

WEST TOWNLINE DRAIN

New Bridge for Union Gas

(Part Lot 1, Con. 3)

and

Updated Maintenance Schedule of Assessment

Geographic Twp. of Colchester South



TOWN OF ESSEX

33 Talbot Street South

ESSEX, Ontario N8M 1A8

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519-322-1621

REI Project 2016D061

April 26th, 2019

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

Mayor Snively and Members of Council:

**WEST TOWNLINE DRAIN
Bridge for Union Gas (Part of Lot 1, Concession 3) and
Updated Maintenance Schedule of Assessment
Geographic Twp. of Colchester South
Project REI2016D061
Town of Essex, County of Essex**

I. INTRODUCTION

In accordance with the instructions received from you by letter of October 19th, 2016, from your Manager, Legislative Services (Clerk), Robert Auger, we have prepared the following report that provides for the construction of a new access bridge in the West Townline Drain and an updated Maintenance Schedule of Assessment for the drainage works. This proposed new bridge is intended to provide a safe access to serve Parcel 750-02100 being the Union Gas lands in Part of Lot 1, Concession 3, in the former Geographic Township of Colchester South. The West Townline Drain is primarily an open drain with a number of access bridges located along the east side of County Road 20 between the 3rd Concession Road and 4th Concession Road, and proceeds southerly along the easterly side of County Road 41 (Meadows Road) to its outlet into Lake Erie. The drain was constructed pursuant to the Drainage Act. A plan showing the West Townline Drain alignment, as well as the general location of the above-mentioned bridge, is included herein as part of the report.

Our appointment and the works related to the construction of the above-mentioned new access bridge in the West Townline Drain, proposed under this report, and preparation of the updated Maintenance Schedule of Assessment 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 new bridge and Maintenance Schedule for the West Townline Drain, and we report thereon as follows.

II. BACKGROUND

From our review of the Town's drainage files, we have determined that the West Townline Drain portion encompassing the affected bridge was last repaired under an Engineer's Report dated May 20th, 1971 by M. Armstrong, P.Eng. The works included in said report consisted of repair and improvement of the drain, and bridge improvements. The report also provided an assessment schedule for proper allocation of the construction costs. We have reviewed the report plans and assessment schedule to confirm the watershed limits of the drain and to form a basis for the updated Maintenance Schedule of Assessment.

We have also utilized the plan and profile within the Armstrong report to establish the size parameters for the drain and the details to be used in establishing the new bridge culvert installation. We have also used this Engineer's report to confirm the drain profile grades, and to assist us in establishing the design grade for the subject new bridge culvert installation. The Armstrong report was used to check the upstream watershed limits for confirming flows and the required bridge size and creating the construction Schedule of Assessment for the new bridge work.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the available drainage information and documentation organized in the town files, we arranged with Town staff to schedule an on-site meeting for June 14th, 2017. The following people were in attendance at said meeting: Dean Martin, Joe Gorski, Joe Kozera, Morley McLean, Leland McLean, Marvin Marontate, Maurice Hutchins, Roger Demars, Stephanie Demakos, Bill Bruce, Norm Nussio (Town of Essex Assistant Drainage Superintendent), and Gerard Rood (Rood Engineering).

Details of the proposed bridge work were reviewed. It was confirmed that the new bridge should be located north of the property line of parcel 750-03000, Pt. Lot 1, Con 3.

Union Gas advised us that the parcel requires a new bridge to access the existing parcel. Mr. Rood advised that a new maintenance schedule will be completed to use for assessing the cost of future drain maintenance and improvements that are planned.

We advised the owner that the minimum standard top width for an access bridge is 6.10 metres (20 ft.). After some discussions, it was established that the owner was satisfied with this width and preferred using the most economical end treatment so that cost is kept down. We went on to discuss that sloped quarried limestone on filter cloth ends for the installation was expected to be the most economical end treatment. A standard 5 metre turning radius will be provided at the gravel shoulder to enhance access across the bridge and the entrance will be graded no steeper than 6%. Union Gas was also advised that because the bridge is a new bridge, the cost of the new access bridge construction, as well as all the cost for the preparation of the Engineer's Report would be borne completely by the parcel owner. Any cost for additional top width will be borne by the owner. We went on to discuss that concrete filled jute bag ends or precast concrete blocks for the installation, like those on some other newer bridges, would be checked and the Engineer would contact the owner to review the engineering cost estimates if costs were comparable.

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 & Forestry (M.N.R.F.), and the Essex Region Conservation Authority (E.R.C.A.). We further discussed bridge maintenance, sizing, and material of the proposed bridge, suggesting that a corrugated aluminized steel pipe will likely be employed similar to the bridges a short distance upstream and downstream. It was further discussed that the current 1971 report is quite old and there have been several severances, so that the drain requires an updated maintenance schedule to properly assess future maintenance, and this will be included as part of the drainage report.

IV. FIELD SURVEY AND INVESTIGATIONS

Following the on-site meeting we arranged for our survey crew to attend at the site and perform a topographic survey, including taking the necessary levels and details to establish the design parameters for the installation of this new access bridge.

A bench mark was looped from previous work carried out on the drain and was utilized in establishing a site bench mark near the location of the bridge. We surveyed the drain both upstream and downstream of the proposed new access bridge. We also took cross-sections of the West Townline Drain at the general location of the proposed new bridge, as necessary for us to complete our design calculations, estimates and specifications.

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

For the purposes of establishing the watershed area upstream of the proposed bridge, and determining the bridge size required, we investigated and reviewed the Engineer's Report dated May 20th, 1971 as prepared by M. Armstrong, P.Eng. The report provided for repair and improvements on the West Townline Drain and included the required Schedule of Assessment.

V. FINDINGS AND RECOMMENDATIONS

Prior to the preparation of our report, we reviewed the details of the bridge installation including the end treatment options based on the regulatory restrictions and the cost estimates that we were to review. From our investigations, it was determined that the sloped quarried limestone on filter cloth endwall option was the most cost effective and we have proceeded with this option, along with H.D.P.E. smooth wall plastic pipe instead of using aluminized corrugated steel pipe (C.S.P.), as discussed at the on-site meeting. The pipe sizing is based on minimum conveyance of a 1:2 year storm event corresponding to the full flow capacity of the upstream and downstream pipe culverts in the drain, plus an allowance for embedment of the pipe, and conforms to the grade requirements set out in the 1971 report.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owner, we would recommend that a new access bridge be constructed in the West Townline Drain at the location and to the general parameters as established in our design drawings attached herein. It was also established that the covered portion of the drain would be impacted by the site works and provisions were made to deflect the drain around the work area as shown on the attached plans and we recommend that the section replaced with the deflected covered drain be abandoned pursuant to Section 19 of the Drainage Act.

During the course of our investigations, this drainage project was discussed and reviewed with E.R.C.A., to deal with any Authority and D.F.O. issues and comments related to this Municipal drain. To prevent flooding and adverse impacts upstream, the new structure needs to provide an equivalent level of service to the adjacent structures upstream and downstream and, as set out below, we have therefore used the same diameter for the current work. The Town will be required to obtain an E.R.C.A. permit for the 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 culverts. Therefore, based on this, we have made provisions to set the invert of the proposed H.D.P.E. culvert required for this bridge installation, at 10% of its diameter below the existing or design drain bottom, whichever is lower at the time

of construction. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels identified in this area. The West Townline Drain is located within the Regulated Area and is under the jurisdiction of the E.R.C.A., and therefore all work has to comply with the current mitigation provisions of the E.R.C.A. and D.F.O. Details of these mitigation measures are included in the Specifications and **Appendix “REI-A”** forming part of this report.

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

Based on all of the above, we recommend that the new access bridge be constructed in the West Townline Drain to serve the lands of Union Gas in Part of Lot 1, Concession 3, 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 bridge work including all incidental expenses is the sum of **SEVENTEEN THOUSAND TWO HUNDRED DOLLARS (\$17,200.00)**, made up as follows:

CONSTRUCTION

Item 1)	Provide all labour, equipment and material to construct a new access bridge consisting of 11.0 metres (36.1 ft.) of 525mm diameter, 320 kPa H.D.P.E. smooth wall pipe with wrap couplers; including sloped quarried limestone on filter cloth end protection, excavation, granular bedding and backfill, granular approaches, compaction, hauling, tile diversion, culvert protection, cleanup and restoration, complete.	Lump Sum	\$ 8,000.00
	Estimated Net H.S.T. (1.76%)		\$ 140.00
TOTAL FOR CONSTRUCTION			\$ 8,140.00

INCIDENTALS

1)	Report, Estimate, and Specifications	\$ 2,250.00
2)	Survey, Assistants, Expenses, Drawings,	\$ 3,500.00
3)	Duplication Cost of Report and Drawings,	\$ 900.00

4) Estimated Cost of Preparing Tender Documents	\$	900.00
5) Estimated Cost of Construction Supervision and Inspection (based on 1 day)	\$	1,000.00
6) Net H.S.T. on Items Above (1.76%)	\$	150.00
7) Estimated Cost of E.R.C.A. permit	\$	150.00
8) Estimated Contingency Allowance	\$	210.00
TOTAL FOR INCIDENTALS	\$	9,060.00
TOTAL FOR CONSTRUCTION (brought forward)	\$	8,140.00
TOTAL ESTIMATE FOR BRIDGE CONSTRUCTION	\$	17,200.00
TOTAL COST FOR MAINTENANCE SCHEDULE	\$	3,400.00

VII. DRAWINGS AND SPECIFICATIONS

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

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

VIII. SCHEDULE OF ASSESSMENT

We would recommend that all of the costs associated with the construction of this new access bridge, and the share of construction incidentals for preparation of this Engineer’s report, be assessed against the lands of Union Gas (750-02100), in Part of Lot 1, Concession 3. A construction Schedule of Assessment has been prepared and included herein to indicate the lands and roads assessed for this new access bridge installation. A Schedule of Assessment has been prepared and included herein to indicate the lands and roads assessed for the new maintenance schedule.

It has been clearly established that this new access bridge is being provided to serve as the access from County Road 20 to a new parcel. Pursuant to the current Agricultural Drainage Infrastructure Program (A.D.I.P.) Policies that are in place, the full cost of the bridge construction and incidental costs shall be borne by the owner.

We recommend that the Engineering cost of preparing the Maintenance Schedule of Assessment for this drain be assessed in accordance with the attached Maintenance Schedule of Assessment. In accordance with current A.D.I.P. policies, it is expected that the cost to 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 the preparation of this schedule, and for the sharing of future maintenance costs to the drain and bridges on a pro-rata basis with the values in this Maintenance Schedule of Assessment.

IX. FUTURE MAINTENANCE

After the completion of the construction of this new access bridge, all of same shall be maintained in the future by the Town of Essex.

Furthermore, if any maintenance work is required to this access bridge in the future, we recommend that 100% of the future maintenance costs shall be assessed as a Benefit against the abutting property (Parcel 780-02100) being served by the access bridge, which is currently owned by the utility Union Gas, in Part of Lot 1, Concession 3, pursuant to Section 26 of the Drainage Act.

We recommend that the new bridge structure as identified herein, be maintained in the future as part of the drainage works. We would also recommend that this legal access bridge constructed in the drain, for which the future maintenance costs are to be borne by the abutting affected landowner 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 this bridge culvert require removal as part of the maintenance works, these surfaces should also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guard rails 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 material 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 served by said access bridge.

When maintenance work is carried out on any bridges in the future, we recommend that part of the cost be assessed as a Benefit to the abutting parcel served by the access bridge, and the remainder shall be assessed to the upstream lands and roads based on their affected area and Outlet Liability assessments as set out in the attached Maintenance Schedule of Assessment. The share for Benefit and Outlet Liability shall be as set out in the Bridge Cost Sharing table below.

WEST TOWNLINE DRAIN
BRIDGE COST SHARING

<u>Bridge</u>	<u>Owners</u>	<u>Benefit to Owner</u>	<u>Outlet Upstream</u>
1	Town of Essex, Erie Blue Drive	98.0%	2.0%
2	County of Essex, Road 50,	98.0%	2.0%

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3	John Ciotoli, (670-02000),	41.0%	59.0%
4	Jean-Paul Lesperance & Marilyn Filiault, (670-01902),	46.0%	54.0%
5	Town of Essex, (2nd Concession Road),	98.0%	2.0%
6	Lightpath Utilities Inc., (750-01000),	70.3%	29.7%
7	Bruce & Daniela Smith, (750-01100),	62.0%	38.0%
8	Town of Essex, (Collison Sideroad),	98.0%	2.0%
9	Bruce & Daniela Smith, (750-01200),	62.8%	37.2%
10	County of Essex, (Road 50),	98.0%	2.0%
11	Morley, Rosemarie & Calvin McLean, (750-01400),	73.5%	26.5%
12	Ronald Renaud, (750-01500),	66.5%	33.5%
13	Nancy & Ronald Renaud, (750-01600),	66.5%	33.5%
14	Richard & Janet Geffs, (750-01700),	84.0%	16.0%
15	Matthew & Breanne Renaud, (750-01800),	66.5%	33.5%
16	John St. Louis, (750-01900),	66.5%	33.5%
17	Town of Essex, (3rd Concession Road),	98.0%	2.0%
18	Union Gas Ltd., (750-02102),	100.0%	0.0%

19	John Zavaros, (750-02100),	84.0%	16.0%
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We recommend that the bridge structures as identified herein, be maintained in the future as part of the drainage works. We would also recommend that the access bridges in the drain, for which the future maintenance costs are to be borne by the abutting affected landowners and upstream lands and roads, be maintained by the Town and that said maintenance would include works to the bridge culvert, bedding, backfill and end treatment. Where concrete, asphalt or other decorative driveway surfaces over the bridge culverts require removal as part of the maintenance works, these surfaces should also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guard rails 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 material 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 parcel served by said access bridge.

When any maintenance work is carried out in the future on the open portions of the West Townline Drain, we recommend that the costs for same be shared on a pro-rata basis with the Benefit and Outlet Liability assessments shown in the new attached Maintenance Schedule of Assessment. When any maintenance work is required to the bridges along the course of the West Townline Drain, we recommend that the costs be shared as set out in the Table above. The future cost sharing for all works to Bridge 18 will be borne 100% by the utility Union Gas Ltd. pursuant to Section 26 of the Drainage Act.

The above provisions for the future maintenance of this new access bridge, being constructed under this report, and for the sharing of the cost for any future maintenance work on the other bridges and open drain shall remain as aforesaid until otherwise determined under the provisions of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

All of which is respectfully submitted.

Rood Engineering Inc.

Gerard Rood

Gerard Rood, P.Eng.



tr

att.

ROOD ENGINEERING INC.

Consulting Engineers
9 Nelson street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
WEST TOWNLINE DRAIN
(Bridge for Union Gas)
TOWN OF ESSEX

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
750-02102	3	1	0.05	0.020	Union Gas	\$ 17,200.00	\$ -	\$ -	\$ 17,200.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 17,200.00	\$ -	\$ -	\$ 17,200.00
TOTAL ASSESSMENT			0.05	0.020		\$ 17,200.00	\$ -	\$ -	\$ 17,200.00

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1 Hectare = 2.471 Acres
Project No. REI2016D061
April 26th, 2019

MAINTENANCE SCHEDULE OF ASSESSMENT
WEST TOWNLINE DRAIN
Town of Essex

3. MUNICIPAL LANDS:

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
Malden-Colchester Townline Rd.			1.42	0.58	Town of Essex	\$ 4.00	\$ 3.00	\$ 7.00
County Road 41			5.48	2.22	County of Essex	\$ 19.00	\$ 26.00	\$ 45.00
County Road 50			2.83	1.14	County of Essex	\$ 7.00	\$ 7.00	\$ 14.00
County Road 20			16.96	6.86	County of Essex	\$ 49.00	\$ 200.00	\$ 249.00
Collison Road			0.27	0.11	Town of Essex	\$ 1.00	\$ 2.00	\$ 3.00
Gore Road			9.15	3.70	Town of Essex	\$ -	\$ 24.00	\$ 24.00
2nd Concession Road			1.78	0.72	Town of Essex	\$ 7.00	\$ 12.00	\$ 19.00
3rd Concession Road			5.63	2.28	Town of Essex	\$ 10.00	\$ 47.00	\$ 57.00
Smith Road			2.72	1.10	Town of Essex	\$ -	\$ 10.00	\$ 10.00
						\$ 97.00	\$ 331.00	\$ 428.00

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
670-00250	Gore	5	1.46	0.592	John & Suzanne Toner	\$ -	\$ 4.00	\$ 4.00
670-00300	Gore	5	1.00	0.406	Murray & Lynda Pigeon	\$ -	\$ 3.00	\$ 3.00
670-00350	Gore	5	0.41	0.167	James & Karrie Stuart	\$ -	\$ 1.00	\$ 1.00

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
670-00360	Gore	5	0.63	0.255	Miroslaw & Grazyna Nowak	\$ -	\$ 2.00	\$ 2.00
670-00365	Gore	5	0.54	0.220	Dennis & June Grayer	\$ -	\$ 1.00	\$ 1.00
670-00370	Gore	5	0.62	0.251	Lyle Grayer	\$ -	\$ 2.00	\$ 2.00
670-00375	Gore	5	0.73	0.297	Robert Grayer	\$ -	\$ 2.00	\$ 2.00
670-00900	Gore	5	1.03	0.418	James & Victoria Lypps	\$ -	\$ 3.00	\$ 3.00
670-01001	Gore	5	0.71	0.287	George & Janet Ellenberger	\$ -	\$ 2.00	\$ 2.00
670-01003	Gore	5	1.07	0.435	Hydro One Networks Inc.	\$ -	\$ 3.00	\$ 3.00
670-01100	1	93	0.76	0.309	John Middleton	\$ -	\$ 2.00	\$ 2.00
670-01200	1	93	1.12	0.454	Athena Pollard	\$ -	\$ 3.00	\$ 3.00
670-01300	1	94	0.54	0.220	Peter & Karen Livingston	\$ -	\$ 2.00	\$ 2.00
670-01400	1	94	0.99	0.402	Matthew & Carolann Langlois	\$ -	\$ 3.00	\$ 3.00
670-01401	1	94	1.12	0.454	Kim & Patrick Dumeah	\$ -	\$ 3.00	\$ 3.00
670-01500	1	95	0.46	0.186	James & Carrie Butt	\$ -	\$ 1.00	\$ 1.00
670-01610	1	95	0.48	0.194	2614469 Ontario Inc.	\$ -	\$ 1.00	\$ 1.00
670-01800	1	96	2.00	0.810	Dianne & Dale Wright	\$ -	\$ 4.00	\$ 4.00
670-01810	1	97	1.24	0.502	Amanda Tomkins	\$ -	\$ 3.00	\$ 3.00
670-01902	1	97	3.03	1.226	Marilyn Filiault & Jean-Paul Lesperance	\$ -	\$ 6.00	\$ 6.00
670-02000	1	97	0.22	0.089	John Ciotoli	\$ 1.00	\$ 1.00	\$ 2.00
670-02100	1	97	0.06	0.024	Hydro One Networks Inc.	\$ 1.00	\$ 1.00	\$ 2.00
740-00950	2	4	1.18	0.476	Robert Smyth & William & Linda Deans	\$ -	\$ 3.00	\$ 3.00
750-00100	2	3	1.58	0.639	Larry & Barbara Freeswick	\$ -	\$ 6.00	\$ 6.00
750-00150	2	3	0.69	0.279	Debbi Little	\$ -	\$ 2.00	\$ 2.00
750-00310	2	2	0.88	0.356	Christopher & Diane McQueen	\$ 36.00	\$ 2.00	\$ 38.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	TOTAL VALUE
750-00501	2	1	3.34	1.352	William Bruce & Sherri Lauzon	\$ 6.00	\$ 6.00	\$ 12.00
750-00700	2	1	2.69	1.087	John Blackmore	\$ 10.00	\$ 6.00	\$ 16.00
750-00800	2	1	1.87	0.757	Michael Adam	\$ 7.00	\$ 4.00	\$ 11.00
750-00900	2	1	0.64	0.261	Jeremy Rollo	\$ 2.00	\$ 2.00	\$ 4.00
750-01000	2	1	7.67	3.105	Lightpath Utilities Inc.	\$ 28.00	\$ 17.00	\$ 45.00
750-01100	2	1	0.69	0.278	Bruce & Daniela Smith	\$ 3.00	\$ 3.00	\$ 6.00
750-01200	2	1	0.60	0.242	Bruce & Daniela Smith	\$ 3.00	\$ 3.00	\$ 6.00
750-01300	2	1	1.93	0.781	John Sawatzky & Jenney Crowder	\$ 7.00	\$ 5.00	\$ 12.00
750-01600	2	1	0.45	0.182	Nancy & Ronald Renaud	\$ 2.00	\$ 2.00	\$ 4.00
750-01700	2	1	0.45	0.182	Richard & Janet Geffs	\$ 2.00	\$ 2.00	\$ 4.00
750-01800	2	1	1.39	0.564	Matthew & Breanne Renaud	\$ 5.00	\$ 4.00	\$ 9.00
750-01900	2	1	9.20	3.723	John St.Louis	\$ 33.00	\$ 12.00	\$ 45.00
750-02002	2	1	2.01	0.813	Rodney & Michelle Ferriss	\$ 7.00	\$ 3.00	\$ 10.00
750-02102	2	1	0.05	0.021	Union Gas Ltd.	\$ 1.00	\$ 1.00	\$ 2.00
750-03100	2	1	0.87	0.353	David & Lou Greenham	\$ 3.00	\$ 3.00	\$ 6.00
750-03201	2	1	0.51	0.205	Morley & Rosemarie McLean	\$ 1.00	\$ 2.00	\$ 3.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 158.00	\$ 141.00	\$ 299.00

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	TOTAL VALUE
670-00200	Gore	5	63.42	25.664	Thomas Lypps	\$ -	\$ 68.00	\$ 68.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	TOTAL VALUE
670-00400	Gore	5	4.99	2.020	Karen Fox	\$ -	\$ 5.00	\$ 5.00
670-00600	Gore	5	33.72	13.645	1741094 Ontario Limited	\$ -	\$ 30.00	\$ 30.00
670-00800	Gore	5	35.01	14.170	Christopher & Maureen Gillan	\$ -	\$ 37.00	\$ 37.00
670-00805	Gore	5	44.80	18.131	Ronald Renaud	\$ -	\$ 47.00	\$ 47.00
670-01000	Gore	5	33.23	13.449	Miller Cattle & Grain Ltd.	\$ -	\$ 37.00	\$ 37.00
670-01050	1	93	3.36	1.360	Dean & Rosemarie Martin	\$ -	\$ 4.00	\$ 4.00
670-01101	1	93	0.52	0.210	Rosemarie Martin	\$ -	\$ 2.00	\$ 2.00
670-01550	1	95	8.15	3.300	1849784 Ontario Limited	\$ -	\$ 9.00	\$ 9.00
670-01600	1	95	26.35	10.662	Cedar Branches Farms Inc.	\$ -	\$ 28.00	\$ 28.00
670-01900	1	97	66.21	26.794	Bonnefield Farmlands Ontario	\$ 246.00	\$ 61.00	\$ 307.00
670-02200	1	97	40.75	16.493	Marvin Marontate	\$ 142.00	\$ 25.00	\$ 167.00
670-02700	2	94	0.22	0.090	Gyori Farms Inc.	\$ -	\$ 1.00	\$ 1.00
670-35100	1	97	1.75	0.710	Marvin Marontate	\$ 6.00	\$ 1.00	\$ 7.00
670-35200	1	97	4.27	1.730	Marvin Marontate	\$ 15.00	\$ 2.00	\$ 17.00
670-35300	1	97	3.98	1.610	Marvin Marontate	\$ 14.00	\$ 2.00	\$ 16.00
740-00900	2	PT. 3 & 4	36.83	14.904	Martin Gorski & Suzanne Dajczak	\$ -	\$ 40.00	\$ 40.00
750-00170	2	PT. 2 & 3	70.14	28.385	Dean & Rosemarie Martin	\$ -	\$ 73.00	\$ 73.00
750-00200	2	2	58.32	23.600	Hugh & Dean Martin Trustee	\$ -	\$ 66.00	\$ 66.00
750-00300	2	2	40.54	16.407	Rosemarie Martin & Antonio Drommi	\$ -	\$ 48.00	\$ 48.00
750-00400	2	2	62.13	25.142	Gorski Land Holdings Inc.	\$ -	\$ 66.00	\$ 66.00
750-00500	2	1	45.41	18.379	Morley, Calvin & Rosemarie McLean	\$ 82.00	\$ 48.00	\$ 130.00
750-00600	2	1	19.85	8.035	William & Alice Borland	\$ 72.00	\$ 23.00	\$ 95.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	TOTAL VALUE
750-01400	2	1	24.92	10.086	Morley, Calvin & Rosemarie McLean	\$ 91.00	\$ 30.00	\$ 121.00
750-01500	2	1	20.39	8.252	Ronald Renaud	\$ 75.00	\$ 27.00	\$ 102.00
750-01801	2	1	3.34	1.350	Matthew & Breanne Renaud	\$ 12.00	\$ 7.00	\$ 19.00
750-02100	2	1	22.95	9.289	John Zavaros	\$ 83.00	\$ 36.00	\$ 119.00
750-02900	2	2	35.01	14.170	Leland McLean	\$ -	\$ 48.00	\$ 48.00
750-03000	2	1	98.36	39.804	1741094 Ontario Limited	\$ 264.00	\$ 141.00	\$ 405.00
750-03200	2	1	50.60	20.477	Morley, Calvin & Merna McLean	\$ 90.00	\$ 54.00	\$ 144.00
750-03600	2	3	37.02	14.980	Rosemarie & Dean Martin	\$ -	\$ 39.00	\$ 39.00
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 1,192.00	\$ 1,105.00	\$ 2,297.00

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

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	TOTAL VALUE
670-01700	1	96	31.78	12.860	Irene Cappelli	\$ -	\$ 34.00	\$ 34.00
750-02000	2	1	1.99	0.807	Maurice & Linda Hutchins	\$ 7.00	\$ 3.00	\$ 10.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						\$ 7.00	\$ 37.00	\$ 44.00

ESSEX TOTAL ASSESSMENT 1135.50 459.53 **\$ 1,454.00** **\$ 1,614.00** **\$ 3,068.00**

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
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MAINTENANCE SCHEDULE OF ASSESSMENT
WEST TOWNLINE DRAIN
Town of Amherstburg

3. MUNICIPAL LANDS:

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
County Road 50			0.44	0.180	County of Essex	\$ 2.00	\$ 7.00	\$ 9.00
Malden-Colchester Townline Rd.			1.42	0.576	Town of Amherstburg	\$ 3.00	\$ 4.00	\$ 7.00
Meadows Lane			1.73	0.700	Town of Amherstburg	\$ 2.00	\$ 6.00	\$ 8.00
County Road 41			6.90	2.792	County of Essex	\$ 8.00	\$ 38.00	\$ 46.00
County Road 20			3.91	1.582	County of Essex	\$ 11.00	\$ 66.00	\$ 77.00
Total on Municipal Lands.....						\$ 26.00	\$ 121.00	\$ 147.00

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
510-00100	1292	LOTS 1 TO 5	0.50	0.203	1954923 Ontario Inc.	\$ 1.00	\$ 1.00	\$ 2.00

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	<u>TOTAL VALUE</u>
510-00200	1292	LOTS 5 TO 7	0.32	0.129	Darren & Christina Nantais	\$ 1.00	\$ 1.00	\$ 2.00
510-00300	1292	LOTS 8 TO 10	0.38	0.155	Allan & Evy Ruish	\$ 1.00	\$ 1.00	\$ 2.00
510-00500	1292	LOTS 11 TO 12	0.26	0.104	Ernest Kovosi & Trisha Labonte	\$ 1.00	\$ 1.00	\$ 2.00
510-00600	1292	LOTS 13 AND 14	0.26	0.104	Town of Amherstburg	\$ 1.00	\$ 1.00	\$ 2.00
510-00800	1292	LOTS 15 TO 16	0.26	0.104	William & Nancy Dent	\$ 1.00	\$ 1.00	\$ 2.00
510-00900	1292	LOTS 17 TO 18	0.25	0.103	William & Nancy Dent	\$ 1.00	\$ 1.00	\$ 2.00
510-01000	1292	LOT 19	0.13	0.052	William & Nancy Dent	\$ 1.00	\$ 1.00	\$ 2.00
510-01001	1292	LOT 20	0.13	0.052	Richard & Diana King	\$ 1.00	\$ 1.00	\$ 2.00
510-01100	1292	LOTS 21 TO 22	0.25	0.103	Richard & Diana King	\$ 1.00	\$ 1.00	\$ 2.00
510-01200	1292	LOTS 23 TO 26	0.51	0.207	Martin & Lydia McCloskey	\$ 1.00	\$ 1.00	\$ 2.00
510-01400	1292	LOTS 27 TO 28	0.25	0.103	Justin Kelly	\$ 1.00	\$ 1.00	\$ 2.00
510-01450	7	PT LOT 60	0.73	0.296	Raymond Guilbeault	\$ 1.00	\$ 2.00	\$ 3.00
510-01500	1292	LOT 29	0.13	0.052	Justin Kelly	\$ 1.00	\$ 1.00	\$ 2.00
510-01600	1292	LOTS 30 TO 32	0.38	0.155	Mitchell Sinasac	\$ 1.00	\$ 1.00	\$ 2.00
510-01800	1292	LOTS 33 TO 35	0.38	0.155	David & Carley Carr	\$ 1.00	\$ 1.00	\$ 2.00
510-01900	1292	LOTS 36 TO 37	0.26	0.104	Debra Smith	\$ 1.00	\$ 1.00	\$ 2.00
510-02000	1292	LOTS 38 TO 40	0.38	0.155	Trevor & Paige Ferriss	\$ 1.00	\$ 1.00	\$ 2.00

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
510-02200	1292	LOTS 41 TO 43	0.39	0.156	Kenneth Matte	\$ 1.00	\$ 1.00	\$ 2.00
510-02300	1292	LOTS 44 TO 46	0.39	0.156	Constance Scott	\$ 1.00	\$ 1.00	\$ 2.00
510-02400	1292	LOTS 47 & 48	0.26	0.104	David Craig	\$ 1.00	\$ 1.00	\$ 2.00
510-02600	1292	LOTS 49 TO 51 & PT LOT 52	0.45	0.182	Brandon Roelens & Elizabeth Parent	\$ 1.00	\$ 1.00	\$ 2.00
510-02700	1292	LOT 53 & PT LOT 52	0.23	0.094	Wayne Jahn	\$ 1.00	\$ 1.00	\$ 2.00
510-02800	1292	LOT 54 TO LOT 56	0.41	0.165	Liuzhi Yu & Haihua Guan	\$ 1.00	\$ 1.00	\$ 2.00
510-02900	1292	LOTS 57 TO 58	0.26	0.104	Liuzhi Yu & Haihua Guan	\$ 1.00	\$ 1.00	\$ 2.00
510-03000	1292	LOTS 59 TO 61	0.38	0.155	Nelson & Chantale Quesnel & Lloyed Ayotte	\$ 1.00	\$ 1.00	\$ 2.00
510-03100	1292	LOTS 62 TO 64	0.38	0.155	Xian Zhang	\$ 1.00	\$ 1.00	\$ 2.00
510-03200	1292	LOTS 65 TO 67	0.38	0.155	Lloyd & Marjorie Miller	\$ 1.00	\$ 1.00	\$ 2.00
510-03300	1292	LOTS 68 TO 69	0.25	0.103	Timothy Girard	\$ 1.00	\$ 1.00	\$ 2.00
510-03400	1292	LOTS 70 & 71	0.25	0.103	Stephen Gignac	\$ 1.00	\$ 2.00	\$ 3.00
510-03500	1292	LOTS 72 TO 75	0.27	0.110	Stephen Gignac	\$ 1.00	\$ 1.00	\$ 2.00
510-03600	7	PT LOT 60	6.79	2.747	Kristin Copf	\$ 8.00	\$ 7.00	\$ 15.00
510-03900	7	PT LOT 61	0.32	0.130	Hydro One Networks Inc.	\$ 1.00	\$ 1.00	\$ 2.00

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
510-04000	7	PT LOT 61	0.99	0.400	Gary & Kathleen Talbot	\$ 1.00	\$ 2.00	\$ 3.00
520-04010	7	PT LOT 65	1.44	0.581	Tristan Anderson	\$ -	\$ 2.00	\$ 2.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 41.00	\$ 45.00	\$ 86.00

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

510-03700	7	PT LOT 61	8.99	3.640	Gregory & Maria Underwood	\$ 10.00	\$ 9.00	\$ 19.00
520-04020	7	PT. LOT 65	0.99	0.400	Harry & Helen Schwab	\$ -	\$ 2.00	\$ 2.00
520-04000	7	PT LOT 65	8.99	3.640	Helen Schwab & Janet Edwards	\$ 10.00	\$ 17.00	\$ 27.00
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 20.00	\$ 28.00	\$ 48.00

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

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
510-03800	7	PT LOT 61	19.00	7.690	Everton Morris	\$ 22.00	\$ 23.00	\$ 45.00
520-03700	7	PT LOT 66	0.99	0.400	CTV Limited	\$ 1.00	\$ 5.00	\$ 6.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						\$ 23.00	\$ 28.00	\$ 51.00

Tax Roll <u>No.</u>	Con. or Plan <u>No.</u>	Lot or Part of Lot <u>of Lot</u>	Acres <u>Afft'd</u>	Hectares <u>Afft'd</u>	<u>Owner's Name</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
AMHERSTBURG TOTAL ASSESSMENT						\$ 110.00	\$ 222.00	\$ 332.00
Amherstburg Total Area			72.99	29.537				
ESSEX TOTAL ASSESSMENT						\$ 1,454.00	\$ 1,614.00	\$ 3,068.00
Essex Total Area			1135.50	459.53	(brought forward)			
PROJECT TOTAL ASSESSMENT						\$ 1,564.00	\$ 1,836.00	\$ 3,400.00

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1 Hectare = 2.471 Acres
Project No.REI2016D061
April 26th, 2019

SPECIFICATIONS**WEST TOWNLINE DRAIN****Bridge for Union Gas, Parcel 750-02102****Part of Lot 1, Concession 3 and****Future Drain Maintenance****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 access bridge for Union Gas consisting of 11.0 metres (36.1 ft.) of 525mm diameter, smooth wall 320 kPa High Density Poly Ethylene (H.D.P.E.) pipe in the West Townline Drain. The new access bridge shall be constructed so that the centre of the pipe is set slightly north of Parcel 750-03000, and in accordance with the layout as shown on the plans in **Appendix "REI-E"**. This location shall be the exact designated location of this new access bridge culvert unless otherwise directed by the property owner and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the new access bridge must be approved in writing by the Engineer. The general layout of the access bridge and other ancillary work shall be provided as shown and detailed in the accompanying drawing attached within **Appendix "REI-E"**. A Bench Mark has been set near this proposed access bridge so that same can be utilized for the setting of the new bridge culvert grades. The **Bench Mark** is the "*top of nail on west face of hydro pole located on the south side of the proposed bridge and the east side of County Road 20*", with same being **Elevation 190.588 metres**.

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

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

The Contractor is to review **Appendix "REI-A"** in detail and is required to comply in all regards with the contents of said E.R.C.A. and D.F.O. measures, and follow the special requirements therein included during construction. The work shall be carried out in the dry and silt and sediment control shall be a key consideration during the course of the work. All silt and sediment controls shall be provided in accordance with O.P.S.S. and O.P.S.D. requirements for same. Controls shall be cleaned out as necessary during the course of the installation, and once the site has been stabilized, shall be completely removed and disposed of by the Contractor.

III. M.N.R.F. CONSIDERATIONS

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

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

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project for the new Union Gas bridge extends along the east side of County Road 20. Future maintenance on other bridges will be along the east sides of County Road 20, County Road 41, and the Malden-Colchester Townline Road, along with road crossings at County Road 50, 2nd Concession Road, Collison Road, County Road 20 and the 3rd Concession Road. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the driveways as necessary to carry out the construction of the new access bridge, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridge to carry out all ancillary work.

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

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the lawn areas of residential properties. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer.

Specifications – West Townline Drain
(Union Gas Bridge & Updated Maintenance Schedule)
Town of Essex - REI2016D061

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Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, granular placement and asphalt required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

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

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

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

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

VI. FENCING

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

VII. DETAILS OF OPEN DRAIN WORK

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

The drain shall be of the size, type, depth, etcetera as shown on the accompanying drawings that may be provided. When completed, the drain shall have a uniform and even bottom and in no case shall such bottom project above the grade line, as shown on the accompanying drawings, and as determined from the Bench Marks. The finished side slopes of the drain shall be 1.5 metres horizontal to 1.0 metre vertical and the bottom width shall be 0.9 metres.

The excavated material to be cast onto the adjoining lands shall be well and evenly spread over a sufficient area so that no portion of the excavated earth is more than 100mm in depth. The material shall be kept at least 1.2 metres clear from the finished edge of the drain, care being taken not to fill up any existing tiles, ditches, furrows or drains with the excavated material. The excavated material to be spread upon the lands shall be free from rocks, cobbles, boulders, stumps, rubble, rubbish or other similar material and these materials, if encountered, shall be hauled away by the Contractor and disposed of at a site to be obtained by it at its expense.

Where the drain crosses any lawn, garden, orchard, roadway or driveway, etcetera, the excavated material for the full width of the above-mentioned areas shall be hauled away by the Contractor and disposed of to a site to be obtained by the Contractor at its expense. All work at the disposal site shall be established between the Contractor and the site owner. The Contractor shall be responsible for any permits required and shall provide copies of same to the Town and Consulting Engineer when requested.

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

VIII. BRIDGE CONSTRUCTION

When completed, the new access bridge to serve the Union Gas parcel along the centreline of the new culvert shall have a total top width, including the top width of the quarried limestone on filter cloth end walls, of approximately 7.9 metres (25.9 ft.) and a travelled driveway width of 6.8 metres (22.3 ft.). The quarried limestone on filter cloth end wall protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical, and shall extend from the end of the new H.D.P.E. pipe to the top elevation of the driveway.

The 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe to be provided for this project is to be supplied as no more than two (2) approximately equal lengths of pipe for the bridge, which are to be coupled together with the use of a wrap coupler, secured in accordance with the manufacturer's recommendations. Under no circumstance shall the access culvert for the bridge be provided with more than two (2) lengths of pipe. The high density polyethylene pipe to be utilized for this bridge installation must be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain.

Specifications – West Townline Drain
(Union Gas Bridge & Updated Maintenance Schedule)
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The Contractor shall also note that the placement of the new access bridge culvert is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the bridge pipe and for a distance of 3.05 metres (10.0 ft.) both upstream and downstream of said pipe. The design parameters of the West Townline Drain at the location of this new access bridge installation consists of a 0.9m (3 ft.) bottom width, 0.15% grade, and 1.5 horizontal to 1.0 vertical sideslopes. The Contractor shall be required to cut any brush and strip the existing drain sideslopes of any vegetation as part of the grubbing operation. The Contractor shall also be required to dispose of all excavated and deleterious materials, as well as any grubbed out materials, to a site to be obtained by it at its own expense. The Contractor shall note that the survey indicates that the existing drain bottom is slightly above the design grade. The Contractor shall be required to provide any and all labour, material and equipment to set the pipe to the required design grades. The Contractor shall also be required to supply, if necessary for a solid base, a minimum thickness of 150mm (6") of 20mm (3/4") clear stone bedding underneath the culvert pipe, extending from the bottom of the excavation to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

The installation of the complete length of the new access bridge culvert, including all appurtenances, shall be completely inspected by the Town Drainage Superintendent or Engineer prior to backfilling any portions of same. Under no circumstance shall the Contractor backfill same until the Town Drainage Superintendent or Engineer inspects and approves said pipe installation. The Contractor shall provide a minimum notice of 2 working days to the Town Drainage Superintendent or Engineer prior to the commencement of this work. The installation of this new access bridge is to be performed during the normal working hours from Monday to Friday of the Town Drainage Superintendent or Engineer.

Once the 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe has been satisfactorily set in place at the site, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. (Ontario Provincial Standard Specification) Form 1010, with the exception of the top 305mm (12") of the backfill material for the full top width of the drain and the access bridge, which shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. The end slopes of the backfill material over the 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe from the invert of said pipe to the top of driveway elevation shall be quarried limestone on filter cloth erosion protection. The end walls shall be extended around onto the drain banks in line with the end of the bridge culvert pipe, all as shown on the plans included in Appendix "REI-E".

The Contractor shall also perform the necessary excavation to extend the width of the driveway southerly from the north top of bank to the south top of bank on the drain. This driveway approach from the north top of bank to approximately the south top of bank shall consist of a minimum of 305mm (12") of granular material M.T.O. Type "A" satisfactorily compacted in place. The gravel apron shall extend for the full width of the access culvert top, as shown on the plans. The gravel backfill shall also extend across the pipe to approximately 1.0m beyond the north and south top of banks as shown on the plans. The pipe shall have a minimum of 800mm of cover, and be uniformly graded down to the south top of bank from the existing north top of bank.

Once the new 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe has been set in place at the required location, the Contractor shall completely backfill same with granular material, and install the quarried limestone on filter cloth protection on both ends of the bridge. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 2), 3), and 4) of the **"Standard Specifications for Access Bridge Construction"** attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in Item 4) of said Appendix. The Contractor, in all cases, shall comply with these specifications and upon completion of the sloped quarried

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limestone end protection installation shall restore the adjacent areas to their original conditions.

The 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe for this installation shall be provided with a depth of cover measured from the top of the 320 kPa smooth wall heavy duty H.D.P.E. plastic pipe to the top of the granular backfill of approximately 0.400m (16.0”) for the new bridge and if the culvert is placed at its proper elevations, this should be easily achieved. If the Contractor finds that the specified cover is not being met, they shall notify the Drainage Superintendent and the Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The cover requirement is critical and must be attained. In order for this new access bridge culvert to properly fit the channel parameters, all of the design grade elevations provided below must be strictly adhered to.

Also, for use by the Contractor, we have established a Bench Mark near the site. This **Bench Mark** is the “top of nail in west face of hydro pole on the south side of the proposed bridge and east side of County Road”, with same being **Elevation 190.588 metres**. The new pipe culvert and the backfilling are to be placed on the following basis:

- a) The **north (upstream) invert** of the proposed bridge culvert is to be set at **Elevation 189.175 metres**.
- b) The **south (downstream) invert** of the proposed bridge culvert is to be set at **Elevation 189.158 metres**.

The centreline of driveway for this bridge installation shall be set to approximately Elevation **190.250 metres** at approximately 1.0 west of the west top of bank, Elevation **190.177 metres** at the culvert pipe centreline, and Elevation **190.100 metres** at approximately 1.0 metre east of the east top of bank to match to the existing field grade. The access bridge driveway, in all cases, shall be graded with a cross-fall from the centreline of the driveway to the outer edges of the driveway at an approximate grade of 1.50%.

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

The Contractor shall also be required to provide all labour, equipment and material to provide granular fill to all gore areas at the corners as noted on the plans and protect any existing landscape features during the course of the work. All plastic pipe ends shall be secured against flotation, to the satisfaction of the Town Drainage Superintendent or Engineer. Previously used methods include driving a rod with a tee head through the bottom of the pipe just inside the pipe end, with the rod sufficiently long enough to anchor the pipe end and resist all flotation forces. A second method is installation of rods on each side of the pipe near the outlet ends with a steel strap or heavy gauge wiring across the top of the pipe and secured tightly to the rods. Rods may be T-bar fence posts or steel re-bar minimum 15M size with sufficient length embedded into the soil to prevent any risk of pipe end flotation.

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

For the Union Gas bridge, the Contractor shall divert the existing covered portion of the West Townline Drain westerly around the new infrastructure being installed as shown and detailed

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on the plans in **Appendix “REI-E”**. The existing clay tile shall be replaced with 200mm diameter Boss 2000 smooth wall pipe or equal, including 45 degree bends. Connections shall be made using manufacturer’s couplers wherever possible. All other connections shall be completely sealed with concrete grout around the full exterior perimeter of each joint.

The Contractor is to note that the granular driveway approaches extending from the east edge of pavement to the R.O.W. limit east of the east top of bank of the drain shall consist of granular material M.T.O. Type “A” O.P.S.S. Form 1010 and is to be provided to a minimum depth of 305mm (12”), and be satisfactorily compacted in place. The Contractor is to also note that all granular material being placed as backfill for this bridge installation shall be compacted in place to a minimum Standard Proctor Density of 98%, and that all native fill material to be used for the construction shall be compacted in place to a minimum Standard Proctor Density of 95%.

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

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

The placing and grading of any topsoil shall be carefully and meticulously carried out in accordance with Ontario Provincial Standard Specifications, Form 802 dated November 2010, or as subsequently amended, or as amended by these specifications and be readied for the seeding and mulching process. The seeding and mulching of all of the above mentioned areas shall comply in all regards to Ontario Provincial Standard Specifications, Form 803 dated November 2010 and Form 804, dated November 2013, or as subsequently amended, or as amended by these specifications. The seeding mixture shall be the Standard Roadside Mix (Canada No. 1 Lawn Grass Seed Mixture) as set out in O.P.S.S. 804. All cleanup and restoration work shall be performed to the full satisfaction of the Town Drainage Superintendent or Engineer.

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

IX. DETAILS OF BRIDGE WORK

The Contractor shall provide all material, labour and equipment to repair and improve the existing access bridges in the West Townline Drain requiring work, along with endwall repairs and other improvements as noted.

The existing concrete bridges slated to be removed may be replaced with new aluminized steel Type II Hel-Cor pipe or precast concrete box structures that include the standard 10% embedment and equivalent capacity. Any other new or replacement access bridge installations shall comprise of aluminized steel Type II helical pipe. All piping sections shall be connected by the use of 9 corrugation (9-C) bolted couplers installed around the complete circumference of the pipe in accordance with the manufacturer’s recommendation. Each coupler shall be wrapped in filter cloth material around the complete circumference to ensure that there will be no soil migration through the joints and into the pipe through said connections.

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The culvert pipe and bridge replacements and new bridge installations on this drain shall be set to the grades as shown on the plans that are provided or as otherwise established by the Town Drainage Superintendent or the Consulting Engineer and they may make minor changes to the bridge alignment as they deem necessary to suit the site conditions. All work shall be carried out in general accordance with the items in the **“STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION”** attached to this report and labelled **Appendix “REI-C”**. Any plastic pipes shall be installed in accordance with the specifications noted above for the Union Gas bridge. Plastic pipe segments shall have a minimum length of 2 metres, with standard 6 metre full length segments comprising the end sections of each installation. Steel pipes shall be installed as noted below.

X. CORRUGATED STEEL PIPE AND PRECAST CONCRETE BOX INSTALLATION

Any new corrugated steel pipe (CSP) to be installed on this drain is required to be provided in the longest lengths that are available and shall not be less than 3.0 metres. Where the overall access pipe length exceeds the standard pipe lengths, the Contractor shall connect the pipe sections together by use of a manufactured 9-C bolted coupler installed in accordance with the manufacturer’s recommendations. All coupler joints shall be wrapped with a layer of filter cloth around the complete circumference so that it extends a minimum of 100mm beyond the coupler on each end, to ensure a positive seal against soil migration through the joints.

Each precast concrete box unit segment shall have a minimum length of 2.44m (8’). The Contractor shall provide manufacturer’s shop drawings stamped by a Professional Engineer for the design of the box sections. The bridge sections shall be designed for less than 600mm (2’) cover and be capable of handling the Ontario Highway Bridge Design Code loading. Each bridge shall be installed on a minimum 300mm (12”) thick bed of Granular ‘A’ compacted to 100% of Standard Proctor Density. All joints shall be mortared and wrapped in filter cloth.

The Contractor shall note that the placement of any new culvert pipe shall be performed totally in the dry and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the pipe and for a distance of 3.05 metres (10 ft.) upstream and downstream of the pipe. The Contractor shall note that the pipe inverts are set at least 10% of the pipe diameter (or the pipe rise) below the drain bottom to provide the embedment required by E.R.C.A. and D.F.O. and to meet the minimum cover requirements for the pipe.

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

For the access bridge installation, once the new aluminized steel type II corrugated pipe or the precast concrete box structure has been satisfactorily set in place, the Contractor shall completely backfill same with granular material M.T.O. Type “B” O.P.S.S. Form 1010 with the following exception. The top 305mm (12”) of the backfill material for the full top width of the access, and the full top width of the drain or the excavated trench, and any approaches to the south and transitions to the north shall be granular material M.T.O. Type “A” O.P.S.S. Form 1010. All of the driveway approach areas extending from the Municipal roadway to the west

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face of the new bridge culvert shall be backfilled with compacted granular material M.T.O. Type "A" O.P.S.S. Form 1010, but only after all topsoil material has been completely removed and disposed of, and the minimum thickness of this granular material shall be 305mm (12"). All areas outside of the access driveway shall be backfilled with native material compacted to 96% of Standard Proctor Density and topped with a minimum of 50mm of topsoil, and shall be seeded and mulched.

For hard surface roadway and driveway crossings, the top 305mm (12") of the backfill over the pipe below the hard surface treatment shall comprise granular material M.T.O. Type "A" O.P.S.S. Form 1010 compacted to a minimum of 100% Standard Proctor Density. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the pipe. To ensure that no damage is caused to the proposed 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 restore the asphalt surface by placing a minimum of the existing thickness or a 90mm minimum thickness of Type HL-4 or Superpave base course hot mix asphalt. The asphalt shall be supplied and placed in two (2) approximately equal lifts compacted to a value ranging from 92% to 96% of maximum relative density as per O.P.S.S. 310. On County roadways the Contractor will be required to provide a stepped joint that will require grinding down the existing surface asphalt on each side of the road cut to allow the new surface course of asphalt to overlap the existing base asphalt by a minimum of 300mm or as otherwise required by the County of Essex engineering department.

For existing concrete driveways, the Contractor shall carefully remove the concrete to the nearest expansion joint. The concrete driveway shall be restored to the original length and width that was removed and include 150mm thick, 30mPa concrete, with 6% \pm 1% air entrainment and 6x6-6/6 welded wire fabric reinforcing installed at the midpoint of the slab. All slab surfaces shall be finished to provide an appearance approximating the finish on the existing concrete driveway abutting the replacement.

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

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

The Contractor shall also note that the placing of the new access bridge culvert shall be completed so that it totally complies with the parameters established and noted in the Bridge Details and Tables for the culvert replacement. The culvert shall be set on an even grade and the placement shall be performed totally in the dry, and the Contractor should be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor shall also be required to supply a minimum of 100mm (4") of 20mm (3/4") clear stone bedding underneath the culvert pipe extending from the bottom of the drain to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. Furthermore, if an unsound base is encountered, it must be removed and replaced with 20mm (3/4") clear stone satisfactorily compacted in place to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor is to note that when replacing an access bridge or enclosure culvert, it shall be required to excavate a trench having a width not less than the new pipe outside diameter or dimension plus a 600mm working width on both sides of the new pipe to allow for proper installation of granular backfill and compaction of same. The Contractor shall also note that all culvert pipe installations are to be carried out with

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a minimum of 10% of their diameter or rise embedded below the drain design bottom, as shown and noted on the plan for each of the access bridge installations.

XI. REMOVALS

Where existing access bridges and enclosures are to be completely removed and replaced, the Contractor shall be required to excavate and completely extract the existing concrete structure or culvert pipe and the existing endwalls in their entirety, as well as any other deleterious materials that may be encountered in removing same, excluding poured concrete headwalls that are to be reused. The Contractor shall neatly saw cut any concrete or asphalt surfaces over the pipes for a sufficient width to allow for the safe removal of same or go to the nearest expansion joint panel of the concrete driveways. The Contractor shall also be required to completely dispose of all removed materials to a site to be obtained by it at its own expense. The Contractor shall note that when headwalls are shown to be left in place, the Contractor shall protect same and carry out its work for the pipe replacement as noted above and dispose of any debris resulting from the work.

All unsuitable and deleterious materials from the excavation and removal of the existing bridge and enclosure culverts and drain cleaning shall be hauled away and disposed of by the Contractor to a site to be obtained by it at its expense. Likewise, any material excavated to allow for the granular approaches to the bridge, driveway transitions, or installation of new headwalls shall also be hauled away and disposed of by the Contractor.

XII. CONCRETE FILLED JUTE BAG, PRECAST BLOCK OR SLOPED END PROTECTION

Unless otherwise shown or noted, the Contractor is to provide new concrete filled jute bag headwalls, precast concrete block or sloped quarried limestone on non-woven filter cloth end protection for the access bridges and enclosures being replaced or constructed on this drain.

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the accompanying drawings and as noted in the Standard Specifications in **Appendix "REI-C"**. In all cases, the concrete filled jute bag headwalls shall be topped with a minimum 100mm (4") thick continuous concrete cap for the entire length of the headwalls. The headwalls shall be installed on an inward batter to be not less than 1 horizontal to 5 vertical, and under no circumstances shall this batter, which is measured from the top of the headwall to the projection of the end of the pipe, be less than 305mm (12"). From the midpoint of the pipe height down to the concrete footing, the wall shall be a double concrete filled jute bag installation. On the road side the walls shall be deflected as shown to provide daylighting and a better approach across the new or replacement bridge.

The installation of the concrete filled jute bag headwalls, unless otherwise specified, shall be provided in total compliance with the Items 1, 3, and 4 included in the **"STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"**. These are attached to the back of this report and labelled **Appendix "REI-C"**. The Contractor shall comply in all respects with the General Conditions included in Item 4 and the **"Typical Concrete Filled Jute Bag Headwall End Protection"** detail also shown therein.

The Contractor shall install interlocking precast concrete blocks with filter cloth backing for walls on both ends of the bridges or enclosures requiring same. The blocks shall be minimum 600X600X1200mm in size as available from Underground Specialties - Wolseley, Windsor, Ontario, or equal, and installed as set out in **Appendix "REI-C"**. Vertical joints shall be staggered by use of half blocks where needed and wingwall deflections when required shall employ 45-degree angled blocks. Voids between the blocks and the pipe shall be grouted with 30mPa concrete having 6% ±1% air entrainment and extend for the full thickness of the wall, and have a smooth uniform finish on the face that blends with the precast blocks. The

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installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 1), 3), and 4) of the "Standard Specifications for Access Bridge Construction" attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in said Appendix. The Contractor shall submit shop drawings for approval of the wall installation that includes details for a minimum 300mm thick concrete footing that extends from the pipe invert downward. The footing shall extend into the drain banks each side for the required embedment of the blocks and be constructed to ensure that the completed wall will be completely vertical or tipped slightly back towards the driveway. Where the block walls extend more than 1.8 metres in height, the supplier shall provide the Contractor with uni-axial geogrid (SG350 or equivalent) reinforcement for installation to tie the wall back into the granular backfill. The Contractor, in all cases, shall comply with these specifications and upon completion of the stacked precast concrete end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone on filter cloth rock protection adjacent to the headwalls at each corner of the bridge. All rock protection shall be 1.0 metres wide and 305mm (12") thick, installed on non-woven filter cloth, and shall be installed in accordance with Item 2) of the "Standard Specifications for Access Bridge Construction". The synthetic filter mat to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products through Underground Specialties - Wolseley in Windsor, Ontario or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Industries Amherst Quarries, in Amherstburg, Ontario, or equal.

Where sloped end protection is specified, the top 305mm (12") of backfill material over the ends of the access pipe, from the invert of said pipe to the top of the driveway elevation of the access bridge or enclosure, shall be quarried limestone. The quarried limestone shall be provided as shown and detailed on the plans or as indicated in the Standard Specifications in **Appendix "REI-C"** and shall be graded in size from a minimum of 100mm (4") to a maximum of 250mm (10"). The quarried limestone to be placed on the sloped ends of an access bridge or enclosure shall be underlain with a synthetic **non-woven** geotextile filter fabric. The sloped quarried limestone protection is to be rounded as shown on the plan details and shall also extend along the drain side slopes to a point directly in line with the ends of the culvert pipe. The road side approach to the entrance shall be provided with a minimum 5.0m radius at each end of the driveway entrance. All work shall be completed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer.

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

The quarried limestone erosion protection shall be embedded into the sideslopes of the drain a minimum thickness of 305mm and shall be underlain in all cases with non-woven synthetic filter mat. The filter mat shall not only be laid along the flat portion of the erosion protection, but also contoured to the exterior limits of the quarried limestone and the unprotected slope. The width of the erosion protection shall be as established in the accompanying drawings or as otherwise directed by the Town Drainage Superintendent or the Consulting Engineer during construction. In placing the erosion protection, the Contractor shall carefully tamp the quarried limestone pieces into place with the use of the excavator bucket so that the erosion protection when completed will be consistent, uniform and tightly laid. In no instance shall the quarried limestone protrude beyond the exterior contour of the unprotected drain sideslopes along either side of said protection. The synthetic filter mat fabric to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum

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of 100mm to a maximum of 250mm, and is available from Walker Aggregates Amherst Quarries, in Amherstburg, Ontario, or equal.

XIII. BENCH MARKS

Also, for use by the Contractor, we have established Bench Marks along the course of the work and especially at the locations where existing access bridges are being replaced or new bridges are being constructed.

For each of the bridge replacements and new bridges, the plans include details illustrating the work to be carried out. For each bridge detail a Bench Mark has been indicated and the Elevation has been shown and may be utilized by the Contractor in carrying out its work. The Contractor shall note that in each case a specific design elevation grade has been provided for the invert at each end of the pipe in the table accompanying each detail. The table also sets out the pipe size, materials, and other requirements relative to the installation of the culvert structure. In all cases, the Contractor is to utilize the specified drain grade to set any new pipe installation. The Contractor shall ensure that it takes note of the direction of flow and sets all pipes to assure that all grades flow from north to south to match the direction of flow within the drain. The Contractor's attention is drawn to the fact that the pipe invert grades established herein provide for the pipes to be set at least 10% of their diameter or pipe rise below the existing drain bottom or the design grade of the drain, whichever is lower.

XIV. ANCILLARY WORK

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

Where the bridge or enclosure installation interferes with the discharge of an existing culvert or swale, the Contractor shall extend the culvert using similar material to the existing pipe and a bolted coupler, or re-grade the existing swales to allow for the surface flows to freely enter the drain. Any disturbed grass areas shall be fully restored with topsoil, seed and mulch.

All granular backfill for the bridge and enclosure installations shall be satisfactorily compacted in place to a minimum Standard Proctor Density of 98% by means of mechanical compaction equipment. All other good, clean, native fill material or topsoil to be utilized, where applicable, shall be compacted in place to a minimum Standard Proctor Density of 95%. All of the backfill material, equipment used, and method of compacting the backfill material shall be provided

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and performed to the full satisfaction of the Town Drainage Superintendent or Consulting Engineer.

Where the Contractor removes concrete or asphalt hard surfaces over the pipes, the Contractor shall restore the hard surfaces as previously outlined. The Contractor will be responsible to restore any damage caused to these driveways at its cost. All damaged hard surface driveway areas shall be neatly saw cut and the damaged materials removed and disposed of by the Contractor prior to carrying out any restoration work.

The new corrugated aluminized steel type II pipes for these installations are to be provided with a minimum depth of cover measured from the top of the pipe of 305mm (12") for a round pipe and 500mm for a pipe arch. If the bridge culvert pipes are placed at their proper elevations, same should be achieved. If the Contractor finds that the minimum cover is not being met, they shall notify the Town Drainage Superintendent and the Consulting Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The minimum cover requirement is **critical** and must be attained. In order for these new access bridge culverts to properly fit the channel parameters, **all of the design grade elevations must be strictly adhered to.**

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

Although it is anticipated that the culvert installation at each site shall be undertaken in the dry, the Contractor shall supply and install a temporary straw bale or silt curtain check dam in the drain bottom immediately downstream of each culvert site during the time of construction. The straw bale or silt curtain check dam shall be to the satisfaction of the Town Drainage Superintendent or Consulting Engineer and must be removed upon completion of the construction. The check dam materials may be reused at each site subject to their condition. All costs associated with the supply and installation of this straw bale or silt curtain check dam shall be included in the cost bid for the bridge replacements.

XV. TOPSOIL, SEED AND MULCH

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

When all of the work for this installation has been completed, the Contractor shall ensure that positive drainage is provided to all areas, and shall ensure that the site is left in a neat and

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

XVI. 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 banks where protection is required for surface water outlet or bank stabilization using quarried limestone on non-woven synthetic filter mat, as determined by the Town Drainage Superintendent or the Engineer during construction. The general erosion protection on the bank shall extend from the slope bottom up along the slope to the top of the outlet pipe or drain bank and beyond as required and as shown and detailed on any plan cross sections and profiles.

Along the bank of the drain, the general erosion protection is to be embedded into the sideslope of the bank 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. 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.

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 Engineer at the time of construction.

XVII. GENERAL CONDITIONS

- a) The Town Drainage Superintendent or Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.
- b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility or other object which it may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town of Essex, the County of Essex and the Engineer and their representatives for any damages which it may cause or sustain during the progress of the work. It shall not hold the Town of Essex, the County of Essex or the Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.
- c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Engineer can review same and check that the work will generally conform to the design and project intent.

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- d) The Contractor will be responsible for any damage caused by it to any portion of the Town or County road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, etcetera, from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.
- e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.
- f) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.
- g) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.
- h) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses, the Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.
- i) 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.
- j) 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.

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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.

- k) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project, and shall name the Town of Essex and its officials and staff, the County of Essex and its officials and staff and the Engineer and its staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Engineer prior to the commencement of work.
- l) 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.

The Contractor shall satisfy the 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.

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

APPENDIX "REI-A"

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

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

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

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.

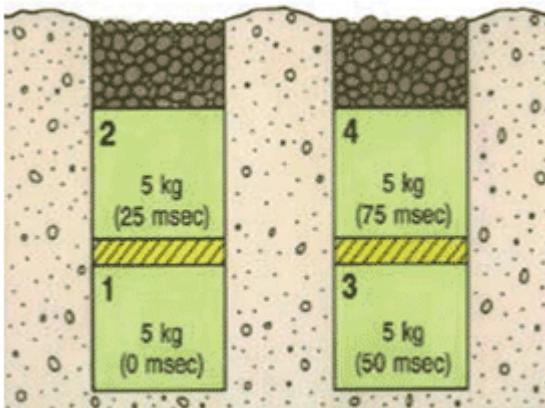
- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious 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 Mitigation Plan shall be in effect until June 30, 2015.

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

PART A. DEFINITIONS

1. Definitions:

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

"DFO" means Fisheries and Oceans Canada;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS

2. Process Charts

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

3. Review of Documentation

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

4. Sensitive Areas Maps

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

5. Prior Notification to Seek Direction

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

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

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

6. General Mitigation Measures

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

PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS

ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES

7. Activities undertaken in Sensitive Areas for Mussels

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

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

8. Training and Required On Site Materials for Turtles

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

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

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

10. Measures for Encounters with Turtles During a Sensitive Period

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

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

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

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

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

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

13. Release of Captured Individuals Outside of a Sensitive Period

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

14. Measures for Dead Turtles

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

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

15. Training and Required On Site Materials for Snakes

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

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

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

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

17. Measures for Encounters with Snakes During a Sensitive Period

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

18. Measures for Encounters with Snake Nests

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

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

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

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

20. Release of Captured Individuals Outside of a Sensitive Period

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

21. Measures for Dead Snakes

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

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

ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS

22. Activities Undertaken in Sensitive Areas for Herbaceous Plants

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

ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES

23. Additional Measures for Butternut

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

24. Measures for Other Trees

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

PART D. MONITORING AND REPORTING REQUIREMENTS

25. Compliance Monitoring.

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

26. Reporting

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

27. Review

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

APPENDIX "REI-C"

STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION

1. 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.

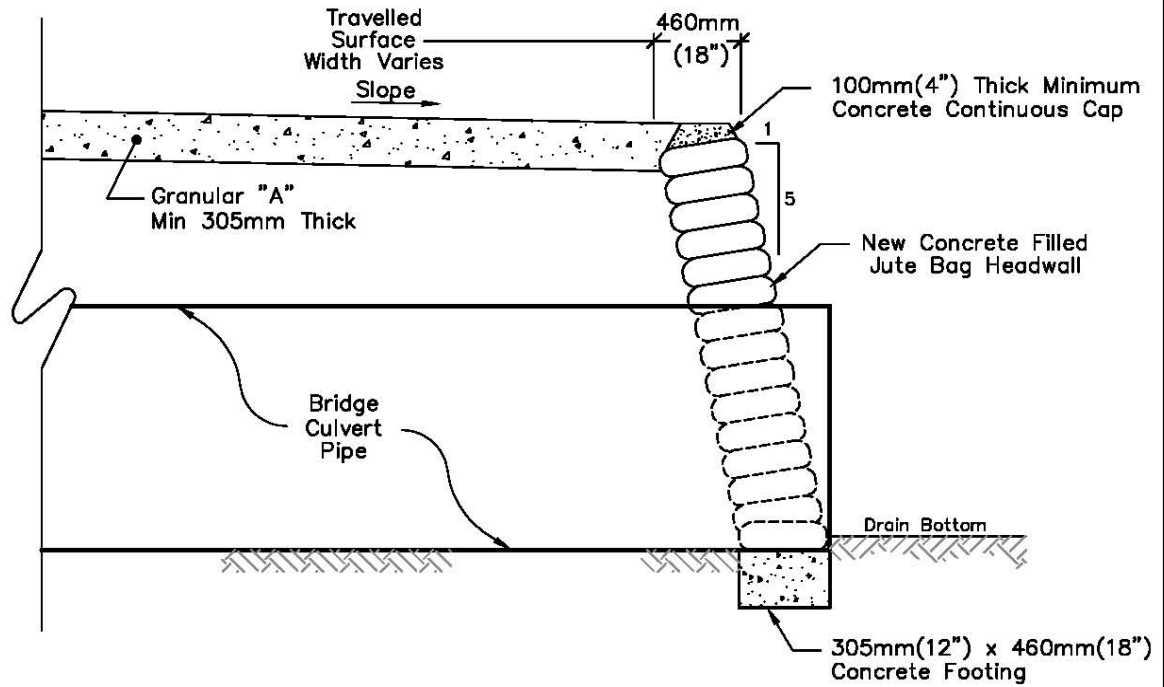
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

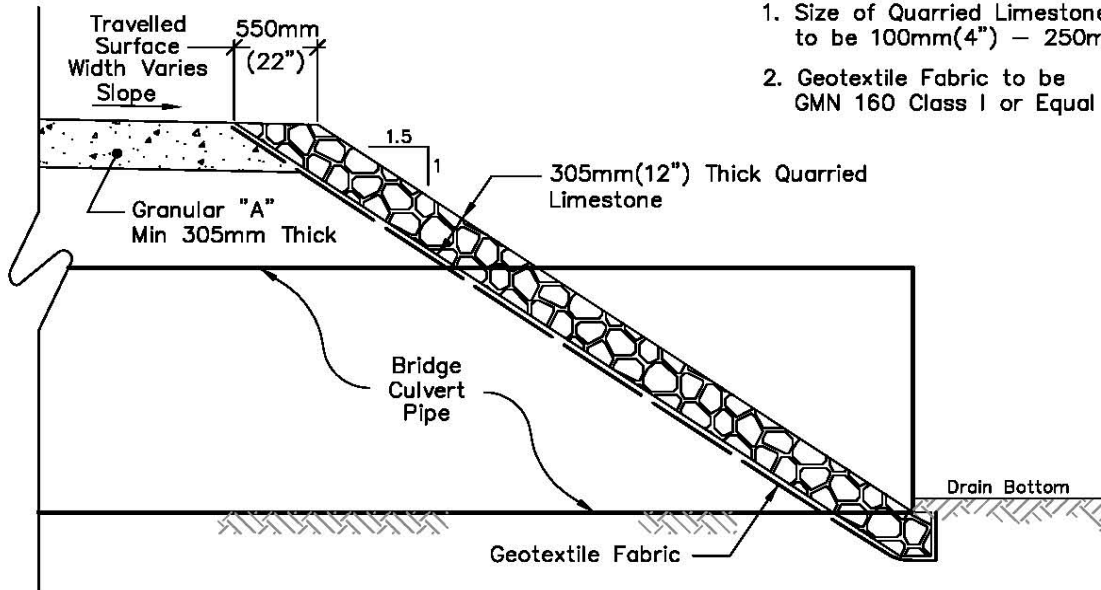
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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

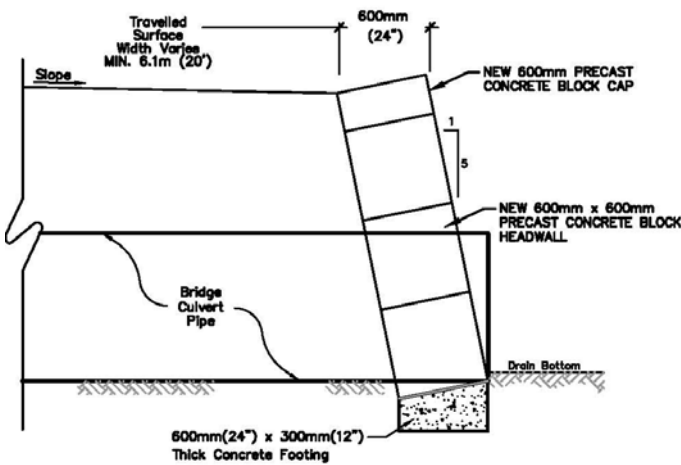
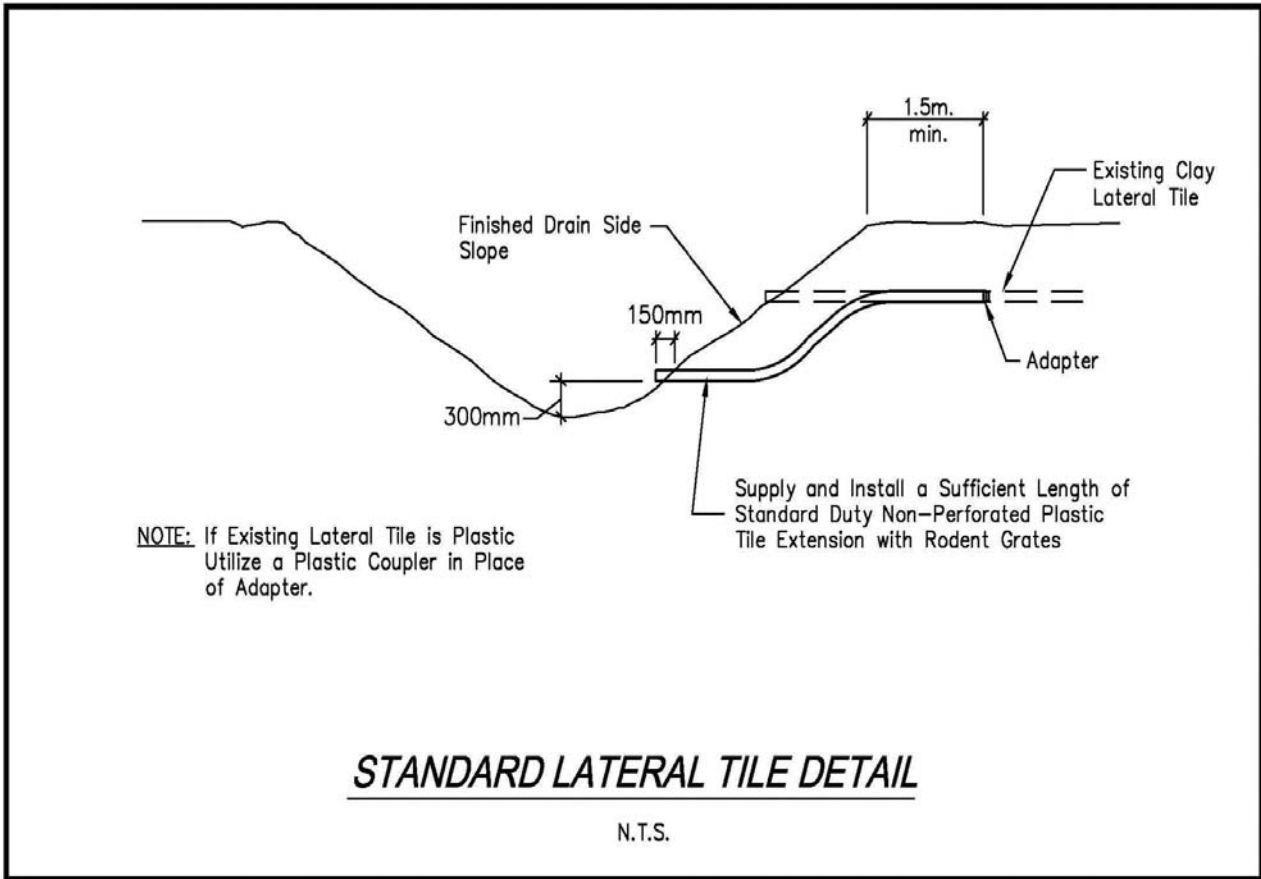
Rood Engineering Inc.

Consulting Engineers

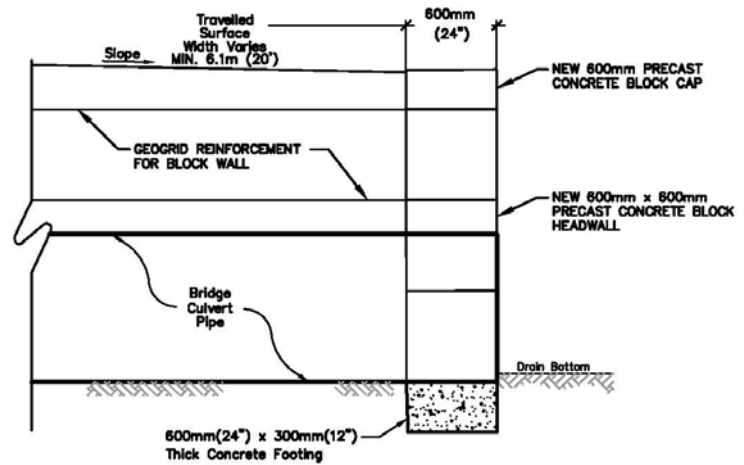
9 Nelson Street

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"

Appendix D – General Conditions and Specifications not required.

APPENDIX "REI-E"

WATERSHED AND NEW BRIDGE

FOR THE

WEST TOWNLINE DRAIN

IN THE FORMER

TOWNSHIP OF COLCHESTER SOUTH

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rod
GERARD ROD, P.ENG.

ROOD ENGINEERING INC.

9 NELSON STREET
LEAMINGTON, ONTARIO
N8H 1G6

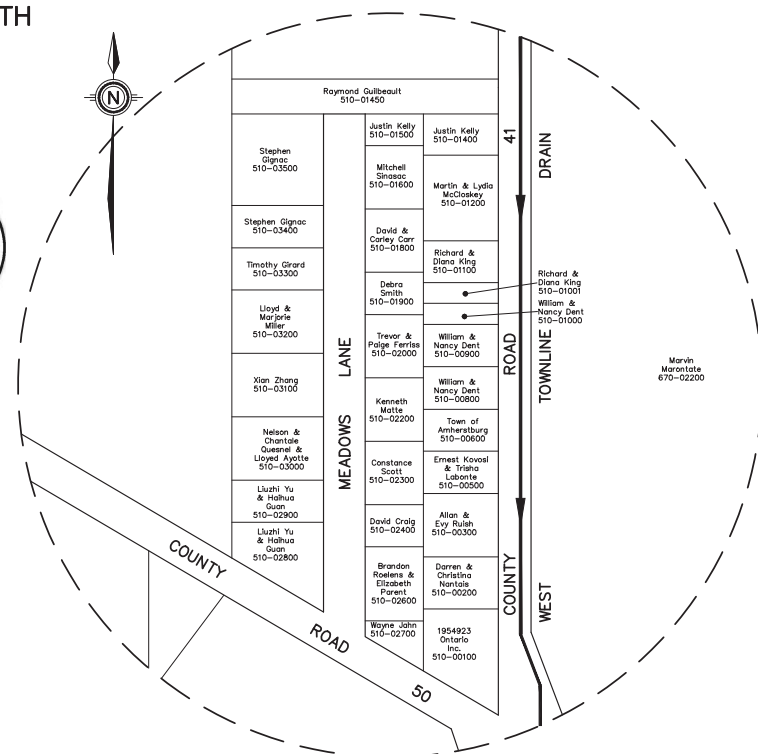
DATE: APRIL 26th, 2019

TOWN OF ESSEX

MAYOR: LARRY SNIVELY
ADMINISTRATOR: ROBERT AUGER
DRAINAGE SUPERINTENDENT: NORMAN NUSSIO

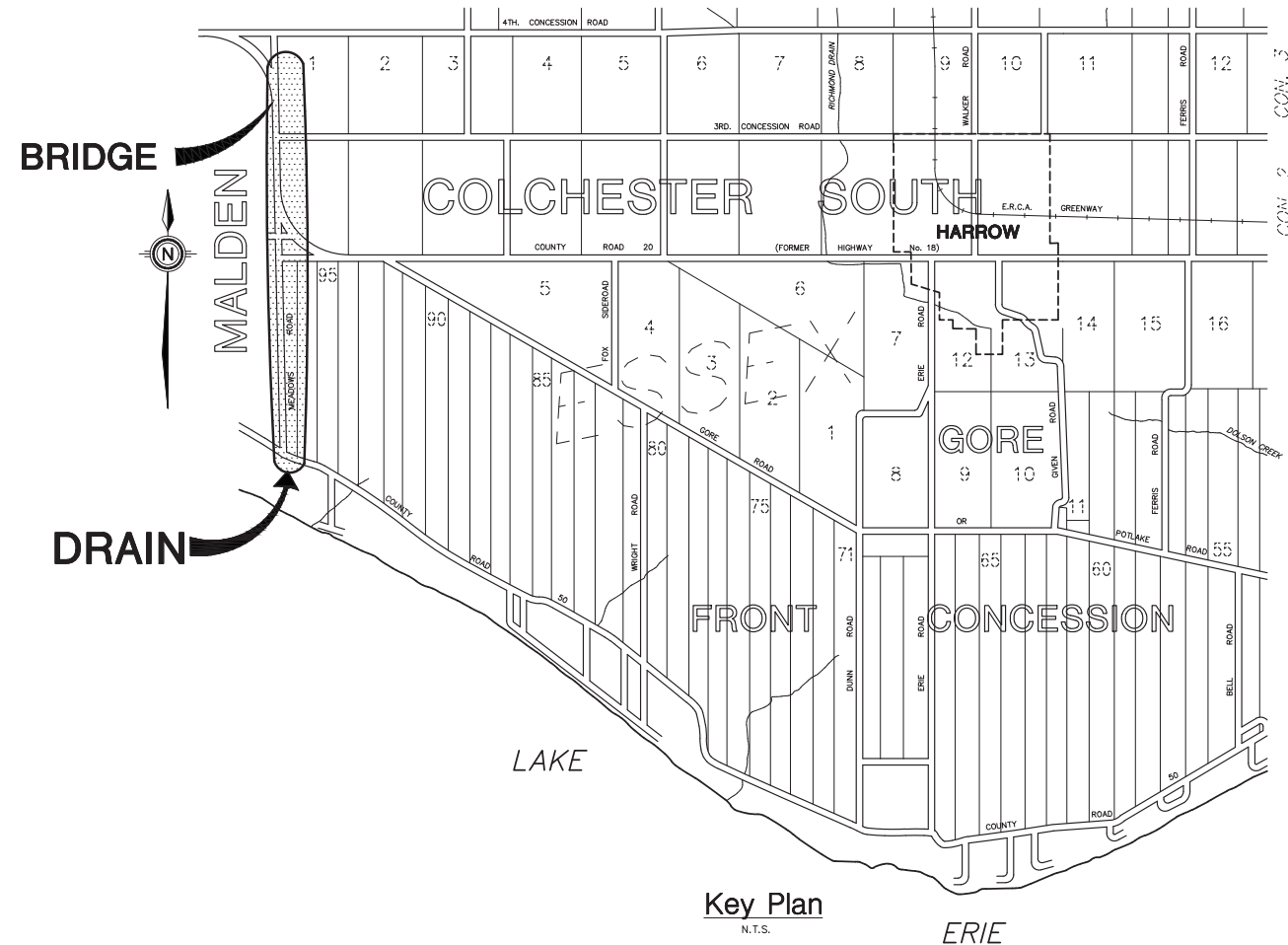
BENCHMARK:

- TOP CENTRELINE OF NORTH CURB OF SECOND CONCESSION ROAD BRIDGE.
ELEV. = 184.404m
- TOP CENTRELINE OF HEADWALL ON TWIN 915mm DIA PIPES UNDER COUNTY ROAD 20
ELEV. = 184.944m
- TOP CENTRELINE OF NORTH END OF 3.88mX2.69m C.S.P. ARCH CULVERT UNDER COUNTY ROAD 50.
ELEV. = 178.047m



DETAIL A

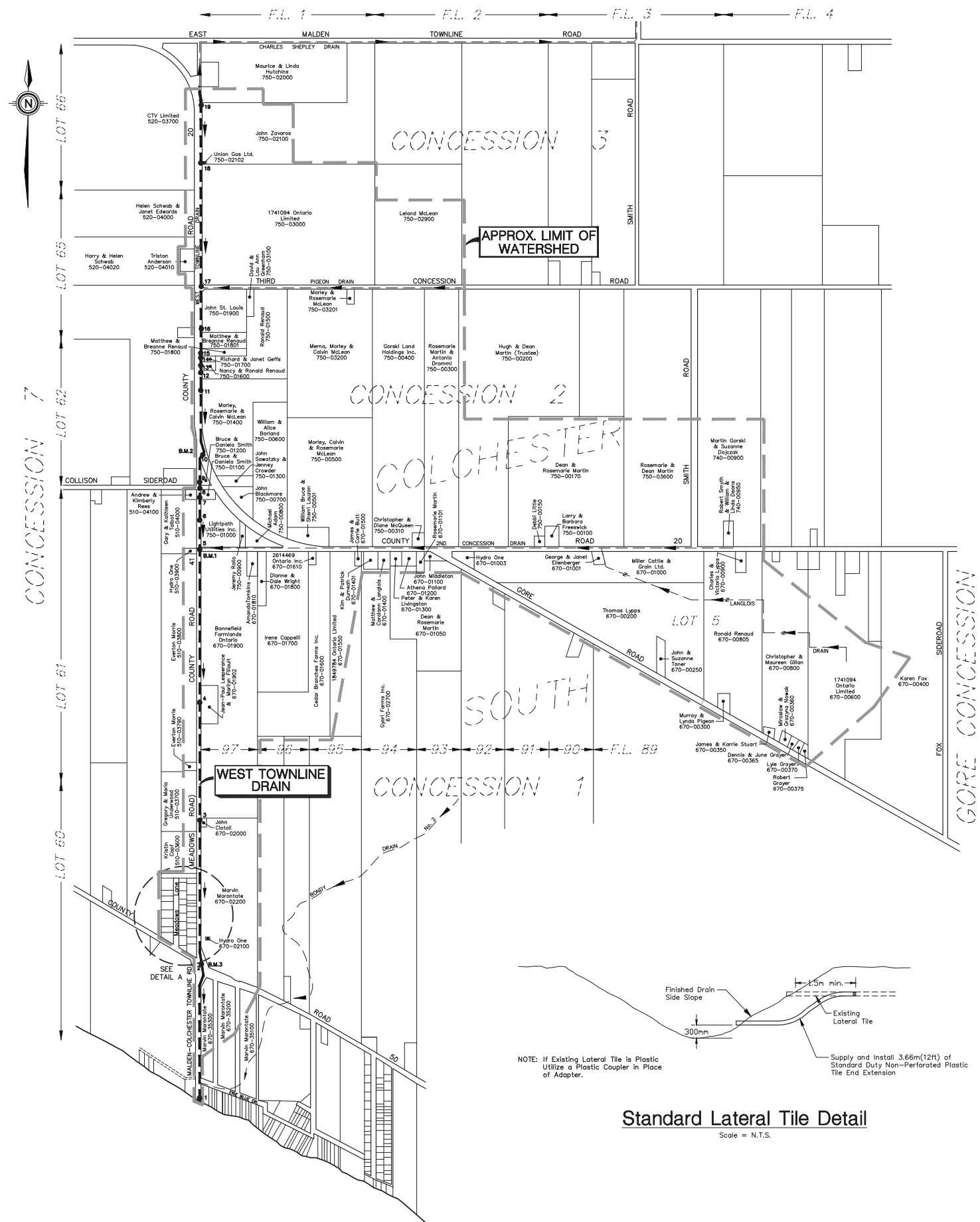
Scale = 1:2000



Key Plan

N.T.S.

ERIE



Plan

Scale = 1:10000

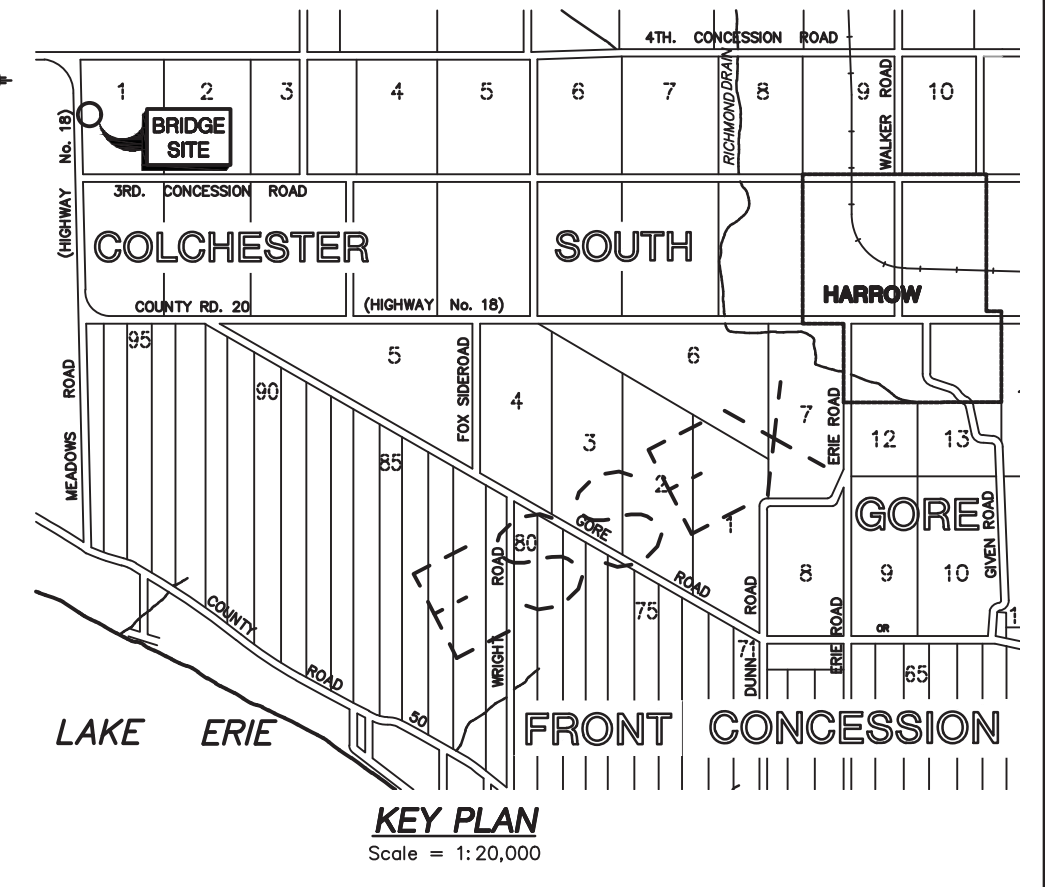
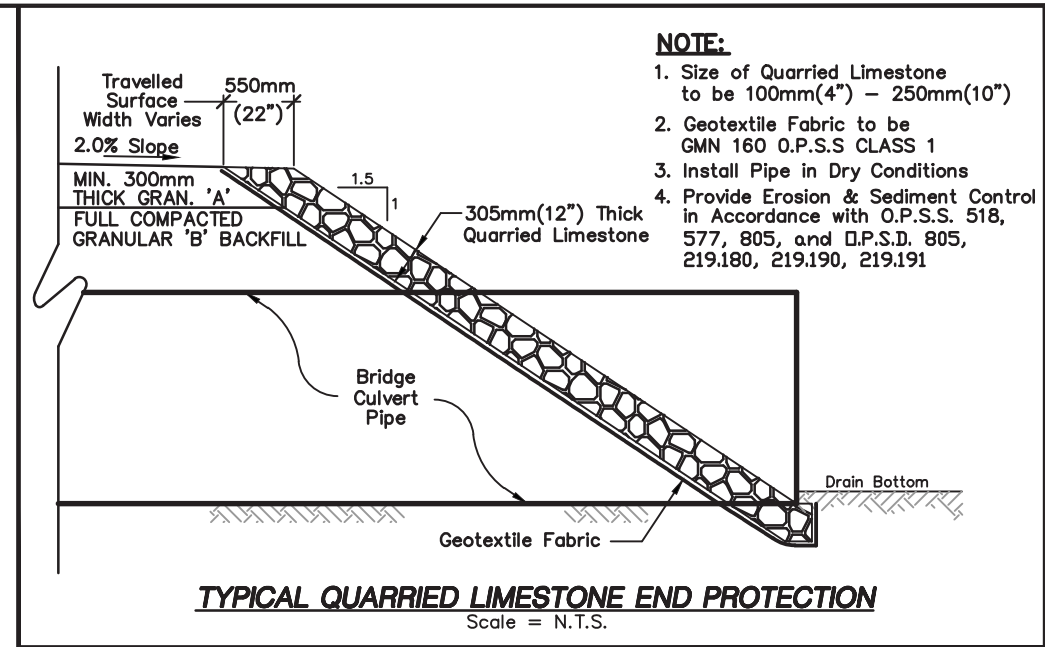
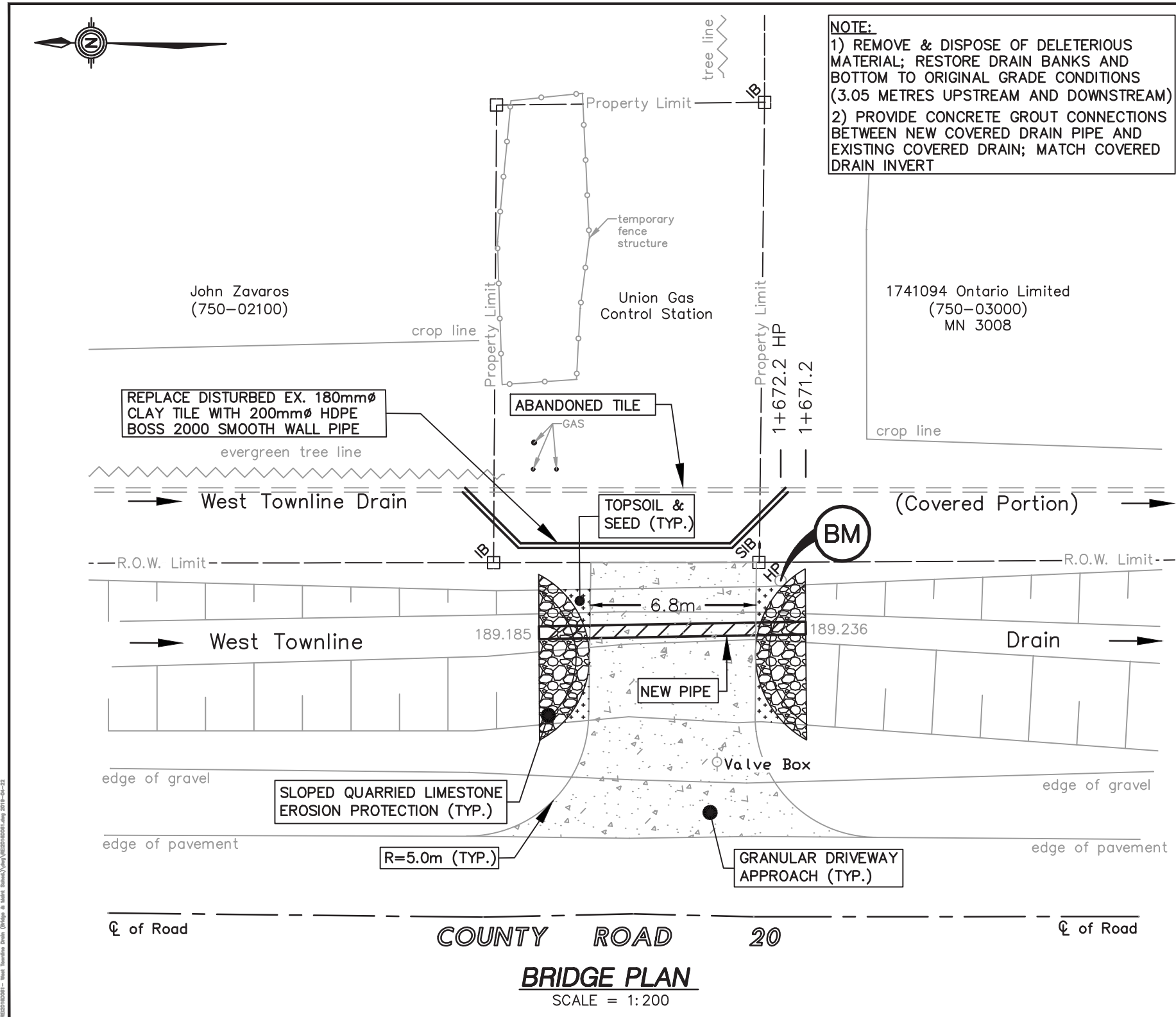
NOTE: If Existing Lateral Tile is Plastic Utilize a Plastic Coupler in Place of Adapter.

Standard Lateral Tile Detail

Scale = N.T.S.

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

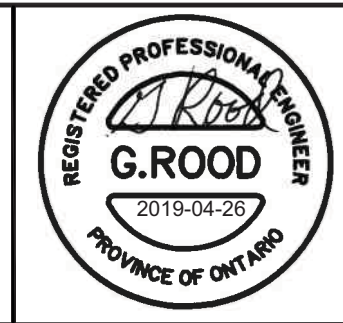
DRAWN BY: G.R. & T.M.
PLOT CODE: 1:10
COMPUTER FILE: REI2016D061.DWG
FILE No.: REI2016D061
SHEET No.: 1 OF 2



BENCHMARK:
 TOP OF NAIL ON WEST FACE OF HYDRO POLE LOCATED ON THE SOUTH SIDE OF PROPOSED BRIDGE AND EAST SIDE OF COUNTY ROAD 20
ELEV. = 190.588m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
525mm ϕ	11.0m (36.09 FT.)	320 kPa	STANDARD	SMOOTH WALL H.D.P.E. PIPE	UPSTREAM INV. (N) = 189.175m DOWNSTREAM INV. (S) = 189.158m ϕ TOP OF DRIVEWAY = 190.177m DRAIN GRADE = 0.15%

WEST TOWNLINE DRAIN
 BRIDGE FOR UNION GAS PRESSURE CONTROL STATION
 (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

DATE: 2019-04-26

FILE No.: REI2016D061
 DRAWN BY: K.S.
 PLOT CODE: 1:1
 FILE: REI2016D061.DWG

APPENDIX 'E'