

SZAKACS DRAIN

Repair and Improvement

Geographic Township of Colchester South

TOWN OF ESSEX



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

Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

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REI Project 2016D004

October 20th, 2020

October 20th, 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:

SZAKACS DRAIN
Repair and Improvement
Geographic Twp. of Colchester South
Project REI2016D004
Town of Essex, County of Essex

I. INTRODUCTION

In accordance with the instructions confirmed by letter of December 14th, 2015 from the former Town Drainage Superintendent, Dan Boudreau, we have prepared the following report that provides for the repair and improvement of the Szakacs Drain. The Szakacs Drain is primarily a covered drain with a number of inlets commencing near the southeast corner of Lot 16 in the Gore Concession on the west side of Ridge Road between Gore Road and County Road 20, and the drain extends southerly and downstream through agricultural lands and outlets into the Dolson Creek Drain. The drain was constructed pursuant to the Drainage Act. A plan showing the Szakacs Drain alignment is included herein as part of the report.

Our appointment and the works related to the repair and improvement of the Szakacs Drain, proposed under this report, is in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010". We have performed all of the necessary survey, investigations, etcetera for the repair and improvement of the Szakacs Drain, and we report thereon as follows.

II. BACKGROUND

From our review of the Town's drainage files, we have determined that the Szakacs Drain was last repaired under an Engineer's Report dated July 30th, 1954 by C.G.R. Armstrong, P.Eng. The report consisted of the details to construct a new enclosed drain. We reviewed the report to establish the details of the previous work and the work needed to complete the repair and improvement of the drain.

We have utilized the plan and profile within the 1954 C.G.R. Armstrong report to establish the size parameters for the drain and the details to be used in establishing the enclosure installation. We have also used this Engineer's report to establish the drain profile grades, and to assist us in establishing the design grade for the subject covered drain installation.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the available drainage information and documentation found in the Town files, we arranged with Town staff to schedule an on-site meeting for February 29th, 2016. The following people were in attendance at said meeting: Don Huber, Jeremy Tingen, David Wright, John Welzel, Neal Huber, Allan Parks, Norm Nussio (Operations & Drainage Essex), Bill Caixeiro (Essex), and Gerard Rood (Rood Engineering).

Mr. Nussio did an introduction of the purpose of the meeting. The Town has been alerted to the need for repair and improvement of the drain. The drain is a covered system with catch basins located just east of Ferris Road and outletting to Dolson Creek Drain.

Neal Huber advised that Gary Zavaros approached him about drain problems and getting work done. Allan Parks advised that Gary Zavaros is the land renter. Gary has standing water and a broken tile in his farm. There are sink holes developing. John Welzel has water in the south east corner of his farm.

It was noted that the water flows faster since the outlet at the pond was cleaned. There is a headwall near the west side of the pond on the north bank. Norm Nussio stated that the tile is running steady since the work 2-3 months ago.

There are catch basins along the property line. The upstream catch basin is missing, and the locations of the others need to be investigated. Norm Nussio noted that there is not much cover on the drain, but they can repair the existing installation. Lowering the tile is hindered by the water levels in the ponds.

Allan Parks tried some new tile last year. The tile on MN 1485 (Quintigliani parcel) does not work at all. The east-west tile in the Quintigliani parcel runs, and they made some connections.

Jeremy Tingen stated that he does not want to share costs since the drain is not needed for his lands located near the outlet and that have other tile drains.

Neal Huber had Bob Chevalier out and he surveyed the farm. Neal Huber is looking to install tile. There is a private drain at the north side of the Zavaros property. Neal and Don Huber can provide maps once Bob Chevalier flies the site in about 2 weeks and completes plans.

Allan Parks suggested moving the drain east for more cover. Neal Huber may take more water to County Road 20 drains since he already has 80 acres going there.

All the owners would like to see a cost estimate before going ahead with any work.

The overall drainage report procedure, and future maintenance processes were generally reviewed with the owners. The owners were also advised that the works will be subject to the approval of the Department of Fisheries and Oceans (D.F.O.), the Ministry of Natural Resources and Forestry (M.N.R.F.), and the Essex Region Conservation Authority (E.R.C.A.).

IV. FIELD SURVEY AND INVESTIGATIONS

Following the on-site meeting we arranged for our survey crew to attend at the site and perform a topographic survey, including taking the necessary levels and details to establish the design parameters for the covered drain repair and improvement installation.

A bench mark was looped from previous work carried out on the drain and was utilized in establishing a correlation between the old report and new survey for the drain. We also took approximate water line shots of the pond along the north bank and using the probe marked the approximate location of the existing covered drain, as necessary for us to complete our design calculations, estimates and specifications.

A Ministry of Natural Resources and Forestry (M.N.R.F.) Species at Risk review of the Town agreement with M.N.R.F. pursuant to the “Endangered Species Act, 2007” was carried out for this project. We reviewed the E.R.C.A. and D.F.O. Species at Risk mapping for fish and mussels and the Town submitted a notification to E.R.C.A. for review and comment.

For the purposes of establishing the watershed area upstream of the proposed work, and determining the pipe size required, we investigated and reviewed the Engineer’s Report dated July 30th, 1954 as prepared by C.G.R. Armstrong, P.Eng. The report provided for the installation of the tile enclosure that is now called the Szakacs Drain that is to be repaired in our report and included a Schedule of Assessment.

V. FINDINGS AND RECOMMENDATIONS

Prior to the completion of our report, we reviewed the details of the covered drain repair and improvement installation including the regulatory restrictions and the cost estimates that we were to review and coordinated with the Town to meet with the owners to review same. As a result of all the Owners requesting cost estimates during the first on-site meeting before proceeding, another on-site meeting was scheduled on September 28th, 2020. The notice for the

meeting included a copy of the draft watershed plan and the draft assessment schedule for the project. The meeting was attended by the following people: John Welzel & Arlene Wade, Romano & Mary Quintigliani, Neal Huber, James and Denise Tingen, Norm Nussio (Manager Operations & Drainage), Lindsay Dean (Drainage Superintendent), Tanya Tuzlova (Drainage Clerk), Dan Boudreau (Drainage Board), Percy Dufour (Drainage Board), Felix Weigt-Bienzle (Drainage Board), and Gerard Rood (Rood Engineering).

Lindsay Dean introduced all attendees and outlined that the project was commenced in 2015 under Section 78 of the Drainage Act. She reminded everyone of the on-site meeting held in 2016 and explained that this current meeting was to discuss the estimated costs and gain input from the owners on how to proceed. Mr. Rood provided the background on the work done to date on the project. Mr. Nussio explained the past work and access to the drainage works for maintenance and confirmed to the Owners that notice would be sent out whenever future maintenance work and access is required. Project costs to date were discussed. Many landowners expressed opposition to making any improvements to the drain at this time. Ms. Dean explained that the report can proceed so that future repairs and maintenance can be completed when required, or there is an option to abandon the proposed works through a Section 40 drainage report. In terms of grants, the preparation of a Section 40 report would not be eligible for grant. O.M.A.F.R.A. will need to be consulted if the landowners choose to proceed with the preparation of a Section 78 report without completion of construction to determine if grants will apply. In response to a question from Mrs. Quintigliani, it was confirmed that 1/3 grants will be applied for to reduce the total assessment for lands that have the Farm Property Tax Class designation. Life expectancy of the repaired and improved drain was discussed, and Owners were advised that assessment costs can be debentured for 5 years. Town responsibility and liability for the drainage works pursuant to the Drainage Act was discussed. Mr. Nussio confirmed to the Owners that the drain is a Municipal drain created pursuant to the Drainage Act over 60 years ago.

Mr. Huber advised everyone that the drainage of his lands has been modified to take all waters northerly pursuant to a Section 65 Drainage Report that was completed, and the drainage works have been done to divert all flows from his land northerly. Mr. Rood confirmed that his lands would not be assessed in the current drainage report based on the drainage changes that have been made and that only those parcels that direct flows to the Szakacs Drain and benefit from the proposed works will be assessed.

Ms. Dean explained that the report values are only estimates and that the Town tenders out all projects to get the best possible price for completing the works. Final assessments to each of the affected lands will be based on the actual total cost for completion of the drainage report and construction of the works. Mr. Nussio discussed that the timeline for the works would likely be construction in the latter part of next year with invoices going out the following year. It was confirmed by Mr. Rood that the ponds will not be part of the drainage works.

Timing for the project drainage report and construction was discussed in detail. Details of the covered drain repair and improvement were discussed. Ms. Dean reminded the Owners that if they have questions on their share of the cost, they may appeal to the Court of Revision for adjustments. The final consensus was to proceed with the drainage report preparation and that the Town would coordinate the construction schedule in consultation with the Owners at a later date when required or requested by the landowners. O.M.A.F.R.A. will be consulted to determine if the report will be eligible for grant without the construction component. Ms. Dean reminded the Owners that they can contact the Drainage Department or the Engineer if they have any questions on the project. She confirmed that a copy of the drainage report would be sent out to each of the affected owners with the Notice for the Consideration meeting.

Through our investigations, it was determined that a completely new pipe installation option was the most cost effective and we have proceeded with this option, as discussed at the on-site meetings. The pipe sizing is based on minimum conveyance of a 1:2 year storm event corresponding to the capacity of existing pipes in the drainage system.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owners, we would recommend that a new replacement covered drain be constructed for the Szakacs Drain at the location and to the general parameters as established in our design drawings attached herein. Work will include catch basin maintenance holes and connections of existing pipes outletting to the drainage works along with ancillary works.

During the course of our investigations, this drainage project was discussed and reviewed with E.R.C.A., to deal with any Authority issues and comments related to this Municipal drain. To prevent flooding and adverse impacts upstream, the new structure needs to provide an equivalent level of service to the adjacent structures. This project will not require any access bridges but it is located within the Regulated Area and is under the jurisdiction of the E.R.C.A., and therefore all work has to comply with the current mitigation provisions of the E.R.C.A. Details of these mitigation measures are included in the Specifications and **Appendix “REI-A”** forming part of this report.

As part of our investigations, a D.F.O. self screening assessment of the project was carried out. The mapping indicated no species at risk or critical habitat for the area of the covered drain work. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be embedded below the design or existing bottom of the drain a minimum of 10% of the bridge opening height to ensure a continued path for fish migration through the access bridge, but this will not be applicable to this project. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels identified in this area. Should any species be encountered, details of required mitigation measures are included in the Specifications and **Appendix “REI-A”** forming part of this report.

As is now required under the new Endangered Species Act, 2007 Provincial Legislation administered by the Ministry of Environment, Conservation & Parks (M.E.C.P.), we have reviewed the former M.N.R.F. agreement with the Town. The M.N.R.F. mapping has basically confirmed that there are no foreseen impacts to natural heritage features or endangered or threatened species on this project; therefore, a permit or agreement under the E.S.A. 2007 is not necessary at this time. Because turtles and snakes are mobile and snakes are indicated as sensitive in the area, we have included herein a copy of the M.N.R.F. mitigation requirements for them in **Appendix “REI-B”**.

Providing mitigation requirements are implemented it was concluded that present wildlife Species at Risk will be protected from negative impacts and will not contravene with Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007. Based on this information we find that the Town can proceed with the eligible replacement construction of the drain as they are exempt under Sections 9 and 10 of the Act, provided that they follow the rules within Ontario Regulation 242/08. To address these requirements the Town has established comprehensive mitigation measures as well as species identification guides for reference. Copies of the measures and guides are available for viewing by any interested parties at the Town office.

Based on all of the above, we recommend that a new replacement covered drain be constructed for the Szakacs Drain, in the geographic township of Colchester South. We further recommend that all work shall be done in accordance with this report, the attached specifications and the accompanying drawings, and that all works associated with same be carried out in accordance with Section 78 of the “Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010”.

VI. ALLOWANCES

We have provided that all of the work will generally be completed along the length of the covered drain, including access from Ferriss Road easterly to the drain along the north limit of the Quintigliani Parcel 690-02800. The Contractor will be required to restore any existing grassed buffer and driveway areas damaged by the work. Based on all of the above we find that allowances for damages are payable pursuant to Sections 29 and 30 of the Drainage Act.

We find that the provision of access along the drain for construction and loading, hauling, and disposal of deleterious materials requires payment for the land necessary to carry out same. We therefore recommend that the following owners be compensated for all work areas that will be impacted, including for the access to the drain and for damages to lands and crops, if any, as follows, namely:

1)	John Welzel, (690-00800),	Owner,	Part of Lot 16, Gore Concession,	\$	100.00
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2)	Romano Quintigliani, (690-02800),	Owner,	Part of Lot 16, Gore Concession,	\$	1,063.00
3)	Gustav Zavaros, (690-02900),	Owner,	Part of Lot 16 & 17, Gore Concession,	\$	996.00
4)	James Tingen, (690-00500)	Owner,	Part of Lot 16, Gore Concession	\$	148.00
TOTAL FOR ALLOWANCES AND DAMAGES					\$ 2,307.00

These values for allowances and damages are based on a strip of land parallel to and immediately along the drain for the parcels along the length of the Municipal drain and the access from Ferriss Road and are based on a value of \$1,225.00 per acre (\$3,027.00 per hectare) for the affected lands and crops, if any. These allowances provide for a working width of 8.0 metres and are calculated using a rate per acre of \$700.00 for year one, \$350.00 for year two and \$175.00 for the third year. The impact after 3 years is considered negligible.

We have provided for this in our estimate as is provided for under Sections 29 and 30 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010".

VII. ESTIMATE OF COST

Our estimate of the total cost of this work including all incidental expenses is the sum of **NINETY THREE THOUSAND DOLLARS (\$93,000.00)**, made up as follows:

CONSTRUCTION

- Item 1) **Outlet to CBMH-1**; Provide all labour, equipment and material to construct a replacement covered drain consisting of approximately 190 metres (623.4 ft.) of 300mm diameter, 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe including wrap couplers; connections, bedding, backfill, excavation, compaction, cleanup, and restoration, complete at \$77.00 per metre.
- \$ 14,630.00

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|---------|---|--------------|
| Item 2) | <u>CBMH-1 to CBMH-2</u> ; Provide all labour, equipment and material to construct a replacement covered drain consisting of approximately <u>280</u> metres (918.6 ft.) of 300mm diameter, 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe including wrap couplers; connections, bedding, backfill, excavation, compaction, cleanup, and restoration, complete at <u>\$77.00</u> per metre. | \$ 21,560.00 |
| Item 3) | <u>CBMH-2 to CBMH-3</u> ; Provide all labour, equipment and material to construct a replacement covered drain consisting of approximately <u>51</u> metres (167.3 ft.) of 300mm diameter, 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe including wrap couplers; connections, bedding, backfill, excavation, compaction, cleanup, and restoration, complete at <u>\$77.00</u> per metre. | \$ 3,927.00 |
| Item 4) | <u>CBMH-3 to CBMH-4</u> ; Provide all labour, equipment and material to construct a replacement covered drain consisting of approximately <u>85</u> metres (278.9 ft.) of 300mm diameter, 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe including wrap couplers; connections, bedding, backfill, excavation, compaction, cleanup, and restoration, complete at <u>\$77.00</u> per metre. | \$ 6,545.00 |
| Item 5) | <u>CBMH-4 to CBMH-5</u> ; Provide all labour, equipment and material to construct a replacement covered drain consisting of approximately <u>35</u> metres (114.8 ft.) of 300mm diameter, 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe including wrap couplers; connections, bedding, backfill, excavation, compaction, cleanup, and restoration, complete at <u>\$95.00</u> per metre. | \$ 3,325.00 |
| Item 6) | <u>Catch Basin Maintenance Holes 1, 2, 3, 4 & 5</u> ; supply and install 600mm X 600mm precast concrete units, 1.8m deep, with 600mm square cast iron frames and grates, including adjustment units, excavation, disposal, bedding, connections, 450mm sump, backfill, compaction and restoration, complete, approximately <u>5</u> units at <u>\$ 2,380.00</u> each. | \$ 11,900.00 |
| Item 7) | <u>Offset Catch Basins 1 & 2</u> ; supply and install 600mm X 600mm precast concrete units, 1.2m deep, with 600mm square cast iron frames and grates, including adjustment units, | |

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	excavation, disposal, bedding, connections, 450mm sump, with 200mm diameter pipe and fittings; backfill, compaction and restoration, complete, approximately <u>2</u> units at <u>\$1,815.00</u> each.	\$	3,630.00
Item 8)	<u>Outlet Protection at Station 1+640.8</u> ; supply and install quarried limestone on non-woven filter cloth erosion protection including all excavation, supply, placing, cleanup, and restoration, complete:		
	(i) Supply and place quarried limestone rock protection, approximately <u>6.0</u> tonnes at <u>\$55.00</u> per tonne	\$	330.00
	(ii) Supply and place non-woven filter cloth as underlay for rock protection, approximately <u>12.0</u> square metres at <u>\$5.00</u> per square metre	\$	60.00
Item 9)	<u>Final Cleanup and Restoration</u> ; provide all equipment and materials to completely clean up and carry out final restoration of the project site. Lump Sum	\$	2,000.00
	Net H.S.T. (1.76%) on construction	\$	1,195.00
TOTAL FOR CONSTRUCTION		\$	69,102.00

INCIDENTALS

1)	Report, Estimate, and Specifications	\$	5,500.00
2)	Survey, Assistants, Expenses, Drawings, Consideration Meeting, etc.	\$	7,500.00
3)	Estimated Cost of Duplicating Drawings and Report	\$	800.00
4)	Estimated Cost of Preparing Tender Documents	\$	1,200.00
5)	Estimated Cost of Construction Supervision and Inspection (based on 4 days)	\$	5,120.00

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6) Net H.S.T. (1.76%) on Items Above	\$	360.00
7) Estimated Cost of E.R.C.A. permit	\$	500.00
8) Estimated Contingency Allowance	\$	611.00
TOTAL FOR INCIDENTALS	\$	21,591.00
TOTAL FOR ALLOWANCES (brought forward)	\$	2,307.00
TOTAL FOR CONSTRUCTION (brought forward)	\$	69,102.00
TOTAL ESTIMATE	\$	93,000.00

VIII. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of this drain replacement. The design drawings show the subject drain location and the details of the covered drain installation and ancillary work. The design drawings are attached to the back of this report and are labelled **Appendix “REI-E”**.

Also attached, we have prepared Specifications which set out the required construction details for the proposed covered drain replacement installation, which also includes Standard Specifications within **Appendix “REI-C”**.

IX. CONSTRUCTION SCHEDULE OF ASSESSMENT

We would recommend that all of the costs associated with the construction of this drain enclosure, and the preparation of this Engineer’s report, be assessed against the lands of the owners as set out in the attached assessment schedule. A Schedule of Assessment has been prepared and included herein to indicate the lands assessed for the new replacement covered drain installation.

X. FUTURE MAINTENANCE

After the completion of the construction of this covered drain replacement, all of same shall be maintained in the future by the Town of Essex as part of the drainage works.

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Furthermore, if any maintenance work is required to the covered drain system in the future, we recommend that the costs be assessed as set out in the assessment schedule on a pro-rata basis.

The above provisions for the future maintenance and assessment of this new replacement covered drain, being constructed under this report, shall remain as aforesaid until otherwise determined 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.



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att.

ROOD ENGINEERING INC.

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9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT**SZAKACS DRAIN****Repair and Improvement****TOWN OF ESSEX****5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):**

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
690-00800	Gore	16	1.50	0.607	John Welzel	\$ 3,690.00	\$ 1,962.00	\$ -	\$ 5,652.00
690-00900	Gore	16	12.00	4.856	John Welzel & Arlene Wade	\$ 7,907.00	\$ 15,698.00	\$ -	\$ 23,605.00
690-02800	Gore	16	25.00	10.117	Romano & Mary Quintigliani	\$ 13,178.00	\$ 22,958.00	\$ -	\$ 36,136.00
690-02900	Gore	16 & 17	10.00	4.047	Gustav Zavaros	\$ 18,449.00	\$ 9,158.00	\$ -	\$ 27,607.00
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 43,224.00	\$ 49,776.00	\$ -	\$ 93,000.00
TOTAL ASSESSMENT						\$ 43,224.00	\$ 49,776.00	\$ -	\$ 93,000.00

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1 Hectare = 2.471 Acres
 Project No. REI2016D004
 October 20th, 2020

SPECIFICATIONS**SZAKACS DRAIN****Repair and Improvement****Geographic Township of Colchester South****TOWN OF ESSEX****I. GENERAL SCOPE OF WORK**

The Contractor shall provide all material, labour, and equipment to construct a replacement covered drainage system for the Szakacs Drain comprising 320 kPa smooth wall H.D.P.E. plastic pipe, with catch basin maintenance holes and offset catch basins with connections. The replacement covered drain shall be constructed so that it extends from the north end of the existing drain southerly to its outlet in the Dolson Creek Drain following the existing centreline of the covered drain. This location shall be the exact designated location of this covered drain. Any changes to the location of the new drain must be approved in writing by the Engineer. The general layout of the drain and other ancillary work shall be provided as shown and detailed in the accompanying drawings attached within **Appendix "REI-E"**. A Benchmark has been set near the proposed enclosure so that the same can be utilized for the setting of the new pipe invert grades. The **Benchmark** is described in the detail plans for the covered drain pipe installation along with its elevation.

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

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. The standard mitigation response received from E.R.C.A. shall be followed and a copy of same is included within **Appendix "REI-A"**. The Contractor shall ensure that sediment and erosion control provisions, set out further in these specifications and in **Appendix "REI-A"**, are followed. Work shall be scheduled so that it can be completed in the dry and when there is no risk of a rain event that might exceed the capacity of the water control system that the Contractor employs. Any damming of the drain will be done on the upstream side in accordance with the provisions set out in **Appendix "REI-A"**.

The Contractor is to review **Appendix "REI-A"** in detail and is required to comply in all regards with the contents of said E.R.C.A. and D.F.O. measures, and follow the special requirements therein included during construction.

III. M.N.R.F. CONSIDERATIONS

The Contractor is to note that this project has gone through 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" former agreement with the Town. Snake species including Butler's Garter Snake and Eastern Foxsnake are indicated to be threatened and endangered respectively on the agreement plans for this site. In addition, turtles along with the snakes are considered sensitive to the area and are mobile. Schedule 'C' of the agreement has provisions to protect them and mitigate any impacts. A copy of the agreement mitigation are included within **Appendix "REI-B"**.

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"

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(E.S.A.) now administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. 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.-M.E.C.P. 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.-M.E.C.P. staff in the handling of the species.

IV. COVERED DRAIN CONSTRUCTION

The Contractor shall provide all material, labour, and equipment to remove and dispose of the existing covered drain and catch basins along the alignment of the replacement covered drain, as shown and noted in the drawings. The Contractor shall supply and install new 320 kPa high density polyethylene (H.D.P.E.) Big “O” Boss 2000 wrap coupler soil tight pipe, extending from the proposed catch basin maintenance hole #1 (C.B.M.H.-1) to the outlet into the Dolson Creek Drain.

The Contractor shall also note that the placing of the new H.D.P.E. pipe is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent and Engineer. The new plastic pipe shall be set to the grades as noted and as shown and detailed on the plans with special care to match the inverts of the pipe to the structures at each end of each pipe run.

The installation of the complete length of the new H.D.P.E. pipe, including all appurtenances, shall be completely inspected by the Town Drainage Superintendent or Engineer prior to backfilling any portions of same. Under no circumstance shall the Contractor backfill same until the Town Drainage Superintendent or Engineer inspects and approves said pipe installation.

Once the new smooth wall H.D.P.E. pipe has been satisfactorily set in place, the Contractor shall completely backfill the drain pipe with select native material, thoroughly compacted around the pipe to ensure that there is minimal settlement upon completion of the work. The backfilling of the smooth wall H.D.P.E. plastic pipe, unless otherwise specified herein, shall be provided in total compliance with Item 3) and Item 4) of the **“Standard Specifications for Access Bridge Construction Including Endwall Treatment, Backfilling, and Installation Procedures”**. 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) in the **“Standard Specifications”** in said Appendix.

Along the length of the covered drain, the Contractor shall supply and install precast concrete catch basin maintenance holes as outlined on the plans and as set out in the Schedule of Items and Prices, along with the required offset catch basins and connections. Each precast concrete unit shall conform to the sizes and depths indicated on the plans and in the Schedule of Items. The catch basin maintenance holes that are 600mm X 600mm in size shall be fitted with cast iron frames and grates. All catch basin maintenance holes shall include a minimum 450mm deep sump

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and be fitted with cast iron frames and grates and lift rings as outlined on the plans and in the Schedule of Items and Prices. The Contractor shall note that all concrete units shall be fitted with a minimum of three and a maximum of six High Density Poly Ethylene (H.D.P.E.) lift rings, secured in place in accordance with the manufacturer's recommendations. Catch basin tops shall generally be set 50mm below the adjacent ground elevation and be graded to ensure positive drainage and that all flows will enter the top of the unit.

The Contractor shall connect all covered drains to the concrete units with the use of a mortar joint. Said mortar joint shall be provided at the exterior of the concrete unit walls for the full circumference of the covered drain and be of a sufficient mass to produce a sealed joint, all to be performed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer. All grout for the mortar joint shall be provided in unopened pre-mixed bags or shall comprise of 3 parts of clean sharp sand to 1 part Portland cement with just sufficient water added to provide a stiff plastic mix. Where possible, the Contractor shall employ a standard factory fitting or adapter to connect between the various units, pipes, and tiles. For offset catch basins being connected directly to the improved mainline covered drain in the future, the Contractor shall make the connection with the use of an Inserta-Tee fitting. The Inserta-Tee shall be installed by coring a properly sized hole in the side of the H.D.P.E. pipe and securing the fitting into the mainline pipe wall in accordance with the manufacturer's recommendations.

The Contractor, as part of this project, is to connect all existing drain connections into the new covered drainage system unless the pipe is noted to be abandoned and plugged off. In the event that a lateral drain pipe is being abandoned, the plug shall comprise a minimum 305mm (12 in.) long concrete grout plug, securely packed into the end of the abandoned pipe for the full internal diameter of the pipe or be a manufactured cap designed for the purpose. The connection of the existing tile drains and the entire installation of the new covered drain shall be performed to the full satisfaction of the Town Drainage Superintendent and the Engineer.

The alignment of drains throughout shall be to the full satisfaction of the Town Drainage Superintendent and the Engineer. The whole of the work shall be done in a neat, thorough, and workmanlike manner to the full satisfaction of the Town Drainage Superintendent and the Engineer.

The Contractor shall lay the covered drain to the lines, levels and grades as shown in the accompanying drawings or as may be otherwise laid out and established by the Engineer prior to the time of construction. The Contractor will be held responsible for said lines, levels, and grades of the drain pipe. Should the Engineer determine that the Contractor has not satisfactorily adhered to such lines, levels, and grades, the Engineer may direct the Contractor to take up and relay any portion of the drain which does not conform to such lines, levels, and grades.

A laser beam shall be used to maintain line and grade and the Contractor shall have a qualified operator to set up and operate the equipment.

The Contractor should note that, because the covered drain is being installed with an excavator, it is expected that they will provide approximately 100mm (4") of either granular material or 20mm (3/4") clear stone bedding throughout the length of this drain pipe to ensure that a good firm base is provided under the drain pipe, and they shall provide for this item as part of their tender price.

All materials shall be stored and handled by the Contractor at its own expense. It shall be responsible for the safe storage of all materials, for obtaining storage area, for the safe transportation and distribution of all the materials at the job site, and for inspection in order to

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determine defects and breakage. No additional recompense will be allowed the Contractor for any loss incurred by it in the storage and handling of the materials.

Pipe, fittings, and all accessory appurtenances must be loaded and unloaded by lifting with means of a hoist or utilizing a skid so as to avoid shock or damage. Under no circumstances shall any pipe material or materials for pipe appurtenances be dropped.

Pipes shall be laid in trenches in the general location shown on the accompanying drawings or as may be specifically directed and laid out by the Engineer at the time of construction. The trench shall be located to clear all existing utilities and structures above, on, or below the ground level. The Contractor will be responsible at all times for complete investigation to determine the location of all such utilities or structures known or unknown, and it shall indemnify and save harmless the Engineer and the Municipality for any responsibility, injury, or liability arising from and damage to such utilities or structures by the Contractor.

The Contractor shall further contact or notify such utility company or commission of its intention to carry out work in the area and co-operate with such utility company or commission in the location, maintenance, and preservation of all such utilities. The Contractor shall note that if the trench passes in close proximity to hydro poles, it shall temporarily brace or secure such poles as it deems necessary to prevent any damage to the utility. The location of the pipes and appurtenances as shown on the drawings is approximate and may be changed by the Engineer if deemed advantageous for the progress of the work.

The trenches are to be excavated where directed. If any part of the bottom of the trench is found to be unsound or in any way unsuitable to lay the pipe in the Town Drainage Superintendent's or the Engineer's opinion, they may direct that the location of said trench be changed if it is possible to avoid unsound soil by doing so. The Contractor shall note that exploratory digs may be required by it to establish the depth of water services, particularly along the deepest portions of the proposed Municipal drainage system. The covered drain should clear all service connections that have been provided to the private lands, but the Contractor shall take steps to ensure that these are protected from any damage during the course of its works particularly where those service connections are shallow and may be just below the covered drain invert level. Where water services are impacted by the covered drain installation, the Contractor shall coordinate its lowering operations with the Town Water Department and ensure that all of their requirements are met, including notice to any Owners who may be affected by temporary shutdown of the water supply.

Should the Contractor discover any utility conflicts with existing utilities during the course of the work, that requires the relocation of same as established by the Engineer, the Contractor shall give that utility the opportunity to make any adjustments to their services if required, which work shall be done by the utility at the expense of the utility pursuant to Section 26 of the Drainage Act. The Contractor shall note that any water services that are to be lowered by them shall be done on a time and material basis. The Contractor shall provide all couplings, fittings, and pipe necessary to carry out any lowering of the water services to the individual properties. All work shall be carried out in accordance with the Town Water Department requirements for same and shall be completed to their full satisfaction including utilization of proper materials and disinfection procedures to ensure that no contamination of the existing water system will occur and there shall be no leaks.

All excavation shall be made in compliance with the drawings and in such a manner and at such depths and widths as will give ample room for installing the pipe, the bracing, sheeting, or otherwise supporting the sides of the excavation and for the pumping of ground water if

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encountered. The Contractor is fully responsible for the safety of all its people and equipment and must conform completely to the provisions of the "Construction Safety Act".

The bottoms of the trenches must be carefully excavated and trimmed to the elevation and shape of the bottom of the pipe. The bottom of each trench shall be recessed to receive the pipe in order to allow the pipe to be uniformly supported on firm undisturbed earth or compacted bedding for its entire length. Corrections in depth of excavation caused by the Contractor excavating to an extent greater than that required for the elevation of the pipe shall be made by bedding the pipe with granular material 20mm (3/4") clear stone placed at the time that the pipes are being installed.

The trenches shall be excavated to the depths given by the Engineer and only as far in advance of the pipe installation as permitted by the said Engineer or the Town Drainage Superintendent.

If any part of the bottom of the trench is found to be unsound or in any way unsuitable in the Town Drainage Superintendent's or the Consulting Engineer's opinion to lay drain pipe, the Contractor shall remove as much material as may be required and shall replace same with sufficient approved granular material 20mm (3/4") clear stone to form a sound bed for the pipe. The Contractor shall be paid an extra for such additional excavation and for supplying and placing of the granular material in place of unsound soil as per the unit price established for same in the Form of Tender.

No extras will be allowed for excavating any hardpan, boulders, rocks, cobbles, ice, or other obstacles found in the excavation or in the line of the trench or for any pumping or bailing of water required in the execution of the work. The trench must be drained or pumped in order to avoid the necessity of making joints under water. The trench must also be drained to avoid any possibility of ground water entering the pipe in the trench until the installation has been successfully completed.

The Contractor shall be responsible for the safe and proper handling of the pipe and shall inspect all pipes to ensure that no cracks, chips, or defects exist in the pipe prior to placing the pipe in the drain line. Should the Contractor permit damaged pipe or materials to be installed in the drain, it shall be responsible for the removal and replacement of same at its own expense should the Engineer require such removal and replacement.

If the drain pipe is laid in freezing weather, the Contractor shall take all the necessary precautions to prevent damage to the pipe or to any of the materials used in the construction of the work. In addition, the Contractor shall take care that no frozen ground or backfill is placed in the trench backfilling adjacent to the drain pipe.

All drain pipes and the various other materials used in the placing of said pipe shall be installed in strict compliance with the manufacturer's recommendations.

The Contractor shall also be required, as part of the drain pipe installation, to satisfactorily connect all intercepted tiles or pipes into the new covered drain. When intercepted tiles or pipes are to be connected, the Contractor shall be required to neatly cut the pipe walls with either a hole saw, concrete saw or welding torch where applicable, and connect the existing tiles or pipes to the new covered drain with a mortar joint or where possible, a plastic connecting adapter. The Contractor shall provide all of the above equipment and materials required to connect all intercepted tiles or pipes at no extra cost to the project, and all of same shall be performed to the full satisfaction of the Town Drainage Superintendent or the Engineer and shall not be backfilled until it is inspected by them.

Backfill for the drain pipe shall be in accordance with the specifications noted previously. In any driveway entrance areas, the Contractor shall provide all granular backfill comprising Granular “B”, compacted to 98% S.P.D. to within 300mm of the underside of any existing driveway. The top 300mm of the granular backfill shall comprise Granular “A” compacted to 100% S.P.D. If the driveways have asphalt surfaces in the future, the top of the trench shall be completed with a minimum 90mm thick lift of hot mix HL-4 asphalt or to match the existing asphalt thickness, in maximum 50mm thick lifts. All asphalt shall be carefully placed and compacted in place with rollers or plate tampers to achieve 92% to 96% of maximum relative density in accordance with O.P.S.S. 310. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the covered drain. To ensure that no damage is caused to the proposed drain pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work.

The Contractor shall note that during future maintenance it will also be required to cut across any asphalt and concrete that may be intercepted by the covered drain work. Said areas shall also be restored utilizing hot mix asphalt or concrete placed in accordance with the requirements established previously in these specifications.

The Contractor shall take steps to protect all legal survey bars and markers during the course of its work. If any bars are removed or damaged, the Contractor shall arrange for a legal surveyor to replace same, all at its cost.

All of the work towards the construction of the covered drain shall be performed in a neat and workmanlike manner and the general site shall be restored to its original condition, and all of same is to be performed to the full satisfaction of the Town Drainage Superintendent and Engineer.

The Contractor will be required to provide topsoil and sod or seed and mulch all areas along the length of the new covered drain installation and areas where the old pipe has been removed that had a grass cover. Outside of the roadway limits the topsoil shall consist of good clean, dry loam, fine graded and compacted in place and ready for sodding or seeding and mulching in accordance with O.P.S.S. Form 802. The seeding and mulching operation shall be carried out according to O.P.S.S. Form 804 and all of this work is to be performed to the full satisfaction of the Town Drainage Superintendent and Engineer.

V. RESTORING SWALES AND FURROWS

The Contractor shall provide all labour, material, and equipment, in order to restore the swale drains and furrows to the lines, levels, and grades that existed prior to disturbance by the construction. The centreline of swales and furrows finished grade elevation and the finished cross section at various locations along the length of the drain are to match the adjacent and original portions of same. The Contractor shall be required to strictly adhere to this swale and furrow design unless otherwise directed and approved by the Engineer on the project. The drawings include the approximate location of the swales and furrows along the new covered drain pipe along the length of the drain. The Contractor shall adhere to same unless otherwise directed by the Town Drainage Superintendent or the Engineer.

The swale or furrow shall generally be constructed with a V-section, having minimum 4 horizontal to 1 vertical side slopes. All swales and furrows shall be graded to ensure positive flow of the surface drainage from the existing ones into the top of any catch basins that act as outlets for the particular swale or furrow section. All materials excavated from the swale or furrow, except

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scavenged topsoil, including all deleterious materials shall be loaded up and hauled away and disposed of by the Contractor to a site to be obtained by it at its own expense.

All grassed swales and boulevard areas are to be completely restored with topsoil, seed, and mulch. Where required by the work, all disturbed and newly filled areas and surfaces of newly graded shallow swales shall be covered with approximately 50mm of topsoil fine graded. Across all other grass boulevard areas, the swale and drain banks shall be restored by utilizing a seed and mulch mix and shall be thoroughly restored to their pre-construction conditions. The placing and grading of all topsoil and seeding shall be carefully and meticulously carried out according to the specifications above. The Contractor shall provide watering of sod and seed areas in accordance with O.P.S.S. requirements. As part of the work, the Contractor must provide a full one (1) year guarantee on all sod, seeding, and mulching work, and will be required to repair all areas that erode or where the grass cover fails to catch. All work shall be meticulously done and completed in a good and workmanlike fashion to the full satisfaction of the Town Drainage Superintendent or the Engineer.

VI. ANCILLARY WORK

As part of the work, the Contractor shall ensure that all of the grouted connections for the new H.D.P.E. plastic pipe are grouted solidly and securely to the proposed concrete structures. The grout connection must be solid and thick enough to resist any head pressure build up and prevent leaking and washout of the pipe or surrounding soils. It is anticipated that a fillet of concrete with a surface length of a minimum 305mm at a 45 degree bevel will be required around the complete circumference of the H.D.P.E. plastic pipe to achieve same.

The Contractor shall be required to remove and dispose of the existing covered drain and catch basin and maintenance holes. Any deleterious and other materials not required for the restoration of the site shall be loaded up, hauled away, and disposed of by the Contractor to a site to be obtained by it at its expense.

The Contractor shall be required to restore any and all drain sideslopes and boulevard areas damaged by the covered drain installation, utilizing the available scavenged topsoil, and shall seed and mulch over all of said areas.

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.

VII. ACCESS TO WORK

The Contractor is to note that its access to the work shall be off of Ferriss Road along the north side of the Quintigliani parcel easterly to the covered drain location. The Contractor shall have access along the covered drain for replacement including sufficient area around each C.B.M.H. to complete the installation.

The access through the parcels shall generally comprise of an area extending 8.0 metres in perpendicular width along the length of the drain. The Contractor may also access the entire width of the adjacent public roadway.

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 or through the private lands in order to get to the site of the proposed works. Protection of landscaping and vegetation will be a particular concern along the lawn areas of the residential properties. Any accesses or areas utilized in carrying out the works are to be fully restored to their original conditions by the Contractor, including topsoil placement and residential lawn restoration with seed and mulch as directed by the Engineer or the Town Drainage Superintendent. Restoration shall include, but not be limited to, all necessary levelling, grading, shaping, topsoil placement, and granular required to make good any damage caused. Should the Contractor damage any concrete slab areas or sidewalks, the Contractor will be required to remove the broken materials and restore the area using concrete with a minimum 30 MPa strength at 28 days with $6\% \pm 1\%$ air entrainment. All concrete surfaces shall be finished to match as closely as possible to the existing concrete adjacent to the repair areas. The Contractor shall dispose of all removed material, supply, and place the concrete, and complete all repairs to the full satisfaction of the Town Drainage Superintendent and the Engineer.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

The extent of the brush and trees along the area of the work is fairly limited. Where there is any brush, trees or rubbish along the course of the drain, including the full width of the access, all such brush, trees or rubbish shall be close cut and grubbed out, and the whole shall be chipped, hauled away or otherwise satisfactorily disposed of by the Contractor. The brush and trees removed along the course of the work are to be put in piles by the Contractor in locations where they can be safely chipped and shall be hauled away and disposed of by the Contractor at its expense. The removal of brush and trees shall be carried out in close consultation with the Town Drainage Superintendent or 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 along the course of the work.

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.

Any trees that need to be removed on any residential lot shall be cut and the stumps removed by careful excavation or grinding to prevent damage to any structures. Brush and bushes along any open drain shall be cut to ground level. The removal of rubbish and bulrushes or other debris shall be included in the Contractor's rate of payment for excavation. No excavation shall occur until after brush clearing and close cutting is completed.

The Contractor shall be required to remove any and all tree roots or stumps which obviously cause obstructions to the installation of the drain. If encountered and directed by the Town Drainage Superintendent or the Engineer, they shall be removed and be chipped or hauled away together with the rest of the trees and brush at no extra cost to the project.

VI. FENCING AND DECORATIVE LANDSCAPING

Where it is necessary to take down or remove any fence or decorative landscaping to proceed with the work, the same shall be done by the Contractor across or along that portion of the work where such fence or decorative landscaping is located. The Contractor will be required to exercise extreme care in the removal of any fencing or decorative landscaping so as to cause a minimum of damage to the same. The decorative landscaping material such as brick pavers, border walls, plants and bushes shall be carefully put aside so that the owners may re-use or dispose of the material. Any materials no longer required by the owners shall be hauled away and disposed of by the Contractor.

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 replacing of the same. When any fence is removed by the Contractor, and the owner thereof deems it advisable and procures new materials 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. EXCAVATION AND DISPOSAL OF FILL

The Contractor is advised that the installation of the new covered drain may result in a small surplus of fill materials. Any extra materials not required for the restoration of the site shall be loaded up, hauled away, and disposed of by the Contractor to a site to be obtained by it at its expense. During the course of its excavation operations, the Contractor shall salvage sufficient topsoil materials to carry out any restoration required to the field, grass and lawn areas of the project site.

In all cases, the disposal of any trucked extra or deleterious material will be the responsibility of the Contractor and any work at the disposal site shall be established between the Contractor and the site owner. The Contractor shall ensure that any permits required for fill disposal are obtained from the appropriate authority. The Contractor will be responsible for keeping all private and public roadways free and clear of mud and debris resulting from its use of same for access and hauling purposes.

VIII. GENERAL CONDITIONS

- a) The Town Drainage Superintendent or 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 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 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 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

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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, etcetera, 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) 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.
- g) 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.
- h) 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 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 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.
- i) During the course of the project the Contractor shall deal with any excess soil management from the project in accordance with Ontario Reg 406/19 pursuant to the Environmental Protection Act, R.S.O. 1990, c. E.19 and any subsequent amendments to same.
- j) 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.
- k) 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.

- l) 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 Town. 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 Town 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.

- m) 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.
- n) 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

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.

- o) 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.

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- p) Should extra work be required by the Town Drainage Superintendent or Consulting Engineer and it is done on a time and material basis, the actual cost of the work will be paid to the Contractor with a 15% markup on the total actual cost of labour, equipment and materials needed to complete the extra 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.

Measures to Avoid Causing Harm to Fish and Fish Habitat

If you are conducting a project near water, it is your responsibility to ensure you avoid causing [serious harm to fish](#) in compliance with the *Fisheries Act*. The following advice will help you avoid causing harm and comply with the *Act*.

PLEASE NOTE: This advice applies to all project types and replaces all “Operational Statements” previously produced by DFO for different project types in all regions.

Measures

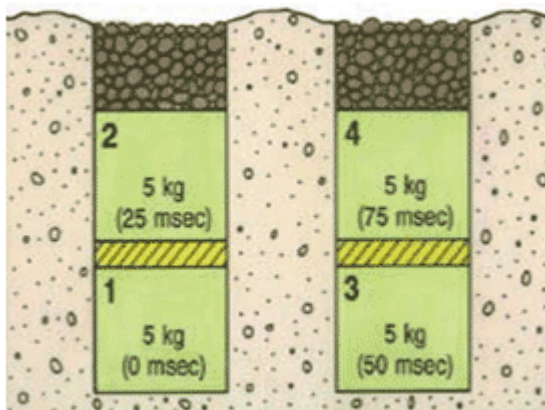
- Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
- Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
- Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.
- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
 - o Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
 - o Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
 - o Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
 - o Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
 - o Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
 - o Repairs to erosion and sediment control measures and structures if damage occurs.
 - o Removal of non-biodegradable erosion and sediment control materials once site is stabilized.
- Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.
- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
- Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
- Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.
 - o In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:
 - Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
 - Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
 - The screen face should be oriented in the same direction as the flow.
 - Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.
 - Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
 - Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
 - Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
 - Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
 - Provision should be made for the removal, inspection, and cleaning of screens.
 - Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
 - Pumps should be shut down when fish screens are removed for inspection and cleaning.
- Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
 - o If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a dam or water intake), the potential for impacts to fish and fish habitat should be minimized by implementing the following measures:

- Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries [timing windows](#).
- Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
- Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting
- Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).
- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.
- Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes; and decking of charges within holes.

- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

- Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.
- Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
- Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

Date modified:
2013-11-25

SECTION II
SPECIFICATIONS
FOR FISH SALVAGE

GENERAL
SECTION 201

The Work shall include the capture, salvage and release of fish that are trapped or stranded as the result of the Contractor's operations, at locations identified in the Fish Salvage Plan, and in co-operation with the Essex Region Conservation Authority (E.R.C.A.).

Fish capture shall be performed prior to dewatering, and in such manner that will minimize the injury to the fish.

MATERIALS
SECTION 202

All materials required for fish capture, salvage and release shall be supplied by the Contractor.

CONSTRUCTION
SECTION 203

The Contractor shall not commence any fish capture, salvage and release work until the Fish Salvage Plan has been accepted by the Consultant and the Conservation Authority. All work shall be performed in accordance with the Fish Salvage Plan unless otherwise determined by the Consultant or the Conservation Authority.

The Contractor shall ensure an ice-free pool is maintained throughout all fish capture and release operations.

All fish shall be captured within the area specified, and released at an acceptable location in the downstream water body. Fish shall be captured by electro fishing, netting, seining, trapping, or other method acceptable to the Consultant and/or the Conservation Authority.

MEASUREMENT AND PAYMENT
SECTION 204

Payment for this Work will be made at the lump sum price bid for "Fish Capture and Release". The lump sum price will be considered full compensation for all labour, materials, equipment, tools and incidentals necessary to complete the Work to the satisfaction of the Consultant.

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. PRECAST CONCRETE BLOCK & CONCRETE FILLED JUTE BAG HEADWALLS

After the Contractor has set the endwall foundations and the new pipe in place, it shall completely backfill same and install new precast concrete blocks or concrete filled jute bag headwalls at the locations and parameters indicated on the drawing. All concrete used for headwalls shall be a minimum of 30 mPa at 28 days and include 6% +/- 1% air entrainment.

Precast concrete blocks shall be interlocking and have a minimum size of 600mmX600mmX1200mm. Half blocks shall be used to offset vertical joints. Cap blocks shall be a minimum of 300mm thick. A foundation comprising minimum 300mm thick poured concrete or precast blocks the depth of the wall and the full bottom width of the drain plus 450mm embedment into each drain bank shall be provided and placed on a firm foundation as noted below. The Contractor shall provide a levelling course comprising a minimum thickness of 150mm Granular "A" compacted to 100% Standard Proctor Density or 20mm clear stone, or a lean concrete as the base for the foundation. The base shall be constructed level and flat to improve the speed of installation. Equipment shall be provided as required and recommended by the block supplier for placing the blocks such as a swift lift device for the blocks and a 75mm eye bolt to place the concrete caps,. The headwall shall extend a minimum of 150mm below the invert of the access bridge culvert with the top of the headwall set to match the finished driveway grade, unless a 150mm high curb is specified at the edge of the driveway. To achieve the required top elevation, the bottom course of blocks and footing may require additional embedment into the drain bottom. The Contractor shall provide shop drawings of the proposed wall for approval by the Drainage Superintendent or Engineer prior to construction.

Blocks shall be placed so that all vertical joints are staggered. Excavation voids on the ends of each block course shall be backfilled with 20mm clear stone to support the next course of blocks above. Walls that are more than 3 courses in height shall be battered a minimum of 1 unit horizontal for every 5 units of vertical height. The batter shall be achieved by careful grading of the footing and foundation base, or use of pre-battered base course blocks. Filter cloth as specified below shall be placed behind the blocks to prevent the migration of any fill material through the joints. Backfill material shall be granular as specified below. Where the wall height exceeds 1.8 metres in height, a uni-axial geogrid SG350 or equivalent shall be used to tie back the walls and be installed in accordance with the manufacturer's recommendations. The wall face shall not extend beyond the end of the access bridge pipe. Non-shrink grout shall be used to fill any gaps between the blocks and the access bridge pipe for the full depth of the wall. The grout face shall be finished to match the precast concrete block walls as closely as possible.

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, and 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 30 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 450mm (18") 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 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 Drainage Superintendent and Engineer.

4. GENERAL

Prior to the work commencing, the 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 Drainage 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, or the Municipality, 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.

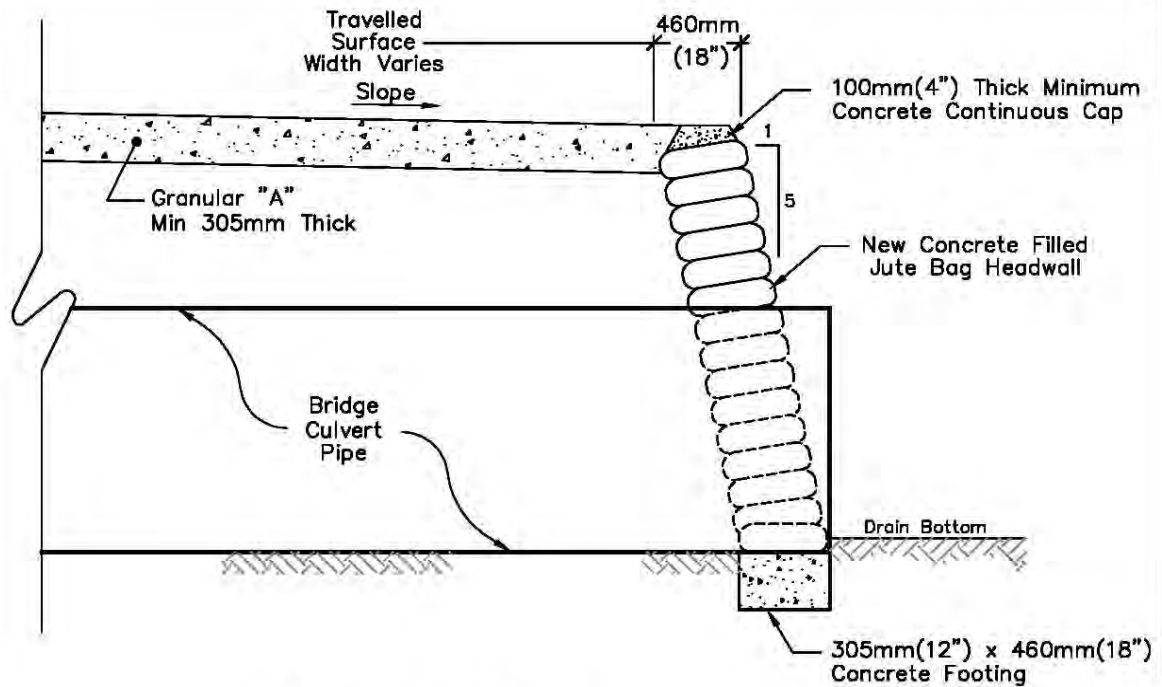
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original 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 and Ontario Traffic Manual Book 7.

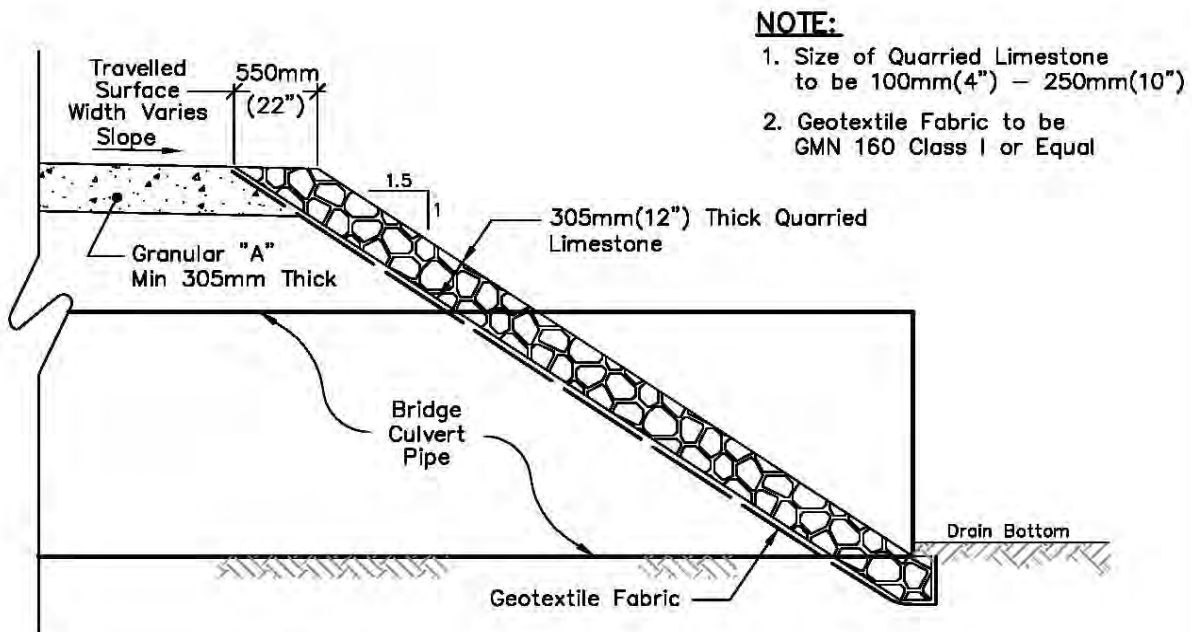
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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 Drainage Superintendent and Engineer.



Typical Jute Bag Headwall



Typical Quarried Limestone End Protection

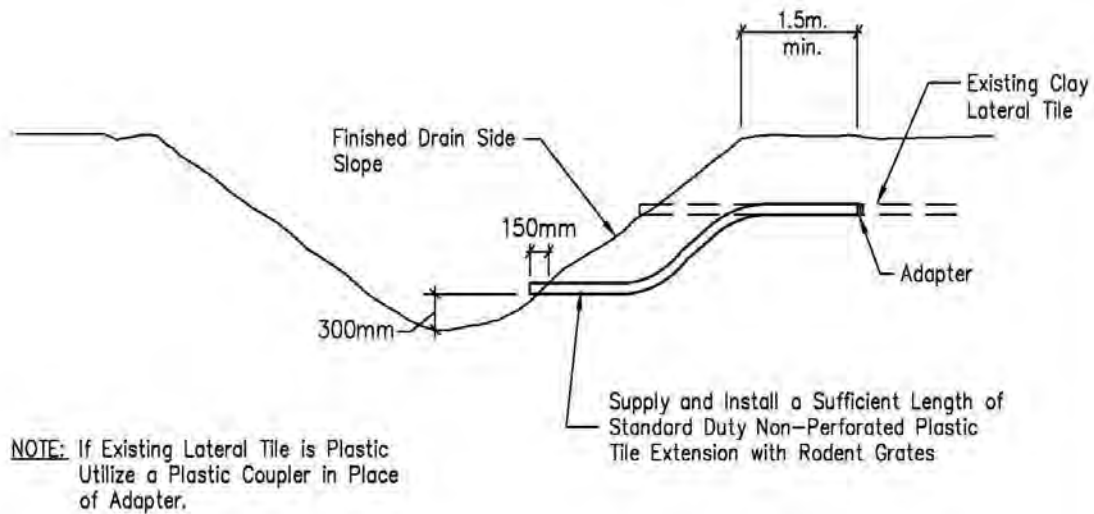
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

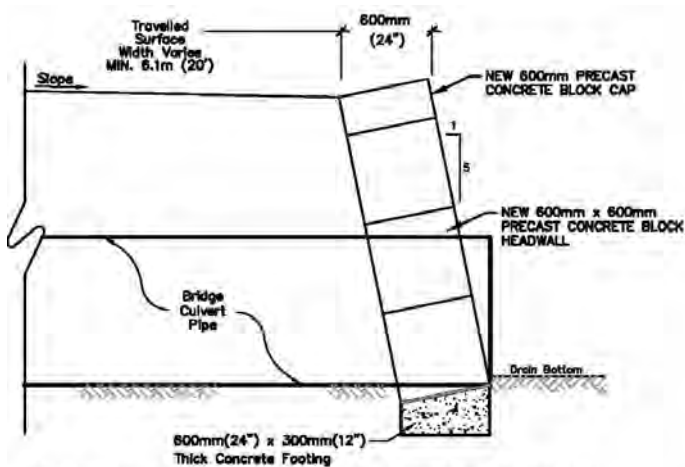
Leamington, Ontario N8H 1G6

519-322-1621



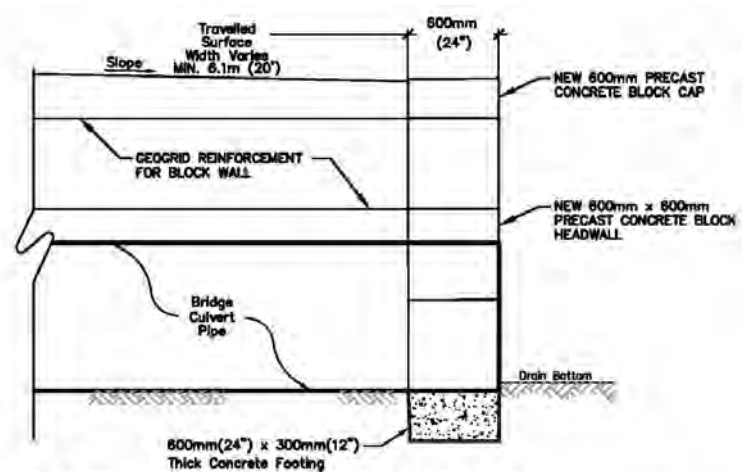
STANDARD LATERAL TILE DETAIL

N.T.S.



TYPICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = 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 ¾" 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”

General Conditions not required

APPENDIX “REI-E”

PLAN, PROFILE & DETAIL

OF THE

SZAKACS DRAIN
REPAIR AND IMPROVEMENT

(Geographic Township of Colchester South)

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rood
GERARD ROOD, P.ENG.

**ROOD
ENGINEERING
INC.**



CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: October 20th, 2020

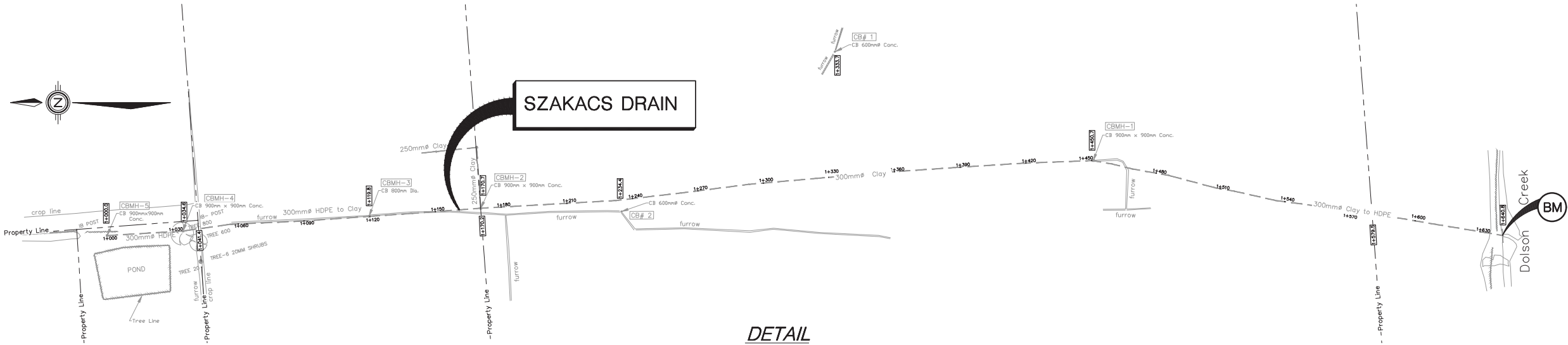
TOWN OF ESSEX

MAYOR: Larry Snively
CLERK: Robert Auger
DRAINAGE SUPERINTENDENT: Lindsay Dean, B.Sc.

BENCHMARKS:

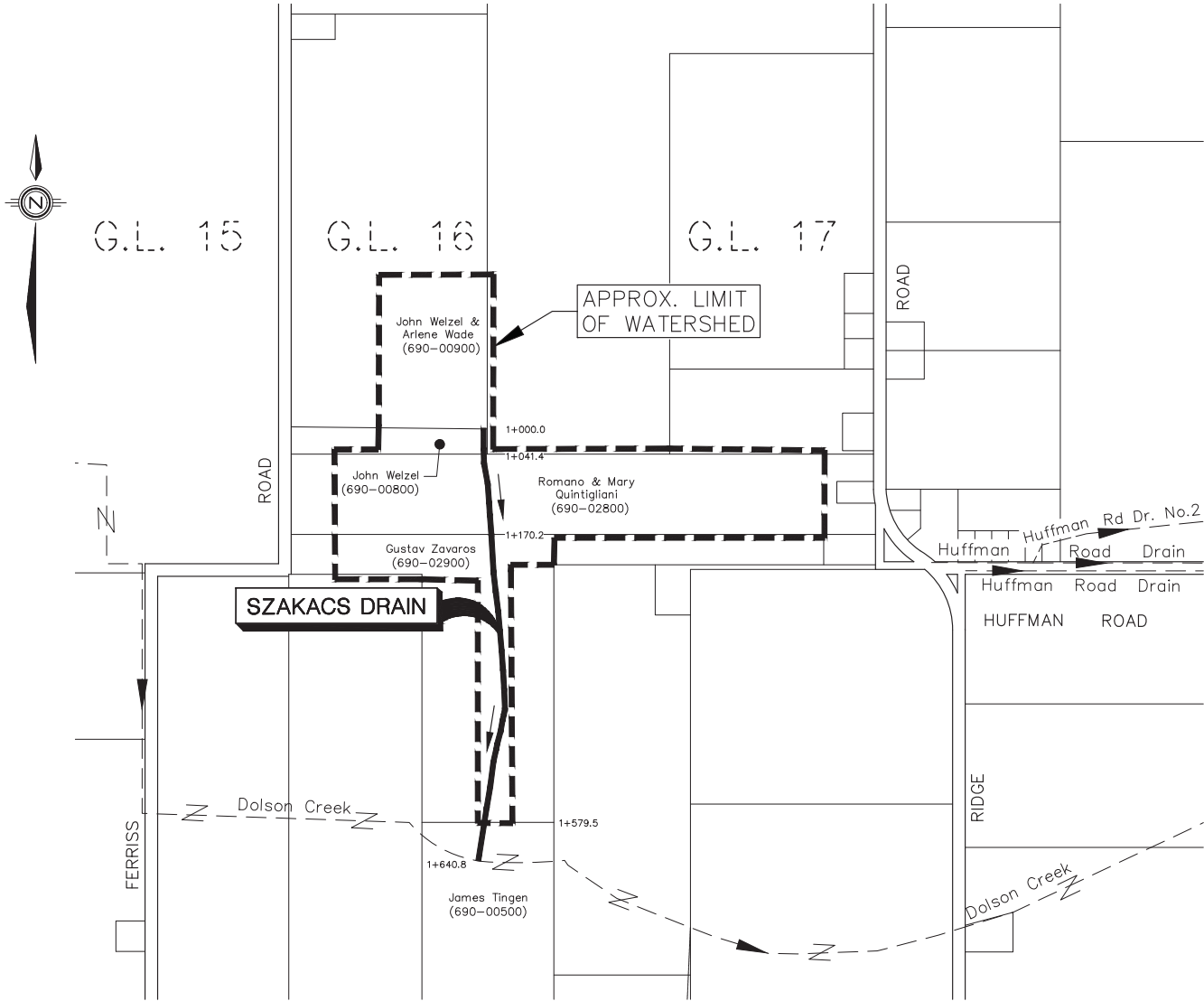
TOP OF HEADWALL AT SOUTH OUTLET OF DRAIN
AT DOLSON CREEK

ELEV. = 190.232



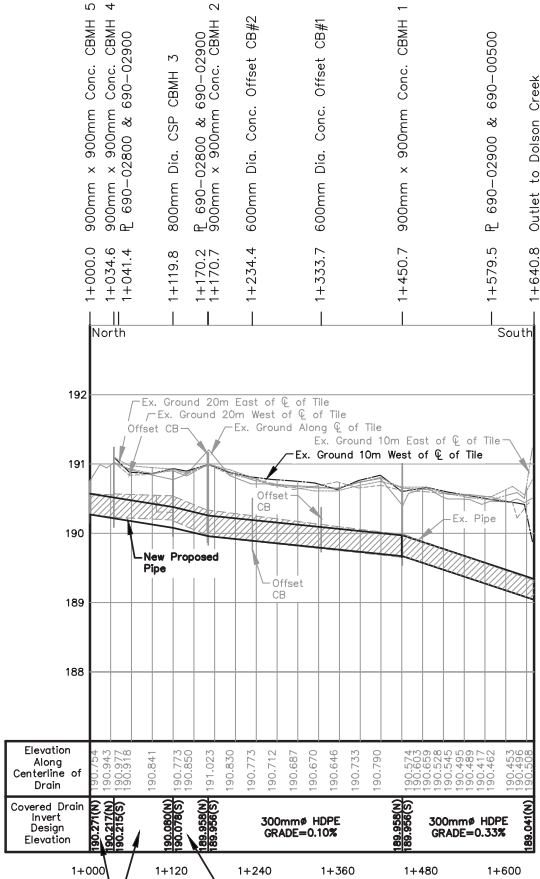
DETAIL

Scale = 1:1000



WATERSHED PLAN

Scale = 1:5,000



PROFILE SZAKACS DRAIN

SCALE=1:5000 hor.
1:50 vert.

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

DRAWN BY: G.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2016D004.DWG
FILE No.: 2016D004 SHEET No.: 1 OF 5

\\SERVER-2019\REI Data Server\DRAWING\PROJECTS\Projects 2016\REI2016D004 - Spaulds Drain\Draw\REI2016D004.dwg 2020-10-15

