

# BASSETT DRAIN

Replacement Bridge & Enclosure for 730-01300

Geographic Township of Colchester South



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

***Rood Engineering Inc.***  
**Consulting Engineers**  
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Project REI2021D008  
2021-11-16



November 16th, 2021

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

Mayor Snively and Members of Council:

**BASSETT DRAIN**  
**Replacement Bridge & Enclosure for 730-01300**  
**Geographic Twp. of Colchester South**  
**Project REI2021D008**  
**Town of Essex, County of Essex**

## **I. INTRODUCTION**

In accordance with the instructions received from you by letter of April 23rd, 2021, from your Clerk, Legal and Legislative Services, Robert Auger, we have prepared the following report that provides for the construction of a replacement access bridge and enclosure in the Bassett Drain. This proposed bridge replacement and new enclosure is intended to provide a safer access to the residential lands and increase the front lawn area of parcel 730-01300, in the Geographic Township of Colchester South. The Bassett Drain is an open drain with a number of access bridges. The drain was constructed pursuant to the Drainage Act. A plan showing the Bassett Drain alignment, as well as the general location of the above-mentioned bridge and enclosure, is included herein as part of the report.

Our appointment and the works related to the construction of the above-mentioned access bridge and enclosure in the Bassett 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 and enclosure, as well as the Bassett Drain, and we report thereon as follows.

## **II. BACKGROUND**

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

- |    |                    |                                      |                     |
|----|--------------------|--------------------------------------|---------------------|
| 1) | December 7th, 2007 | Bassett Drain repair and improvement | Gerard Rood, P.Eng. |
|----|--------------------|--------------------------------------|---------------------|

The 2007 report by Gerard Rood, P.Eng. provided for general repairs and improvements to the entire length of the drain and has the latest profile for the grading of the drain. We arranged with the Town to provide us with the updated assessment roll information for the affected parcels. We also reviewed reports for the abutting drains and spoke to the owners to help in establishing the current watershed limit for the Bassett Drain.

We have utilized the plans within the Rood report to establish the size parameters for the drain and the details to be used in establishing the new bridge culvert and enclosure 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 new access bridge and enclosure 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 and enclosure.

### **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 July 13th, 2021. The following people were in attendance at said meeting: Mark Fishleigh (County Field Services Engineer), William and Debbie Harris, Peter Battaglia, Roger Putman, Fernando & Maria Pedro and Jenny Cacilhas, Norm Nussio (Manager of Operations & Drainage), Tanya Tuzlova (Drainage Clerk), Elizabeth Stiers (Town Drainage Staff), Lindsay Dean (Town Drainage Superintendent), and Gerard Rood (Rood Engineering).

Details of the proposed bridge work were reviewed. It was confirmed that the replacement bridge should be located near the east limit of the parcel and centred on the existing bridge and driveway. The owner had requested enclosure of the drain across the frontage of the property and was advised that this would be investigated. Ms. Dean noted that the Town would apply to the County for any permit required for completion of the works.

We advised the owner that the minimum standard top width for an access bridge is 6.10 metres (20 ft.) and that the bridge centreline location will need to be established with them. They were also advised that because the bridge is a replacement bridge, the cost of the new replacement access bridge construction, as well as all the cost for the preparation of the Engineer's Report would be borne by them and shared with the upstream affected lands and roads, and future maintenance costs would be shared by the owner and upstream affected lands and roads. Any cost for additional top width and construction of the enclosure will be borne by the owner for both the construction and future maintenance of the structure. It was established that the owner prefers a 6.10 metre (20') top width at the driveway entrance. We went on to discuss that sloped quarried limestone on filter cloth ends for installation were expected to be the most economical, but concrete filled jute bag ends or precast concrete blocks for the installation, like those on

other newer bridges, were expected to be an economical end treatment as well, and the owner requested that the precast concrete block ends be utilized.

The overall drainage report procedure, future maintenance processes and grant eligibility were generally reviewed with the owners. They were also advised that the works will be subject to the approval of the Department of Fisheries and Oceans (D.F.O.), the Ministry of Natural Resources and Forestry (M.N.R.F.), the Ministry of Environment, Conservation and Parks (M.E.C.P.) and the Essex Region Conservation Authority (E.R.C.A.). We further discussed bridge maintenance, sizing, and material of the proposed bridge, suggesting that an aluminized corrugated steel pipe will be employed similar to the bridge a few metres downstream and others in the drain.

#### **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 replacement access bridge.

A benchmark was looped from previous work carried out on the drain and was utilized in establishing a site benchmark 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 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 Bassett 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 for work that would be proposed to be carried out on the section of the Bassett Drain to be improved. A response from the Conservation Authority was received via email on June 24th, 2021. E.R.C.A. stated that the affected portion of the Bassett Drain is located within a regulated area administered by E.R.C.A. Accordingly, a permit or approval will be required from E.R.C.A. for any construction works to the affected portion of the Bassett Drain.

As part of our investigations, a D.F.O. self screening assessment of the project was carried out. The mapping indicated no species at risk or critical habitat for the area of the bridge work. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be embedded below the design or existing bottom of the drain a minimum of 10% of the bridge opening height to ensure a continued path for fish migration through the access bridge. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels identified in this area. Should any species be encountered, details of required mitigation measures are included in the Specifications and **Appendix “REI-A”** forming part of this report.

Former Ministry of Natural Resources and Forestry (M.N.R.F.) agreements are replaced with new legislation provisions under Ontario Regulation 242/08, Section 23.9, administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.), which allows repairs, maintenance and improvements to be conducted by the Municipality within existing municipal drains. These

works are exempt from Sections 9 and 10 of the Endangered Species Act provided that the rules in the regulations are followed by the Municipality and their contractor. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

For the purposes of establishing the watershed area upstream of the proposed replacement bridge and enclosure, and determining the pipe size required, we investigated and reviewed the past drainage reports on the Bassett Drain.

## **V. FINDINGS AND RECOMMENDATIONS**

Prior to the preparation of our report, we reviewed the details of the new bridge and enclosure installation including the end treatment options based on the regulatory restrictions and the cost estimates that we were to review. The preliminary plan for the bridge replacement and enclosure installation was submitted to E.R.C.A. and D.F.O. in liaison with the Town Drainage Department. When their clearances were received for the enclosure, we provided the owner with a copy of the draft plan and preliminary estimates. The owner found the proposed bridge replacement and enclosure acceptable to proceed with. In liaison with Drainage Superintendent Lindsay Dean, we contacted the County of Essex for any installation requirements, and they only asked for a permit to be applied for before the construction proceeds.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owner, we would recommend that a new access bridge and enclosure be constructed in the Bassett 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 issues and comments related to this Municipal drain. To prevent flooding and adverse impacts upstream, the new structure needs to provide an equivalent level of service to the adjacent structures. Therefore, based on this, we have made provisions to use an aluminized corrugated steel pipe culvert as set out below, similar to the structure a short distance downstream and other pipes in the drain. The Bassett 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. Details of these mitigation measures are included in the Specifications and **Appendix "REI-A"** forming part of this report. The Town will be required to apply for a permit from E.R.C.A. before proceeding with the construction of the project.

As part of our investigations, a D.F.O. self screening assessment of the project was carried out. The mapping indicated no species at risk or critical habitat for the area of the bridge work. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be embedded below the design or existing bottom of the drain a minimum of 10% of the bridge opening height to ensure a continued path for fish migration through the access bridge. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels

identified in this area. Should any species be encountered, details of required mitigation measures are included in the Specifications and **Appendix “REI-A”** forming part of this report.

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

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

Since all of the work will be carried out at the existing driveway and is primarily from within the road allowance and limits of the drain, and because full restoration will be provided, we find that there is no requirement for damages or allowances pursuant to Sections 29 and 30 of the Drainage Act.

Based on all of the above, we recommend that a new replacement access bridge and enclosure be constructed in the Bassett Drain to serve the lands of Peter Battaglia and Samantha El-Ahmar, 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 **SIXTY SEVEN THOUSAND SIX HUNDRED NINETY DOLLARS (\$67,690.00)**, made up as follows:

### **CONSTRUCTION**

- Item 1) Provide all labour, equipment and material to construct a new access bridge and enclosure consisting of 26.0 metres (85.3 ft.) of 1200mm diameter 2.0mm thick aluminized steel Type II corrugated Hel-Cor pipe with annular ends and 125mm x



## **VII. DRAWINGS AND SPECIFICATIONS**

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

## **VIII. SCHEDULE OF ASSESSMENT**

We would recommend that all of the costs associated with the construction of this replacement access bridge, and the preparation of this Engineer’s report, be assessed against the lands of Peter Battaglia and Samantha El-Ahmar, in Part of Lot 8, Concession 2, and all upstream affected lands and roads in the Town of Essex. A Schedule of Assessment has been prepared and included herein to indicate the lands and roads assessed for this replacement access bridge and the enclosure installation.

Pursuant to the current Agricultural Drainage Infrastructure Program (A.D.I.P.) Policies that are in place, it is anticipated that these lands will not be eligible for a grant, but any upstream lands designated as Farm Property Tax Class will 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.

Where a bridge structure has increased top width beyond the standard 6.10 metre (20.0 ft.) top width, all of the increased costs resulting from same are assessed 100% to the Owner, as provided for in the cost sharing set out in the attached Schedule of Assessment.

## **IX. FUTURE MAINTENANCE**

We recommend that the bridge and enclosure 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 and enclosure within the Bassett Drain shall be maintained in the future by the Town of Essex. Furthermore, if any maintenance work is required to this access bridge and enclosure in the future, we recommend that 72.7% of the future maintenance costs shall be assessed as a Benefit against the abutting property (Parcel 730-01300) being served by the access bridge and enclosure, which is currently owned by Peter Battaglia and Samantha El-Ahmar, in Part of Lot 8, Concession 2, and the remaining balance of 27.3% be assessed pro-rata against the upstream affected lands and roads based on their Outlet Liability assessment in the attached Schedule of Assessment. This sharing reflects that the owner has requested an enclosure of the drain beyond the bridge standard 6.1 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 replacement access bridge and enclosure, 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.***

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Gerard Rood, P.Eng.

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att.

**ROOD ENGINEERING INC.**

Consulting Engineers  
9 Nelson Street  
LEAMINGTON, Ontario N8H 1G6

**SCHEDULE OF ASSESSMENT**  
**BASSETT DRAIN**  
**(Replacement Bridge & Enclosure for 730-01300)**  
**Town of Essex**

**3. MUNICIPAL LANDS:**

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Lands Ward 3 (Harrow Centre)				89.93	36.394	Town of Essex	\$ -	\$ 13,342.00	\$ -	\$ 13,342.00
Roads Ward 3 (Harrow Centre)				27.79	11.246	Town of Essex	\$ -	\$ 4,122.00	\$ -	\$ 4,122.00
County Road 20				0.96	0.389	County of Essex	\$ -	\$ 143.00	\$ -	\$ 143.00
<b>Total on Municipal Lands.....</b>							<b>\$ -</b>	<b>\$ 17,607.00</b>	<b>\$ -</b>	<b>\$ 17,607.00</b>

**4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:**

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
730-01100	2	Pt. 8	0.773	1.91	0.773	2597849 Ontario Ltd.	\$ -	\$ 119.00	\$ -	\$ 119.00
730-01101	2	Pt. 8	0.202	0.50	0.202	Kevin Shannon	\$ -	\$ 47.00	\$ -	\$ 47.00
730-01104	2	Pt. 8	0.093	0.23	0.093	Jose & Lucilia Liberato	\$ -	\$ 27.00	\$ -	\$ 27.00
730-01130	2	Pt. 8	0.210	0.52	0.210	Jose & Lucilia Liberato	\$ -	\$ 48.00	\$ -	\$ 48.00
730-01131	2	Pt. 8	0.113	0.28	0.113	Scott & Terri Waters	\$ -	\$ 31.00	\$ -	\$ 31.00
730-01140	2	Pt. 8	1.137	2.81	1.137	Scott & Terri Waters	\$ -	\$ 159.00	\$ -	\$ 159.00

**Bassett Drain**  
**(Replacement Bridge & Enclosure 730-01300)**  
Town of Essex

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
730-01150	2	Pt. 8	3.553	8.78	3.553	Gordon & Rebecca Nascimento	\$ -	\$ 261.00	\$ -	\$ 261.00
730-01200	2	Pt. 8	0.186	0.46	0.186	Gregory & Maria Underwood	\$ -	\$ 46.00	\$ -	\$ 46.00
730-01300	2	Pt. 8	0.919	2.27	0.919	Peter Battaglia & Samantha El-Ahmar	\$ 49,210.00	\$ 135.00	\$ -	\$ 49,345.00
<b>Total on Privately Owned - Non-Agricultural Lands.....</b>							<b>\$ 49,210.00</b>	<b>\$ 873.00</b>	<b>\$ -</b>	<b>\$ 50,083.00</b>
<b>TOTAL ASSESSMENT</b>				136.44	55.22		<b>\$ 49,210.00</b>	<b>\$ 18,480.00</b>	<b>\$ -</b>	<b>\$ 67,690.00</b>

1 Hectare = 2.471 Acres  
Project No. REI2021D008  
November 16th, 2021

**SPECIFICATIONS**  
**BASSETT DRAIN**  
**Bridge Replacement & Drain Enclosure for 730-01300**  
**Geographic Twp. of Colchester South**  
**TOWN OF ESSEX**

**I. GENERAL SCOPE OF WORK**

The Contractor shall provide all material, labour, and equipment to construct a new replacement bridge and drain enclosure along the north side of County Road 20 west of Roseborough Road at Harrow Centre for Parcel 730-01300. The work will consist of installing approximately 26.0 metres (85.3 ft.) of 1200mm diameter, 2.0mm thick aluminized steel Type II corrugated pipe, with precast concrete block headwalls at each end for an access driveway and lawn enclosure. The general layout of the new replacement bridge and drain enclosure construction and other ancillary work, including tile diversion, gravel driveway, topsoil placement, seeding and mulching, shall be provided as shown and detailed in the accompanying drawings attached within **Appendix "REI-E"**. Benchmarks have been set along the course of the work for use by the Contractor in completing same.

**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 requirements 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.

**III. M.N.R.F. & M.E.C.P. ENDANGERED SPECIES ACT CONSIDERATIONS**

The Ministry of Natural Resources & Forestry (M.N.R.F.) Species at Risk former Town agreement with M.N.R.F. pursuant to Section 23 of the "Endangered Species Act, 2007" expired as of June 30th, 2015. The former agreements are replaced with new regulation provisions under Ontario Regulation 242/08 administered by the M.E.C.P. The Contractor is to note that the Ministry of

**Specifications** – Bassett Drain  
Replacement Bridge & Drain Enclosure 170-01300  
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Environment, Conservation and Parks (M.E.C.P.) screening process by way of a Species at Risk (S.A.R.) review of the M.E.C.P. “Endangered Species Act, 2007” (E.S.A.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. prior to construction. This Section allows the Town to conduct eligible works of repair, maintenance, and improvements to existing municipal drains under the Drainage Act, and exemptions from Sections 9 and 10 of the E.S.A., provided that the requirements are followed in accordance with Ontario Regulation 242/08. The results of the review will be provided to the Contractor and copies of the mitigation measures, habitat protection and identification sheets will be included within **Appendix “REI-B”**. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

The M.N.R.F. - M.E.C.P. mapping has basically confirmed that snake species including Butler’s Garter Snake and Eastern Fox Snake are threatened and endangered, respectively, on this project. Because snakes are mobile and indicated as sensitive and endangered in the area, we have included herein a copy of the M.N.R.F. - M.E.C.P. mitigation requirements for them in **Appendix “REI-B”**. Providing mitigation requirements are implemented, it was concluded that present wildlife Species at Risk will be protected from negative impacts and the works will not contravene Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007.

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. & M.E.C.P. measures, and follow the special requirements therein included during construction. Throughout the course of construction, the Contractor will be responsible to ensure that all necessary provisions are undertaken to protect all species at risk and their habitats. If a threatened or sensitive species is encountered, the Contractor shall notify the Town and M.N.R.F. - M.E.C.P. and provide all the equipment and materials stipulated by the mitigation requirements for handling the species and cooperate fully with the Town and M.N.R.F. - M.E.C.P. staff in the handling of the species.

#### **IV. BRIDGE REPLACEMENT & ENCLOSURE CONSTRUCTION**

The Contractor shall provide all material, labour, and equipment to remove and dispose of the existing access bridge and all unsuitable materials along the alignment of the new replacement bridge and drain enclosure, as shown and noted in the drawings. The Contractor shall supply and install new 1200mm diameter 2.0mm thick aluminized Type II corrugated steel pipe (C.S.P.) along the north side of the road, extending from the east end of the existing access bridge to a point near the west limit of the parcel being served by the enclosure as detailed on the plans.

The Contractor shall also note that the placing of the new C.S.P. is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent and Consulting Engineer. The new corrugated steel pipe shall be set to the grades as noted and as shown and detailed on the plans with special

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care to match the inverts of the pipe to the embedded depth at each end so that 10% of the pipe diameter or height is embedded below the existing or drain design grade, whichever is lower.

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

Once the new corrugated steel pipe has been satisfactorily set in place, the Contractor shall completely backfill the driveway area with granular material M.T.O. Type “B”, O.P.S. Specification Form 1010, except for the top 300mm. The top 300mm (12”) of the backfill material for the full top width of the trench across the driveway shall be granular material M.T.O. Type “A” O.P.S. Specification Form 1010. All other sections of the drain pipe shall be backfilled with select native material, thoroughly compacted around the pipe, to ensure that there is minimal settlement upon completion of the work. The backfilling of the corrugated steel pipe, unless otherwise specified herein, shall be provided in total compliance with Item 3) and Item 4) of the **“Standard Specifications for Access Bridge Construction Including Endwall Treatment, Backfilling, and Installation Procedures”**. These are attached to the back of these Specifications and labelled **Appendix “REI-C”**. The Contractor shall comply in all respects with the General Conditions included in Item 4) in the **“Standard Specifications”** in said Appendix.

At the east and west end of the bridge and enclosure drain pipe, the Contractor shall supply and install precast concrete block headwalls including 300mm thick footing, concrete cap, and rock on filter cloth erosion protection on the banks adjacent to the walls as outlined on the plans and as set out in the Schedule of Items and Prices. The standard concrete blocks shall be 600mm X 600mm X1200mm long and include half blocks to allow for staggering of the vertical joints.

The Contractor shall connect the new C.S.P. to the concrete block walls with the use of a mortar joint. Said mortar joint shall be provided for the full circumference of the drain pipe and depth of the walls and be of a sufficient mass to produce a sealed joint, all to be performed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer. All grout for the mortar joint shall be provided in unopened pre-mixed bags or shall comprise of 3 parts of clean sharp sand to 1 part Portland cement with just sufficient water added to provide a stiff plastic mix. The Contractor shall employ a standard factory 9C (corrugation) bolted coupler to connect between the various pipes segments with each joint wrapped in filter cloth extending 300mm beyond the coupler on each end.

The Contractor, as part of this project, is to divert the existing tile drain as noted and detailed on the plans. For the lateral drain pipe that is being abandoned, the plug shall comprise a minimum 305mm (12 in.) long concrete grout plug, securely packed into each end of the abandoned pipe segment for the full internal diameter of the pipe or be a manufactured cap designed for the purpose. The connection of the existing tile drain and the entire installation of the new covered

**Specifications** – Bassett Drain  
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drain shall be performed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer representative.

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

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

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

All materials shall be stored and handled by the Contractor at its own expense. It shall be responsible for the safe storage of all materials, for obtaining storage area, for the safe transportation and distribution of all the materials at the job site, and for inspection in order to determine defects and breakage. No additional recompense will be allowed the Contractor for any loss incurred by it in the storage and handling of the materials.

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

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

The Contractor shall further contact or notify such utility company or commission of its intention to carry out work in the area and co-operate with such utility company or commission in the location, maintenance and preservation of all such utilities. The Contractor shall note that if the trench passes in close proximity to hydro poles, it shall temporarily brace or secure such poles as

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it deems necessary to prevent any damage to the utility. The location of the pipes and appurtenances as shown on the drawings is approximate and may be changed by the Consulting Engineer if deemed advantageous for the progress of the work.

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

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

All excavation shall be made in compliance with the drawings and in such a manner and at such depths and widths as will give ample room for installing the pipe, the bracing, sheeting, or otherwise supporting the sides of the excavation and for the pumping of ground water if encountered. The Contractor is fully responsible for the safety of all its people and equipment and must conform completely to the provisions of the "Construction Safety Act".

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

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

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

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

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

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

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

Backfill for the drain pipe shall be in accordance with the specifications noted previously. In the driveway entrance areas, the Contractor shall provide all granular backfill comprising Granular "B", compacted to 98% S.P.D. to within 300mm of the underside of any existing driveway. The top 300mm of the granular backfill shall comprise Granular "A" compacted to 100% S.P.D. If the driveways have asphalt surfaces in the future, the top of the trench shall be completed with a minimum 90mm thick lift of hot mix HL-4 or equivalent SuperPave asphalt or to match the existing asphalt thickness, in maximum 50mm thick lifts. All asphalt shall be carefully placed and compacted in place with rollers or plate tampers to achieve 92% to 96% of maximum relative density in accordance with O.P.S.S. 310. The Contractor shall at all times be very careful when

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performing its backfilling and compaction operations so that no damage is caused to the covered drain. To ensure that no damage is caused to the proposed drain pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Consulting Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work.

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

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

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

The Contractor will be required to provide topsoil and seed and mulch all areas along the length of the new enclosure drain installation. Outside of the roadway limits the topsoil shall consist of good clean, dry loam, fine graded and compacted in place and ready for seeding and mulching in accordance with O.P.S.S. Form 802. The seeding and mulching operation shall be carried out according to O.P.S.S. Form 804 and all of this work is to be performed to the full satisfaction of the Town Drainage Superintendent and Consulting Engineer.

#### **V. CONSTRUCTING NEW SWALES**

The Contractor shall provide all labour, material, and equipment, in order to construct a swale drain along the enclosure to direct surface flows to the west end and discharge through the rock protection that is shown and detailed in the accompanying drawings. The Contractor shall be required to strictly adhere to this swale design unless otherwise directed and approved by the Consulting Engineer on the project.

The swale shall generally be constructed with a V-section, having minimum 4 horizontal to 1 vertical side slopes. All swales shall be graded to ensure positive flow of the surface drainage from the existing driveway into the rock protected side slope at the pipe ends. All materials excavated from the swale, except scavenged topsoil, including all deleterious materials shall be loaded up and hauled away and disposed of by the Contractor to a site to be obtained by it at its own expense.

All swales and boulevard areas are to be completely restored with topsoil, seed and mulch. Where required by the work, all disturbed and newly filled areas and surfaces of newly graded

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shallow swales shall be covered with approximately 100mm of topsoil fine graded. Across all grass boulevard areas, the swale and drain banks shall be restored by utilizing a seed and mulch mix and shall be thoroughly restored to their pre-construction conditions. The placing and grading of all topsoil and seeding shall be carefully and meticulously carried out according to the specifications above. The Contractor shall provide watering of seed areas in accordance with O.P.S.S. requirements. As part of the work, the Contractor must provide a full one (1) year guarantee on all seeding and mulching work and will be required to repair all areas that erode or where the grass cover fails to catch. All work shall be meticulously done and completed in a good and workmanlike fashion to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer.

## **VI. ANCILLARY WORK**

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

The Contractor shall be required to remove and dispose of the existing 1200mm C.S.P. driveway pipe and concrete filled jute bag headwalls or end treatments at the existing access to the parcel. Any deleterious and other materials not required for the restoration of the site shall be loaded up, hauled away, and disposed of by the Contractor to a site to be obtained by it at its expense.

The Contractor shall be required to restore any and all drain sideslopes and boulevard areas damaged by the replacement access bridge and enclosure 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 Consulting 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

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workmanlike manner, all to the full satisfaction of the Town Drainage Superintendent or Consulting Engineer.

## **VII. ACCESS TO WORK**

The primary accesses to the work shall be from County Road 20 along the north and south bank of the open drain. For the open portion, the Contractor shall generally have access to a minimum 6.0 metre wide strip of land adjacent to the top of the north and south bank of the drain to carry out brushing, grubbing, excavation operations and for disposal of excavated fill materials. Said access shall also be utilized for the installation of any tile diversions that are necessary as determined by the Drainage Superintendent in consultation with the Contractor.

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 to carry out its works. This will be a particular concern along the lawn areas of any residential properties. Any accesses or areas utilized in carrying out the works are to be fully restored to their original conditions by the Contractor, including topsoil placement and lawn restoration as directed by the Consulting Engineer or the Town Drainage Superintendent. Restoration shall include, but not be limited to, all necessary levelling, grading, shaping, topsoil placement, and granular required to make good any damage caused. Where asphalt roadways or driveways are damaged, the Contractor shall neatly saw cut the limits of the damaged area, remove the broken materials, and restore the area using hot mix asphalt to match the existing thickness. The Contractor shall dispose of all removed material, compact the hot mix asphalt in maximum 50mm lifts, and complete all repairs to the full satisfaction of the Town Director of Works, the Town Drainage Superintendent and the Consulting Engineer.

As part of the work, the Contractor will be required to provide traffic control to ensure the safety of the travelling public at all times. The Contractor shall provide all necessary lights, signs, barricades and flag persons to properly control traffic to the satisfaction of the County and the Town. All signs shall be in accordance with the Manual of Uniform Traffic Control Devices (M.U.T.C.D.) and as further set out in these specifications.

## **VIII. REMOVAL OF BRUSH, TREES AND RUBBISH**

Where there is any brush, trees or rubbish along the course of the drain, including the full width of the access, all such brush, trees or rubbish shall be close cut and grubbed out, and the whole shall be chipped, burned, or otherwise satisfactorily disposed of by the Contractor. The Contractor shall take note of the E.R.C.A., D.F.O. and M.N.R.F. requirements to preserve trees wherever possible along the drain banks. Any clean, mature trees located on the slope within 0.5 metres of the top of the bank are to be preserved where they appear stable and are not likely to adversely impact the drain bank. All dead Elm and Ash trees are to be completely removed along

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the length of the project. The brush and trees removed along the course of the work are to be put into piles by the Contractor in locations where they can be safely chipped or burned by it or shall be hauled away and disposed of by the Contractor at its expense. Prior to and during the course of the burning operations, the Contractor shall comply with the guidelines prepared by the Air Quality Branch of the Ontario Ministry of the Environment and shall ensure that the Environmental Protection Act is not violated. The Contractor will be required to notify the local fire authorities and co-operate with them in the carrying out of any work. The removal of brush and trees shall be carried out in close consultation with the Town Drainage Superintendent or Consulting Engineer to ensure that no decorative trees or shrubs are disturbed by the operations of the Contractor that can be saved. It is the intent of this project to save as many trees and bushes as practical along the course of the work.

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

Any trees that need to be removed shall be cut and cleared to a maximum stump height of 75mm (3"). Brush and bushes shall be cut to ground level. Once all of the trees have been cut to the required level by the use of a chainsaw or other acceptable mechanical equipment, the Contractor may utilize a flail machine. The flail machine may be used to cut and trim all remaining brush and trees which are smaller than 100mm (4") in diameter along either side slope of the drain and the access area. The removal of rubbish and bulrushes or other debris shall be included in the Contractor's rate of payment for excavation. No excavation shall occur until after brush clearing and close cutting is completed.

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

In no case will brush or trees be allowed to be buried in the spoil bank or within the excavated material. The Contractor will be required to brush-rake the excavated material to remove said brush and trees from the spoil, if so instructed by the Town Drainage Superintendent or the Consulting Engineer.

As part of its brushing work, the Contractor will be required to monitor the drain during the first two (2) rain storms following completion of the work and clear out any jamming or obstruction caused by chipped or flailed material floating downstream and accumulating at any areas. All such material removed by the Contractor to clear any obstruction shall be hauled away by it and disposed of at a site to be obtained by it at its own expense. The Contractor will be required to check all bridge locations downstream and ensure that no major blockage is caused as a result of chipped or flailed material being transported downstream by the storm runoff.

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The Contractor shall note that it will also be responsible to remove all sod and topsoil from the drain bank receiving the general erosion protection and rock chute inlets. The Contractor shall retain sufficient topsoil materials to carry out any restoration and repairs that are required for the works. All excess materials and deleterious substances shall be hauled away and disposed of by the Contractor at a site to be arranged by it at its own expense in accordance with the excess soil regulations.

#### **IX. FENCING**

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

#### **X. EXCAVATION AND DISPOSAL OF FILL**

The open drain shall be excavated for approximately 3 metres upstream and downstream of the new pipe installation to the lines, levels, grades and cross sections as shown on the accompanying drawings or as may be further established by the Town Drainage Superintendent or the Consulting Engineer at the time of the work. The drain shall be carefully excavated so as to not disturb the existing banks, rock protection, and vegetation, except for those portions of the drain where widening or restoration of a stable drain bank configuration is required. Where existing rock protection has to be removed to provide the proposed bank protection, the Contractor shall salvage the rock and use same to carry out the required bank protection as outlined further in these specifications. The bottom width of the drain and the sideslopes of the excavation shall conform to the dimensions given on the drawings. In no case shall the drain bottom project above the grade line as shown on the accompanying drawings, and as determined from the Benchmarks. The finished side slopes of the drain shall be no steeper than existing cross sections for each section of drain. The Contractor shall be very careful to not unnecessarily deepen the drain. At the locations of the rock protection installation along the drain banks, the Contractor shall ensure that the slope is cut to the dimensions provided for on the profile and cross sections for that portion of the Municipal Drainage System.

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Stations have been established along the course of the drain and are numbered consecutively. The work generally extends from the east limit of the affected parcel to a point near the west end.

The excavation work shall include removal of all sod and topsoil on the drain bank where improvements are being carried out. The Contractor shall reserve sufficient salvaged topsoil materials to allow for any restoration works that it is required to carry out. The Contractor shall shape the bank for the installation of the general erosion protection as shown on the plans and cross sections. The Contractor will be required to cut the drain banks to the sideslopes as indicated on the profiles and cross sections within the plans and as noted above. The Contractor shall make every reasonable effort to protect the existing gravel roadways and asphalt surfaces from damage during the course of its works. As part of the work, the Contractor will carry out bottom dipping to restore the drain section as outlined on the drawing cross sections.

The Contractor is advised that all excavated material from the work shall be hauled away and disposed of by the Contractor at its own expense for those areas along lawns, parking lots and bush lot areas. In all cases, the disposal of any trucked material will be the responsibility of the Contractor and any work at the disposal site shall be established between the Contractor and the site owner. The Contractor shall ensure that any permits required for fill disposal are obtained from the appropriate authority. The Contractor will be responsible for keeping all private and public roadways free and clear of mud and debris resulting from its use of same for access and hauling purposes.

#### **XI. GENERAL EROSION PROTECTION**

At the locations indicated on the plans and as further noted in these specifications, the Contractor shall protect the drain banks utilizing general erosion protection. Once the Contractor has cut and shaped the drain banks, the Contractor shall supply all material and labour to place general erosion protection on the drain banks where protection is required for surface water inlets using rock chutes and for tile outlet protection on the drain sideslopes, as determined by the Town Drainage Superintendent or the Consulting Engineer during construction. The general erosion protection on the bank shall extend from the drain bottom up along the slopes to the top of the drain bank as required and as shown and detailed on the plan.

Along the banks of the drain, the general erosion protection is to be embedded into the sideslopes of the drain a minimum thickness of 305mm (12") and same shall be underlain in all cases with a non-woven synthetic filter mat. The synthetic filter mat shall not only be laid along the flat portions of the quarried limestone protection but is also to be contoured to the exterior limits of same between the quarried limestone and the unprotected drain side slope. The Contractor, in placing the general erosion protection, shall carefully tamp the quarried limestone pieces into place with the use of the excavator bucket so that said protection, when completed, will be consistent, uniform, and tightly laid, and in no instance shall the quarried limestone pieces protrude beyond the exterior contour of the unprotected drain side slopes along either side of

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the drain. The general erosion protection shall be installed so that it extends up on the drain side slope as shown and detailed on the plans. The synthetic filter mat to be used shall be non-woven, Geotextile GMN 160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm (4") to a maximum of 250mm (10") on the 305mm thick areas. Said rock is available from Walker Aggregates Amherst Quarries in Amherstburg, Ontario, or equal.

At the locations where surface water inlets and pipes protrude through the drain bank, the Contractor shall provide for rock and filter cloth to be carefully placed around the pipes and below the surface water inlets to achieve a rock chute inlet, ensuring that the rock extends up to the midpoint of the pipe, or to the top of the banks, and for a minimum width of 500mm on each side of the pipe. The Contractor shall be careful not to damage or disturb any pipes penetrating through the drain banks and provide a minimum 305mm (12") thick layer of rock below the invert of the pipe and for any surface water inlets and rock chutes.

The Contractor shall provide 305mm thick erosion protection of the drain banks and these shall be placed at the locations as further established by the Drainage Superintendent or Consulting Engineer at the time of construction:

## **XII. BENCHMARKS**

Also, for use by the Contractor, we have established Benchmarks along the course of the work. The primary Benchmark is the top of the nail in north face of hydro pole located on the south side of County Road 20 approximately 8 metres east of the existing bridge serving MN 2361, and this **Benchmark** is Elevation **187.694 metres**. The Benchmarks are provided along the course of the drain as set out on Sheet 1 of the Plans. The Contractor shall utilize same in establishing the elevation of the drain bottom and all of the rock protection being installed along the course of the drain.

## **XIII. ANCILLARY WORK**

During the course of the improvements along the drain, the Contractor will be required to protect or extend any existing tile ends or swales to maintain the drainage from the adjacent lands. All existing tiles shall be extended utilizing Boss 2000 or equal plastic pipe of the same diameter as the existing tile and shall be installed in accordance with the "Standard Lateral Tile Detail" as shown on the plans. Connections shall be made using a manufacturer's coupling wherever possible. Grouted mortar joints shall be composed of three (3) parts of clean, sharp sand to one (1) part of Portland cement and the mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The mortar joint shall be of a sufficient mass around the full circumference of the joint to ensure a tight, solid seal.

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#### **XIV. TOPSOIL, SEED AND MULCH**

As part of the project, all bare, disturbed and newly filled areas and the surface of all damaged grass areas shall be covered with approximately 100mm of topsoil, fine graded. Across the front of residential properties, the lawn areas shall be restored by the installation of good quality OSECO Lawn Seed Mixture, Canada No. 1, or equal. All grass boulevard areas and drain banks shall be restored utilizing a seed and mulch mixture and shall be thoroughly restored to their pre-construction condition, or better. The placing and grading of all topsoil shall be carefully and meticulously carried out according to Ontario Provincial Standard Specifications, Form 572, dated November 2003, or as subsequently amended or as amended by these Specifications.

The Contractor is advised that control of erosion and sedimentation is a major requirement of this project. The Contractor will be expected to implement control measures including, but not limited to, utilizing silt fences and straw bales in the drain bottom to reduce the amount of sediment escaping downstream into the receiving water bodies. Said work shall be carried out in general conformance with Ontario Provincial Standard Specifications, Form 577, dated November 2006, or as subsequently amended or as amended by these Specifications. As an integral part of the sedimentation control, the Contractor will be required to carry out seeding and mulching on a timely basis so that no portion of the excavated drain or fill placed is left exposed for an extended length of time.

The newly disturbed or filled side slopes shall be seeded and mulched in accordance with the Ministry of Transportation Specifications for same. The Contractor shall be required, as part of the preparation for seeding and mulching, to spread the scavenged topsoil, or new topsoil, and harrow the side slopes and fill areas and to include said cost in its lump sum price bid. Where there is a shortage of topsoil, the Contractor shall provide good, black, loamy topsoil at no extra cost to the project.

The seeding and mulching operation shall be carried out according to Ontario Provincial Standard Specifications Form 572, dated November 2003 or as subsequently amended or as amended by these Specifications. The seeding mixture and rate of application per hectare shall be as follows: Creeping Red Fescue 54 kg. (120 lbs.); Kentucky Blue Grass 22 kg. (49 lbs.); Perennial Rye Grass 13 kg. (30 lbs.); Crown Vetch 11 kg. (25 lbs.); Wild White (Dutch) Clover 6 kg. (12 lbs.); and Oats or Rye 62 kg. (135 lbs.).

If the seeding and mulching operation is carried out in the spring, the seeding mixture shall contain Oats, and if the seeding and mulching operation is carried out in the fall, the mixture shall contain Rye. The seeding and mulching operations shall only be carried out as weather conditions permit in either the months of May or June in the spring, or during the months of September and October in the fall, unless written permission is obtained from either the Consulting Engineer or the Town Drainage Superintendent. If the excavation work is carried out during the months of May and June

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or September and October, the Contractor has the option of hand seeding. It must contact the Town Drainage Superintendent and the Consulting Engineer, and if the Contractor receives their written permission, the seed mixture as above specified, may be placed by hand, daily, at the completion of its daily excavation operation. If the Contractor has been given permission by the Town Drainage Superintendent to place the seeding mixture by hand daily, at the completion of its daily excavation operation, the Contractor shall be responsible to give the areas to be seeded a rough, harrowed texture prior to placing the seed mixture.

As part of the seeding and mulching operation, the Contractor will be required to provide either a hydraulic mulch mix or a spread straw with adhesive binder mulch, in accordance with O.P.S.S. 1103.05.03 dated November 2007, or as subsequently amended, to ensure that the grass seed will be protected during germination and provide a thick uniform cover to protect against erosion. The Contractor shall provide watering of seed areas in accordance with O.P.S.S. requirements and, as part of the work, the Contractor must provide a full one (1) year guarantee on all seeding and mulching work and will be required to repair all areas that erode or where the grass cover fails to catch. All work shall be meticulously done and completed in a good and workmanlike manner to the complete satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

**XV. GENERAL CONDITIONS**

- a) The Town Drainage Superintendent or Consulting Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.
- b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility or other object which it may encounter during the course of the work. The Contractor shall indemnify and save harmless the County of Essex, 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 County of Essex, the Town of Essex or the Consulting Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.
- c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Consulting Engineer can review same and check that the work will generally conform to the design and project intent.
- d) The Contractor will be responsible for any damage caused by it to any portion of the Town road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its' employees and the cost of all labour and materials used to carry out the repair work shall be

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- deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, etcetera, from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.
- e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.
  - f) During the course of the work the Contractor shall be required to connect existing drainage pipes to the Municipal Drain. In the event that polluted flows are discovered, the Contractor shall delay the connection of the pipe and leave the end exposed and alert the Town, the Drainage Superintendent and the Consulting Engineer so that steps can be taken by the Town to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Town in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.
  - g) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.
  - h) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.
  - i) During the course of the project the Contractor shall deal with any excess soil management from the project in accordance with Ontario Reg 406/19 pursuant to the Environmental Protection Act, R.S.O. 1990, c. E.19 and any subsequent amendments to same.
  - j) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Consulting Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses, the Consulting Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.

**Specifications** – Bassett Drain  
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- k) The Contractor will be required to submit to the Town, a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work and the Contractor will be required to submit to the Town, a Certificate of Clearance for the project from the Workplace Safety and Insurance Board before Final Payment is made to the Contractor.
  
- l) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Town. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Town in every way and shall guarantee faithful performance of the contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

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

- m) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project; and shall name the County of Essex, the Town of Essex and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.
  
- n) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:
  - i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
  
  - ii) proof of advertising
  
  - iii) a Statutory Declaration, in a form satisfactory to the Engineer and the Town, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.

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

- o) In the event that the Specifications, Information to Tenderers, or the Form of Agreement do not apply to a specific condition or circumstance with respect to this project, the applicable section or sections from the Canadian Construction Documents Committee C.C.D.C.2 shall govern and be used to establish the requirements of the work.
- p) Should extra work be required by the Town Drainage Superintendent or Consulting Engineer, and it is done on a time and material basis, the actual cost of the work will be paid to the Contractor with a 15% markup on the total actual cost of labour, equipment and materials needed to complete the extra work.

## APPENDIX "REI-A"



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

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

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



# Measures to Avoid Causing Harm to Fish and Fish Habitat

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

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

## Measures

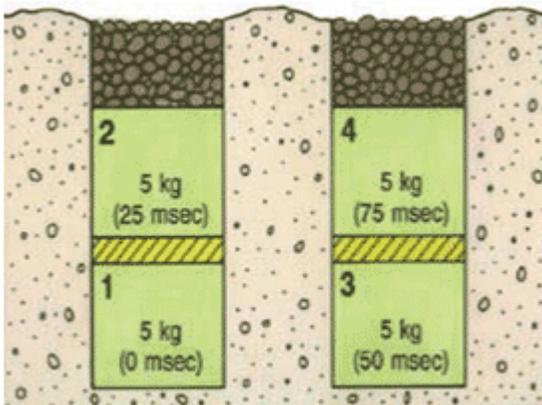
- Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish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

- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
  - 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



## APPENDIX "REI-B"



**SCHEDULE C**  
**MITIGATION PLAN**

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

**PART A. DEFINITIONS**

**1. Definitions:**

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

"DFO" means Fisheries and Oceans Canada;

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

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

"Holding Tub" means a large, light-coloured container fitted with a non-airtight latching 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](http://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](http://www.dfo-mpo.gc.ca), that sets out the conditions and measures to be incorporated into a project in order to avoid negative impacts to fish and fish habitat in Ontario, as modified from time to time;

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

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

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

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

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

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

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

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

## **PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS**

### **2. Process Charts**

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

### **3. Review of Documentation**

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

### **4. Sensitive Areas Maps**

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

### **5. Prior Notification to Seek Direction**

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

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

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

## **6. General Mitigation Measures**

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

## **PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS**

### **ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES**

#### **7. Activities undertaken in Sensitive Areas for Mussels**

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

### **ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES**

#### **8. Training and Required On Site Materials for Turtles**

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

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

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

## **10. Measures for Encounters with Turtles During a Sensitive Period**

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

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

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

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

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

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

### **13. Release of Captured Individuals Outside of a Sensitive Period**

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

### **14. Measures for Dead Turtles**

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

## **ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES**

### **15. Training and Required On Site Materials for Snakes**

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

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

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

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

**17. Measures for Encounters with Snakes During a Sensitive Period**

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

**18. Measures for Encounters with Snake Nests**

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

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

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

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

#### **20. Release of Captured Individuals Outside of a Sensitive Period**

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

#### **21. Measures for Dead Snakes**

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

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

#### **ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS**

##### **22. Activities Undertaken in Sensitive Areas for Herbaceous Plants**

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

#### **ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES**

##### **23. Additional Measures for Butternut**

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

#### **24. Measures for Other Trees**

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

#### **PART D. MONITORING AND REPORTING REQUIREMENTS**

##### **25. Compliance Monitoring.**

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

##### **26. Reporting**

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

##### **27. Review**

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

## APPENDIX "REI-C"



# STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION

## 1. PRECAST CONCRETE BLOCK & CONCRETE FILLED JUTE BAG HEADWALLS

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

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

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

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

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

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

All concrete used for the footing, cap and bags shall have a minimum compressive strength of 30 mPa at 28 days and shall include 6% ± 1% air entrainment.

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

the cap. The Contractor shall fill all voids between the concrete filled jute bags and the corrugated steel pipe with concrete, particular care being taken underneath the pipe haunches to fill all voids.

The completed jute bag headwalls shall be securely embedded into the drain bank a minimum of 450mm (18") measured perpendicular to the sideslopes of the drain.

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

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

## **2. QUARRIED LIMESTONE ENDWALLS**

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

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

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

## **3. BRIDGE BACKFILL**

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

## **4. GENERAL**

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

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

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

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

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

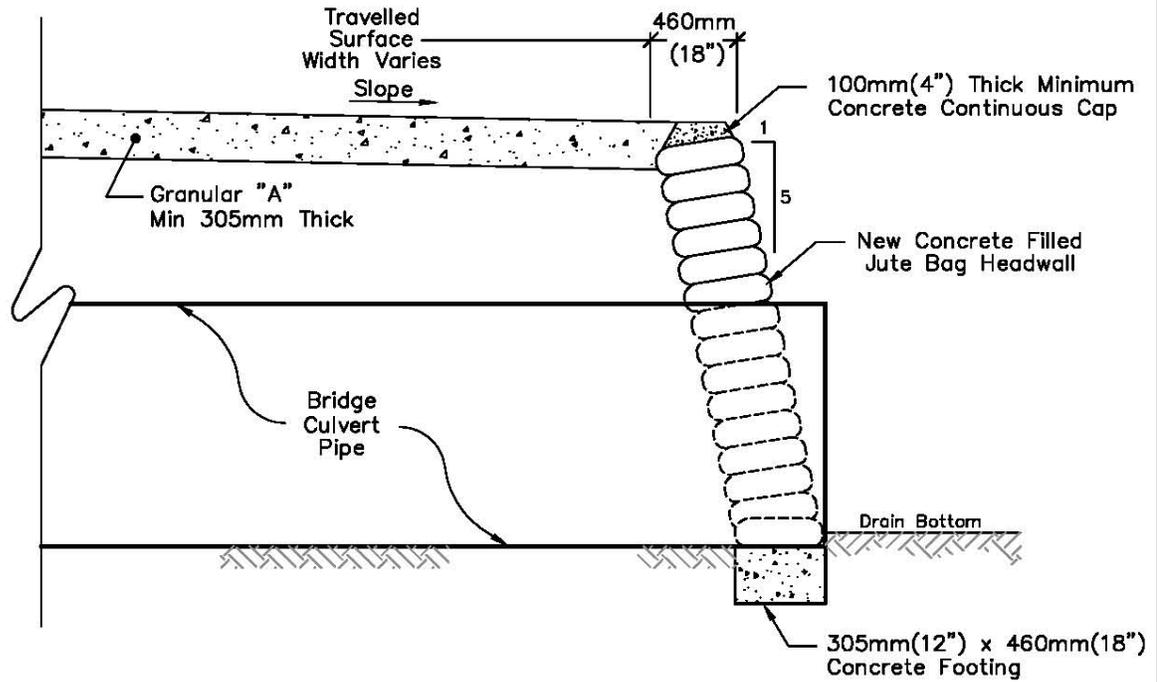
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

When working along a municipal roadway, the Contractor shall provide all necessary lights, signs, barricades and flagpersons as required to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, it is to comply with the M.T.O. Traffic Control Manual for Roadway Work Operations and Ontario Traffic Manual Book 7.

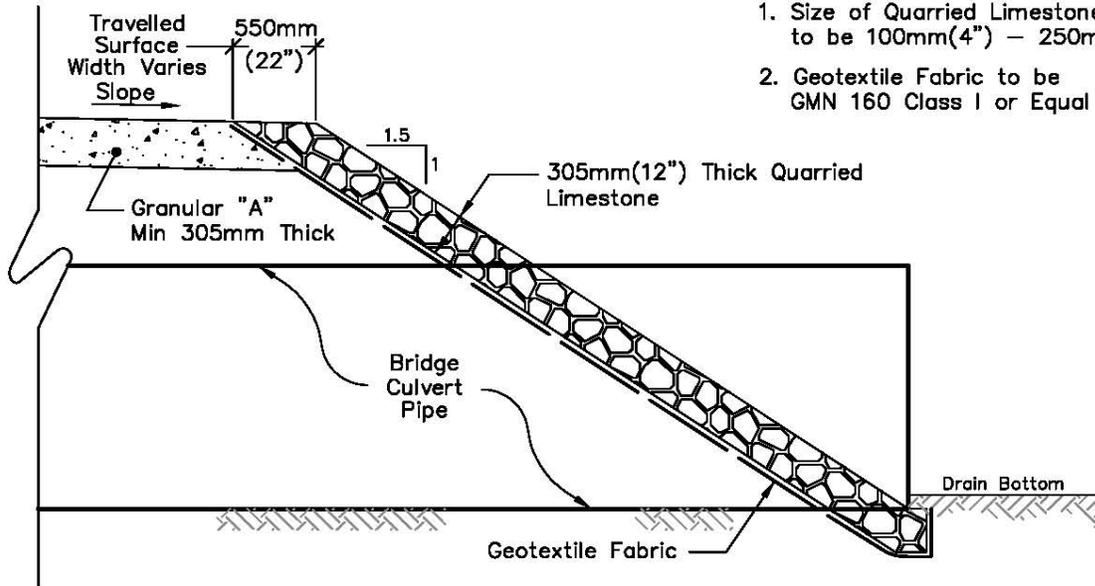
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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

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



**Typical Jute Bag Headwall**



**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**

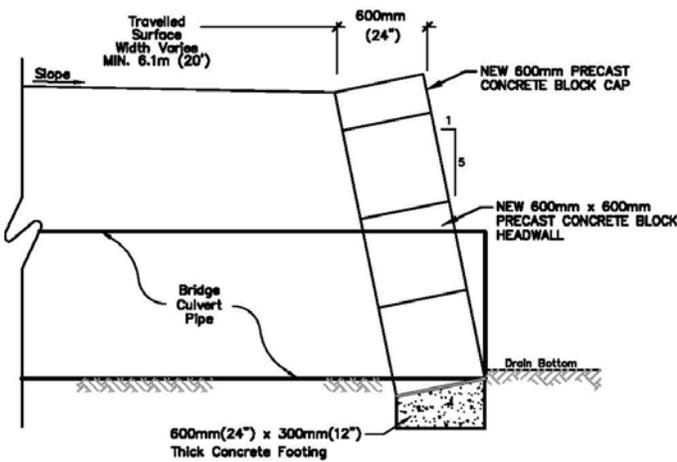
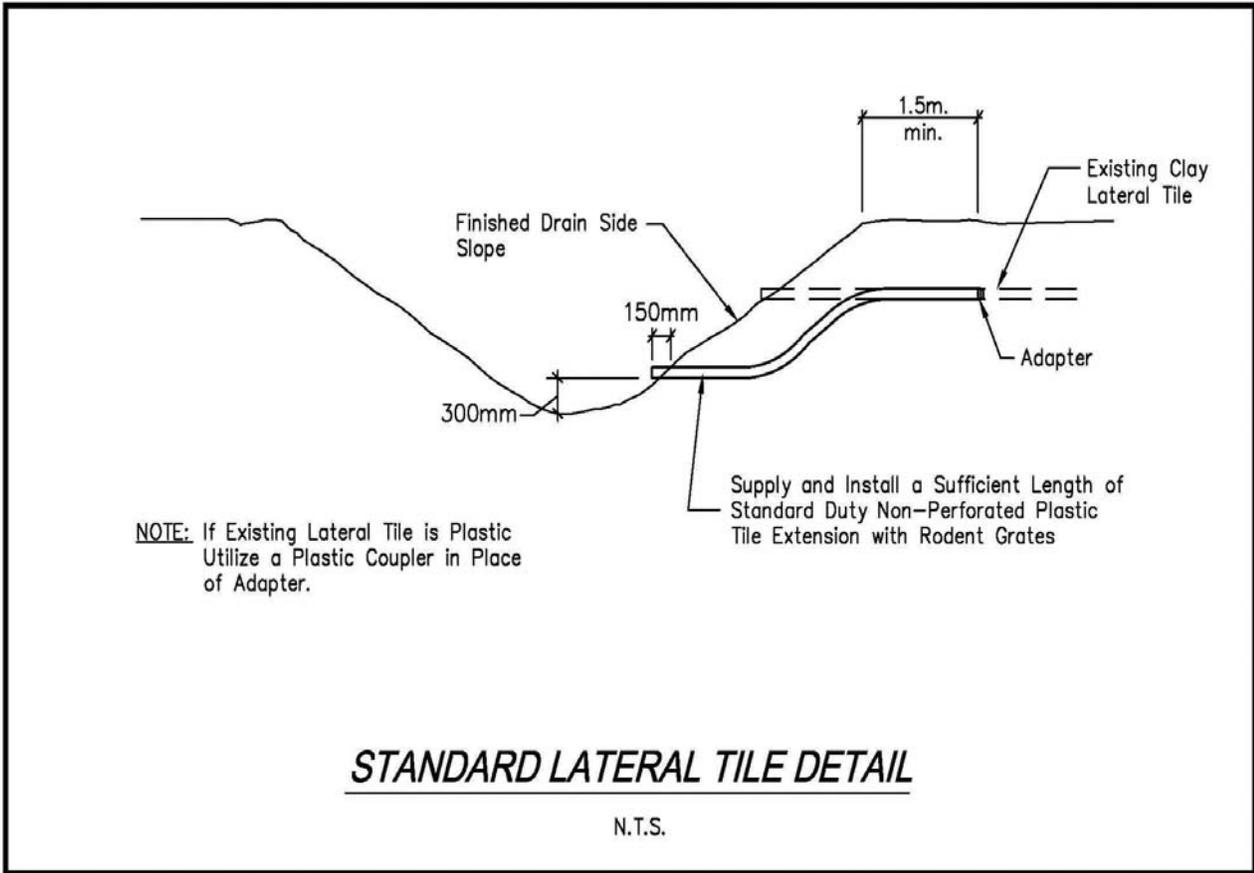
***Rood Engineering Inc.***

**Consulting Engineers**

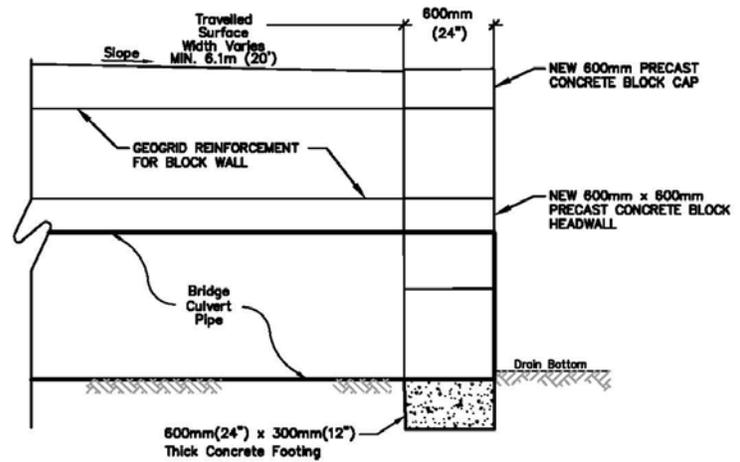
**9 Nelson Street**

**Leamington, Ontario N8H 1G6**

**519-322-1621**



**TYPICAL PRECAST CONCRETE BLOCK END PROTECTION**  
Scale = N.T.S.



**TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION**  
Scale = N.T.S.



## APPENDIX "REI-D"

General Conditions and Specifications not required

## APPENDIX "REI-E"



WATERSHED PLAN & DETAILS

OF THE

**BASSETT DRAIN**

Bridge Enclosure For Peter Battaglia & Samantha El-Ahmar (730-01300)

Geographic Township of Colchester South

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

*Gerard Rood*  
GERARD ROOD, P.ENG.



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

DATE: November 16th, 2021

TOWN OF ESSEX

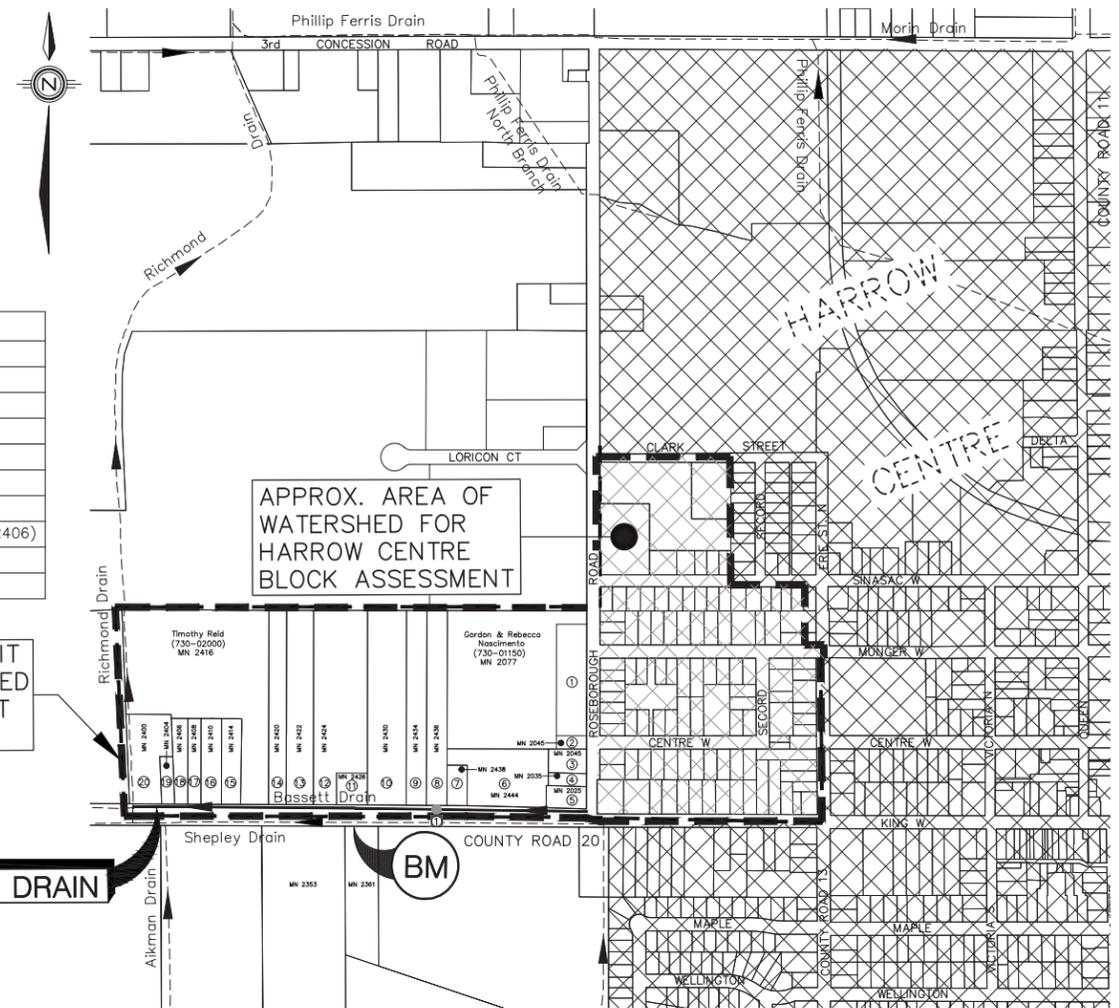
MAYOR: Larry Snively  
CLERK: Robert Auger  
DRAINAGE SUPERINTENDENT: Lindsay Dean, B.Sc.

**BENCHMARKS:**

TOP OF NAIL IN NORTH FACE OF HYDRO POLE LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 20 APPROX. 8.0m EAST OF THE EXISTING BRIDGE SERVING MN 2361.

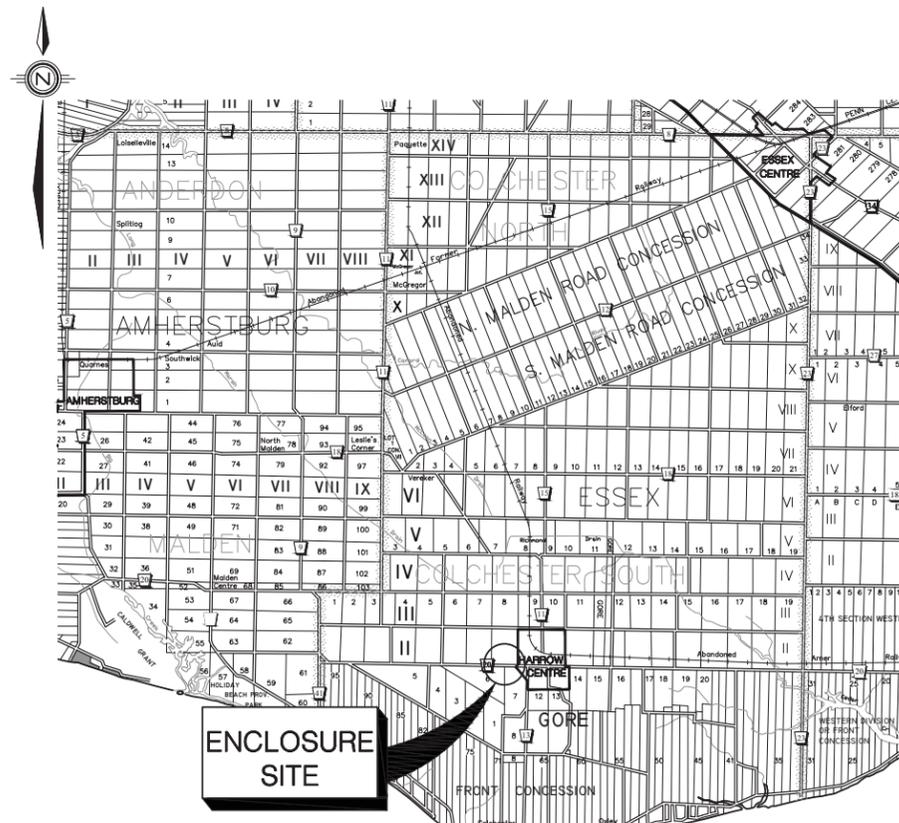
ELEV. = 187.694m

No.	Roll No.	Owner/s	No.	Roll No.	Owner/s
1	730-01100	2597849 Ontario Ltd.	11	730-01700	Rachelle Bastien (MN 2426)
2	730-01104	Jose & Lucilia Liberato	12	730-01710	Rodney & Cynthia Wilson (MN 2424)
3	730-01130	Jose & Lucilia Liberato (MN 2045)	13	730-01800	Roger & Charles Putman (MN 2422)
4	730-01131	Scott & Terri Waters (MN 2035)	14	730-01900	Michel & Debra Lamirande (MN 2420)
5	730-01101	Kevin Shannon (MN 2025)	15	730-02100	William Harris (MN 2414)
6	730-01140	Scott & Terri Waters (MN 2444)	16	730-02300	Bernard & Carol Korpan (MN 2410)
7	730-01200	Gregory & Maria Underwood (MN 2438)	17	730-02400	Darren Chartrand (MN 2408)
8	730-01300	Peter Battaglia & Samantha El-Ahmar	18	730-02500	Luanne Cipkar & Mickal Menogue (MN 2406)
9	730-01500	Hilary Zullo (MN 2434)	19	730-02600	Lucien Garant (MN 2404)
10	730-01600	Fernando & Maria Pedro (MN 2430)	20	730-02700	Donald & Blanche Guthrie (MN 2400)



**WATERSHED PLAN**

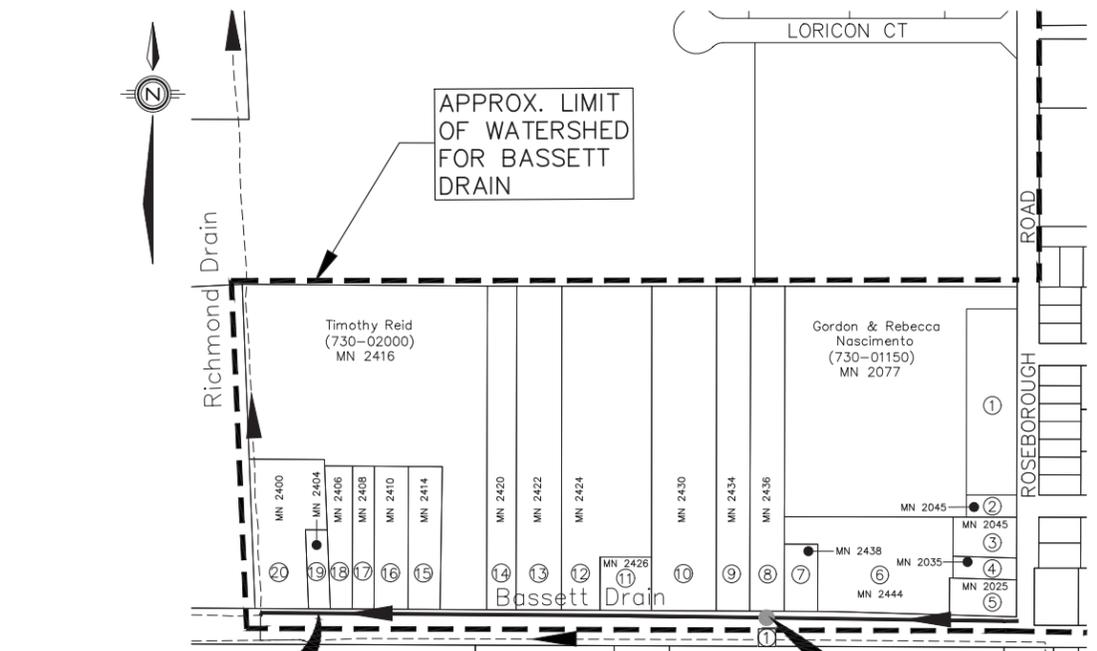
Scale = 1:8,000



**ENCLOSURE SITE**

**KEY PLAN**

Scale = 1:50,000



**BASSETT DRAIN**

**WATERSHED PLAN - BLOW UP**

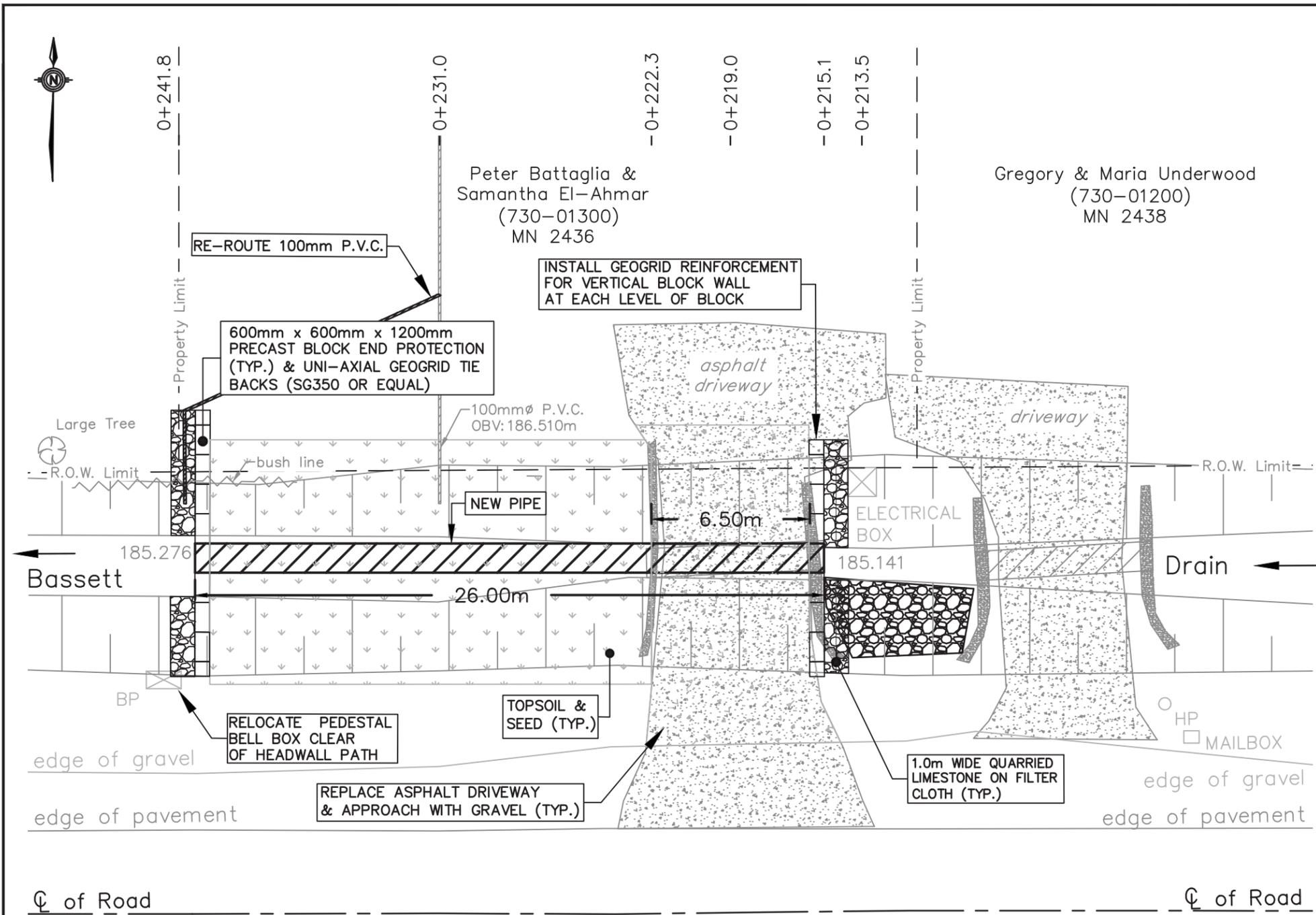
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**ENCLOSURE SITE**

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

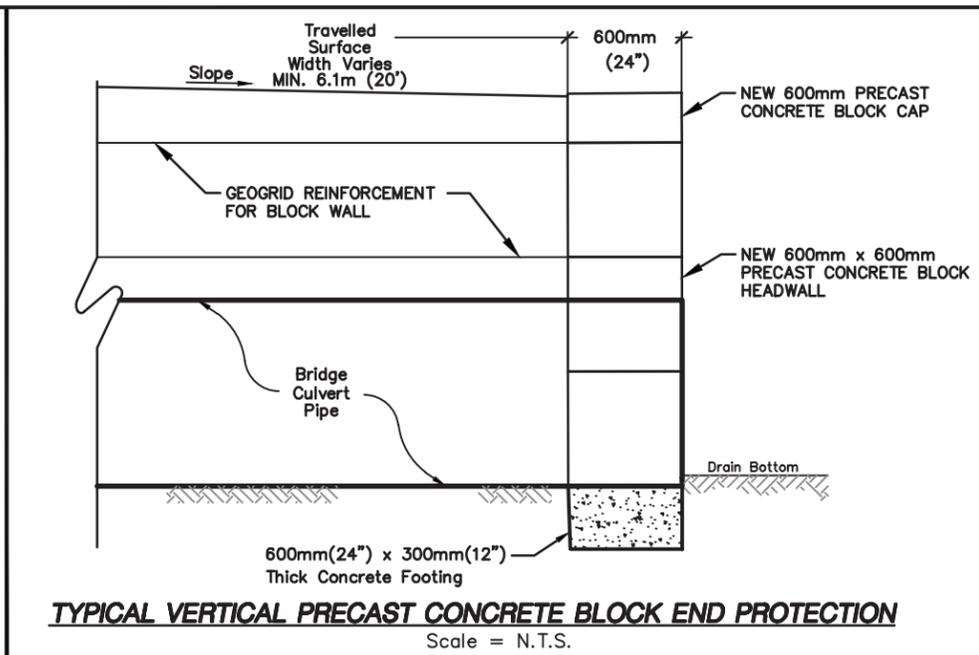
DRAWN BY: K.D.  
PLOT CODE: 1:1  
COMPUTER FILE: REI2021D008.DWG  
FILE No.: REI2021D008  
SHEET No.: 1 OF 2



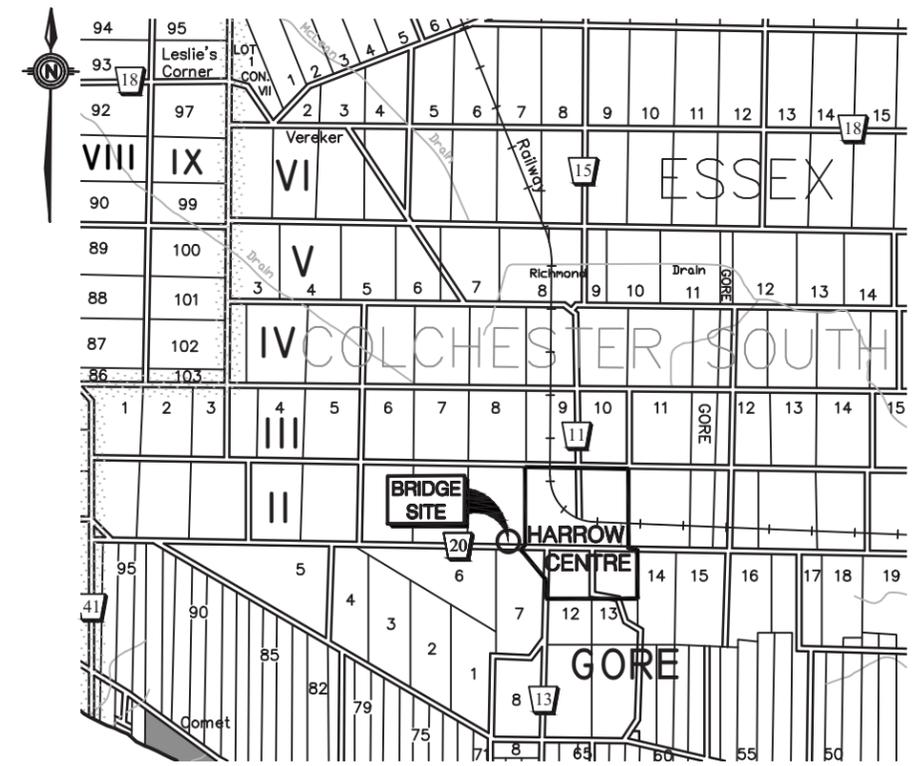


**COUNTY ROAD 20**

**BRIDGE PLAN**  
SCALE = 1:200



**TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION**  
Scale = N.T.S.



**KEY PLAN**  
Scale = 1:100,000

**BENCHMARK:**  
TOP OF NAIL IN NORTH FACE OF HYDRO POLE LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 20 APPROX. 8.0m EAST OF THE EXISTING BRIDGE SERVING MN 2361.  
**ELEV. = 187.694m**

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mm	26.0m (85.30 FT.)	2.0 mm (14 GA.)	125x25 mm (5.0"x1.0")	ALUMINIZED C.S.P.	UPSTREAM INV. (E) = 185.043 DOWNSTREAM INV. (W) = 185.004m ☉ TOP OF DRIVEWAY = 187.390m DRAIN GRADE = 0.15%

**BASSETT DRAIN**  
Bridge Enclosure For Peter Battaglia & Samantha El-Ahmar (730-01300)  
(GEOGRAPHIC TOWNSHIP OF COLCHESTER SOUTH)  
IN THE  
**TOWN OF ESSEX**  
IN THE  
**COUNTY OF ESSEX • ONTARIO**



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

FILE No.: 2021D008  
DRAWN BY: K.D.  
PLOT CODE: 1:1  
FILE: REI2021D008.DWG

DATE: 2021-11-16  
APPENDIX 'E'  
**2 OF 2**