

8TH CONCESSION WEST DRAIN

(Bridge for Walter & Amy Howson, Pt. Lot 14, Con. 8)

Geographic Township of Colchester North



TOWN OF ESSEX

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

Rood Engineering Inc.

Consulting Engineers

***9 Nelson Street
Leamington, Ontario N8H 1G6
519-322-1621***

***REI Project 2017D025
2018-01-22***

January 22nd, 2018

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

Mayor McDermott and Members of Council:

**8TH CONCESSION WEST DRAIN
(Bridge for Walter & Amy Howson)
Part of Lot 14, Concession 8
Geographic Twp. of Colchester North
Project REI2017D025
Town of Essex, County of Essex**

I. INTRODUCTION

In accordance with the instructions received from you by letter of October 4th, 2017, from your Manager, Legislative Services/Clerk, Robert W. Auger, we have prepared the following report that provides for the construction of a new agricultural access bridge in the 8th Concession West Drain. This proposed bridge is intended to provide safe access to the agricultural lands owned by Walter & Amy Howson, in Part of Lot 14, Concession 8, in the former Geographic Township of Colchester North, in the Town of Essex. The 8th Concession West Drain comprises of an open channel drain with a number of access bridges which generally runs westerly, commencing at the Ferris Sideroad, then crossing County Road 15, which then heads north across South Malden Road before extending to its outlet in the River Canard. The drain was constructed pursuant to the Drainage Act. A plan showing the 8th Concession West Drain proposed farm access bridge, as well as the general location of the above-mentioned bridge, is included herein as part of the report.

Our appointment and the works related to the construction of the above-mentioned farm access bridge in the 8th Concession West 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 proposed bridge, as well as the 8th Concession West Drain, and we report thereon as follows.

II. BACKGROUND

From our review of the Town's drainage files, we have determined that the 8th Concession West Drain portion encompassing the affected bridge was last repaired under an Engineer's Report dated October 5th, 1998 prepared by Lou Zarlenga, P.Eng. The work included in said report consisted of drain cleaning, widening and improvements, brushing and grubbing, erosion protection control for agricultural surface runoff, and bridge cleaning. Seeding and mulching was completed for erosion control measures in sensitive areas.

We also referred to the August 10th, 1961 report and plans by C.G.R. Armstrong, P.Eng. Said report provided for the cleaning, widening and improvements, brushing and grubbing, and bridge cleaning to grade. The February 10th, 2002 and June 21st, 2005 bridge reports prepared by Gerard Rood, P.Eng. have also been used. The February 19th, 2002 report aided in confirming the design grade and pipe inverts of the proposed bridge. Likewise, the June 21st, 2005 report was used in determining a sub-watershed for lands draining into the 8th Concession West Drain, south of the Spindler Drain.

We have utilized the plans within the Lou Zarlenga, P.Eng. report to establish the size parameters for the drain and the details to be used in establishing the new bridge culvert installation. We have also used this report to establish the drain profile grades, and to assist us in establishing the design grade for the subject farm access bridge installation. The Schedule of Assessment in the latest drainage report was used as a guide to establish the upstream watershed area and flows to be used in the design of the bridge.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the available drainage information and documentation provided by the Drainage Superintendent, we arranged with Town staff to schedule an on-site meeting for November 28th, 2017. The following people were in attendance at said meeting: Walter Howson, Larry Lafferty, Karl Neudorf, Rudy Neufeld, Steve Verbeek, Randy Durance, Norm Nussio (Town of Essex Assistant Drainage Superintendent), Tanya Tuzlova (Town Drainage Clerk), Kory Snelgrove (Rood Engineering) and Gerard Rood (Rood Engineering).

Norm Nussio completed the introductions, outlining the purpose for the meeting. Details of the proposed bridge works were reviewed. Mr. Howson confirmed that the new bridge should be located slightly east of the Verbeek parcel without obstructing the incoming swale from the north. The agricultural lands have been utilizing the concrete bridge for the existing severed residential Parcel, Municipal Number (M.N.) 8720. However, the agreement to use the concrete bridge is expiring, outlining the importance for the proposed agricultural access to the lands. Mr. Howson advised us that the farm land requires a new bridge to access the existing agricultural lands with the farm equipment and trucks. The new bridge access will eliminate damages to the driveway and lawn area of the residential lot. It was discussed that there was no grant for bridges required due to severances after 2004.

We advised the owner that the minimum standard top width for an access bridge is 6.10 metres (20 ft.) and that any extra length will be charged 100% to the land owner for construction and future maintenance. The owner was also advised that because the bridge is new, the cost for the new access bridge construction, as well as all the cost for the preparation of the Engineer's Report would be borne by the owner, with future maintenance costs to be shared by the owner and all upstream affected lands and roads. It was established that the owner prefers a 9.14 metre (30') top width that will result in approximately a 16 metre (52.5 ft.) long pipe to allow for the current large agricultural equipment to more easily access the lands. We went on to discuss that sloped quarried limestone on filter cloth ends for the installation is expected to be the most economical end treatment, but the Engineer would contact the owner to advise if there was any change to this. A standard 5 metre turning radius will be provided at the gravel shoulder to enhance access across the bridge.

The overall drainage report procedure, future maintenance processes and grant eligibility were generally reviewed with the owner. The owner was 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.). We further discussed bridge maintenance, sizing, and material of the proposed bridge, suggesting

that a corrugated steel pipe would likely be employed similar to the bridge serving the agricultural lands just east of M.N. 8702.

Timelines were discussed for this project. Mr. Rood explained how the total process should be approximately 3 to 6 months for the report to proceed and to consider timing windows for construction.

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 installation of this new access bridge.

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 geodetic site bench mark near the location of the bridge. We surveyed the drain both upstream and downstream of the proposed new access bridge and picked up the existing concrete bridges and culvert elevations in order to establish a design grade profile for the installation of the new bridge. We also took cross-sections of the 8th Concession West Drain at the general location of the proposed bridge, as necessary for us to complete our design calculations, estimates and specifications.

The Town made initial submissions to the Essex Region Conservation Authority (E.R.C.A.) regarding their requirements or any D.F.O. (Department of Fisheries and Oceans) requirements for work that would be proposed to be carried out on the 8th Concession West Drain. A response from the Conservation Authority was received by email on November 6th, 2017 and indicated that the Town must apply for a permit and follow standard mitigation requirements.

A Ministry of Natural Resources and Forestry (M.N.R.F.) Species at Risk review of the former 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 showing the drain to be a Class F drain with intermittent flow and no species at risk within the vicinity of the affected area.

For the purposes of establishing the watershed area upstream of the proposed bridge, and determining the bridge size required, we investigated and reviewed the past drainage reports on the 8th Concession West Drain.

V. FINDINGS AND RECOMMENDATIONS

Prior to the preparation of our report, we reviewed the details of the bridge installation including the end treatment options based on the regulatory restrictions and the cost estimates that we were to review.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owner, we would recommend that a new access bridge be constructed in the 8th Concession West Drain at the location and to the general parameters as established in our design drawings attached herein.

During the course of our investigations, this drainage project was discussed and reviewed with E.R.C.A., to deal with any Authority and D.F.O. issues and comments related to this Municipal drain. 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.

To prevent flooding and adverse impacts upstream, the new structure needs to provide an equivalent level of service to the adjacent structures. Therefore, based on this, we have made provisions to use an aluminized corrugated steel pipe as set out below, similar to the agricultural access downstream. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels identified in this area. The 8th Concession West Drain 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. and D.F.O. Details of these 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, we have reviewed the M.N.R.F. former 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”**.

Based on all of the above, we recommend that a new access bridge be constructed in the 8th Concession West Drain to serve the agricultural lands of Walter & Amy Howson in Part of Lot 14, Concession 8, 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. ESTIMATE OF COST

Our estimate of the total cost of this work including all incidental expenses is the sum of **TWENTY ONE THOUSAND FIVE HUNDRED DOLLARS (\$21,500.00)**, made up as follows:

CONSTRUCTION

Item 1)	Provide all labour, equipment and material to construct a new access bridge consisting of 16.0 metres (52.5 ft.) of 1200mm diameter, 125mm by 25mm aluminized corrugated steel pipe, 2.0mm thick, remove and dispose of existing brush, sod, and deleterious material at the new bridge; provide sloped quarried limestone on filter cloth end protection, granular bedding, compacted Granular ‘B’ backfill and surface, and Granular ‘A’ approaches; excavation, compaction, silt and sediment controls, hauling, cleanup and restoration, complete.			
	(Howson Bridge)	Lump Sum	\$	13,800.00
	Net H.S.T. (1.76%)		\$	243.00
				<hr/>
TOTAL FOR CONSTRUCTION			\$	14,043.00
				<hr/>

INCIDENTALS

1) Report, Estimate, and Specifications	\$ 2,350.00
2) Survey, Assistants, Expenses, Drawings, Duplication Cost of Report and Drawings, Consideration Meeting, etc.	\$ 2,700.00
3) Estimated Cost of Preparing Tender Documents	\$ 1,000.00
4) Estimated Cost of Construction Supervision and Inspection (based on 1 day)	\$ 1,000.00
5) Net H.S.T. on Items Above (1.76%)	\$ 124.00
6) Estimated Cost of E.R.C.A. permit	\$ 150.00
7) Estimated Contingency Allowance	\$ 133.00
TOTAL FOR INCIDENTALS	\$ 7,457.00
TOTAL FOR CONSTRUCTION (brought forward)	\$ 14,043.00
TOTAL ESTIMATE	\$ 21,500.00

VII. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of this new access bridge. The design drawings show the subject bridge location and the details of the new access bridge installation. 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 bridge installation, which also includes Standard Specifications within **Appendix “REI-C”**.

VIII. CONSTRUCTION SCHEDULE OF ASSESSMENT

We would recommend that all of the costs associated with the construction of this new access bridge, and the preparation of this Engineer’s report, be assessed against the agricultural lands of Walter & Amy Howson (360-02602), in Part of Lot 14, Concession 8, former Geographic Township of Colchester North, in the Town of Essex. A Schedule of Assessment has been prepared and included herein to indicate the lands assessed for this new agricultural access bridge installation.

It has been clearly established that this new access bridge is being provided to serve as the access over the 8th Concession West Drain to an existing agricultural farm parcel severed from Parcel 360-02600 after July 28th, 2004. However, the severed agricultural Parcel is not currently a Farm Tax Class Rated classification. Pursuant to the current Agricultural Drainage Infrastructure Program (A.D.I.P.) Policies that are in place, it is anticipated that these severed after 2004 **will**

not be eligible for a grant from the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) in the amount of 1/3 of their total assessment for this project. It is recommended that the owner take steps to work with the Town to have the designation updated if possible, prior to future maintenance, so that the grant can be applied for.

IX. FUTURE MAINTENANCE

We recommend that the bridge structure as identified herein, be maintained in the future as part of the drainage works. We would also recommend that the bridge, for which the maintenance costs are to be shared with the upstream lands and roads within the watershed, be maintained by the Town and that said maintenance would include works to the bridge culvert, bedding, backfill and end treatment. Should concrete, asphalt, or other decorative driveway surfaces over these bridge culverts require removal as part of the maintenance works, these surfaces shall also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guardrails, or other special features exist that will be impacted by the maintenance work, they are also to be removed and restored or replaced as part of the bridge maintenance work. However, the cost of the supply and installation of any surface materials other than Granular “A” material and the cost of removal and restoration or replacement, if necessary, of any special features, shall be totally assessed to the benefiting adjoining Owner(s) served by said access bridge.

After the completion of all of the works included within this report, the access bridge within the Drain shall be maintained in the future by the Town of Essex. Furthermore, if any maintenance work is required to this access bridge in the future, we recommend that 78% of the future maintenance costs shall be assessed as a Benefit against the abutting property being served by the access bridge, which is currently owned by Walter & Amy Howson, in Part of Lot 14, Concession 8, and the remaining balance of 22% be assessed pro-rata against the upstream lands and roads based on their Outlet Liability assessment in the October 5th, 1998 Lou Zarlenga, P.Eng. Schedule of Assessment. This sharing reflects that the owner has requested a bridge wider than the standard 6.10 metre (20 feet) top width that is normally shared between the owner and upstream affected lands and roads.

The above provisions for the future maintenance of this new access bridge, 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.

tm

att.



ROOD ENGINEERING INC.

Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
8TH CONCESSION WEST DRAIN
(Bridge for Walter & Amy Howson)
Town of Essex

5. PRIVATELY OWNED - AGRICULTURAL LANDS (non-grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
360-02602	8	14	42.3	13.11	5.307	Walter & Amy Howson	\$ 21,500.00	\$ -	\$ -	\$ 21,500.00
Total on Privately Owned - Agricultural Lands (non-grantable).....							<u>\$ 21,500.00</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ 21,500.00</u>
TOTAL ASSESSMENT				13.11	5.31		<u>\$ 21,500.00</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ 21,500.00</u>
=====										

1 Hectare = 2.471 Acres
Project No.REI2017D025
January 22nd, 2018

SPECIFICATIONS

8TH CONCESSION WEST DRAIN

Bridge for Walter & Amy Howson

(Geographic Township of Colchester North)

TOWN OF ESSEX

I. GENERAL SCOPE OF WORK

The Contractor shall provide all material, labour, and equipment to construct a new agricultural access bridge for the Howson Parcel (360-02602) consisting of 16.0 metres (52.5 ft.) of 1200mm diameter, 2.0mm thick, aluminized steel Type II corrugated Hel-Cor pipe with 125mm x 25mm corrugations and rolled annular ends in the 8th Concession West Drain. The new access bridge shall be constructed so that the pipe is located at the Stations shown on the plans where the west end of the new pipe is positioned approximately 2.1 metres east of the Standard Iron Bar (S.I.B) which represents the property line of Parcels 360-02500 and 360-02602. This location shall be the exact designated location of this access bridge culvert unless otherwise directed by the property owner and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the new access bridge must be approved in writing by the Engineer. The general layout of the access bridge and other ancillary work shall be provided as shown and detailed in the accompanying drawing attached within **Appendix "REI-E"**. A Bench Mark has been set near the proposed access bridge so that same can be utilized for the setting of the new bridge culvert invert grades. The **Bench Mark** is the *"top of nail set in the north face of hydro pole located on south side of the 8th Concession Road directly across from the proposed bridge and southeast of M.N. 8722"*, with same being **Elevation 188.289 metres**.

All work shall be carried out in accordance with these specifications, the plans forming part of this drainage project, as well as the Standard Details included in **Appendix "REI-C"**. The new bridge construction shall be of the size, type, depth, etcetera, as is shown in the accompanying drawings, as determined from the Bench Marks, and as may be further laid out at the site at the time of construction. All work carried out under this project shall be completed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

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

Silt and sediment control is a key component of the work on this project. The Contractor shall provide temporary control measures in accordance with O.P.S.S. 805 dated November 2010 or as subsequently amended or as otherwise provided for in these specifications. All of the work shall be carried out in accordance with any permits or authorizations issued by the Essex Region Conservation Authority (E.R.C.A.) or the Department of Fisheries and Oceans (D.F.O.), copies of which will be provided, if available. 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 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. The work shall be carried out in the dry and silt and

sediment control shall be a key consideration during the course of the work. All silt and sediment controls shall be provided in accordance with O.P.S.S. and O.P.S.D. requirements for same. Controls shall be cleaned out as necessary during the course of the installation, and once the site has been stabilized, shall be completely removed and disposed of by the Contractor.

The Contractor is advised that no work may be carried out in the existing drain from March 15th to June 30th of any given year since the drain is directly connected to a downstream area that is classified as sensitive to impacts on aquatic life and habitat by E.R.C.A. and D.F.O.

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. Although no species are indicated on the agreement plans for this site, turtles and snakes are considered sensitive to the area and mobile, and Schedule 'C' of the agreement has provisions to protect them and mitigate any impacts. A copy of same is 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. If a threatened or sensitive species is encountered, the Contractor shall notify the Town and M.N.R.F. and provide all the equipment necessary for handling the species and cooperate fully with the Town and M.N.R.F. staff in the handling of the species.

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the north side of the 8th Concession Road. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the proposed driveway as necessary to carry out the construction of the new access bridge, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridges to carry out the required construction of the new structure installation. For this installation the Contractor will be required to remove and dispose of an existing stump and any trees that will obstruct the access across the bridge as noted on the plans.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close the 8th Concession Road for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the Essex Works Department.

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of

the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. BRIDGE CONSTRUCTION

When completed, the new access bridge along the centreline of the new culvert shall have a total top width, including the top width of the quarried limestone on filter cloth end walls, of approximately 11.1 metres (36.4 ft.) and a travelled driveway width of 10.0 metres (32.8 ft.). The quarried limestone on filter cloth end wall protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical, and shall extend from the invert end of the new aluminized C.S.P. to the top elevation of the driveway.

The aluminized C.S.P. to be provided for this project is to be supplied as no more than two (2) approximately equal lengths of pipe for the bridge, which are to be coupled together with a 2.0mm thick, 9-C aluminized corrugated steel bolted coupler, secured in accordance with the manufacturer's recommendations. Under no circumstance shall the access culvert for the bridge be provided with more than two (2) lengths of pipe. The corrugated steel pipe to be utilized for this bridge installation must be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain. Each coupler shall be installed with filter cloth wrap around the entire circumference of the joint so that there is no risk of separation and the joint is tight against soil migration.

The Contractor shall also note that the placement of the new access bridge culvert 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 or Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the bridge pipe and for a distance of 3.05 metres (10.0 ft.) both upstream and downstream of said pipe. The design parameters of the 8th Concession West Drain at the location of this new access bridge installation consists of a 0.91m (3.0 ft.) bottom width, 0.20% grade, and 1.5 horizontal to 1.0 vertical north sideslope and 1.75 horizontal to 1.0 vertical south sideslope. The Contractor shall be required to cut any brush and strip the existing drain side slopes of any vegetation as part of the grubbing operation, and remove the stump and trees as noted on the plans. The Contractor shall also be required to dispose of all excavated and deleterious materials, as well as any grubbed out materials, to a site to be obtained by it at its own expense. The Contractor shall note that the survey indicates that the existing drain bottom is slightly above the design grade. The Contractor shall be required to provide any and all labour, material and equipment to set the pipe to the required design grades. The Contractor shall also be required to supply, if necessary for a solid base, a minimum thickness of 150mm (6") of 20mm (3/4") clear stone bedding underneath the culvert pipe, extending from the bottom of the excavation to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

The installation of the complete length of the new access bridge culvert, 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. The Contractor shall provide a minimum notice of 2 working days to the Town Drainage Superintendent or Engineer prior to the commencement of this work. The installation of this new access bridge is to be performed during the normal working hours from Monday to Friday of the Town Drainage Superintendent or Engineer.

Once the new aluminized corrugated steel pipe has been satisfactorily set in place at the site, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. (Ontario Provincial Standard Specification) Form 1010, with the exception of the top 305mm (12") of the backfill material for the full top width of the drain and the access bridge, which shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. The end slopes of the backfill material over the corrugated steel pipe from the invert of said pipe to the top of driveway elevation shall be quarried limestone on filter cloth erosion protection. The end walls shall be extended around onto the drain banks in line with the end of the replacement pipe, all as shown on the plans included in **Appendix "REI-E"**.

The Contractor shall also perform the necessary excavation to extend the width of the driveway southerly from the south top of bank of the drain to the north limit of the roadway gravel. This driveway approach from the existing edge of gravel shoulder to approximately the south top of bank shall consist of a minimum thickness of 305mm (12") of granular material M.T.O. Type "A" satisfactorily compacted in place. The gravel apron shall extend for the full width of the access culvert top, and include a gore section at the roadside curved protection with a 5.0m radius to the edge of the roadway shoulder, as shown on the plans. The gravel backfill shall also extend across the pipe to approximately 1.0m beyond the north top of bank as shown on the plans. The pipe shall have a minimum of 305mm of cover, and then be graded down to the existing ground level at a maximum of 10% grade.

Once the new corrugated steel pipe has been set in place at the required location, the Contractor shall completely backfill same with granular material, and install the quarried limestone on filter cloth protection on both ends of the bridge. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 2), 3), and 4) of the **"Standard Specifications for Access Bridge Construction"** attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in Item 4) of said Appendix. The Contractor, in all cases, shall comply with these specifications and upon completion of the sloped quarried limestone end protection installation shall restore the adjacent areas to their original conditions.

The corrugated steel pipe for this installation shall be provided with a depth of cover measured from the top of the pipe to the top of the granular backfill of approximately 0.361m (14.2") for the new bridge and if the culvert is placed at its proper elevations, this should be easily achieved. If the Contractor finds that the specified cover is not being met, they shall notify the Drainage Superintendent and the Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The cover requirement is **critical** and must be attained. In order for this new access bridge culvert to properly fit the channel parameters, all of the design grade elevations provided below must be strictly adhered to.

Also, for use by the Contractor, we have established a Bench Mark near the site. This Bench Mark is the *"top of nail set in the north face of hydro pole located on the south side of the 8th Concession Road directly across from the proposed bridge and southeast of M.N. 8722"*, with same being **Elevation 188.289 metres**. The new pipe culvert and the backfilling are to be placed on the following basis:

- i) The **east (upstream) invert** of the proposed bridge culvert is to be set at Elevation **186.397** metres.
- ii) The **west (downstream) invert** of the proposed bridge culvert is to be set at Elevation **186.365** metres.
- iii) The centreline of driveway for this bridge installation shall be set to approximately Elevation **188.094** metres at the existing pavement edge, Elevation **188.033** metres at the culvert pipe centreline, and Elevation **188.005** metres at approximately 1.0 metre north of the north top of bank to match to the existing grade for the agricultural lands. The access bridge driveway, in all cases, shall be graded with a cross-fall from the centreline of the driveway to the outer edges of the driveway at an approximate grade of 1.50%.

As a check, all of the above design grade elevations should be confirmed before commencing to the next stage of the new access bridge installation. The Contractor is also to check that the pipe invert grades are correct by referencing the Bench Mark provided for the site.

The Contractor shall also be required to provide all labour, equipment and material to provide granular fill to all gore areas at the road as noted on the plans. The Contractor shall provide a 5.0 meter radius on each side of the entrance and protect any existing landscape features during the course of the work.

As part of the work provided for the construction of the access bridge, the Contractor shall be required to protect or extend any existing lateral tile ends which conflict with the bridge installation and maintain the swale at the west side of the new pipe. All existing lateral tile drains, where required, shall be diverted and extended to the ends of the new access bridge culvert and shall be extended and installed in accordance with the "Standard Lateral Tile Detail" as shown in **Appendix "REI-C"**, unless otherwise noted. Connections shall be made using manufacturer's couplers wherever possible. All other connections shall be completely sealed with concrete grout around the full exterior perimeter of each joint.

The Contractor is to note that the granular driveway approaches extending from the north edge of roadway pavement to the north top of bank of the drain shall consist of granular material M.T.O. Type "A" O.P.S.S. Form 1010 and is to be provided to a minimum depth of 305mm (12"), and be satisfactorily compacted in place. The Contractor is to also note that all granular material being placed as backfill for this bridge installation shall be compacted in place to a minimum Standard Proctor Density of 100%, and that all native fill material to be used for the construction shall be compacted in place to a minimum Standard Proctor Density of 95%.

All of the granular backfill, native fill, and the compaction levels for same shall be provided to the full satisfaction of the Town Drainage Superintendent or the Engineer. The Contractor shall also note that any sediment being removed from the drain bottom as previously specified herein, shall not be utilized for the construction of the driveway, and shall be disposed of by the Contractor to a site to be obtained by it at its own expense.

The Contractor shall be required to restore any and all drain side slopes damaged by the access bridge 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.

VI. GENERAL CONDITIONS

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

project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.

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

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

- l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$2,000,000.00 on this project, and shall name

the Town of Essex and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.

- m) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 45 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:
 - i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
 - ii) proof of advertising
 - iii) a Statutory Declaration, in a form satisfactory to the Consulting Engineer and the Municipality, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.

The Contractor shall satisfy the Consulting Engineer or Town that there are no liens or claims against the work and that all of the requirements as per the Construction Lien Act, 1983 and its' subsequent amendments have been adhered to by the Contractor.

- n) In the event that the Specifications, Information to Tenderers, or the Form of Agreement do not apply to a specific condition or circumstance with respect to this project, the applicable section or sections from the Canadian Construction Documents Committee CCDC2 shall govern and be used to establish the requirements of the work.

APPENDIX "REI-A"

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

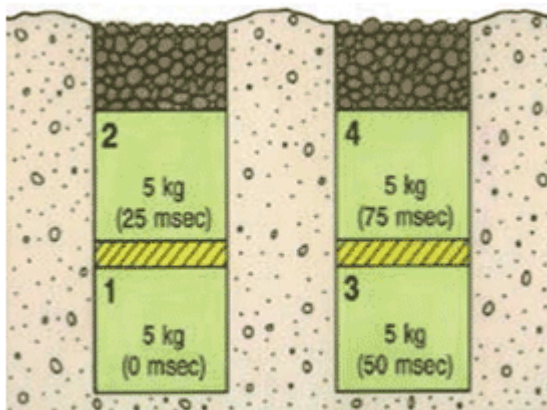
- Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish 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:
 - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
 - 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.
 - 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).
 - 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.
 - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
 - Repairs to erosion and sediment control measures and structures if damage occurs.
 - 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.
 - 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.
 - 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

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

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

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

APPENDIX "REI-B"

SCHEDULE C

MITIGATION PLAN

The Mitigation Plan shall be in effect until June 30, 2015.

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

PART A. DEFINITIONS

1. Definitions:

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

"DFO" means Fisheries and Oceans Canada;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS

2. Process Charts

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

3. Review of Documentation

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

4. Sensitive Areas Maps

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

5. Prior Notification to Seek Direction

- 5.1. If, after completing the review of documents described in section 3.1, the Municipality determines that the proposed Activities will be undertaken:
 - (a) in a place;
 - (b) at a time; or
 - (c) in a manner,that requires prior notification in accordance with the Process Charts, the Municipality shall provide prior notification to the MNR in order for the MNR to determine if the Municipality must undertake additional site-specific or Species-specific mitigation

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

5.2. The prior notification under section 5.1 shall include a completed Interagency Notification Form:

- (a) in respect of maintenance/repair where the proposed Activities are being undertaken pursuant to subsection 3(18) or section 74 of the *Drainage Act*; or
- (b) in respect of construction/improvement where the proposed Activities are being undertaken pursuant to section 77 or 78 of the *Drainage Act*.

5.3. Where an Activity is undertaken in accordance with section 124 of the *Drainage Act* and would otherwise have required prior notification under section 5.1, the Municipality shall Contact the MNR by email prior to the commencement of the Activity, and complete and submit the applicable Interagency Notification Form within one week of the Activity's completion, unless otherwise directed in writing by the MNR Designated Representative.

6. General Mitigation Measures

6.1. Notwithstanding that prior notification or additional mitigation measures may be required in accordance with this schedule, in undertaking any Activity at any time in respect of the Drainage Works the Municipality shall:

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

PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS

ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES

7. Activities undertaken in Sensitive Areas for Mussels

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

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

8. Training and Required On Site Materials for Turtles

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

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

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

10. Measures for Encounters with Turtles During a Sensitive Period

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

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

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

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

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

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

13. Release of Captured Individuals Outside of a Sensitive Period

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

14. Measures for Dead Turtles

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

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

15. Training and Required On Site Materials for Snakes

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

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

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

16.2. Where a proposed Activity will occur at or adjacent to a known hibernacula (as identified by the MNR) for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall:

- (a) erect effective temporary snake barriers approved by the MNR that will not pose a risk of entanglement for snakes and that shall be secured so that individual snakes may not pass over or under the barrier or between any openings to enter or re-enter the Work Zone;
- (b) inspect the temporary snake barriers daily during periods when snakes are active, capture any individuals incidentally encountered within the area bounded by the snake barrier and release the captured individuals in accordance with section 20.1; and
- (c) remove the temporary snake barriers immediately upon completion of the Activity.

16.3. Where a proposed Activity that does not involve physical infrastructure will occur in a Sensitive Area for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall undertake the Activity outside of the Sensitive Period, unless otherwise authorized by and in accordance with any site-specific measures provided in writing by the MNR Designated Representative.

17. Measures for Encounters with Snakes During a Sensitive Period

17.1. Where one or more individuals belonging to a snake Species is encountered, or should an active hibernacula be uncovered, while conducting an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:

- (a) capture and transfer all injured and uninjured individual snakes of that Species into individual light-coloured, drawstring cotton sacks;
- (b) place all cotton sacks filled with the captured individuals into a Holding Tub;
- (c) ensure that the Holding Tub with the captured individuals is stored at a cool temperature to protect the snakes from freezing until the individuals can be retrieved or transferred;
- (d) if an active hibernacula is uncovered, cease all Activities at the hibernacula site; and
- (e) immediately Contact the MNR to seek direction and to arrange for the transfer and/or retrieval.

18. Measures for Encounters with Snake Nests

18.1. Where an active nest of any of the snake Species is encountered and disturbed while undertaking an Activity in any part of a Work Zone, the Municipality shall:

- (a) collect any displaced or damaged eggs and transfer them to a Holding Tub;
- (b) capture and transfer all injured dispersing juveniles of that Species into a light-coloured drawstring cotton sack;
- (c) place all cotton sacks with the captured injured individuals into a Holding Tub;
- (d) ensure that the Holding Tub with the captured injured individuals is stored out of direct sunlight;
- (e) immediately Contact the MNR to seek direction and to arrange for the transfer of the injured individuals;
- (f) immediately stop any disturbance to the nest site and loosely cover exposed portions with soil or organic material to protect the integrity of the remaining individuals;

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

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

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

20. Release of Captured Individuals Outside of a Sensitive Period

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

21. Measures for Dead Snakes

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

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

ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS

22. Activities Undertaken in Sensitive Areas for Herbaceous Plants

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

ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES

23. Additional Measures for Butternut

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

24. Measures for Other Trees

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

PART D. MONITORING AND REPORTING REQUIREMENTS

25. Compliance Monitoring.

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

26. Reporting

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

27. Review

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

APPENDIX "REI-C"

STANDARD SPECIFICATIONS **FOR ACCESS BRIDGE CONSTRUCTION**

1. CONCRETE FILLED JUTE BAG HEADWALLS

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

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

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

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

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

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

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

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

2. QUARRIED LIMESTONE ENDWALLS

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

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

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

3. BRIDGE BACKFILL

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

4. GENERAL

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

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

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

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

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

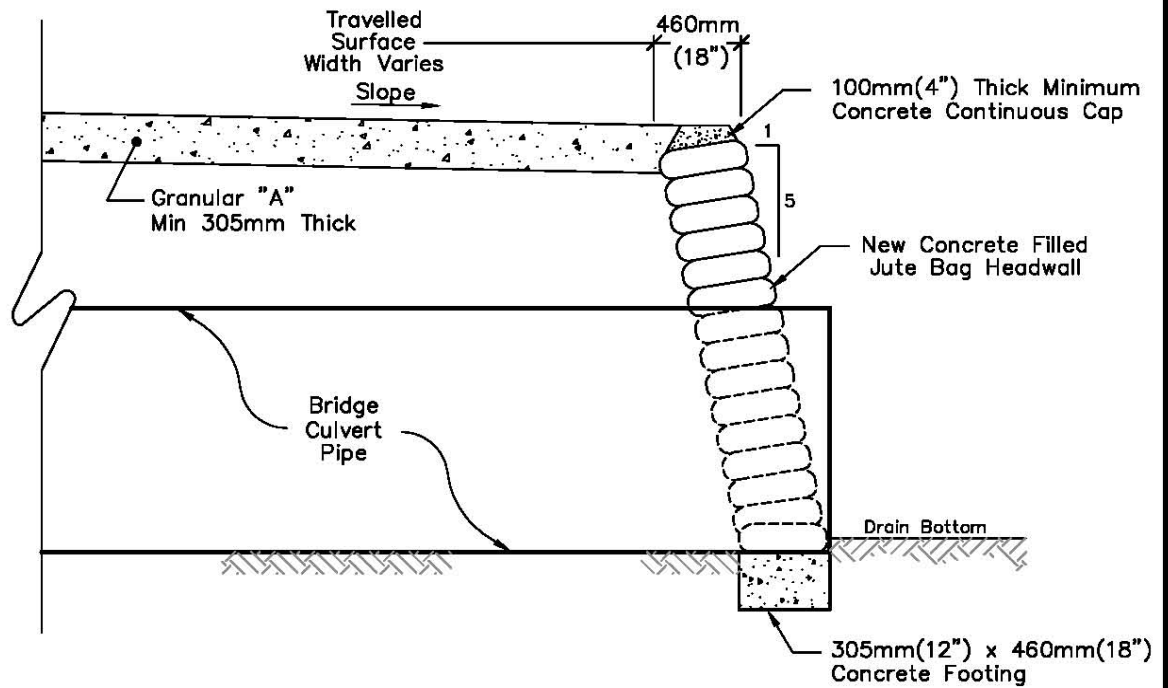
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

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

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

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

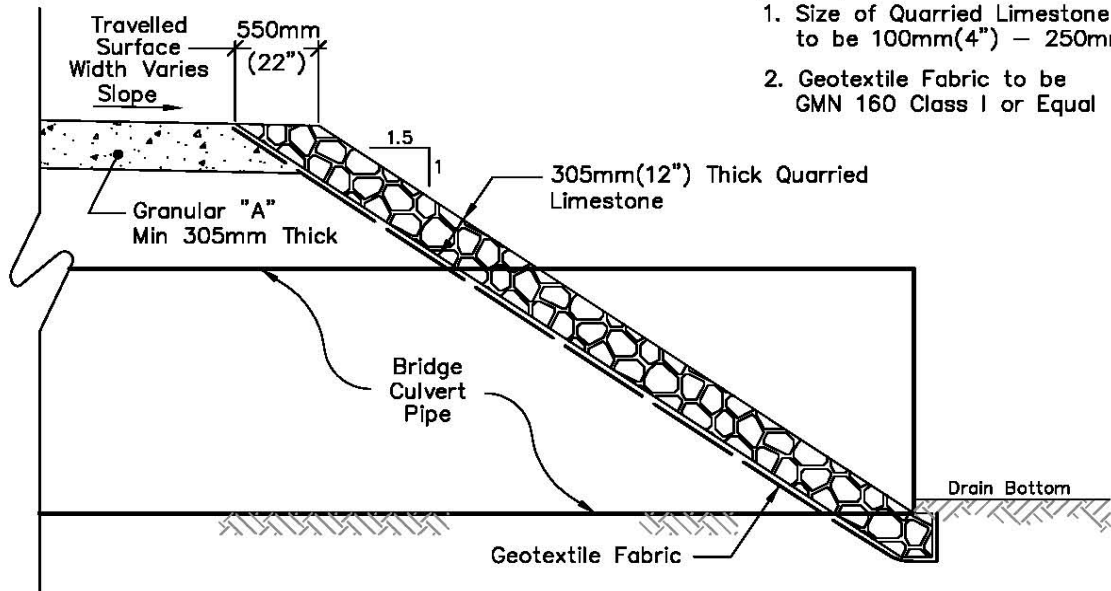
All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Town Drainage Superintendent and Engineer.



Typical Jute Bag Headwall

NOTE:

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



Typical Quarried Limestone End Protection

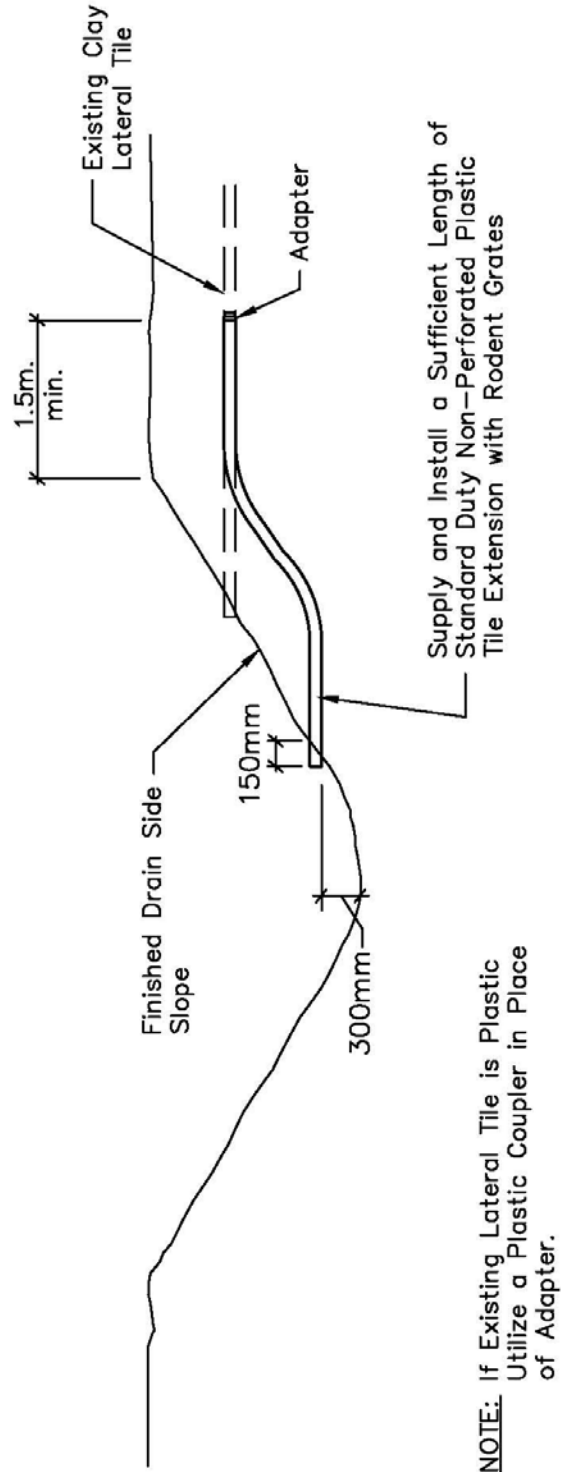
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

Leamington, Ontario N8H 1G6

519-322-1621



STANDARD LATERAL TILE DETAIL

N. T.S.



Block Headwall Installation Instructions for Culverts

1. A swift lift device will be required to place the blocks. A 75mm eye bolt will be required to place the caps.
2. The bottom course of blocks shall be founded on a firm solid base. The contractor shall provide a minimum levelling course of 150mm of compacted 3/4" Clear Stone, or a 100% compacted granular A, or lean concrete as a foundation base.
3. Ensure that the base is level and flat as this will greatly improve speed of installation.
4. On new culverts a minimum of 150mm of block wall will extend below the culvert to prevent scouring under the culvert.
5. The bottom course of blocks shall be embedded into the drain bottom to achieve the desired top elevation of the wall.
6. Blocks shall extend from the pipe invert across the full height and width of the drain and be imbedded a minimum of 300mm into the drain banks. Where possible the top of the block wall will match the height of the completed driveway.
7. Blocks shall be placed such that all joints are staggered.
8. Any excavation voids on the ends of block walls below subsequent block layers shall be filled with 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"

Appendix D – General Conditions and Specifications for Fish Salvage not required.

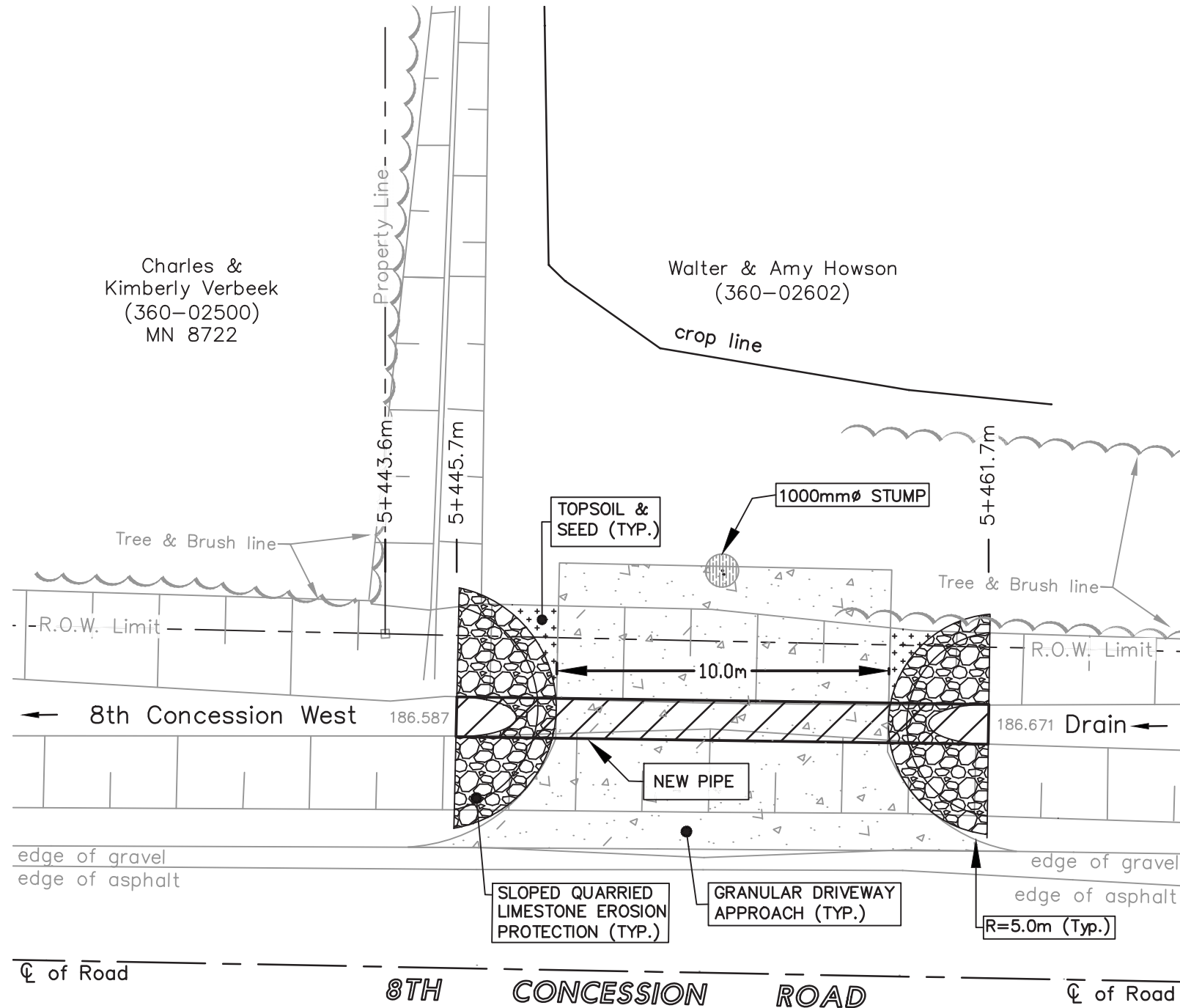
APPENDIX "REI-E"



Charles &
Kimberly Verbeek
(360-02500)
MN 8722

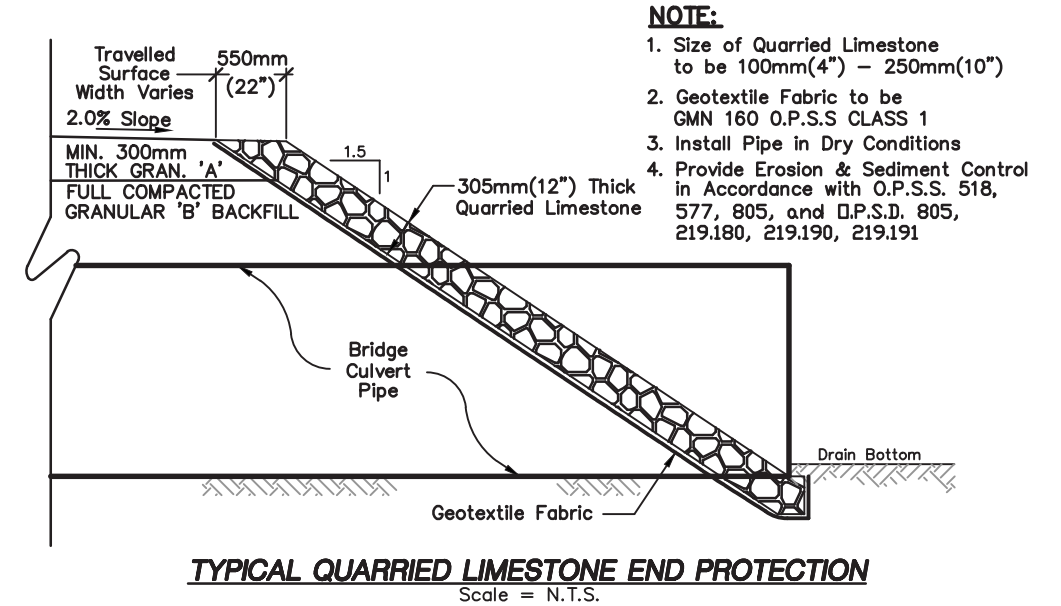
Walter & Amy Howson
(360-02602)

crop line

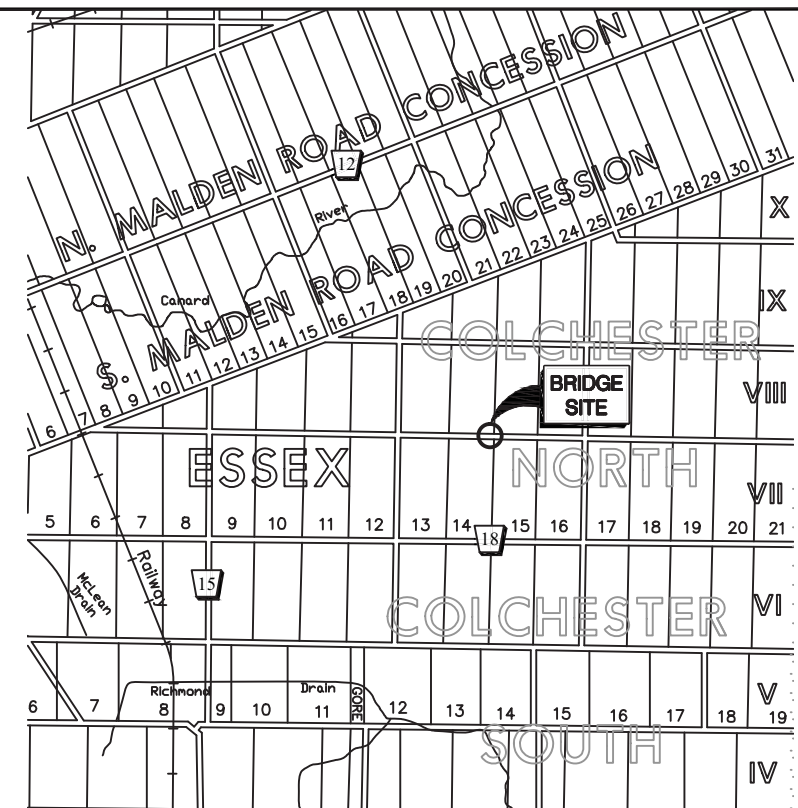


NOTE:
REMOVE & DISPOSE OF EXISTING
STUMP AND TREES OBSTRUCTING
ENTRANCE

BRIDGE PLAN
SCALE = 1:200



- NOTE:**
1. Size of Quarried Limestone to be 100mm(4") - 250mm(10")
 2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
 3. Install Pipe in Dry Conditions
 4. Provide Erosion & Sediment Control in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191



KEY PLAN
Scale = 1:100,000

BENCHMARK:
TOP OF NAIL SET IN NORTH FACE OF HYDRO POLE LOCATED ON THE SOUTH
SIDE OF THE 8TH CONCESSION ROAD DIRECTLY ACROSS FROM THE PROPOSED
BRIDGE AND SOUTHEAST OF M.N. 8722
ELEV. = 188.289m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mm	16.0m (52.5 FT.)	2.0 mm (14 GA.)	125x25mm (5.0"x 1.0")	ALUMINIZED C.S.P	UPSTREAM INV. (E) =186.397m DOWNSTREAM INV. (W) =186.365m ☐ TOP OF DRIVEWAY =188.033m DRAIN GRADE = 0.20%

8TH CONCESSION WEST DRAIN
Bridge for Walter & Amy Howson 360-02602
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO



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

FILE No.:
2017D025
DRAWN BY: L.V.
PLOT CODE: 1:1
FILE: REI2017D025.DWG

APPENDIX 'E'
1 OF 1

DATE: 2018-01-22