and a channel iron cap installed as shown on the plans. The cap shall be securely bolted or welded to each sheet. The Contractor shall create weep holes in the front wall sheets approximately 150mm above the standard water elevation in the drain. The sheet piling shall be "Z" series as available from Roll Form Group Division of Samuel and be section Z55, or equal.

The Contractor shall note that an envelope of clear stone is to be installed behind the wall to allow for seepage and drainage of water from the bank behind the wall. The clear stone installation shall be a minimum of 300mm thick with non-woven filter cloth between the stone and the native backfill materials to prevent soil migration into the clear stone and prevent settlement from occurring.

The installation of the complete length of the new steel sheet pile wall and wingwalls, including all appurtenances, shall be completely inspected by the Town Drainage Superintendent or the Consulting Engineer's Inspector prior to backfilling any portions of same. Under no circumstance shall the Contractor commence the construction or backfill of the new walls without the site presence of the Town Drainage Superintendent or the Consulting Engineer's Inspector to inspect and approve said installation. The Contractor shall provide a minimum of two (2) working days' notice to the Town Drainage Superintendent or the Consulting Engineer prior to commencement of the work. The installation of the new wall structure is to be performed during normal working hours of the Town Drainage Superintendent and the Consulting Engineer from Monday to Friday unless written authorization is provided by them to amend said working hours.

The Contractor will be responsible to restore any damage caused to the roadways at its cost. All damaged hard surface roadway areas shall be neatly saw cut and the damaged materials removed and disposed of by the Contractor prior to carrying out any restoration work. The extent of the repairs shall be established in consultation with the Town Drainage Superintendent, the Road Authority, and the Consulting Engineer and the repairs shall be completed to their full satisfaction.

The Contractor is to note that any intercepted pipes or tiles along the length of the proposed works are to be extended and connected at its cost to the open drain at the face of the new wall unless otherwise noted in the accompanying drawings.

The Contractor shall also note that the placing of the new steel wall shall be completed so that it totally complies with the parameters established and noted in the plans and cross sections for the wall construction. The wall placement shall be performed totally in the dry, and the Contractor should be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor shall also be required to supply a minimum of 300mm (12") of 20mm (3/4") clear stone backfill with filter cloth behind the walls above the drain bottom elevation all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer.

X. REMOVALS

Where the steel sheet pile walls are to be constructed, the Contractor shall be required to excavate and completely any other deleterious materials that may be encountered including all rock, concrete pieces and other debris. The Contractor shall also be required to completely dispose of all removed materials to a site to be obtained by it at its own expense.

All unsuitable and deleterious materials from the excavation for the wall installation and drain cleaning shall be hauled away and disposed of by the Contractor to a site to be obtained by it at its expense.

XI. SLOPED BANK PROTECTION

Where sloped bank protection is specified, the top 305mm (12") of backfill material over the drain bank, from the top of the sheet pile wall to the top of the roadway elevation shall be quarried limestone. The quarried limestone shall be provided as shown and detailed on the plans or as indicated in the Standard Specifications in **Appendix "REI-C"** and shall be graded in size from a minimum of 100mm (4") to a maximum of 250mm (10"). The quarried limestone to be placed on the sloped drain banks shall be underlain with a synthetic **non-woven** geotextile filter fabric. All work shall be completed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer.

The installation of the sloped quarried limestone bank protection, unless otherwise specified herein, shall be provided in total compliance with Item 2, Item 3, and Item 4 of the **"STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"**. These are attached to the back of these specifications and labelled **Appendix "REI-C"**. The Contractor shall comply in all respects with the General Conditions included in Item 4 and the **"Typical Quarried Limestone End Protection Detail"** also in **Appendix "REI-C"**.

The quarried limestone erosion protection shall be embedded into the sideslopes of the drain a minimum thickness of 305mm and shall be underlain in all cases with non-woven synthetic filter mat. The filter mat shall not only be laid along the flat portion of the erosion protection, but also contoured to the exterior limits of the quarried limestone and the unprotected slope. The width of the erosion protection shall be as established in the accompanying drawings or as otherwise directed by the Town Drainage Superintendent or the Consulting Engineer during construction. In placing the erosion protection, the Contractor shall carefully tamp the quarried limestone

pieces into place with the use of the excavator bucket so that the erosion protection when completed will be consistent, uniform and tightly laid. In no instance shall the quarried limestone protrude beyond the exterior contour of the unprotected drain sideslopes along either side of said protection. The synthetic filter mat to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Aggregates Amherst Quarries, in Amherstburg, Ontario, or equal.

XII. BENCHMARKS

Also, for use by the Contractor, we have established Benchmarks along the course of the work and especially at the locations where the stabilization is being constructed.

For the bank stabilization, the plans include details illustrating the work to be carried out. A Benchmark has been indicated and the Elevation has been shown and may be utilized by the Contractor in carrying out its work. A table sets out the size, materials, and other requirements relative to the installation of the bank stabilization. In all cases, the Contractor is to utilize the specified drain grade. The Contractor shall ensure that it takes note of the direction of flow and ensures that all grades flow from west to east to match the direction of flow within the drain.

XIII. ANCILLARY WORK

During the course of any work to the bank stabilization along the length of the project, the Contractor will be required to protect or extend any existing tile ends or swales and connect them to the drainage works to maintain the drainage from the adjacent lands. All existing tiles shall be extended utilizing solid Big 'O' "standard tile ends" or equal plastic pipe of the same diameter as the existing tile and shall be installed in accordance with the "**Standard Lateral Tile Detail**" included in the plans or Appendices, unless otherwise noted. Connections shall be made using a manufacturer's coupling where possible. All cuts to steel pipes shall be touched up with a thick coat of zinc rich paint (Galvicon or equal) in accordance with the manufacturer's recommendations. For other connections, the Contractor shall utilize a grouted connection. Grouted mortar joints shall be composed of three (3) parts of clean, sharp sand to one (1) part of Portland cement with just sufficient water added to provide a stiff plastic mix, and the mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The mortar joint shall be of a sufficient mass around the full circumference of the joint on the exterior side to ensure a tight, solid seal. The Contractor is to note that any intercepted pipes along the length of the work are to be extended and connected to the open drain unless otherwise noted in the accompanying drawings.

As a check, all of the above bank stabilization design grade elevations should be confirmed before commencing to the next stage of the installation. The Contractor is also to check that the grades are correct by referencing the Benchmark.

Although it is anticipated that the installation shall be undertaken in the dry, the Contractor shall supply and install a temporary straw bale or silt curtain check dam in the drain bottom immediately downstream of the site during the time of construction. The straw bale or silt curtain check dam shall be to the satisfaction of the Town Drainage Superintendent or Consulting Engineer and must be removed upon completion of the construction along with any accumulated silt or debris. All costs associated with the supply and installation of this straw bale or silt curtain check dam shall be included in the cost bid for the bank stabilization.

XIV. TOPSOIL, SEED AND MULCH

The Contractor shall be required to restore all existing grassed areas and drain side slopes disturbed by the construction, by placing topsoil, and then seed and mulch over said areas including any specific areas noted on the details. The Contractor shall be required to provide all the material and to cover the above mentioned surfaces with approximately 50mm of good, clean, dry topsoil on slopes and 100mm of good, clean, dry topsoil on horizontal surfaces, fine graded and spread in place ready for seeding and mulching. The placing and grading of any topsoil shall be carefully and meticulously carried out in accordance with Ontario Provincial Standard Specifications, Form 802 dated November 2010, or as subsequently amended, or as amended by these specifications and be readied for the seeding and mulching process. The seeding and mulching of all of the above mentioned areas shall comply in all regards to Ontario Provincial Standard Specifications, Form 803 dated November 2010 and Form 804, dated November 2013, or as subsequently amended, or as amended by these specifications. The seeding mixture shall be the Standard Roadside Mix (Canada No. 1 Lawn Grass Seed Mixture) as set out in O.P.S.S. 804. All cleanup and restoration work shall be performed to the full satisfaction of the Town Drainage Superintendent or Engineer.

When all of the work for this installation has been completed, the Contractor shall ensure that positive drainage is provided to all areas, and shall ensure that the site is left in a neat and workmanlike manner, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

XV. GENERAL CONDITIONS

- a) The Town Drainage Superintendent or Consulting Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.
- b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility or other object which it may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town of Essex and the Consulting Engineer and their representatives for any damages which it may cause or sustain during the progress of the work. It shall not hold the Town of Essex or the Consulting Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.
- c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Consulting Engineer can review same and check that the work will generally conform to the design and project intent.
- d) The Contractor will be responsible for any damage caused by it to any portion of the Town road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its' employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, etc., from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.
- e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health

and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.

- f) During the course of the work the Contractor shall be required to connect existing drainage pipes to the Municipal Drain. In the event that polluted flows are discovered, the Contractor shall delay the connection of the pipe and leave the end exposed and alert the Town, the Drainage Superintendent and the Consulting Engineer so that steps can be taken by the Town to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Town in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.
- g) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.
- h) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.
- i) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Consulting Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses, the Consulting Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.
- j) The Contractor will be required to submit to the Town, a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work and the Contractor will be required to submit to the Town, a Certificate of Clearance for the project from the Workplace Safety and Insurance Board before Final Payment is made to the Contractor.
- k) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Owner. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Owner in every way and shall guarantee faithful performance of the contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

The Tenderer shall include the cost of bonds in the unit price of the Tender items as no additional payment will be made in this regard.

- l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project and shall name the Town of Essex and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.
- m) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the

work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:

- i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
- ii) proof of advertising
- iii) a Statutory Declaration, in a form satisfactory to the Consulting Engineer and the Town, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.

The Contractor shall satisfy the Consulting Engineer or Town that there are no liens or claims against the work and that all of the requirements as per the Construction Act 2018 and its' subsequent amendments have been adhered to by the Contractor.

- n) In the event that the Specifications, Information to Tenderers, or the Form of Agreement do not apply to a specific condition or circumstance with respect to this project, the applicable section or sections from the Canadian Construction Documents Committee C.C.D.C.2 shall govern and be used to establish the requirements of the work.

APPENDIX "REI-A"

STANDARD E.R.C.A. AND D.F.O.
MITIGATION REQUIREMENTS

As part of its work, the Contractor will implement the following measures that will ensure that any potential adverse effects on fish and fish habitat will be mitigated:

1. As per standard requirements, work will not be conducted at times when flows in the drain are elevated due to local rain events, storms, or seasonal floods. Work will be done in the dry.
2. All disturbed soils on the drain banks and within the channel, including spoil, must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better condition to what existed prior to the works. The spoil material must be hauled away and disposed of at a suitable site, or spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.
3. To prevent sediment entry into the drain in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with the related Ontario Provincial Standards. It is incumbent on the proponent and Contractors to ensure that sediment and erosion control measures are functioning properly and maintained/upgraded as required.
4. Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.
5. All activities including maintenance procedures should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicular refuelling and maintenance should be conducted away from the water.
6. Any drain banks trimmed outside of the July 1st to September 15th timing window will require erosion control blankets to be installed to promote re-vegetation and to protect the slope from erosion in the interim.

APPENDIX "REI-B"

SCHEDULE C
MITIGATION PLAN

The Municipality shall undertake measures to minimize adverse effects on species at risk in accordance with the general conditions described in Part B and taxa-specific conditions described in Part C, and the monitoring and reporting requirements described in Part D of this Mitigation Plan.

PART A. DEFINITIONS

1. Definitions:

1.1. In this Schedule, the following words shall have the following meanings:

"DFO" means Fisheries and Oceans Canada;

"MNR" means the Aylmer District Office of the Ministry of Natural Resources;

"Contact" means to contact the MNR in accordance with the notification/contact schedule provided to the Municipality by the MNR Designated Representative from time to time;

"Holding Tub" means a large, light-coloured container fitted with a non-airtight latchable lid approved by the MNR for the temporary storage of captured snakes, turtles, amphibians, birds or eggs;

"Interagency Notification Form" means the form issued by DFO, available at www.dfo-mpo.gc.ca, which is required to be completed when a drain is being maintained or constructed;

"Monitoring and Reporting Form" means the document that must be completed by the Municipality in accordance with Part D to this Schedule and will be provided to the Municipality;

"Ontario Operational Statement" means one of the documents issued by DFO, available at www.dfo-mpo.gc.ca, that sets out the conditions and measures to be incorporated into a project in order to avoid negative impacts to fish and fish habitat in Ontario, as modified from time to time;

"Process Charts" means the charts attached as Part E to this Schedule which describe the steps set out in this Mitigation Plan;

"Seasonal Timing Windows Chart" means the chart attached as Part G to this schedule which describes the Sensitive Periods applicable to each Taxonomic Group;

"Sensitive Area" means a geographic area in the Municipality where additional mitigation measures are required to be undertaken for one or more Taxonomic Groups;

"Sensitive Areas Map" means any one of the maps attached as Part F to this schedule which sets out the applicable Sensitive Areas;

"Sensitive Period" means a time of year set out in the Seasonal Timing Windows Chart during which taxa-specific mitigation measures are required to be undertaken for a Taxonomic Group because of ambient air/water temperatures, water-levels or important life-history stages;

"Taxonomic Group" means the distinct group comprising one or more Species based on their taxonomic relationship and common approaches to mitigating adverse effects (i.e., fish, mussels, turtles, snakes, amphibians, birds or plants); and

"Work Zone" means the geographic area in the Municipality where an Activity in respect of one of the Drainage Works is being conducted.

- 1.2. For greater certainty, any defined terms that are not defined in section 1.1 have the same meanings as in the Agreement.

PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS

2. Process Charts

- 2.1. The general steps set out in this Part B are visually described in the Process Charts (Part E).

3. Review of Documentation

- 3.1. Prior to conducting any Activities in respect of the Drainage Works the Municipality shall determine if conditions apply to the place, time or manner in which the Municipality wishes to pursue them by reviewing:
 - (a) the Sensitive Areas Maps (Part F) to determine if the Work Zone for the proposed Activities will occur within a Sensitive Area;
 - (b) the DFO Reference Guide for Fish and Mussel Species at Risk Distribution Maps: A Referral Review Tool for Projects Affecting Aquatic Species at Risk;
 - (c) the Seasonal Timing Windows Chart (Part G) to determine if the proposed Activities will occur during a Sensitive Period for one or more of the Taxonomic Groups; and
 - (d) the Process Charts to determine if prior notification is required;
 - (e) the mitigation measures for each applicable Taxonomic Group in Part C to determine what additional site-specific mitigation measures, if any, are required.
- 3.2. The Municipality shall document the results of the review undertaken in accordance with section 3.1 using the Monitoring and Reporting Form.

4. Sensitive Areas Maps

- 4.1. The Sensitive Areas Maps contain sensitive information about the distribution of species at risk, are provided for the sole purpose of informing this Agreement and are not to be copied or distributed for any other purposes or to any other party without the prior written authorization of the MNR Designated Representative.

5. Prior Notification to Seek Direction

- 5.1. If, after completing the review of documents described in section 3.1, the Municipality determines that the proposed Activities will be undertaken:
 - (a) in a place;
 - (b) at a time; or
 - (c) in a manner,

that requires prior notification in accordance with the Process Charts, the Municipality shall provide prior notification to the MNR in order for the MNR to determine if the Municipality must undertake additional site-specific or Species-specific mitigation

measures to minimize adverse effects on the Species and, if applicable, to identify such measures.

- 5.2. The prior notification under section 5.1 shall include a completed Interagency Notification Form:
 - (a) in respect of maintenance/repair where the proposed Activities are being undertaken pursuant to subsection 3(18) or section 74 of the *Drainage Act*; or
 - (b) in respect of construction/improvement where the proposed Activities are being undertaken pursuant to section 77 or 78 of the *Drainage Act*.
- 5.3. Where an Activity is undertaken in accordance with section 124 of the *Drainage Act* and would otherwise have required prior notification under section 5.1, the Municipality shall Contact the MNR by email prior to the commencement of the Activity, and complete and submit the applicable Interagency Notification Form within one week of the Activity's completion, unless otherwise directed in writing by the MNR Designated Representative.

6. General Mitigation Measures

- 6.1. Notwithstanding that prior notification or additional mitigation measures may be required in accordance with this schedule, in undertaking any Activity at any time in respect of the Drainage Works the Municipality shall:
 - (a) undertake the mitigation measures for sediment control and for erosion control and bank stabilization set out in The Drain Primer (Cliff Evanitski 2008) published by DFO (ISBN 978-0-662-48027-3), unless otherwise authorized in writing by the MNR Designated Representative;
 - (b) use net free, 100% biodegradable erosion control blanket for all erosion control or bank stabilization done in conjunction with their Activities or, if authorized in writing by the MNR Designated Representative, alternative erosion control blankets that provide equal or greater protection to individual Species; and
 - (c) where applicable, follow the guidelines set out in the following Ontario Operational Statements:
 - (i) Beaver Dam Removal;
 - (ii) Bridge Maintenance;
 - (iii) Culvert Maintenance;
 - (iv) Isolated Pond Construction;
 - (v) Maintenance of Riparian Vegetation in Existing Right of Ways; and
 - (vi) Temporary Stream Crossing.

PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS

ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES

7. Activities undertaken in Sensitive Areas for Mussels

- 7.1. Subject to section 7.2, where a proposed Activity will occur in a Sensitive Area for a mussel Species, the Municipality shall Contact the MNR to seek further direction.
- 7.2. Section 7.1 does not apply where the applicable Drainage Works are:
 - (a) in a naturally dry condition;
 - (b) classified as a Class F drain in DFO's *Class Authorization System for the Maintenance of Agricultural Municipal Drains in Ontario* (ISBN 0-662-72748-7); or
 - (c) a closed drain.

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

8. Training and Required On Site Materials for Turtles

- 8.1. The Municipality will ensure any person:
 - (a) involved in the capture, temporary holding, transfer and release of any turtle Species has received training in proper turtle handling procedures; and
 - (b) who undertakes an Activity has a minimum of two Holding Tubs and cotton sacks on site at all times.

9. Activities undertaken in Sensitive Areas and Sensitive Periods for Turtles

- 9.1. Subject to section 9.2, where a proposed Activity will occur in a Sensitive Area for any turtle Species and during a Sensitive Period for that Species, the Municipality shall:
 - (a) not undertake any Activities that include the excavation of sediment or disturbance to banks during the applicable Sensitive Period unless otherwise authorized;
 - (b) undertake Activities in accordance with any additional site-specific measures provided in writing by the MNR Designated Representative;
 - (c) avoid draw-down and de-watering of the Sensitive Area during the applicable Sensitive Period; and
 - (d) if authorized by the MNR Designated Representative under (a) above to undertake Activities that include excavation of sediment or disturbance of banks, in addition to any other measures required under (b) above, ensure any person undertaking an Activity has at least two Holding Tubs on site at all times.
- 9.2. Section 9.1 does not apply where the applicable Drainage Works are:
 - (a) in a naturally dry condition;
 - (b) classified as a Class F drain in DFO's *Class Authorization System for the Maintenance of Agricultural Municipal Drains in Ontario* (ISBN 0-662-72748-7); or
 - (c) a closed drain.

10. Measures for Encounters with Turtles During a Sensitive Period

- 10.1. Where one or more individuals belonging to a turtle Species is encountered in the undertaking of an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:
- (a) capture and transfer all uninjured individuals of that Species into a Holding Tub;
 - (b) capture and transfer all individuals injured as a result of the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals;
 - (c) ensure that the Holding Tubs with the captured individuals are stored at a cool temperature to prevent freezing until the individuals can be transferred; and
 - (d) immediately Contact the MNR to seek direction and to arrange for the transfer of the individual turtles.

11. Measures for Encounters with Turtles Laying Eggs or Nest Sites

- 11.1. Where one or more individuals belonging to a turtle Species laying eggs, or an active nest site of any turtle Species, is encountered in undertaking an Activity in a Work Zone, the Municipality shall:
- (a) not disturb a turtle encountered laying eggs and not conduct any Activities within 20 metres of the turtle while it is laying eggs;
 - (b) collect any displaced or damaged eggs and capture any injured dispersing juveniles and transfer them to a Holding Tub;
 - (c) store all captured injured individuals and collected eggs out of direct sunlight;
 - (d) immediately Contact the MNR to seek direction and to arrange for the transfer of any injured individuals and eggs;
 - (e) immediately stop any disturbance to the nest site and recover exposed portions with soil or organic material to protect the integrity of the remaining individuals;
 - (f) not drive any equipment over the nest site or conduct any Activities within 5 metres of the nest site;
 - (g) not place any dredged materials removed from the Drainage Works on top of the nest site;
 - (h) mark out the physical location of the nest site for the duration of the project but not by any means that might increase the susceptibility of the nest to predation or poaching; and
 - (i) where there are no collected eggs or captured individuals, record relevant information and Contact the MNR within 72 hours to provide information on the location of the nest site.

12. Measures for Encounters with Turtles Outside of a Sensitive Period

- 12.1. Where one or more individuals belonging to a turtle Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:
- (a) briefly stop the Activity for a reasonable period of time to allow any uninjured individual turtles of that Species to leave the Work Zone;

- (b) where individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (a) above, capture all uninjured individuals and release them in accordance with section 13.1;
- (c) where circumstances do not allow for their immediate release, transfer captured uninjured individuals for a maximum of 24 hours into a Holding Tub which shall be stored out of direct sunlight and then release them in accordance with section 13.1;
- (d) capture and transfer any individuals that have been injured into a Holding Tub separate from any Holding Tub containing uninjured individuals; and
- (e) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

13. Release of Captured Individuals Outside of a Sensitive Period

- 13.1. Where uninjured individuals are captured under section 12.1, they shall be released:
- (a) within 24 hours of capture;
 - (b) in an area immediately adjacent to the Drainage Works;
 - (c) in an area that will not be further impacted by the undertaking of any Activity; and
 - (d) not more than 250 metres from the capture site.
- 13.2. Following a release under section 13.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

14. Measures for Dead Turtles

- 14.1. Where one or more individuals of a turtle Species is killed as a result of an Activity in a Work Zone, or if a person undertaking an Activity finds a deceased individual of a turtle Species within the Work Zone, the Municipality shall:
- (a) place any dead turtles in a Holding Tub outside of direct sunlight; and
 - (b) Contact the MNR within 72 hours to seek direction and to arrange for the transfer of the dead individuals.

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

15. Training and Required On Site Materials for Snakes

- 15.1. The Municipality will ensure any person:
- (a) involved in the capture, temporary holding, transfer and release of any snake Species has received training in proper snake handling procedures; and
 - (b) who undertakes an Activity has a minimum of two Holding Tubs and cotton sacks on site at all times.

16. Activities undertaken in Sensitive Areas and Sensitive Periods for Snakes

- 16.1. Where a proposed Activity involves physical infrastructure (e.g., culverts, pump houses, etc.) and will occur in a Sensitive Area for any snake Species and during a *Sensitive Period – Hibernation* for that Species, the Municipality shall undertake the Activity outside of the Sensitive Period, unless otherwise authorized by and in accordance with any site-specific measures provided in writing by the MNR Designated Representative.

- 16.2. Where a proposed Activity will occur at or adjacent to a known hibernacula (as identified by the MNR) for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall:
- (a) erect effective temporary snake barriers approved by the MNR that will not pose a risk of entanglement for snakes and that shall be secured so that individual snakes may not pass over or under the barrier or between any openings to enter or re-enter the Work Zone;
 - (b) inspect the temporary snake barriers daily during periods when snakes are active, capture any individuals incidentally encountered within the area bounded by the snake barrier and release the captured individuals in accordance with section 20.1; and
 - (c) remove the temporary snake barriers immediately upon completion of the Activity.
- 16.3. Where a proposed Activity that does not involve physical infrastructure will occur in a Sensitive Area for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall undertake the Activity outside of the Sensitive Period, unless otherwise authorized by and in accordance with any site-specific measures provided in writing by the MNR Designated Representative.

17. Measures for Encounters with Snakes During a Sensitive Period

- 17.1. Where one or more individuals belonging to a snake Species is encountered, or should an active hibernacula be uncovered, while conducting an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:
- (a) capture and transfer all injured and uninjured individual snakes of that Species into individual light-coloured, drawstring cotton sacks;
 - (b) place all cotton sacks filled with the captured individuals into a Holding Tub;
 - (c) ensure that the Holding Tub with the captured individuals is stored at a cool temperature to protect the snakes from freezing until the individuals can be retrieved or transferred;
 - (d) if an active hibernacula is uncovered, cease all Activities at the hibernacula site; and
 - (e) immediately Contact the MNR to seek direction and to arrange for the transfer and/or retrieval.

18. Measures for Encounters with Snake Nests

- 18.1. Where an active nest of any of the snake Species is encountered and disturbed while undertaking an Activity in any part of a Work Zone, the Municipality shall:
- (a) collect any displaced or damaged eggs and transfer them to a Holding Tub;
 - (b) capture and transfer all injured dispersing juveniles of that Species into a light-coloured drawstring cotton sack;
 - (c) place all cotton sacks with the captured injured individuals into a Holding Tub;
 - (d) ensure that the Holding Tub with the captured injured individuals is stored out of direct sunlight;
 - (e) immediately Contact the MNR to seek direction and to arrange for the transfer of the injured individuals;
 - (f) immediately stop any disturbance to the nest site and loosely cover exposed portions with soil or organic material to protect the integrity of the remaining individuals;

- (g) not drive any equipment over the nest site or conduct any Activities within 5 metres of the nest site;
- (h) not place any dredged materials removed from the Drainage Works on top of the nest site;
- (i) mark out the physical location of the nest site but not by any means that might increase the susceptibility of the nest to predation or poaching; and
- (j) where there are no collected eggs or captured individuals, Contact the MNR within 72 hours to provide information on the location of the nest site.

19. Measures for Encounters with Snakes Outside of a Sensitive Period

- 19.1. Where one or more individuals belonging to a snake Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:
- (a) follow the requirements in section 15;
 - (b) briefly stop the Activity for a reasonable period of time to allow any uninjured individual snakes of that Species to leave the Work Zone;
 - (c) if the individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (b) above, capture all uninjured individuals and release them in accordance with section 20.1;
 - (d) where circumstances do not allow for the immediate release of captured uninjured individuals, they may be transferred into individual, light-coloured, drawstring cotton sacks before placing them in a Holding Tub which shall be stored out of direct sunlight for a maximum of 24 hours before releasing them in accordance with section 20.1;
 - (e) capture and transfer any individuals injured as a result of conducting the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals; and
 - (f) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

20. Release of Captured Individuals Outside of a Sensitive Period

- 20.1. Where uninjured individuals are captured under section 19.1, they shall be released:
- (a) within 24 hours of capture;
 - (b) in an area immediately adjacent to the Drainage Works where there is natural vegetation cover;
 - (c) in an area that will not be further impacted by the undertaking of any Activity; and
 - (d) not more than 250 metres from the capture site.
- 20.2. Following a release under section 20.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

21. Measures for Dead Snakes

- 21.1. Where one or more individuals belonging to a snake Species is killed as a result of an Activity in a Work Zone, or if a person undertaking an Activity finds a deceased individual of a snake Species within the Work Zone, the Municipality shall:

- (a) collect and transfer any dead individuals into a Holding Tub outside of direct sunlight; and
- (b) Contact the MNR within 72 hours to seek direction and to arrange for the transfer of the carcasses of the dead individuals.

ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS

22. Activities Undertaken in Sensitive Areas for Herbaceous Plants

- 22.1. Where a proposed Activity will occur that involves physical disturbance to vegetated banks or the killing and/or removal of vegetation through chemical or mechanical means in a Sensitive Area for any herbaceous plant Species, the Municipality shall:
- (a) undertake the Activity outside of the Sensitive Period, unless otherwise authorized;
 - (b) limit equipment access and operations to the side of the Drainage Works that will minimize disturbances where any of the plant Species occur;
 - (c) locate temporary storage sites for excavated sediments or bank materials on areas of open soil away from where any of the plant Species are likely to occur;
 - (d) not use any broad spectrum herbicides in Sensitive Areas; and
 - (e) undertake Activities in accordance with any additional site-specific measures provided in writing by the MNR Designated Representative.

ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES

23. Additional Measures for Butternut

- 23.1. Where Butternuts may exist in a Work Zone and may be affected by an Activity, the Municipality shall:
- (a) identify and mark as retainable trees all individual Butternut trees within the Work Zone during work planning site visits unless the individual Butternut has been assessed as a non-retainable tree due to infection by Butternut canker by a person designated by the Minister as a Butternut Health Assessor;
 - (b) retain and avoid disturbance to all individuals identified under (a) above that have been identified as retainable trees or that have not been assessed, unless otherwise authorized in writing by the MNR Designated Representative;
 - (c) conduct Activities by:
 - (i) limiting equipment access and operations to the side of the Drainage Works that will minimize disturbance to where any of the individual Butternut trees occur,
 - (ii) working around trees,
 - (iii) avoiding compacting and/or disturbing the soil by keeping excavation and other heavy equipment a minimum of 2 metres away from the main stem of retained individuals to avoid damaging roots and stems,
 - (iv) placing excavated materials on areas not within 2 metres of the main stem of retained individuals; and
 - (v) where branches are required to be removed to allow for safe operation of equipment, removing them using appropriate equipment, such as pruning saws, chain saws or lopping shears, in accordance with good forestry practices.

24. Measures for Other Trees

- 24.1. Where Kentucky Coffee-tree, Common Hoptree, Eastern Flowering Dogwood and American Chestnut may exist in a Work Zone and may be affected by an Activity, the Municipality shall:
- (a) identify and mark all individual Kentucky Coffee-tree, Common Hoptree, Eastern Flowering Dogwood and American Chestnut within the Work Zone during work planning site visits;
 - (b) avoid disturbance to all individuals identified under (a) above, unless otherwise authorized in writing by the MNR Designated Representative;
 - (c) conduct Activities by:
 - (i) limiting equipment access and operations to the side of the Drainage Works that will minimize disturbance where any of the individuals occur,
 - (ii) working around trees,
 - (iii) avoiding compacting and/or disturbing the soil by keeping excavation and other heavy equipment a minimum of 2 metres away from the main stem of retained individuals to avoid damaging roots and stems, and
 - (iv) placing excavated materials on areas not within 2 metres of the main stem of retained individuals; and
 - (d) where branches are required to be removed to allow for safe operation of equipment, remove them using appropriate equipment, such as pruning saws, chain saws or lopping shears, in accordance with good forestry practices.

PART D. MONITORING AND REPORTING REQUIREMENTS

25. Compliance Monitoring.

- 25.1. The Municipality shall inspect the undertaking of the Activities at the locations described in Part F of this Schedule C, and shall record the results of the inspections in the Monitoring and Reporting Form.
- 25.2. The Municipality shall record all encounters with Species and the resulting mitigation measures taken by the Municipality in the Monitoring and Reporting Form.

26. Reporting

- 26.1. Prior to March 31 of each year the Mitigation Plan is in effect, the Municipality shall submit a completed Monitoring and Reporting Form containing all of the information collected under sections 25.1 and 25.2 during the previous twelve months to the MNR Designated Representative.

27. Review

- 27.1. Within six months of the expiry of this Mitigation Plan but no later than three months from the time of its expiry, the Parties shall meet to review the measures and actions taken and the Activities undertaken during its term and to discuss the terms and conditions of the next Mitigation Plan.

APPENDIX "REI-C"

STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION

1. CONCRETE FILLED JUTE BAG HEADWALLS

After the Contractor has set the new pipe in place, it shall completely backfill same and install new concrete filled jute bag headwalls at the locations and parameters indicated on the drawing. When constructing the concrete filled jute bag headwalls, the Contractor shall place the bags so that the completed headwall will have a slope inward from the bottom of the pipe to the top of the finished headwall. The slope of the headwall shall be one unit horizontal to five units vertical. The Contractor shall completely backfill behind the new concrete filled jute bag headwalls with Granular "B" and Granular "A" material as per O.P.S.S. Form 1010 and the granular material shall be compacted in place to a Standard Proctor Density of 100%. The placing of the jute bag headwalls and the backfilling shall be performed in lifts simultaneously. The granular backfill shall be placed and compacted in lifts not to exceed 305mm (12") in thickness.

The concrete filled jute bag headwalls shall be constructed by filling jute bags with concrete. All concrete used to fill the jute bags shall have a minimum compressive strength of 25 MPa in 28 days and shall be provided and placed only as a wet mix. Under no circumstance shall the concrete to be used for filling the jute bags be placed as a dry mix. The jute bags, before being filled with concrete, shall have a dimension of 460mm (18") x 660mm (26"). The jute bags shall be filled with concrete so that when they are laid flat, they will be approximately 100mm (4") thick, 305mm (12") to 380mm (15") wide and 460mm (18") long.

The concrete jute bag headwall to be provided at the end of the bridge pipe shall be a single or double bag wall construction as set out in the specifications. The concrete filled bags shall be laid so that the 460mm (18") dimension is parallel with the length of the new pipe. The concrete filled jute bags shall be laid on a footing of plain concrete being 460mm (18") wide, extending for the full length of the wall, and 305mm (12") thick extending below the bottom of the culvert pipe.

All concrete used for the footing, cap and bags shall have a minimum compressive strength of 25 Mpa at 28 days and shall include 6% ± 1% air entrainment.

Upon completion of the jute bag headwall the Contractor shall cap the top row of concrete filled bags with a layer of plain concrete, minimum 100mm (4") thick, and hand trowelled to obtain a pleasing appearance. If the cap is made more than 100mm thick, the Contractor shall provide two (2) continuous 15M reinforcing bars set at mid-depth and equally spaced in the cap. The Contractor shall fill all voids between the concrete filled jute bags and the corrugated steel pipe with concrete, particular care being taken underneath the pipe haunches to fill all voids.

The completed jute bag headwalls shall be securely embedded into the drain bank a minimum of 500mm (20") measured perpendicular to the sideslopes of the drain.

As an alternate to constructing a concrete filled jute bag headwall, the Contractor may construct a grouted concrete rip rap headwall. The specifications for the installation of a concrete filled jute bag headwall shall be followed with the exception that broken pieces of concrete may be substituted for the jute bags. The concrete rip rap shall be approximately 460mm (18") square and 100mm (4") thick and shall have two (2) flat parallel sides. The concrete rip rap shall be fully mortared in place using a mixture composed of three (3) parts of clean sharp sand and one (1) part of Portland cement.

The complete placement and backfilling of the headwalls shall be performed to the full satisfaction of the Town Drainage Superintendent and the Engineer.

2. QUARRIED LIMESTONE ENDWALLS

The backfill over the ends of the corrugated steel pipe shall be set on a slope of 1-½ units horizontal to 1 unit vertical from the bottom of the corrugated steel pipe to the top of each end slope and between the drain banks. The top 305mm (12") in thickness of the backfill over the ends of the corrugated steel pipe shall be quarried limestone. The quarried limestone shall also be placed on a slope of 1-½ units horizontal to 1 unit vertical from the bottom of the corrugated steel pipe to the top of each bank of the drain adjacent each end slope. The quarried limestone shall have a minimum dimension of 100mm (4") and a maximum dimension of 250mm (10"). The end slope protection shall be placed with the quarried limestone pieces carefully tamped into place with the use of a shovel bucket so that, when complete, the end protection shall be consistent, uniform, and tightly laid in place.

Prior to placing the quarried limestone end protection over the granular backfill and on the drain banks, the Contractor shall lay non-woven geotextile filter fabric "GMN160" conforming to O.P.S.S. 1860 Class I or approved equal. The geotextile filter fabric shall extend from the bottom of the corrugated steel pipe to the top of each end slope of the bridge and along both banks of the drain to a point opposite the ends of the pipe.

The Contractor shall take extreme care not to damage the geotextile filter fabric when placing the quarried limestone on top of the filter fabric.

3. BRIDGE BACKFILL

After the corrugated steel pipe has been set in place, the Contractor shall backfill the pipe with Granular "B" material, O.P.S.S. Form 1010 with the exception of the top 305mm (12") of the backfill. The top 305mm (12") of the backfill for the full width of the excavated area (between each bank of the drain) and for the top width of the driveway, shall be Granular "A" material, O.P.S.S. Form 1010. The granular backfill shall be compacted in place to a Standard Proctor Density of 100% by means of mechanical compactors. All of the backfill material, equipment used, and method of compacting the backfill material shall be inspected and approved and meet with the full satisfaction of the Town Drainage Superintendent and Engineer.

4. GENERAL

Prior to the work commencing, the Town Drainage Superintendent and Engineer must be notified, and under no circumstances shall work begin without one of them being at the site. Furthermore, the grade setting of the pipe must be checked, confirmed, and approved by the Superintendent or Engineer prior to continuing on with the bridge installation.

The alignment of the new bridge culvert pipe shall be in the centreline of the existing drain, and the placing of same must be performed totally in the dry.

Prior to the installation of the new access bridge culvert, the existing sediment build-up in the drain bottom must be excavated and completely removed. This must be done not only along the drain where the bridge culvert pipe is to be installed, but also for a distance of 3.05 metres (10 ft.) both upstream and downstream of said new access bridge culvert. When setting the new bridge culvert pipe in place it must be founded on a good undisturbed base. If unsound soil is encountered, it must be totally removed and replaced with 20mm (3/4") clear stone, satisfactorily compacted in place.

When doing the excavation work or any other portion of the work relative to the bridge installation, care should be taken not to interfere with, plug up, or damage any existing surface drains, swales, and lateral or main tile ends. Where damage is encountered, repairs to correct same must be performed immediately as part of the work.

The Contractor and/or landowner performing the bridge installation shall satisfy themselves as to the exact location, nature and extent of any existing structure, utility or other object that they may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town, the Engineer and their staff from any damages which it may cause or sustain during the progress of the work. It shall not hold them liable for any legal action arising out of any claims brought about by such damage caused by it.

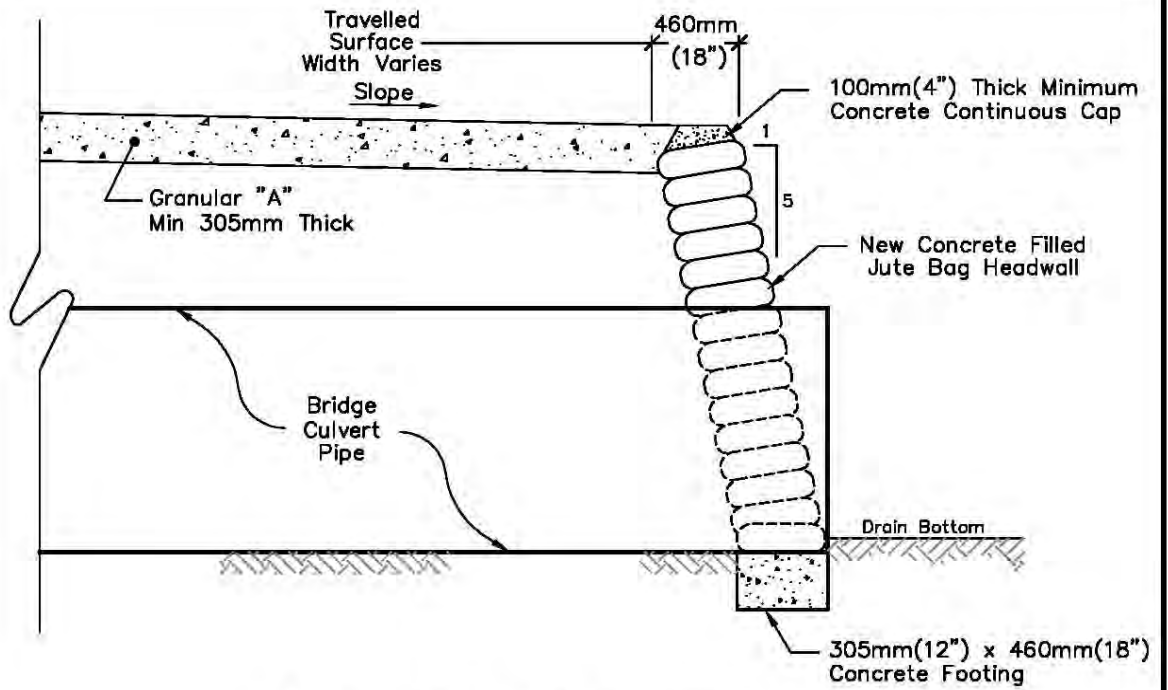
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original condition upon completion of the works.

When working along a municipal roadway, the Contractor shall provide all necessary lights, signs, barricades and flagpersons as required to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, it is to comply with the M.T.O. Traffic Control Manual for Roadway Work Operations.

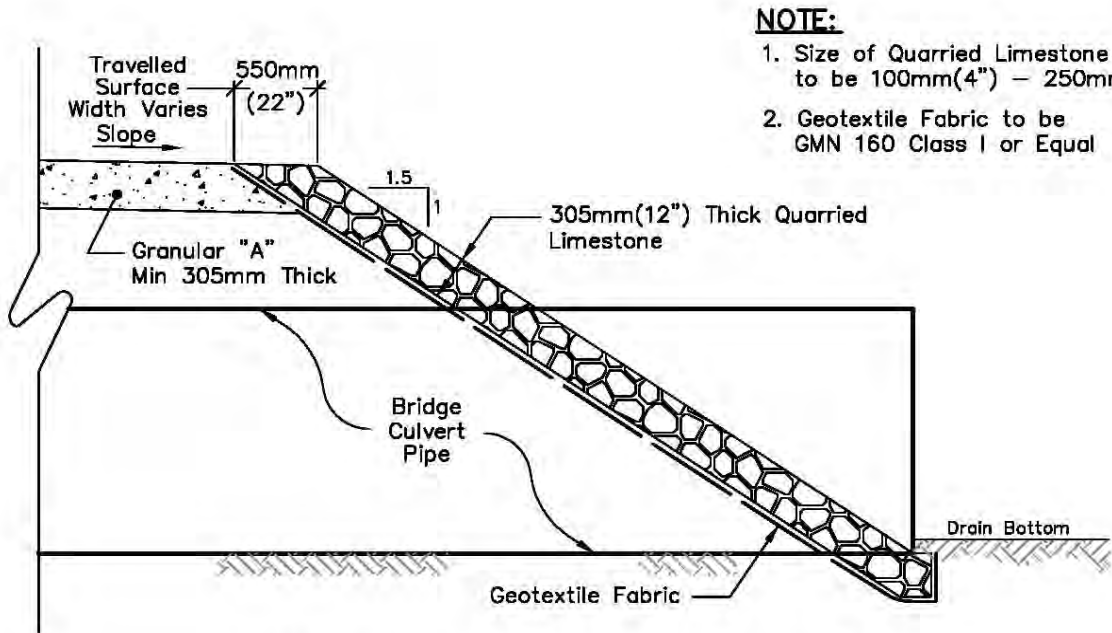
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

All of the work required towards the installation of the bridge shall be performed in a neat and workmanlike manner. The general site shall be restored to its' original condition, and the general area shall be cleaned of all debris and junk, etc. caused by the work

All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Town Drainage Superintendent and Engineer.



Typical Jute Bag Headwall



NOTE:

1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 Class I or Equal

Typical Quarried Limestone End Protection

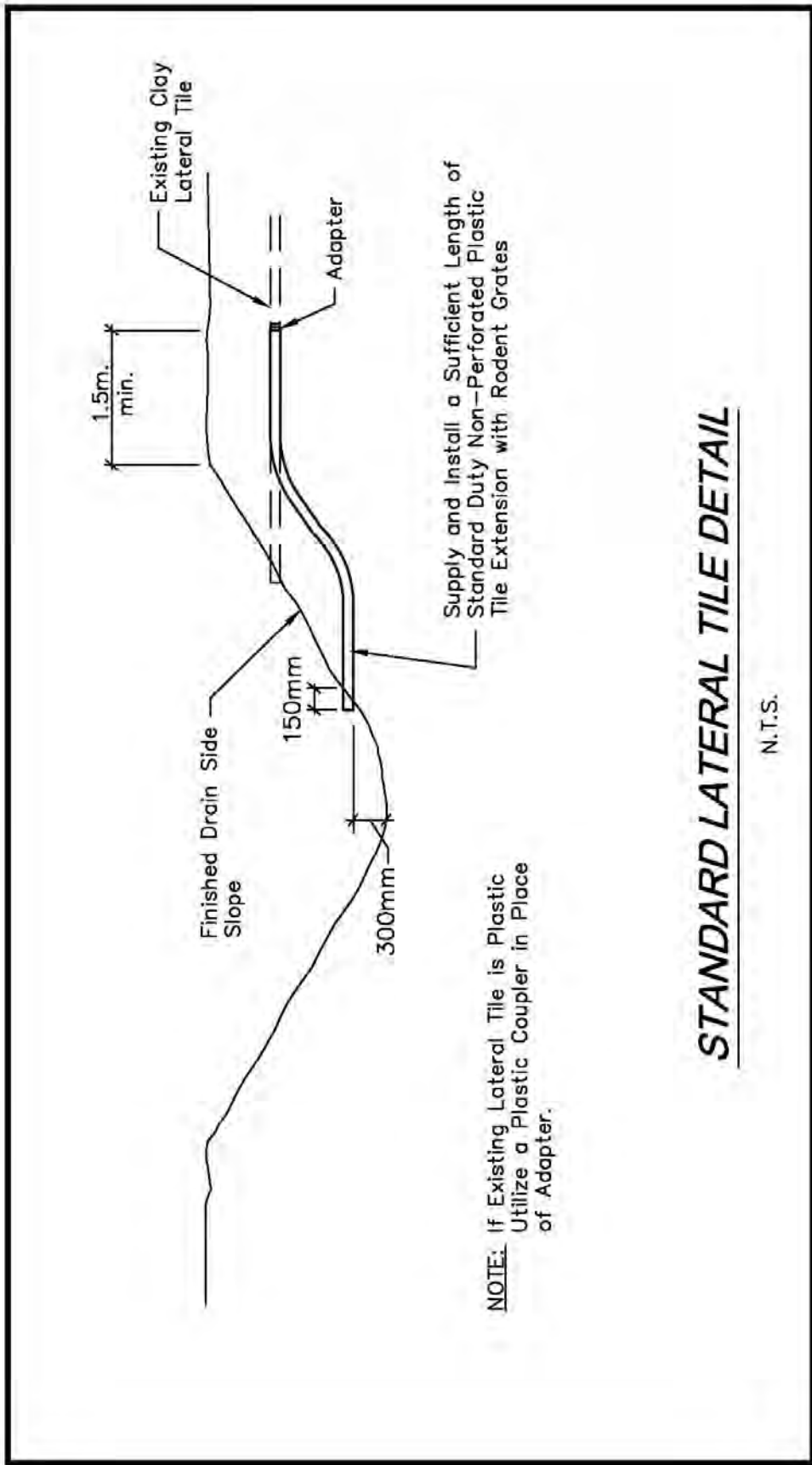
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

Leamington, Ontario N8H 1G6

519-322-1621



NOTE: If Existing Lateral Tile is Plastic Utilize a Plastic Coupler in Place of Adapter.

Supply and Install a Sufficient Length of Standard Duty Non-Perforated Plastic Tile Extension with Rodent Grates

STANDARD LATERAL TILE DETAIL

N.T.S.



Block Headwall Installation Instructions for Culverts

1. A swift lift device will be required to place the blocks. A 75mm eye bolt will be required to place the caps.
2. The bottom course of blocks shall be founded on a firm solid base. The contractor shall provide a minimum levelling course of 150mm of compacted 3/4" Clear Stone, or a 100% compacted granular A, or lean concrete as a foundation base.
3. Ensure that the base is level and flat as this will greatly improve speed of installation.
4. On new culverts a minimum of 150mm of block wall will extend below the culvert to prevent scouring under the culvert.
5. The bottom course of blocks shall be embedded into the drain bottom to achieve the desired top elevation of the wall.
6. Blocks shall extend from the pipe invert across the full height and width of the drain and be imbedded a minimum of 300mm into the drain banks. Where possible the top of the block wall will match the height of the completed driveway.
7. Blocks shall be placed such that all joints are staggered.
8. Any excavation voids on the ends of block walls below subsequent block layers shall be filled with 3/4" Clear Stone.
9. Where block walls extend beyond three blocks in height, they should be battered a minimum of 1 unit horizontal for every 10 units vertical throughout the wall's full height and width. This can be achieved using pre-battered base blocks, or by careful preparation of the base.
10. Filter cloth (270R or equivalent) should be placed behind the wall to prevent the migration of fill material through the joints.
11. The walls should be backfilled with a free draining granular fill.
12. A uni-axial geogrid (SG350 or equivalent) should be used to tie back the headwalls where walls extend beyond 1.8m in height.
13. The face of the block wall shall not extend beyond the end of the pipe culvert.
14. Any gaps between the blocks and culvert shall be sealed with non-shrink grout for the full depth of the block.

APPENDIX "REI-D"

NOT REQUIRED FOR THIS REPORT

APPENDIX "REI-E"

PLAN, PROFILE & DETAILS

OF THE

RICHMOND DRAIN

(5TH CONCESSION ROAD BANK STABILIZATION)

(Geographic Township of Colchester South)

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Road
GERARD ROOD, P.ENG.



ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

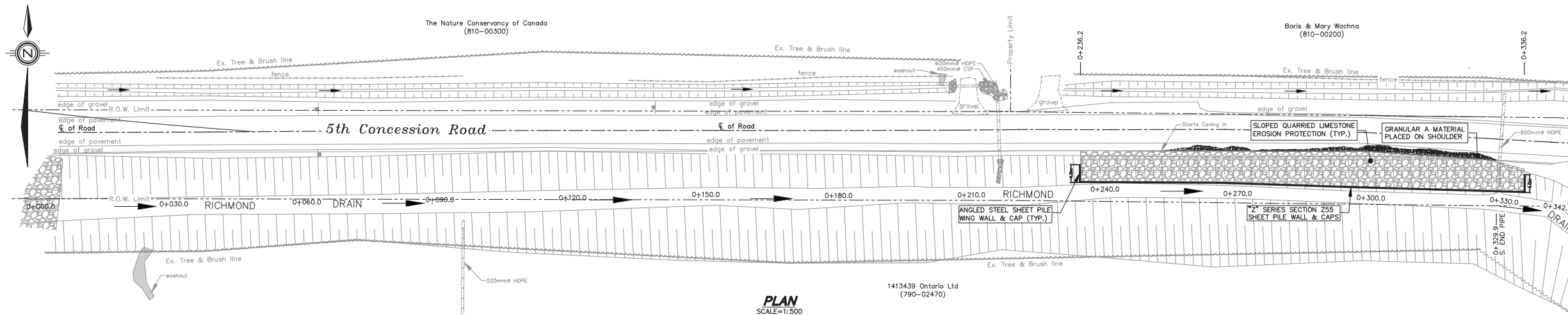
DATE: March 30th, 2020

TOWN OF ESSEX

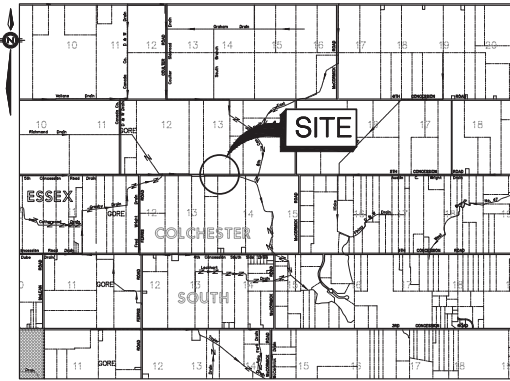
MAYOR: Larry Snively
CLERK: Robert Auger
DRAINAGE SUPERINTENDENT: Lindsay Dean

BENCHMARK:

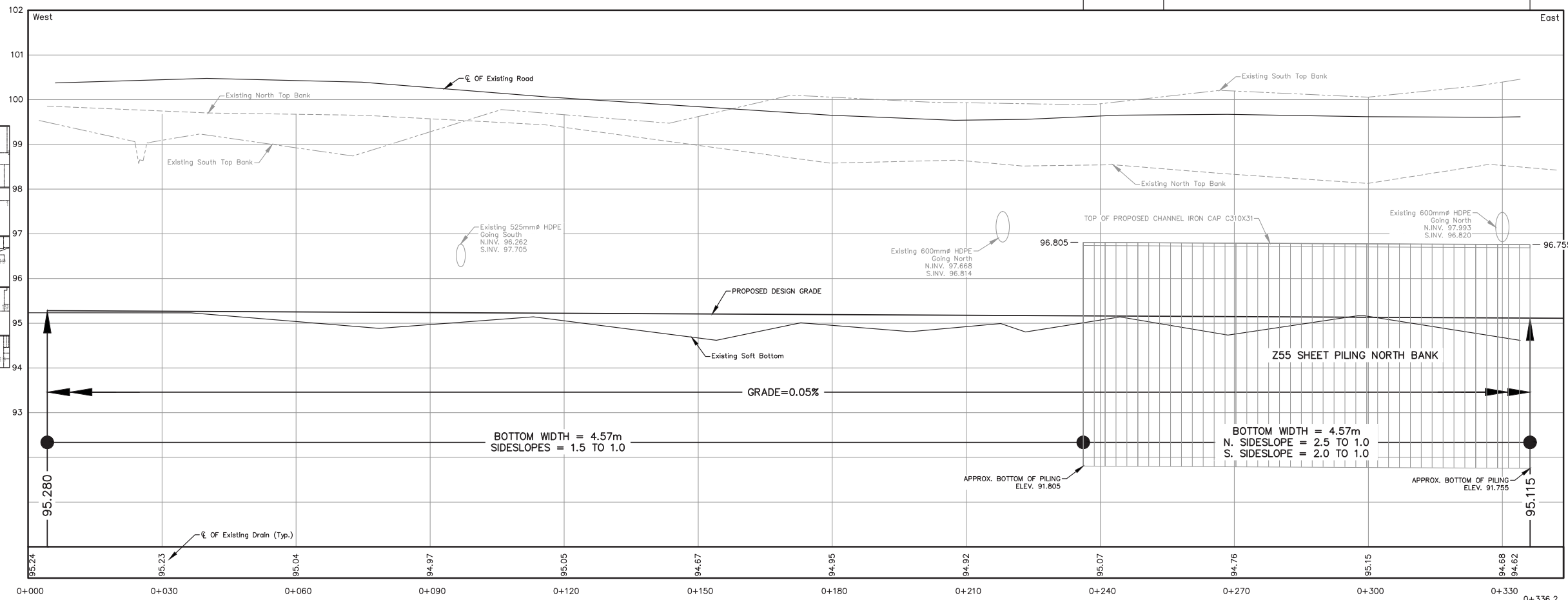
TOP WEST END OF NORTH CONCRETE CURB OF
ROADWAY BRIDGE OVER RICHMOND DRAIN AT
5TH CONCESSION ROAD JUST WEST OF SITE
ELEV. = 101.284 m



PLAN
SCALE=1:500



KEY PLAN
Scale = 1:50,000

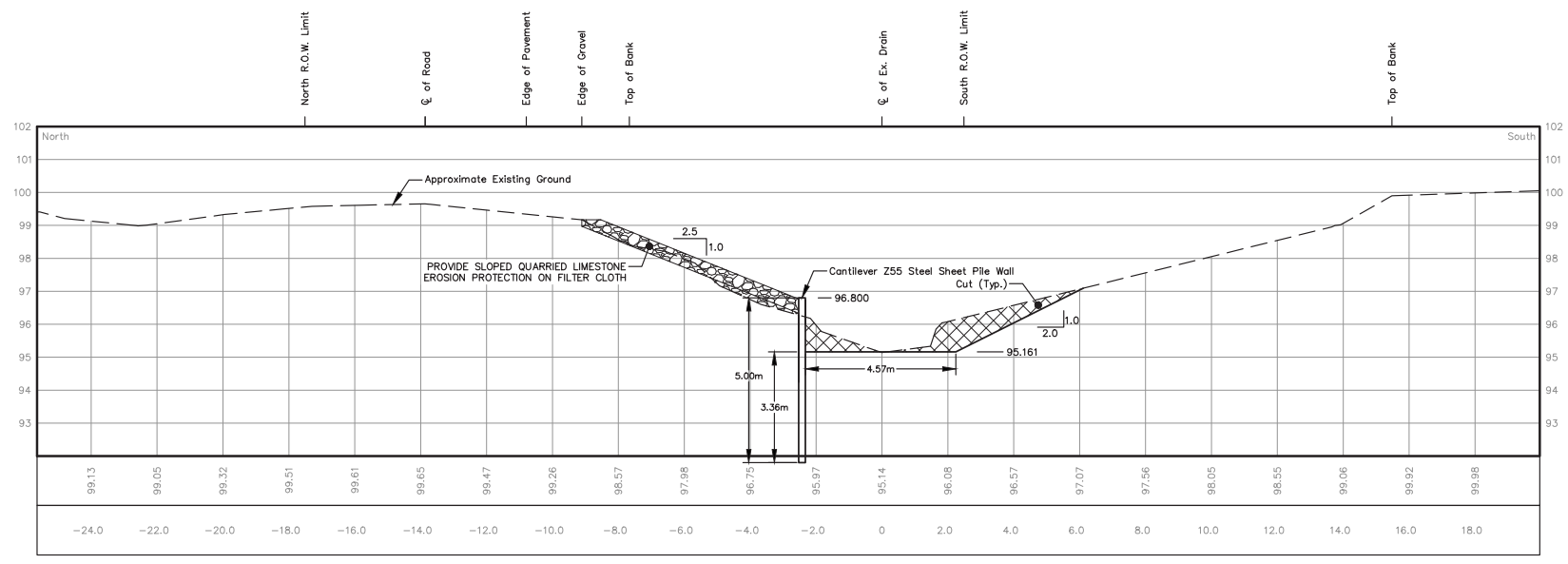


PROFILE
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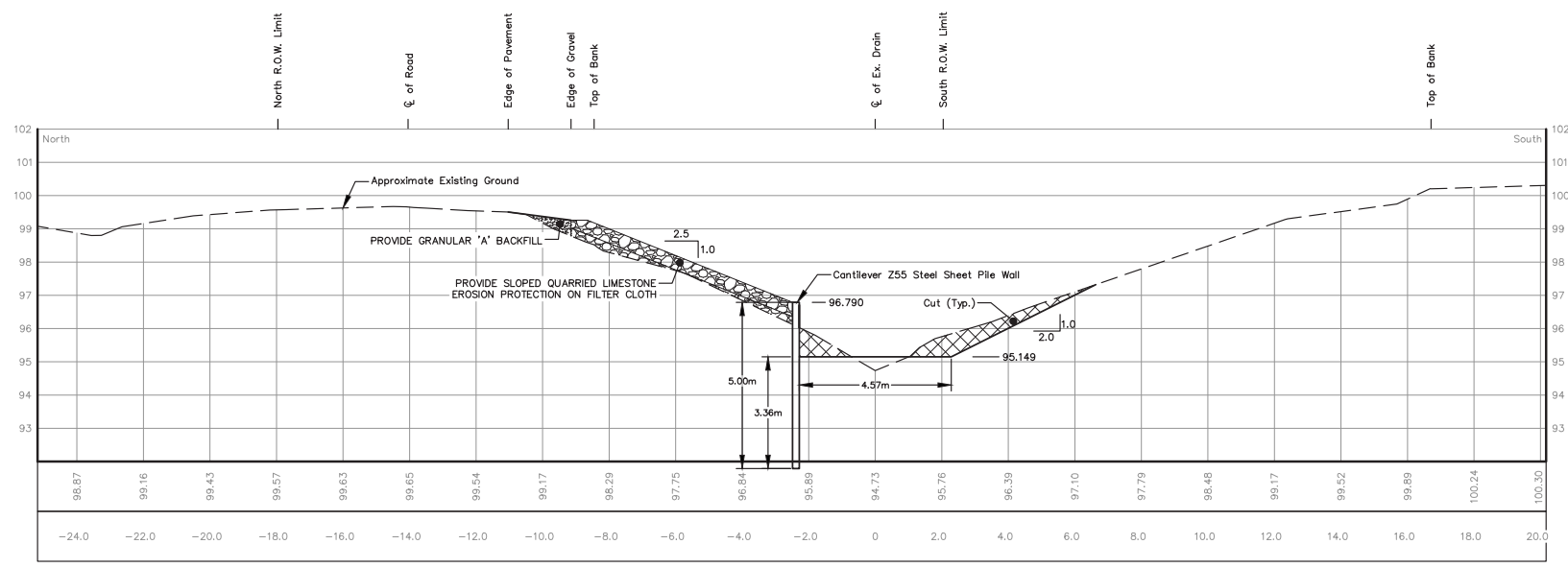
THESE PLANS HAVE BEEN REDUCED
AND THE SCALE THEREFORE VARIES.
FULL SCALE PLANS MAY BE VIEWED
AT THE MUNICIPAL OFFICE.

DRAWN BY: G.S. & K.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2016D016.DWG
FILE No.: REI2016D016 SHEET No.: 1 of 3

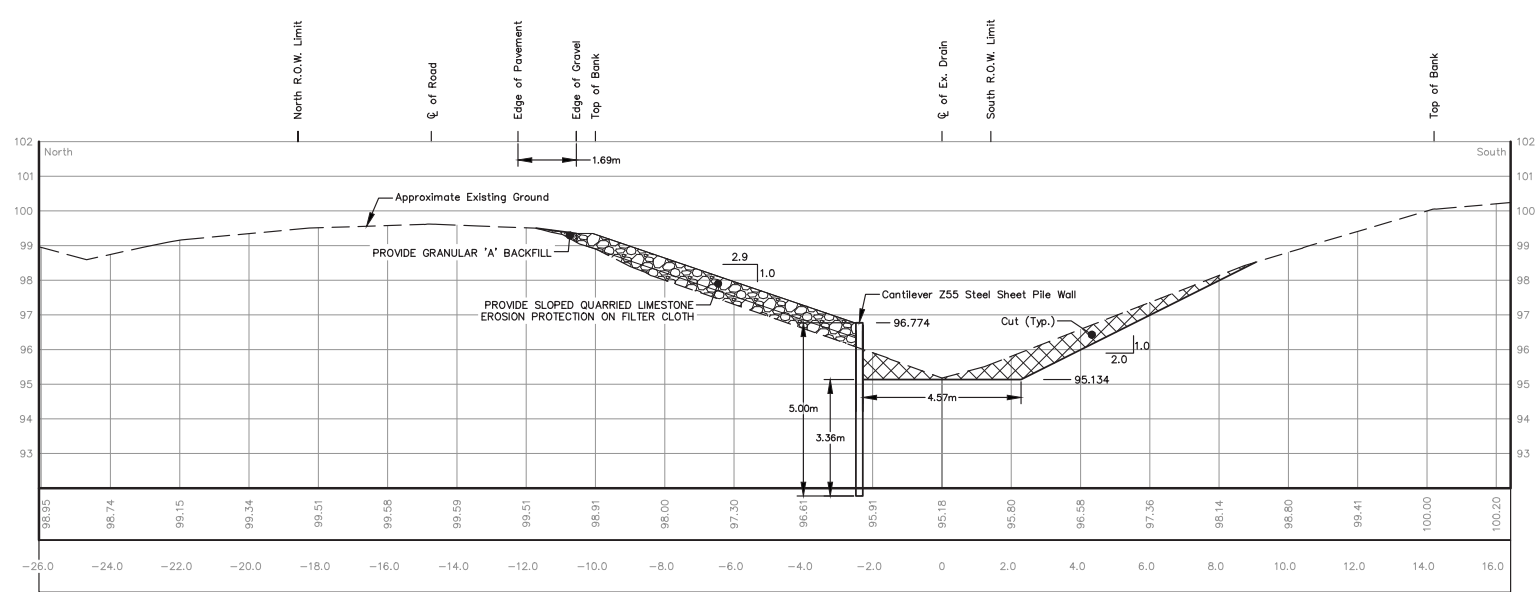
\\SERVER-2018\REI_Data_Serv\DRAWINGS\PROJECTS\2018\REI2016D016 - Richmond Drain (Site Con. Rd. Bank)\Veg\REI2016D016-30-2010.dwg 2020-03-28



STA 0+244.4
Scale = 1:100



STA 0+288.6
Scale = 1:100



STA 0+298.4
Scale = 1:100

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

