SHEPLEY DRAIN

Bridge Replacements for Elwood Defour and Garry & Bonny Quick

Geographic Township of Colchester South

TOWN OF ESSEX
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REI Project 2018D024
October 17th, 2019

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Inc.

Consulting Engineers

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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:

SHEPLEY DRAIN
Replacement Bridges for Elwood Defour and Garry & Bonny Quick
(Part of Lots 6 & 7, Gore Concession)
Geographic Twp. of Colchester South
Project REI2018D024
Town of Essex, County of Essex

I. INTRODUCTION

In accordance with the instructions received from you by letter of June 12th, 2018, from your Town Solicitor/Clerk, Legal and Legislative Services, Robert Auger, we have proceeded with an Engineer's Report for the installation of new replacement access bridges in the Shepley Drain. This Engineer's Report provides for the construction of a replacement access bridge for Elwood Defour, Parcel 710-02800, and the replacement access bridge for future construction for Garry and Bonny Quick, Parcel 710-02900, in the Shepley Drain. The proposed bridge replacement is intended to provide safer access for the agricultural lands of Elwood Defour, in Part of Lot 6, Gore Concession, in the Geographic Township of Colchester South, Town of Essex. Additionally, we investigated the existing bridge conditions for Garry and Bonny Quick and found it to be in fair condition and not in need of immediate replacement. We provided all necessary details for the replacement access bridge for future construction in this report for the residential lands owned by Garry & Bonny Quick, in Part of Lot 7, Gore Concession, in the Geographic Township of Colchester South, Town of Essex. The Shepley Drain is an open drain with a number of access bridges. The drain was constructed pursuant to the Drainage Act. A plan showing the Shepley Drain alignment, as well as the general location of the above-mentioned bridges, are included herein as part of the report.

These investigations were initiated by resolutions passed by Council to prepare a new report to provide for the two replacement access bridges to serve the Defour and Quick Parcels. This investigation, our instructions, and this report are 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 bridges, as well as reviewing the history of the Shepley Drain, and we report thereon as follows.

II. DRAINAGE HISTORY

The Shepley Drain is located entirely within the Town of Essex. The drainage basin served by the Shepley Drain consists of approximately 605.10 hectares (1495.2 acres). The Shepley Drain comprises of an open drain and commences at the outlet into the Richmond Drain located along the south side of County Road 20, at Pt. Lot 6, Gore Concession. The Shepley Drain then extends upstream in a generally southeasterly direction to the north side of Gore Road near the property line of Lots 58 and 59, Concession 1. A plan showing the general location of the Shepley Drain and affected Property Owners is attached in **Appendix "REI-E"**.

From our review of the Town's drainage files, we have determined that the last major repair and improvements to the Shepley Drain was completed under an Engineer's Report dated October 14th, 1983 prepared by Maurice Armstrong, P.Eng. The work included in said report consisted of repair and improvements to the drain and repairs to several bridges located in the drain. We also utilized the Engineer's Report dated March 5th, 1993 prepared by Nick Peralta, P.Eng. which investigated sub watershed boundaries from the Aikman Drain, Jurocko Drain, and Southwest Branch of the Shepley Drain. The 1993 Peralta report also investigated watershed boundary changes subsequent to the storm sewer reconstruction report completed by Lafontaine, Cowie, Buratto and Associates on September 12th, 1990. The work included in the 1993 Peralta report consisted of an updated Maintenance Schedule of Assessment and updated plan. We also utilized the Engineer's Report dated October 27th, 2003 prepared by Gerard Rood, P.Eng. The work included in said report consisted of improvements and bank stabilization. Lastly, an Engineer's Report dated December 5th, 2017 was prepared by Gerard Rood, P.Eng. which consisted of a new replacement access bridge for Joseph & Susan Chisholm and an updated maintenance schedule for the drain.

We have utilized the plans within the 1983 Maurice Armstrong, P.Eng. report, the 1993 Nick Peralta, P.Eng. report and the 2017 Gerard Rood P.Eng. report to establish the size parameters for the drain and the details to be used in establishing the replacement bridge culvert installations. We have also used the 1983 report to establish the drain profile grades, and to assist us in establishing the design grade for the subject access bridge installations. The December 5th, 2017 Updated Maintenance Schedule prepared by Gerard Rood, P.Eng. was used for investigating the watershed limits to determine the area and flows to be used for design of the bridges.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the available drainage information and documentation provided by the Drainage Department, we arranged with Town staff to schedule an on-site meeting for September 25th, 2018. The following people were in attendance at the said meeting: Elwood Defour, Joseph Chisholm, Garry & Bonny Quick, Felix Weigt-Bienzle, Tanya Tuzlova (Town Drainage Clerk), Norm Nussio (Town of Essex Drainage Superintendent), and Kory Snelgrove (Rood Engineering).

Norm Nussio completed introductions explaining the purpose of the on-site meeting. The town has received a request for a new replacement bridge access to serve the agricultural lands of Elwood Defour as the existing reinforced concrete bridge has deteriorated to a state that structural integrity is compromised. Additionally, there is concern with the width of the existing bridge width being narrow causing concern for safe access to the agricultural lands. The town has also received a request for a new replacement bridge access to serve the residential lands of Garry and Bonny Quick. Mr. Quick stated that he does not believe his bridge is in need of replacement at this time as his headwalls and pipe are in fair shape. Garry Quick reviewed the

history of his bridge stating that his headwalls have been reused three times now with new pipes installed. We explained to Mr. and Mrs. Quick that we would survey their bridge and investigate the condition to confirm whether or not their bridge is in need of replacement at this time.

We advised the owners that the minimum standard top width for an access bridge is 6.10 metres (20 ft.) and that the bridges centreline locations will need to be established with Mr. Defour and Mr. and Mrs. Quick. Elwood Defour requested that the bridge be designed to have a 9.14m (30.0 ft.) top width to allow for better egress and ingress into the agricultural lands. The larger driveway top width gives consideration for safe access to the larger farming equipment being used in today's farming practises. The owners were also advised that because the bridges are replacement bridges, the cost of the new replacement access bridge construction, as well as all the cost for the preparation of the Engineer's Report would be shared by the abutting owner and affected upstream lands and roads. Any cost for additional top width beyond the standard 6.10 metres will be borne by the abutting owners served by the bridges.

We went on to discuss that sloped quarried limestone on filter cloth end protection is usually the most economical based on previous similar bridges. Since the two replacement bridges are located so close together it was discussed that this option may not be practical, and difficult to achieve. It was discussed 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 owners to review the engineering cost based on each option. Mr. Nussio had concerns with using sloped quarried limestone on filter cloth giving consideration to the depth of the drain, size of pipe, and space between the two bridges to be replaced. He explained that there may not be enough space between the bridges for sloped quarried limestone endwalls while maintaining a stretch of open drain for meeting all applicable environmental regulations in place. It was discussed that once the bridges are surveyed and investigated we will have a better direction for what headwall options will be the most practical giving consideration to all comments and concerns made.

Mr. Quick and Mr. Defour requested that the new bridge replacements be aligned approximately at the existing centerline of the current bridges. Mr. Snelgrove confirmed that we will try to re-align the new bridge replacements to match the existing centreline of the driveways. Mr. Snelgrove explained that the bridges may need to be shifted slightly to allow for the extra top width requested by Mr. Defour or for any extra length needed for the sloped quarried limestone option, if chosen.

Felix Weigt-Bienzle asked if the survey from the prior bridge replacement upstream will be used. Mr. Nussio confirmed that the prior existing work that was completed will be used for these two bridge replacements. Mr. Snelgrove supported these statements and explained how a field survey of the two bridges will need to be completed for sufficient information to be provided for our report, specifications, and plans. It was confirmed that all prior work completed on the drain will be used on this project to try and keep cost down to all affected owners.

The overall drainage report procedure, timelines, 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.), Ministry of the Environment, Conservation and Parks (M.E.C.P.), Ministry of Natural Resources and Forestry (M.N.R.F.), and the Essex Region Conservation Authority (E.R.C.A.). We further discussed bridge maintenance, sizing, and materials of the proposed bridges, suggesting that an aluminized corrugated steel pipe or aluminized Ultra-Flo pipe will likely be employed similar to the more recent bridges a short distance upstream. Mr. Quick asked if we have considered using plastic coated pipes. Mr. Nussio explained how the plastic or polymer coated pipes are fairly expensive.

Mr. Snelgrove explained to owners on-site that the new corrugated steel pipes have an aluminized coating which has a lifespan of up to 75 years depending on the water quality present within the drain. It was further discussed that the current 2017 report is the most up to date maintenance schedule of assessment, and this will be utilized as part of the drainage report.

The Drainage Act process was discussed including scheduling of meetings and availability of grants. It was noted that construction work would be done after the drainage report is adopted. Mr. Snelgrove asked the owners to call the Town or his office if there are any questions on the project.

Further discussions over the telephone were had with Garry Quick after the meeting regarding the construction of his replacement bridge. It was discussed with Mr. Quick that upon surveying and inspecting his bridge, if it is found to be satisfactory and not in need of replacement, our report will recommend that the bridge not be replaced at this time. We will provide all necessary bridge details for future construction included in our report if the bridge is found to not be in need of replacement. Details were also discussed by telephone discussions with Mr. Defour. Cost estimates, bridge top width, and end wall options were generally discussed with Elwood Defour confirming that he would prefer the 9.14 metre (30 ft.) top width with vertical precast concrete block endwalls for his bridge installation.

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 these two replacement access bridges.

A benchmark was looped from previous work carried out on the drain and was utilized in establishing a site benchmark near the location of the bridges. We surveyed the drain both upstream and downstream of the proposed replacement access bridges and picked up the existing bridges and culvert elevations in order to establish a design grade profile for the installation of the replacement bridges. Cross-sections of the Shepley Drain at the general location of the proposed bridges were taken, as necessary for us to complete our design calculations, estimates and specifications. Bridge inspections were carried out for the two replacement bridges. The condition and details of the existing reinforced concrete bridge for Elwood Defour and corrugated steel pipe with poured concrete headwalls for Garry and Bonny Quick were inspected.

We reviewed the E.R.C.A. and D.F.O. Species at Risk mapping for fish and mussels and the Town made initial submissions to the E.R.C.A. regarding their requirements or any D.F.O. requirements for work that would be proposed to be carried out on the Shepley Drain. A response from the Conservation Authority was received by email on September 18th, 2018 and indicated that the Town must apply for a permit and follow standard mitigation requirements. We also reviewed the Town maps for fish and mussel species at risk for this Class F drain and find that there are no species indicated in the vicinity of this project. A copy of the concerns and requirements to satisfy E.R.C.A. and D.F.O. is included in **Appendix "REI-A"** of this report.

The M.N.R.F. Species at Risk former Town agreement with M.N.R.F. pursuant to Section 23 of the "Endangered Species Act, 2007" expired as of June 30th, 2015. The former agreements are replaced with new legislation provisions under Ontario Regulation 242/08 administered by the M.E.C.P. Section 23.9 allows repairs, maintenance and improvements to be conducted by the Town within existing municipal drains. These works are exempt from Sections 9 and 10 of the

Endangered Species Act provided that the rules in the regulations are followed. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

For the purposes of establishing the watershed area upstream of the proposed bridges, and determining the bridge size required, we investigated and reviewed the past drainage reports dated December 5th, 2017 by Gerard Rood, P.Eng. and March 5th, 1993 by Nick Peralta, P.Eng. The October 14th, 1983 Engineers Report by Maurice Armstrong, P.Eng. was used to establish a design grade at the Defour and Quick bridge locations.

V. FINDINGS AND RECOMMENDATIONS

Prior to the preparation of our report, we reviewed the details of the bridge installations 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 Quick bridge (Parcel 710-02900) does not need to be replaced as it was found to be in satisfactory condition. We have included details for future maintenance for the Quick bridge within our report, specifications, and plans. We also find that a vertical endwall option for the Defour bridge was the most practical option due to the close proximity of the two bridges and we have therefore proceeded with the vertical precast concrete block option, along with using aluminized Ultra-Flo pipe. We find that all existing bridge structures adjacent to County Road 20 constructed prior to the 1993 Peralta report did not take into consideration watershed boundary changes due to the storm sewer reconstruction report completed by Lafontaine, Cowie, Buratto and Associates on September 12 1990. Therefore 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 watershed boundaries changes updated in the 1993 Peralta report and grade requirements set out in the 1983 report. We recommend that in the future any bridge along County Road 20 constructed prior to the 1993 Peralta report, which do not recognize the watershed boundaries from the 1990 Lafontaine, Cowie, Buratto and Associates report, be designed to convey the greater hydraulic flows experienced due to said watershed boundary changes.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owners, we would recommend that a replacement access bridge for Defour (Parcel 710-02800) be constructed in the Shepley Drain at the location and to the general parameters as established in our design drawings attached herein. Additionally, we recommend that the replacement access bridge for Quick (Parcel 710-02900) be replaced in the future under maintenance in the Shepley Drain at the location and to the general parameters as established in our design drawings attached herein. We find that because the replacement bridges are needed to access their lands, the entire cost of the access bridge construction, as well as all the cost for the preparation of the Engineer's Report, will be shared by the affected owners of the parcels served by the access and any affected upstream lands and roads. A Watershed Plan has been prepared and attached in **Appendix "REI-E"** to illustrate all affected upstream lands and roads for the bridge replacements. Additionally, a Construction Schedule of Assessment for the replacement bridges have been prepared and included herein as outlined further in the report for the Defour and Quick bridges. It is anticipated that the agricultural lands served by the replacement Defour bridge should be eligible for the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A) grant as the agricultural property currently holds the Farm Property Tax Class designation. Additionally, all upstream lands that hold the Farm Property Tax Class designation are also expected to be eligible for the O.M.A.F.R.A. grant as detailed in our Schedule of Assessment. Subsequent to the construction of the bridge access, the access will form part of

the drain, and the future maintenance of same shall be shared with the abutting parcel and affected upstream lands and roads as set out further in this report.

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. The Town will be required to obtain an E.R.C.A. permit for the works. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be embedded below the lower of the design or existing bottom of the drain a minimum of 10% of the bridge opening diameter or height to ensure a continued path for fish migration through the access bridge. To prevent flooding and adverse impacts upstream, the new structure needs to provide an equivalent level of service. Therefore, based on this, we have made provisions to use an aluminized steel type II Ultra-Flo pipe for the replacement access bridged as set out below. 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 Shepley Drain is a Class F drain and is located within the Regulated Area 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 administered by the M.E.C.P., we have reviewed the former M.N.R.F. agreement with the Town and their self-assessment. The M.N.R.F. mapping has basically confirmed that snake species including Butler's Garter Snake and Eastern Fox Snake are threatened and endangered, respectively, on this project and threatened birds may be present. Because turtles and snakes are mobile and indicated as sensitive and endangered in the area, we have included herein a copy of the M.N.R.F. mitigation requirements for them in **Appendix "REI-B"**.

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

We find that all the work for the construction of the replacement access bridges can be carried out from the road allowance and within the drain and immediate area of the bridge. We have provided for full restoration of all the work areas. Accordingly, we find that no allowances are necessary pursuant to Sections 29 and 30 of the Drainage Act for the construction work provided in this report.

Based on all of the above, we recommend that the Defour bridge be replaced for construction as shown and detailed on the attached plans. Additionally, we recommend that the Quick bridge be replaced in the future as maintenance on the bridge crossing as shown and detailed on the attached plans. We recommend that the costs for the construction and incidentals for these access bridges in the Shepley Drain be assessed in accordance with the Construction Schedule of Assessment included in this report, and that future maintenance costs for all bridges outlined in the plans be assessed in accordance with the bridge cost sharing outlined in the report.

Based on all of the above, we recommend that a replacement access bridge be constructed in the Shepley Drain to serve the agricultural lands of Elwood Defour, in Part of Lot 6, Gore Concession. We further recommend that the access bridge serving the residential lands of Garry & Bonny Quick, in Part of Lot 7, Gore Concession remain in service and be maintained in the future for replacement. We recommend that all work be in accordance with this report, the attached specifications and the accompanying drawings, and that all works associated with same be carried out in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

VI. ESTIMATE OF COST

Our estimate of the total cost of this work including all incidental expenses is the sum of **FIFTY ONE THOUSAND TWO HUNDRED DOLLARS ($51,200.00)**, made up as follows:

CONSTRUCTION

Item 1)	Provide all labour, equipment and material to construct a new replacement access bridge consisting of 11.0 metres (36.1 ft.) of 2000mm Ultra-Flo smooth wall pipe, 2.8mm thick, aluminized steel type II spiral rib pipe and 190mm x 19mm corrugation profile, including precast concrete block end walls with geogrid reinforcement, quarried limestone on non-woven filter cloth abutting the endwalls on the drain side slopes, excavation, granular bedding and backfill, granular approaches, tile extensions, tree removal, excavation, compaction, removal of the existing structure and deleterious materials off site, hauling, silt and sediment controls, traffic control, cleanup and restoration, complete. (Elwood Defour Bridge)	Lump Sum	$	36,100.00
	Net H.S.T. (1.76%)		$	636.00
	TOTAL FOR CONSTRUCTION		**$**	**36,736.00**

INCIDENTALS

1)	Report, Estimate, and Specifications	$	4,800.00
2)	Survey, Assistants, Expenses, Drawings, Duplication Cost of Report and Drawings, Consideration Meeting, etcetera	$	6,000.00
3)	Estimated Cost of Preparing Tender Documents	$	1,000.00
4)	Estimated Cost of Construction Supervision and Inspection (based on 2 days)	$	2,000.00

5) Net H.S.T. on Items Above (1.76%)	$	243.00
6) Estimated Cost of E.R.C.A. permit	$	150.00
7) Estimated Contingency Allowance	$	271.00
TOTAL FOR INCIDENTALS	**$**	**14,464.00**
TOTAL FOR CONSTRUCTION (brought forward)	**$**	**36,736.00**
TOTAL ESTIMATE	**$**	**51,200.00**

VII. DRAWINGS AND SPECIFICATIONS

As part of this report we have attached design drawings for the construction of these replacement access bridges. The design drawings show the subject bridges locations and the details of the new access bridge installations. 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 installations and future maintenance works, which also includes Standard Specifications within **Appendix "REI-C".**

VIII. CONSTRUCTION SCHEDULE OF ASSESSMENT

We would recommend that all of the costs associated with the construction of the Defour replacement access bridge, and the incidental costs associated with the Defour and Quick bridges, be assessed against the agricultural lands of Elwood Defour (710-02800), in Part of Lot 6, Gore Concession, and the residential lands of Garry & Bonny Quick (710-02900), in Part of Lot 7, Gore Concession, and all affected upstream lands and roads. A Construction Schedule of Assessment has been prepared and included herein to indicate the lands and roads assessed for this replacement access bridge installation.

It has been clearly established that this replacement access bridge for Elwood Defour is being provided to serve as the access from County Road 20 to an existing agricultural parcel. Pursuant to the current Agricultural Drainage Infrastructure Program (A.D.I.P.) Policies that are in place, it is anticipated that this property and the upstream agricultural lands designated Farm Property Tax Class will be eligible for a grant from the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) in the amount of 1/3 of their total assessment for this project related to the replacement bridge serving the Elwood Defour parcel.

IX. FUTURE MAINTENANCE

After the completion of the construction of the replacement access bridge, the said bridge shall be maintained in the future by the Town of Essex. We would also recommend that the Defour access bridge newly constructed in the drain and Quick bridge to be constructed in the future, 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. Should concrete, asphalt or other decorative driveway surfaces over the 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 parcel served by said access bridge.

When any works of maintenance are required to the replacement access bridges, the following provisions with respect to cost sharing shall apply as set out in the Table below. In said table the parcel class has been noted as: "G" - grantable assessment and "NG" - non-grantable assessment.

Shepley Drain
Bridge Summary

Bridge No.	Roll No.	Owners	Parcel Class	% to Abutting Owners	% to Upstream Owners
2.	710-02800	Elwood Defour	G	43.5 %	56.5%
3.	710-02900	Garry & Bonny Quick	NG	36.8%	63.2%

Should any works of maintenance be required to the existing access bridges, the cost will be shared as noted in the above table. The share indicated for the Owners shall be assessed as a Benefit to the bridge Owners and the remaining cost share shall be assessed as an Outlet Liability against the lands and roads within the watershed lying upstream of said access bridge, and shall be assessed in the same proportions as the Outlet Liability assessments shown in the 2017 Gerard Rood, P.Eng. report Updated Maintenance Schedule of Assessment.

The above provisions for the future maintenance of the drain, the replacement access bridge being constructed under this report, and for future maintenance on the other existing bridge, 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.

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2019-10-17
PROVINCE OF ONTARIO

***R**ood **E**ngineering **I**nc.*

Gerard Rood

Gerard Rood, P.Eng.

att.

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CONSTRUCTION SCHEDULE OF ASSESSMENT

SHEPLEY DRAIN

(Replacement Bridges for Elwood Defour and Garry & Bonny Quick)

TOWN OF ESSEX

3. MUNICIPAL LANDS:

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
	County Road 20		County of Essex	1.223	3.02	$ -	$ 164.00	$ 164.00
	County Road 13		County of Essex	3.270	8.08	$ -	$ 437.00	$ 437.00
	Gore Road		Town of Essex	2.791	6.90	$ -	$ 339.00	$ 339.00
	Snake Lane		Town of Essex	2.023	5.00	$ -	$ 246.00	$ 246.00
	Ferris Road		Town of Essex	1.432	3.54	$ -	$ 174.00	$ 174.00
	Harrow Centre Roads		Town of Essex	20.599	50.90	$ -	$ 2,748.00	$ 2,748.00
	Total on Municipal Lands.....					**$ -**	**$ 4,108.00**	**$ 4,108.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
	Harrow Centre Lands		Town of Essex	96.228	237.78	$ -	$ 12,783.00	$ 12,783.00
1	56	630-13300	Hailey Trealout, and Jaremy & Sheri Mayville	0.210	0.52	$ -	$ 18.00	$ 18.00
1	57	630-13301	Manuel Gaspar	0.417	1.03	$ -	$ 30.00	$ 30.00
1	57	630-13410	James Wright	1.011	2.50	$ -	$ 54.00	$ 54.00
1	58	630-13440	Tyler Ryersee & Hailey Broadwell	0.917	2.27	$ -	$ 49.00	$ 49.00
1	60	630-13710	Terry Dube & Kristi Taylor	0.247	0.61	$ -	$ 20.00	$ 20.00

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
1	62	630-13900	Russell & Kimberly Gyori	0.563	1.39	$ -	$ 37.00	$ 37.00
1	66	640-32300	Peter & Patricia McKeen	0.704	1.74	$ -	$ 43.00	$ 43.00
1	66	640-32400	Christopher & Linda Palmer	0.923	2.28	$ -	$ 50.00	$ 50.00
1	63	640-32750	Jerome & Rose Mary Ferriss	0.467	1.15	$ -	$ 33.00	$ 33.00
1	63	640-32850	Philip Jr & Eleonore Kroh	0.417	1.03	$ -	$ 30.00	$ 30.00
1	61	700-00400	Steven & Tonya Hammel	0.202	0.50	$ -	$ 17.00	$ 17.00
Gore	11	700-00609	Colleen & Michael Cox	0.547	1.35	$ -	$ 36.00	$ 36.00
Gore	11	700-00695	Edmund & Sherri Winter	1.683	4.16	$ -	$ 70.00	$ 70.00
Gore	11	700-00900	Gordon & Brenda Dunn	0.350	0.86	$ -	$ 27.00	$ 27.00
Gore	11	700-01000	Loraine Crosby	0.405	1.00	$ -	$ 26.00	$ 26.00
Gore	11	700-01100	Michael & Roberta Pillon	3.513	8.68	$ -	$ 94.00	$ 94.00
Gore	11	700-01200	Gale Williams	0.660	1.63	$ -	$ 36.00	$ 36.00
Gore	14	700-01309	Vincent & Helen Klomp	0.210	0.52	$ -	$ 18.00	$ 18.00
Gore	13	700-01700	Gerald & Ashley Vigneux	0.170	0.42	$ -	$ 16.00	$ 16.00
Gore	13	700-01800	Christine Leal	0.077	0.19	$ -	$ 9.00	$ 9.00
Gore	13	700-01900	Andrew & Barbara Spurdza	0.437	1.08	$ -	$ 31.00	$ 31.00
Gore	13	700-01950	Gregory & Sharon Pillon	0.308	0.76	$ -	$ 24.00	$ 24.00
Gore	13	700-02001	Robin Cadieux-Grayson	0.372	0.92	$ -	$ 28.00	$ 28.00
Gore	10	700-02201	Robert Whitehead	0.372	0.92	$ -	$ 28.00	$ 28.00
Gore	10	700-02290	Rainer & Lynne Pahl	0.371	0.92	$ -	$ 28.00	$ 28.00
Gore	9	700-02401	Russell & Kimberly Gyori	0.324	0.80	$ -	$ 25.00	$ 25.00
Gore	12	700-03210	Derek & Julie Hedges	0.223	0.55	$ -	$ 19.00	$ 19.00
Gore	8	700-03220	Christopher & Roseann O'Keefe	0.223	0.55	$ -	$ 19.00	$ 19.00
Gore	7	700-03250	Brian & Elizabeth Yaciuk	0.223	0.55	$ -	$ 19.00	$ 19.00
Gore	12	700-03300	Perry & Kelly Landry	0.308	0.76	$ -	$ 24.00	$ 24.00

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
Gore	12	700-03400	Teresa Pereira	0.438	1.08	$ -	$ 31.00	$ 31.00
Gore	12	700-03450	Bradley & Alice Laporte	0.344	0.85	$ -	$ 26.00	$ 26.00
Gore	12	700-03470	2275694 Ontario Inc.	0.344	0.85	$ -	$ 26.00	$ 26.00
Gore	12	700-03500	Owl Management Inc.	0.329	0.81	$ -	$ 25.00	$ 25.00
Gore	12	700-03550	Harrow Health Centre Inc.	0.602	1.49	$ -	$ 38.00	$ 38.00
1	58	700-04800	Michael Daum	0.247	0.61	$ -	$ 20.00	$ 20.00
Gore	6	710-02900	Garry & Bonny Quick	1.020	2.52	$ 1,840.00	$ 52.00	$ 1,892.00
Gore	7	710-03100	Joseph & Susan Chisholm	0.213	0.53	$ -	$ 18.00	$ 18.00
Gore	7	710-03200	Aaron & Sarah Swartz	0.819	2.02	$ -	$ 44.00	$ 44.00
Gore	7	710-03300	Jordan Castro & Dayna St. Louis	0.138	0.34	$ -	$ 14.00	$ 14.00
Gore	7	710-03400	Margaret Hennessey	0.146	0.36	$ -	$ 14.00	$ 14.00
Gore	7	710-03500	Margaret Hennessey	0.101	0.25	$ -	$ 10.00	$ 10.00
Gore	7	710-03600	Maria Morujo	0.802	1.98	$ -	$ 45.00	$ 45.00
Gore	7	710-03700	Joan & Debra Sabo	0.816	2.02	$ -	$ 44.00	$ 44.00
Gore	7	710-03800	Robert & Teresa Durand	0.163	0.40	$ -	$ 16.00	$ 16.00
Gore	7	710-03900	Ronald & Deborah Tofflemire	0.140	0.35	$ -	$ 14.00	$ 14.00
Gore	7	710-04000	Jose & Theresa Matos	0.677	1.67	$ -	$ 42.00	$ 42.00
Gore	7	710-04100	Jose & Joana Roberto	0.614	1.52	$ -	$ 39.00	$ 39.00
Gore	7	710-04101	Dean Adam & Tania Morin	0.113	0.28	$ -	$ 12.00	$ 12.00
Gore	7	710-04200	Patrick & Judy Ford	0.127	0.31	$ -	$ 13.00	$ 13.00
Gore	7	710-04300	Richard & Mary Sinasac	0.267	0.66	$ -	$ 22.00	$ 22.00
Gore	7	710-04400	Tracey Ralston	0.151	0.37	$ -	$ 14.00	$ 14.00
Gore	7	710-04500	Bradley Swarts	0.129	0.32	$ -	$ 13.00	$ 13.00
1504	9	710-04600	Brent & Nancy Scratch	0.130	0.32	$ -	$ 13.00	$ 13.00
1504	8	710-04700	Erin Gall	0.129	0.32	$ -	$ 13.00	$ 13.00

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
1504	7	710-04800	Antonio Gomes & Diane Bondy	0.128	0.32	$ -	$ 13.00	$ 13.00
1504	6	710-04900	Timothy & Jacqueline Shepley	0.129	0.32	$ -	$ 13.00	$ 13.00
1504	5	710-05000	Preston Weaver	0.129	0.32	$ -	$ 13.00	$ 13.00
1504	4	710-05100	Donald Flore	0.129	0.32	$ -	$ 13.00	$ 13.00
1504	3	710-05200	Alma Campbell	0.130	0.32	$ -	$ 13.00	$ 13.00
1504	2	710-05300	Shane & Mary Ruthven	0.109	0.27	$ -	$ 11.00	$ 11.00
Gore	8	710-06420	Joseph St. Pierre	1.054	2.60	$ -	$ 54.00	$ 54.00
Total on Privately Owned - Non-Agricultural Lands.....						**$ 1,840.00**	**$ 14,489.00**	**$ 16,329.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
1	61	630-09640	Robert Howie, Linda Nichol & Shirley Reh	6.070	15.00	$ -	$ 148.00	$ 148.00
1	56	630-13250	Rodney Wright	7.883	19.48	$ -	$ 192.00	$ 192.00
1	58	630-13500	Betty Agla, Catherine Fudurich & Barbara Bansky, Linda Kavanaugh	11.251	27.80	$ -	$ 273.00	$ 273.00
1	60	630-13700	Terry Dube & Kristi Taylor	3.270	8.08	$ -	$ 80.00	$ 80.00
1	61	630-13800	Fathe Samour	10.421	25.75	$ -	$ 253.00	$ 253.00
1	67	640-32100	Frederick Pook	0.405	1.00	$ -	$ 10.00	$ 10.00
1	65 & 66	640-32301	Bernard & Martin Gorski	10.117	25.00	$ -	$ 246.00	$ 246.00
1	64	640-32500	Gorski Land Holdings Inc.	16.414	40.56	$ -	$ 399.00	$ 399.00
1	64	640-32701	Bernard Gorski	0.227	0.56	$ -	$ 19.00	$ 19.00
1	63	640-32800	Bernard Gorski	0.251	0.62	$ -	$ 7.00	$ 7.00

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
1	63	640-32870	Bernard Gorski	0.728	1.80	$ -	$ 52.00	$ 52.00
1	58	700-00100	Chun Shi & Xianglin Wu	9.021	22.29	$ -	$ 219.00	$ 219.00
1	58	700-00101	Jose & Celeste Damaso	8.094	20.00	$ -	$ 197.00	$ 197.00
1	58	700-00200	Julia Fabok	24.282	60.00	$ -	$ 589.00	$ 589.00
1	60 & 61	700-00300	Joan & Martin Bansky	0.949	2.34	$ -	$ 51.00	$ 51.00
1	61	700-00500	David & Yvonne Hernandez	8.928	22.06	$ -	$ 217.00	$ 217.00
1	62	700-00600	Marilyn Boulton	4.051	10.01	$ -	$ 99.00	$ 99.00
Gore	11	700-00700	Edward & David Pohanka	13.975	34.53	$ -	$ 339.00	$ 339.00
Gore	11	700-00800	Joan & Martin Bansky	7.871	19.45	$ -	$ 191.00	$ 191.00
Gore	11	700-01300	David & Laura Jenner	12.424	30.70	$ -	$ 302.00	$ 302.00
Gore	14	700-01400	Mary Hrutka	2.023	5.00	$ -	$ 50.00	$ 50.00
Gore	11	700-01600	Michael & Amy Flanagan	9.550	23.60	$ -	$ 232.00	$ 232.00
Gore	13	700-02000	John & Roberta Mailloux	20.026	49.48	$ -	$ 486.00	$ 486.00
Gore	13	700-02100	James Lamoure	10.021	24.76	$ -	$ 244.00	$ 244.00
Gore	10	700-02200	AFF Farms Limited	46.880	115.84	$ -	$ 1,138.00	$ 1,138.00
Gore	10	700-02203	Felix Weigt-Bienzle & Susan Weaver	2.812	6.95	$ -	$ 96.00	$ 96.00
Gore	10	700-02400	Ronald & Etna Stefani	40.146	99.20	$ -	$ 974.00	$ 974.00
Gore	9	700-02500	Roger & Elizabeth Stefani	3.035	7.50	$ -	$ 74.00	$ 74.00
Gore	9	700-03000	Mary Rechwan , Tivador & Kathleen Boros	8.094	20.00	$ -	$ 197.00	$ 197.00
Gore	9	700-03100	David & Anna Hildebrandt	9.486	23.44	$ -	$ 231.00	$ 231.00
Gore	12	700-03200	Richard & Cheryl Huczel	5.666	14.00	$ -	$ 138.00	$ 138.00
Gore	12	700-04750	Joe & Susan Da Silva	9.103	22.49	$ -	$ 221.00	$ 221.00
Gore	7	710-00700	AFF Farms Limited	22.036	54.45	$ -	$ 535.00	$ 535.00
Gore	6	710-02800	Elwood Defour	0.304	0.75	$ 20,097.00	$ 8.00	$ 20,105.00

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
Gore	7	710-03000	Windsor EEG Laboratory Inc.	1.649	4.07	$ -	$ 40.00	$ 40.00
Total on Privately Owned - Agricultural Lands (grantable).....						**$ 20,097.00**	**$ 8,547.00**	**$ 28,644.00**

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

Con. or Plan No.	Lot or Part of Lot	Tax Roll No.	Owner's Name	Hectares Afft'd	Acres Afft'd	Value of Benefit	Value of Outlet	TOTAL VALUE
1	57	630-13400	Colio Estate Wines Inc	16.188	40.00	$ -	$ 393.00	$ 393.00
1	59	630-13600	Allen & Scott McLean	11.736	29.00	$ -	$ 285.00	$ 285.00
1	60	700-00320	1808236 Ontario Limited	34.142	84.37	$ -	$ 829.00	$ 829.00
Gore	10	700-02150	Felix Weigt-Bienzle & Susan Weaver	19.683	48.64	$ -	$ 478.00	$ 478.00
Gore	8	700-03230	Teresa Pereira	5.497	13.58	$ -	$ 134.00	$ 134.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						**$ -**	**$ 2,119.00**	**$ 2,119.00**
		TOTAL ASSESSMENT		589.938	1457.74	**$ 21,937.00**	**$ 29,263.00**	**$ 51,200.00**

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1 Hectare = 2.471 Acres
Project No. REI2018D024
October 17th, 2019

SPECIFICATIONS
SHEPLEY DRAIN
Replacement Bridges for Elwood Defour and Garry & Bonny Quick
(Geographic Township of Colchester South)
TOWN OF ESSEX

I. GENERAL SCOPE OF WORK

The Shepley Drain is located entirely within the Town of Essex. The drainage basin served by the Shepley Drain consists of approximately 605.10 hectares (1495.2 acres). The Shepley Drain compromises of an open drain and commences at the outlet to the Richmond Drain located along the south side of County Road 20, at Pt. Lot 6, Gore Concession. The Shepley Drain then extends upstream in a generally southeasterly direction to the north side of Gore Road near the property line of Lots 58 and 59, Concession 1. A plan showing the general location of the Shepley Drain, and affected Property Owners is attached in **Appendix "REI-E"**. The work under this project generally comprises of the construction of replacement access bridges for the agricultural lands of Elwood Defour and residential lands of Garry and Bonny Quick. The work on the bridges being replaced includes the removal of the existing structures; the installation of a new culverts at the locations as shown in **"Appendix REI-E"**; new culvert end treatments comprising of precast concrete block walls for Defour, and battered concrete jute bags or the reuse of the existing poured concrete headwalls for Quick; granular approach, granular backfill, and granular transition areas. The Quick bridge is to be replaced as future works as the existing bridge is found to be in satisfactory condition and not in need of replacement as of the date of these specifications. The poured concrete headwalls can be reused in consultation with the Drainage Superintendent if they are found to be in good condition when the maintenance replacement of the Quick bridge is required.

The Contractor shall provide all material, labour, and equipment to construct a replacement access bridge for Elwood Defour consisting of 11.0 metres (36.1 ft.) of 2000mm diameter aluminized steel type II Ultra Flo smooth wall pipe, 2.8mm thick, with 190mm X 19mm corrugation profile, with a Hugger band aluminized bolted coupler, including precast concrete block end walls, geogrid reinforcement to secure the walls, grout, and filter cloth backing the walls, in the Shepley Drain. The replacement access bridge shall be constructed so that the centerline of the Defour pipe is set approximately 0.24 metres east of the west end of the existing concrete bridge currently serving the lands, and in accordance with the information as shown on the plans in **Appendix "REI-E"**. The Contractor shall provide all material, labour, and equipment to construct a replacement access bridge for Garry & Bonny Quick consisting of 6.0 metres (19.7 ft.) of 2000mm aluminized steel type II Ultra Flo smooth wall pipe, 2.8mm thick, with 190mm X 19mm corrugation profile, including reusing the existing poured concrete headwalls with grouting to be completed around the pipe opening, in the Shepley Drain. The replacement access bridge shall be constructed so that the centerline of the Quick pipe is set aligned with the existing concrete headwalls bridge currently serving the lands, and in accordance with the information as shown on the plans in **Appendix "REI-E"**. The Contractor will be required to lower the opening in each concrete headwall to suit and shall then securely grout the new replacement pipe into place. If the poured concrete headwalls are determined to be unsatisfactory for use for future construction, we recommend that the Contractor provides 8.0 metres of 2000mm aluminized steel type II Ultra Flo smooth wall pipe, 2.8mm thick, with 190mm X 19mm corrugation profile with a Hugger band aluminized bolted coupler in the Shepley Drain. The new headwall options, if the poured concrete headwalls are not satisfactory for reuse, includes vertical precast concrete block end walls, geogrid reinforcement to secure

the walls, grout, and filter cloth backing the walls or battered concrete jute bags in the Shepley Drain.

The location shall be the exact designated location of these replacement access bridges unless otherwise directed by the property owners and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the replacement access bridges must be approved in writing by the Engineer. The general layout of the access bridges and other ancillary works shall be provided as shown and detailed in the accompanying drawing attached within **Appendix "REI-E"**. A Benchmark has been set near these proposed access bridges so that same can be utilized for the setting of these new bridge culvert grades. The **Benchmark** is the "*top of nail in north face of hydro pole located on the south side of County Road 20 approximately 8.0 metres east of the existing bridge serving Municipal Number 2361"*, with same being **Elevation 187.694 metres.**

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

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

All of the work shall be carried out in accordance with any permits or authorizations issued by the Essex Region Conservation Authority (E.R.C.A.) or the Department of Fisheries and Oceans (D.F.O.), copies of which will be provided, if available. The standard mitigation response received from E.R.C.A. shall be followed and a copy of same is included within **Appendix "REI-A"**. The Contractor shall ensure that sediment and erosion control provisions, set out further in these specifications and in **Appendix "REI-A"**, are followed. Work shall be scheduled so that it can be completed in the dry and when there is no risk of a rain event that might exceed the capacity of the water control system that the Contractor employs. Any damming of the drain will be done on the upstream side in accordance with the provisions set out in **Appendix "REI-A"**. The Contractor will be required to carry out a fish salvage operation if there is water in the drain when the work is being done. Details for the fish salvage are set out in **Appendix "REI-A"**.

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

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

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

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

The Ministry of Natural Resources & Forestry (M.N.R.F.) Species at Risk former Town agreement with M.N.R.F. pursuant to Section 23 of the "Endangered Species Act, 2007" expired as of June 30th, 2015. The former agreements are replaced with new regulation provisions under Ontario Regulation 242/08 administered by the M.E.C.P. Section 23.9 allows repairs, maintenance and improvements to be conducted by the Town within existing municipal drains. These works are exempt from Sections 9 and 10 of the Endangered Species Act provided that the rules in the regulations are followed. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

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

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

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project for the Defour & Quick Bridges extends along the south side of County Road 20. A plan showing the general location of the Shepley Drain and affected Property Owners is attached in **Appendix "REI-E"**. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works where the said roadway is present, or through the easements as set out in the December 5th, 2017 report by Gerard Rood, P.Eng. 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 driveway as necessary to carry out the removal of the existing access bridges and to construct the new replacement access

bridges, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridges to carry out the required construction of the removal and new structure installations and ancillary works.

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

V. REMOVAL OF BRUSH, TREES AND RUBBISH

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

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

Contractor to carry out hand work around the trees, bushes, and shrubs to complete the necessary final site grading and restoration.

Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition. The Contractor shall remove all deleterious materials and rubbish along the course of the open drain in the location of the work areas and any such materials located in the bridge culverts while carrying out its cleaning of same. All such deleterious materials and rubbish shall be loaded up and hauled away by the Contractor to a site to be obtained by it at its cost.

VI. FENCING

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

VII. DETAILS OF BRIDGE WORK

When completed, the new replacement access bridge for Elwood Defour (Parcel 710-02800) along the centreline of the new culvert shall have a total top width, including the top width of the precast concrete block end walls, of approximately 10.88 metres (35.7 ft.) and a travelled driveway width of 9.78 metres (32.1 ft.). When completed, the new replacement access bridge for Garry and Bonny Quick along the centreline of the new culvert shall have a total top width, including the top width of the existing concrete headwalls, of approximately 6.0 metres (19.7 ft.) and a travelled driveway width of 5.12 metres (16.8 ft.). The new pipe shall be set to the invert elevations shown on the plans. The Contractor will be required to lower the opening in each concrete headwall to suit and shall then securely grout the new replacement pipe into place. In the event that the existing poured concrete headwalls are found to not be satisfactory, the culvert shall have a total top width, including the top width of the precast concrete block end walls, of approximately 8.00 metres (26.2 ft.) and a travelled driveway width of 6.78 metres (22.2 ft.). If a battered concrete jute bag end wall is the more preferred option, the culvert shall have a total top width, including the top width of the battered concrete jute bag end walls, of approximately 8.00 metres (26.2 ft.) and a travelled driveway width of 6.10 metres (20.0 ft.). The walls shall have a batter of 1 unit horizontal for every 5 units of vertical distance.

The proposed pipe inverts are set approximately 200mm below the drain design grade. The aluminized steel Type II smooth wall 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 and joined together with a hugger band aluminized bolted coupler with non-woven geotextile filter cloth wrapped around it, secured in accordance with the manufacturer's recommendations. The Ultra-Flo aluminized steel Type II smooth wall pipe to be utilized for this bridge installation must be a

minimum of 2.8mm thick with a 190mm by 19mm corrugation profile and shall be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain.

The Contractor shall have access to carry out the work from the road right-of-way, along with a sufficient distance along both sides of the drain upstream and downstream from the bridge to complete the access bridge installation and drain cleaning as specified. Any accesses or areas utilized in carrying out the works are to be fully restored to their original conditions by the Contractor, including topsoil placement and lawn restoration as directed by the Engineer or the Town Drainage Superintendent. Restoration shall include, but not be limited to, all necessary levelling, grading, shaping, topsoil placement, and granular required to make good any damage caused.

The Contractor shall also note that the placement of the replacement access bridge culverts are 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 3.0 metres (10.0ft.) both upstream and downstream of said pipe. The design parameters of the Shepley Drain at the location of the new access bridges to be installed consists of a 1.22m (4.0 ft.) bottom width, 0.08% 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 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.

Once the new Ultra-Flo aluminized steel Type II smooth wall 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 Contractor shall then install the vertical precast concrete block or battered concrete jute bag end 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 1), 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 precast concrete block end protection installation shall restore the adjacent areas to their original conditions.

The Contractor shall install vertical interlocking precast concrete blocks with filter cloth backing for walls on both ends of the bridge requiring same. The blocks shall be minimum 600X600X1200mm in size as available from Underground Specialties - Wolseley, in 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 grout 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 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. The precast concrete block end wall protection shall be extended from a minimum of 300mm below the invert of the new aluminized steel type II Ultra Flo smooth wall pipe to the top elevation of 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 block end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone rock on filter cloth protection adjacent to the headwalls at each corner of the bridge as seen on the plans in **Appendix "REI-E"**. 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.

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the drawings provided by the Town 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 comprising 30mPa concrete with 6% ±1% air entrainment 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 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 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 Concrete Filled Jute Bag Headwall End Protection"** detail also shown therein.

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.

The Contractor shall also perform the necessary excavation to extend the driveway from the north top bank of the drain to the south limit of the roadway granular. This driveway approach from the existing edge of granular shoulder to approximately 1.0 metres south of 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, and include a gore section at the roadside curved protection with a 5.0m turning radius to the edge of the roadway granular, as shown on the plans. The gravel backfill shall also extend across the pipe to approximately 1.0m beyond the south top of bank as shown on the plans. The pipe shall have a minimum of 500mm of cover, and be uniformly graded down to the existing field level from the existing road edge level at a maximum of 10% grade.

The Ultra-Flo aluminized steel Type II smooth wall pipe for this installation shall be provided with a depth of cover measured from the top of the aluminized steel pipe to the top of the granular backfill of approximately 0.500m (19.7 in.) 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 Benchmark near the site. This Benchmark is the "*top of nail in north face of hydro pole located on the south side of County Road 20 approximately 8.0 metres east of the existing bridge serving Municipal Number 2361*", with same being **Elevation 187.694 metres.**

The new pipe culvert and the backfilling for the Defour Bridge No. 2 (Parcel 710-02800) are to be placed on the following basis:

i) The **East (upstream) invert** of the proposed bridge culvert is to be set at Elevation **185.135** metres.

ii) The **West (downstream) invert** of the proposed bridge culvert is to be set at Elevation **185.127** metres.

iii) The centreline of driveway for this bridge installation shall be set to approximately Elevation **187.940** metres at the existing gravel shoulder edge, Elevation **187.710** metres at the culvert pipe centreline, and Elevation **187.564** metres at approximately 1.0 metre south of the south top of bank and then graded to match the existing ground elevation at each end of the granular approaches. 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%.

The new pipe culvert and the backfilling for the Quick Bridge No. 3 (Parcel 710-02900) are to be placed on the following basis:

iv) The **East (upstream) invert** of the proposed bridge culvert is to be set at Elevation **185.143** metres.

v) The **West (downstream) invert** of the proposed bridge culvert is to be set at Elevation **185.139** metres.

vi) The centreline of driveway for this bridge installation shall be set to approximately Elevation **187.878** metres at the existing gravel shoulder edge, Elevation **187.679** metres at the culvert pipe centreline, and Elevation **187.550** metres at approximately 1.0 metre south of the south top of bank and then graded to match the existing ground elevation at each end of the granular approaches. 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 Benchmark provided for the site.

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

As part of the work provided for the construction of the access bridge, the Contractor shall be required to protect or extend any existing lateral tile ends and swales which conflict with the bridge installation. All existing lateral tile drains and swales, 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. Grouted mortar joints shall be composed of three (3) parts of clean, sharp sand to one (1) part of Portland cement and the mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Engineer. The mortar joint shall be of a sufficient mass around the full circumference of the joint to ensure a tight, solid seal.

The Contractor is to note that the granular driveway approaches extending from the existing edge of gravel shoulder to the north top of bank of the drain shall consist of granular material M.T.O. Type "A" O.P.S.S. Form 1010 and is to be provided to a minimum depth of 305mm (12"), and be satisfactorily compacted in place. The Contractor is to also note that all granular material being placed as backfill for this bridge installation shall be compacted in place to a minimum Standard Proctor Density of 100%, and that all granular 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 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 and removal of vegetation, utilizing the available scavenged topsoil, and shall seed and mulch over all of said areas.

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

IX. GENERAL CONDITIONS

a) The Town Drainage Superintendent or Consulting Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.

b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility or other object which it may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town of Essex, the County of Essex and the Consulting Engineer and their representatives for any damages which it may cause or sustain during the progress of the work. It shall not hold the Town of Essex, County of Essex, or the Consulting Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.

c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Consulting Engineer can review same and check that the work will generally conform to the design and project intent.

d) The Contractor will be responsible for any damage caused by it to any portion of the Municipal road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Municipality 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 Municipality. The Contractor, upon completing the works, shall clean all debris and junk,

etcetera, from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.

e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.

f) During the course of the work the Contractor shall be required to connect existing drainage pipes to the Municipal Drain. In the event that polluted flows are discovered, the Contractor shall delay the connection of the pipe and leave the end exposed and alert the Municipality, the Drainage Superintendent and the Consulting Engineer so that steps can be taken by the Municipality to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Municipality in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.

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

h) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.

i) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Consulting Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses, the Consulting Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.

j) The Contractor will be required to submit to the Municipality, a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work and the Contractor will be required to submit to the Municipality, a Certificate of Clearance for the project from the Workplace Safety and Insurance Board before Final Payment is made to the Contractor.

k) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Owner. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Owner in every way and shall guarantee faithful performance of the

contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

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

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

m) Monthly progress orders for payment shall be furnished the Contractor by the Municipal Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:

i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board

ii) proof of advertising

iii) a Statutory Declaration, in a form satisfactory to the Consulting Engineer and the Municipality, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.

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

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

APPENDIX “REI-A”

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

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

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

2. All disturbed soils on the drain banks and within the channel, including spoil, must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better condition to what existed prior to the works. The spoil material must be hauled away and disposed of at a suitable site, or spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.

3. To prevent sediment entry into the drain in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with the related Ontario Provincial Standards. It is incumbent on the proponent and Contractors to ensure that sediment and erosion control measures are functioning properly and maintained/upgraded as required.

4. Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.

5. All activities including maintenance procedures should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicular refuelling and maintenance should be conducted away from the water.

6. Any drain banks trimmed outside of the July 1st to September 15th timing window will require erosion control blankets to be installed to promote re-vegetation and to protect the slope from erosion in the interim.

Measures to Avoid Causing Harm to Fish and Fish Habitat

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

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

Measures

- Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
- Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
- Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

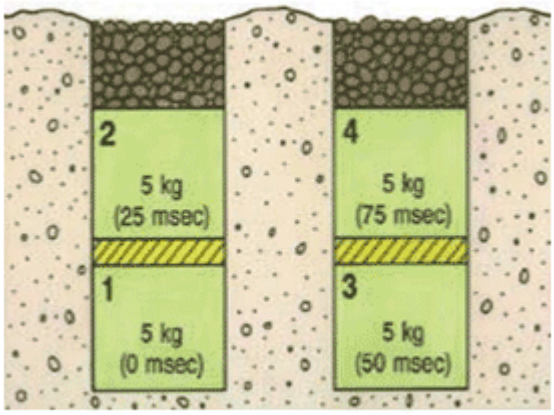
- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
    - Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
    - Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
    - Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
    - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
    - Repairs to erosion and sediment control measures and structures if damage occurs.
    - Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

- Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.
- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

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

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

Figure 1: Sample Blasting Arrangement



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

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

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

Date modified:
2013-11-25

APPENDIX “REI-B”

SCHEDULE C

MITIGATION PLAN

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

PART A. DEFINITIONS

1. Definitions:

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

"DFO" means Fisheries and Oceans Canada;

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

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

"Holding Tub" means a large, light-coloured container fitted with a non-airtight 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.

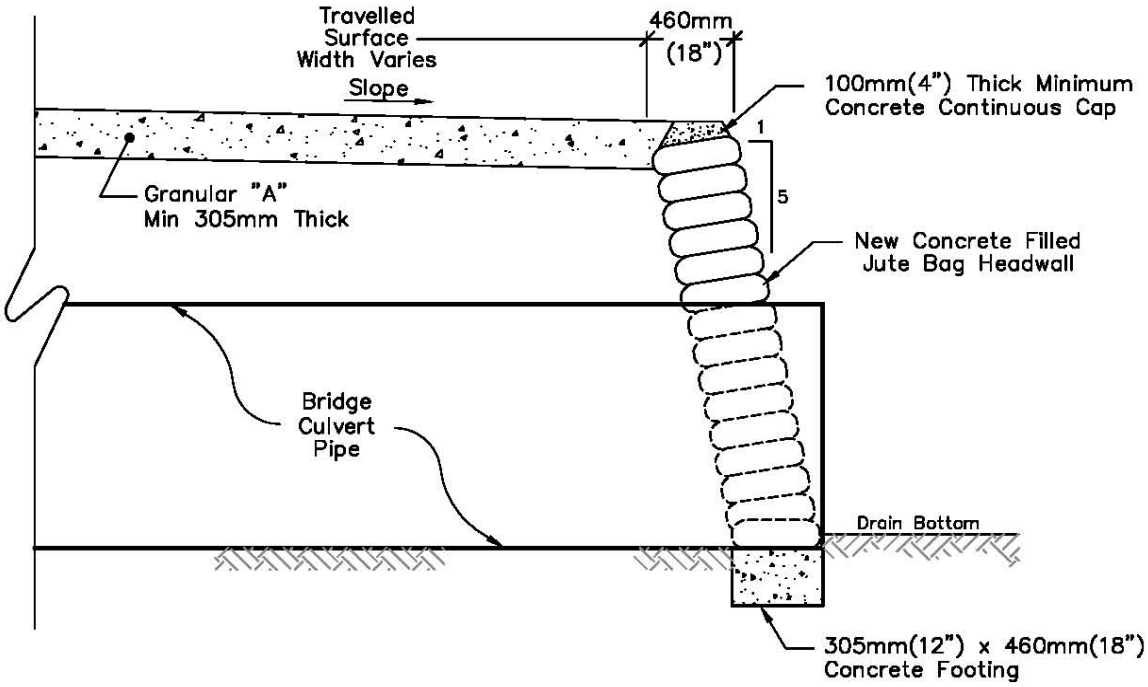
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

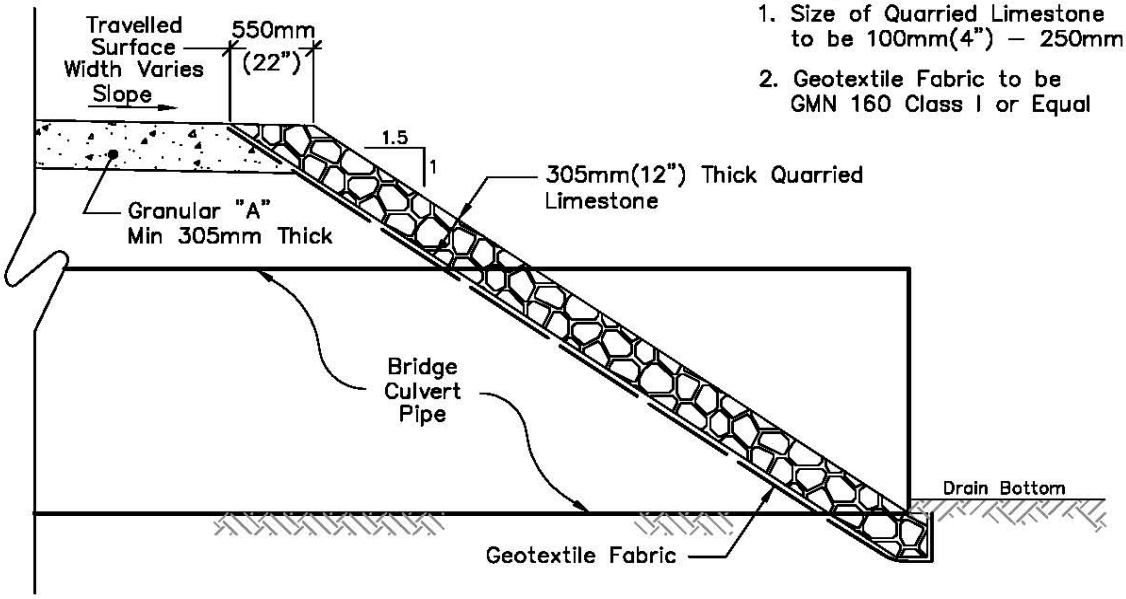
All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Drainage Superintendent and Engineer.



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

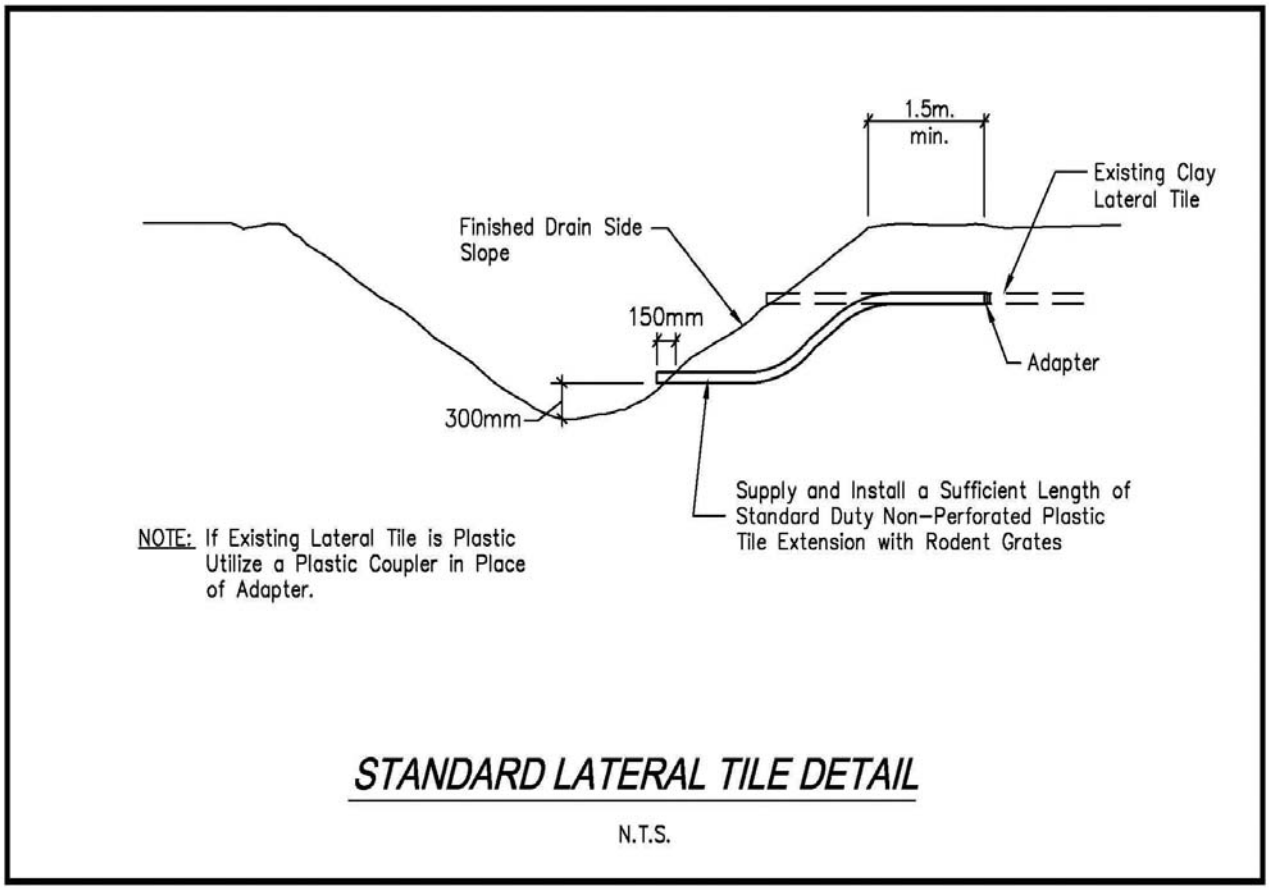
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

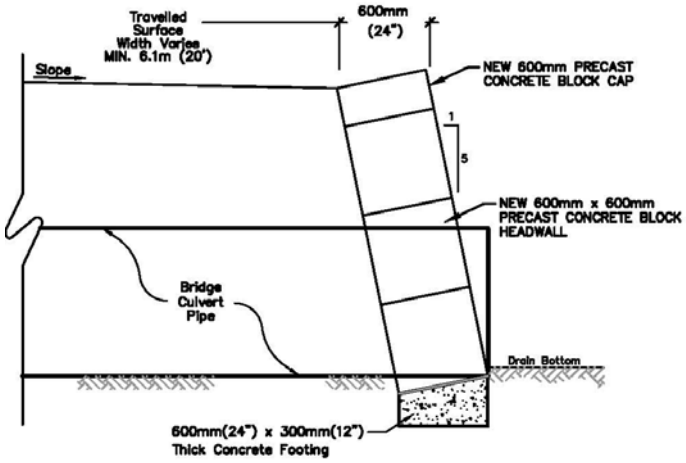
Leamington, Ontario N8H 1G6

519-322-1621



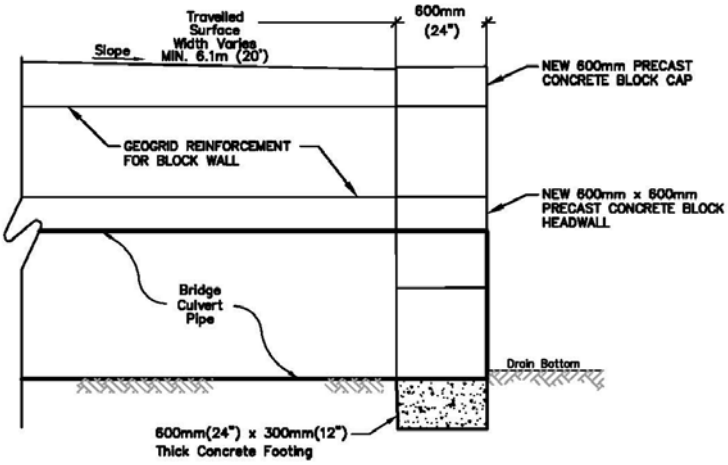
STANDARD LATERAL TILE DETAIL

N.T.S.



TYPICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.

APPENDIX “REI-D”

Appendix D – General Conditions and Specifications not required.

APPENDIX “REI-E”

PLANS FOR DEFOUR AND QUICK BRIDGES

IN THE

SHEPLEY DRAIN

(Geographic Township of Colchester South)

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rood

GERARD ROOD, P.ENG.

REGISTERED PROFESSIONAL ENGINEER G.ROOD 2019-10-17 PROVINCE OF ONTARIO

ROOD ENGINEERING INC.

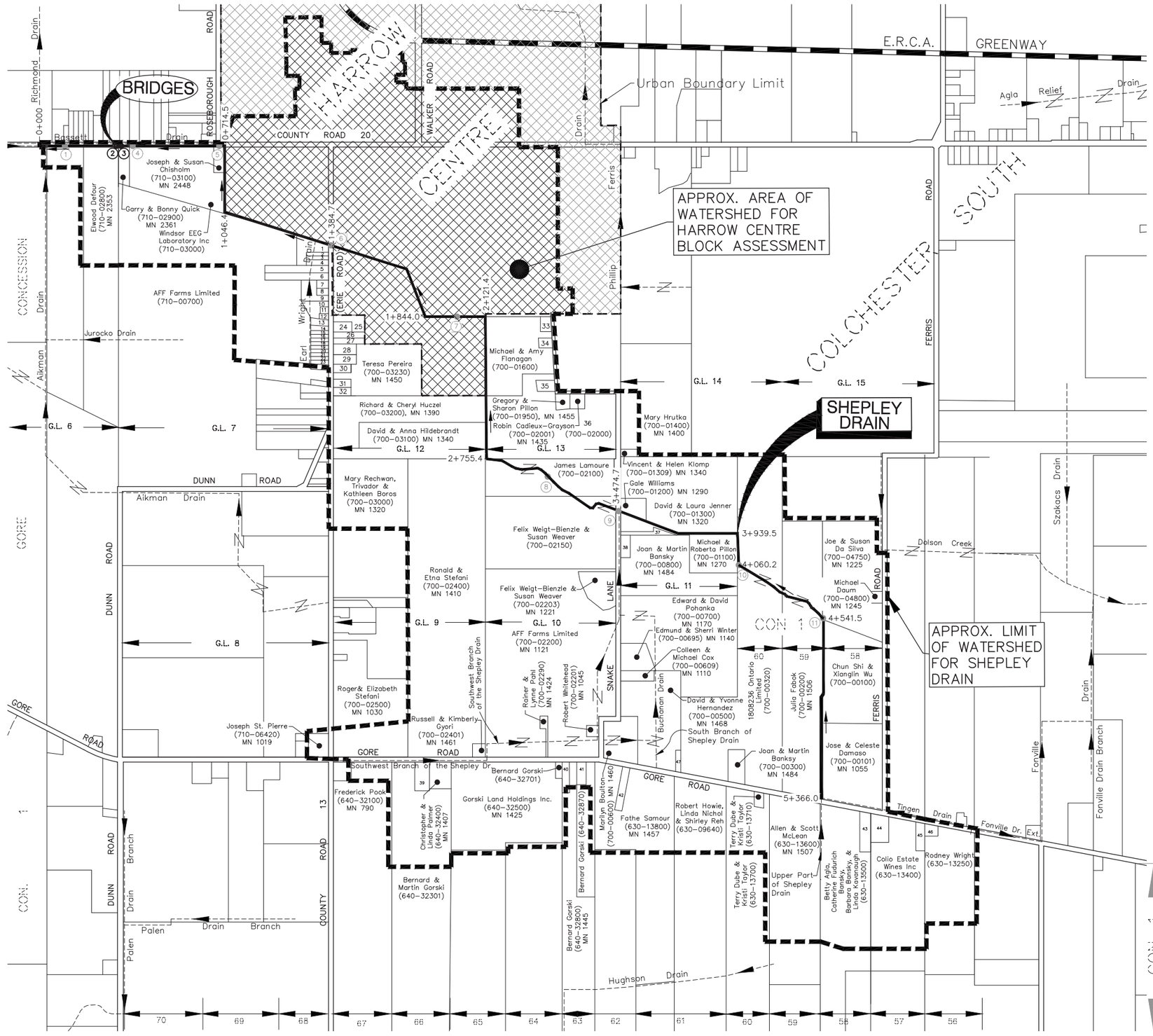
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: October 17th, 2019

TOWN OF ESSEX

MAYOR: Larry Snively
CLERK: Robert Auger
DRAINAGE SUPERINTENDENT: Norm Nussio

No.	Roll No.	Owner/s
1	710-03200	Aaron & Sarah Swartz
2	710-03300	Jordan Castro & Dayna St. Louis (MN 1635)
3	710-03400	Margaret Hennessey (MN 1625)
4	710-03500	Margaret Hennessey (MN 1615)
5	710-03600	Maria Morujo (MN 1605)
6	710-03700	Joan & Debra Sabo (MN 1595)
7	710-03800	Robert & Teresa Durand (MN 1585)
8	710-03900	Ronald & Deborah Tofflemire (MN 1575)
9	710-04000	Jose & Theresa Matos (MN 1565)
10	710-04100	Jose & Joana Roberto (MN 1555)
11	710-04101	Dean Adam & Tania Morin (MN 1545)
12	710-04200	Patrick & Judy Ford (MN 1535)
13	710-04300	Richard & Mary Sinasac (MN 1525)
14	710-04400	Tracey Ralston (MN 1515)
15	710-04500	Bradley Swarts (MN 1505)
16	710-04600	Brent & Nancy Scratch (MN 1495)
17	710-04700	Erin Gall (MN 1485)
18	710-04800	Antonio Gomes & Diane Bondy (MN 1475)
19	710-04900	Timothy & Jacqueline Shepley (MN 1465)
20	710-05000	Preston Weaver (MN 1455)
21	710-05100	Donald Flore (MN 1445)
22	710-05200	Alma Campbell (MN 1435)
23	710-05300	Shane & Mary Ruthven (MN 1425)
24	700-03500	Owl Management Inc. (MN 1470)
25	700-03550	Harrow Health Centre Inc. (MN 1480)
26	700-03470	2275694 Ontario Inc.
27	700-03450	Bradley & Alice Laporte (MN 1460)
28	700-03400	Teresa Pereira (MN 1450)
29	700-03300	Perry & Kelly Landry
30	700-03250	Brian & Elizabeth Yaciuk (MN 1430)
31	700-03220	Christopher & Roseann O'Keefe (MN 1420)
32	700-03210	Derek & Julie Hedges (MN 1410)
33	700-01700	Gerald & Ashley Vigneux (MN 1555)
34	700-01800	Christine Leal (MN 1535)
35	700-01900	Andrew & Barbara Spurdza (MN 1495)
36	700-02000	John & Roberta Mailloux
37	700-01000	Loraine Crosby (MN 1260)
38	700-00900	Gordon & Brenda Dunn (MN 1240)
39	640-32300	Peter & Patricia McKeen (MN 1403)
40	640-32750	Jerome & Rose Mary Ferriss (MN 1443)
41	640-32850	Philip Jr & Eleonore Kroh (MN 1449)
42	630-13900	Russell & Kimberly Gyori (MN 1461)
43	630-13440	Tyler Ryersee & Hailey Broadwell (MN 1525)
44	630-13410	James Wright (MN 1537)
45	630-13301	Manuel Gaspar (MN 1545)
46	630-13300	Hailey Trealout, Jaremy & Sheri Mayville (MN 1547)
47	700-00400	Steven & Tonya Hammel (MN 1474)



WATERSHED PLAN

Scale = 1:8,000

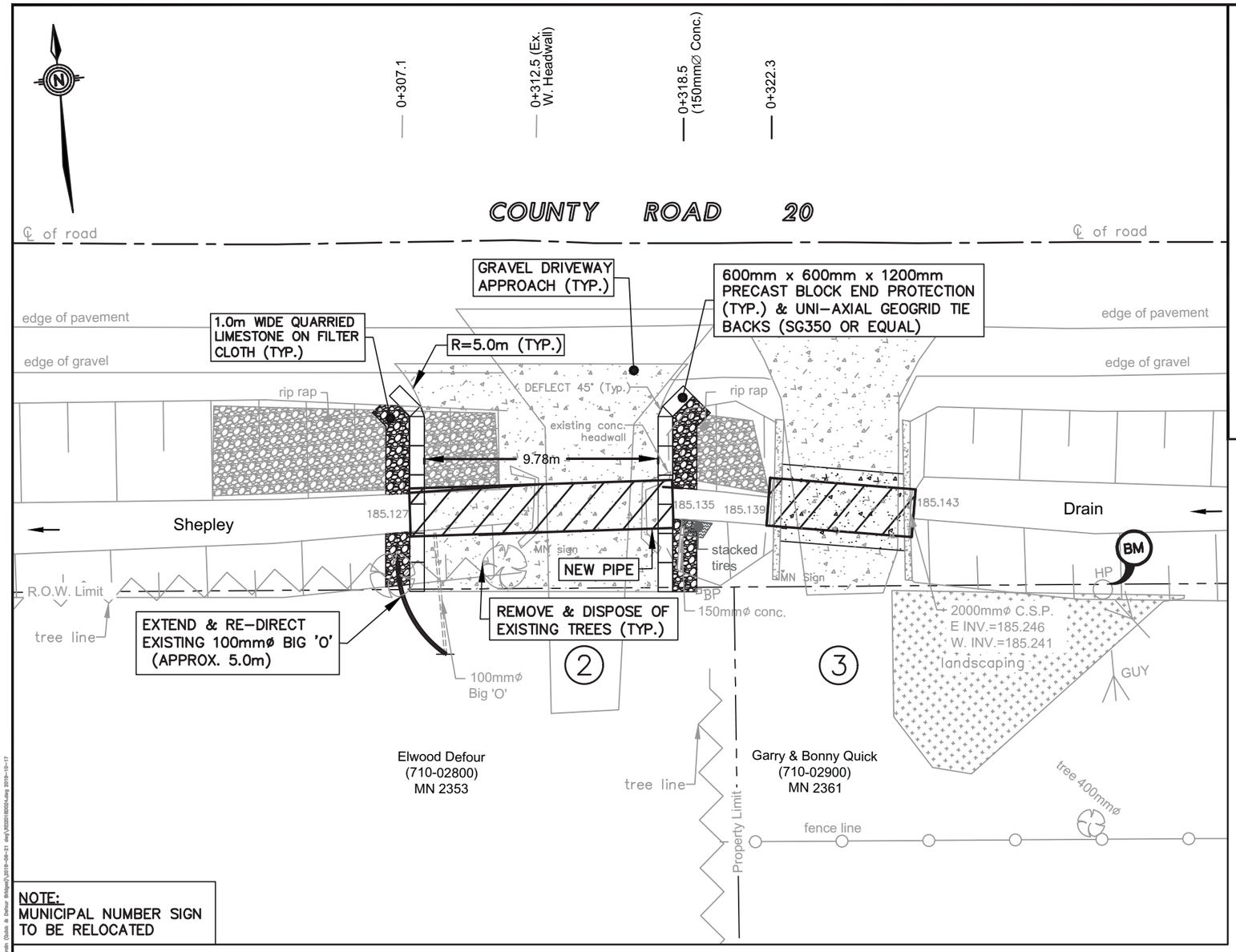
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

DRAWN BY: L.V. & K.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2018D024.DWG

FILE No.: REI2018D024

SHEET No.: 1 OF 3

\\SERVER-2019\RD_Data_Server\DRAFTING\PROJECTS\Projects 2018\REI2018D024 - Shepley Drain (Quick & Defour Bridges)\2019-06-21 dwg\REI2018D024 WATERSHED
Plotted on:Wed Oct 16 - 9:34:17



BRIDGE NO. 2 PLAN

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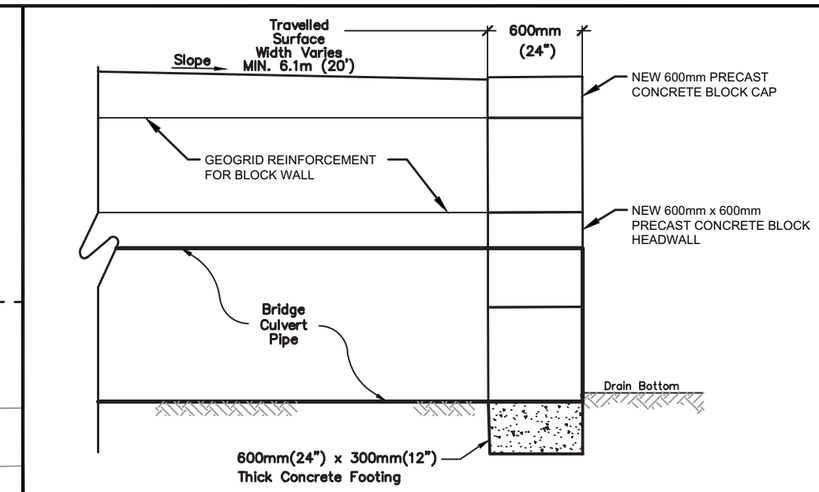

TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

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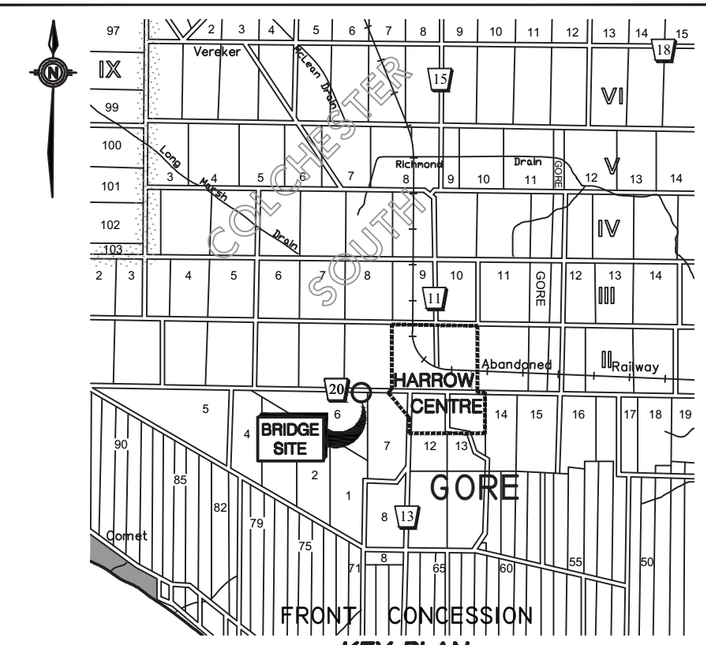


KEY PLAN

Scale = 1:100,000

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

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2000mm	11.0m (36.08 FT.)	2.8 mm (12 GA.)	190x19mm (7.5"x 0.75")	ULTRA-FLO ALUMINIZED	UPSTREAM INV. (E) =185.135m DOWNSTREAM INV. (W) =185.127m ℄ TOP OF DRIVEWAY =187.710m DRAIN GRADE = 0.08%

SHEPLEY DRAIN

Bridge Replacement for Elwood Defour (710-02800)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER SOUTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

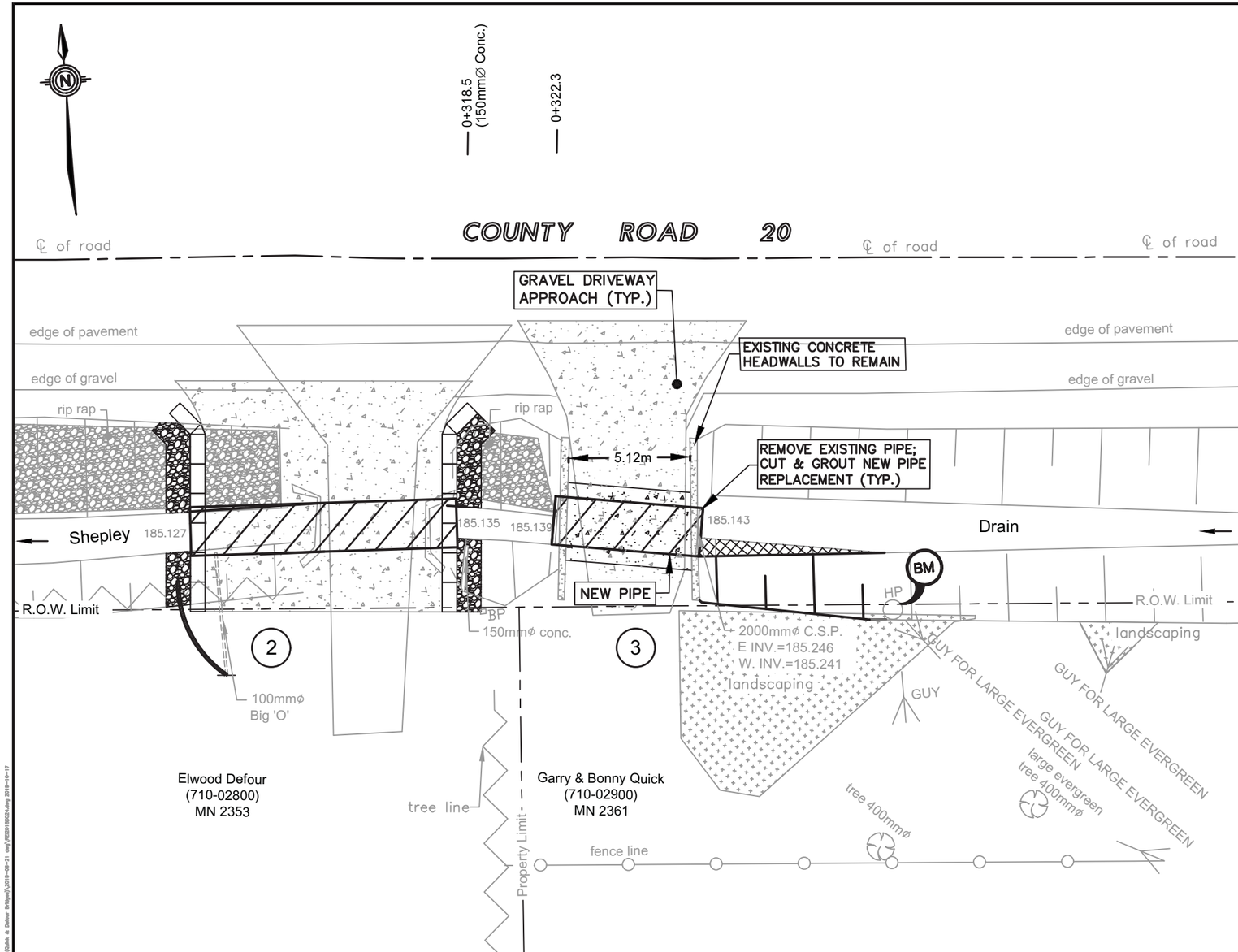
REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2019-10-17
PROVINCE OF ONTARIO

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

DATE: 2019-10-17

FILE No.: 2018D024
DRAWN BY: L.V.&J.S.
PLOT CODE: 1:1
FILE: REI2018D024.DWG

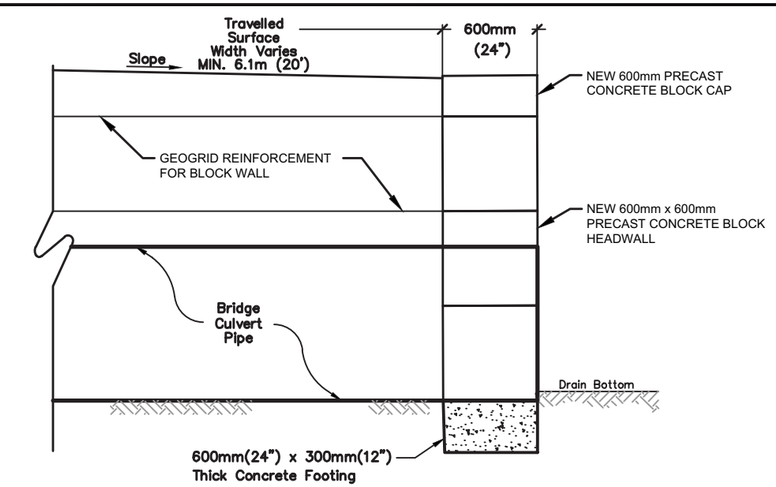
APPENDIX 'E'
2 OF 3



BRIDGE NO. 3 PLAN

SCALE = 1:200

FOR FUTURE CONSTRUCTION



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

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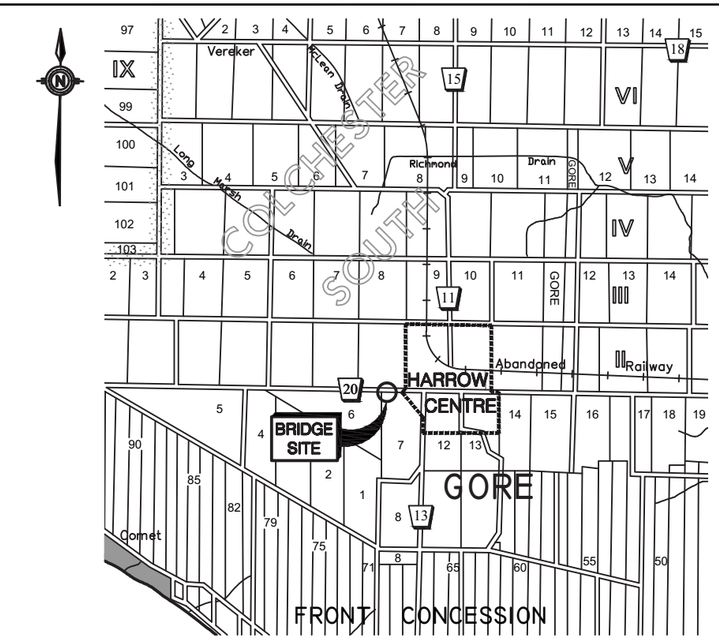

KEY PLAN

Scale = 1:100,000

BENCHMARK:

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

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2000mm	6.0m (19.68 FT.)	2.8 mm (12 GA.)	190x19mm (7.5"x 0.75")	ULTRA-FLO ALUMINIZED	UPSTREAM INV. (E) =185.143m DOWNSTREAM INV. (W) =185.139m ℄ TOP OF DRIVEWAY =187.679m DRAIN GRADE = 0.08%

SHEPLEY DRAIN

Bridge Replacement for Garry & Bonny Quick (710-02900)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER SOUTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2019-10-17
PROVINCE OF ONTARIO

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

DATE: 2019-10-17

FILE No.:	DRAWN BY: L.V.&J.S. PLOT CODE: 1:1 FILE: REI2018D024.DWG	APPENDIX 'E'
2018D024		3 OF 3