

The Corporation of the Town of Essex

Consideration of Report Meeting

Agenda

RE: Thompson Drain

Bridges for Kelly Strong and Davin & Karen Kendrick and Updated Maintenance Schedule Geographic Township of Colchester North, Project

REI2016D025, Town of Essex, County of Essex

County of Essex Civic Centre Council Chambers

360 Fairview Avenue West, Essex, Ontario

Monday December 4, 2017– 5:00 PM-6:00 PM

1. Roll Call

Present: Mayor Ron McDermott, Chair
Deputy Mayor Richard Meloche
Ward 1 Councillor Randy Voakes
Ward 3 Councillor Ron Rogers
Ward 3 Councillor Larry Snively
Ward 4 Councillor Sherry Bondy

Also Present: Chris Nepszy, Director of Infrastructure and Development
Dan Boudreau, Manager, Operations/Drainage Superintendent
Gerard Rood, Professional Engineer, Rood Engineering Inc.
Norm Nussio, Assistant Manager of Operations and Drainage

From the Public: See attached sign-in sheet

The Clerk confirms that all notices have been sent in accordance with The Drainage Act

2. Declarations of Conflict of Interest

3. Public Presentations

a)

i) Gerard Rood, Professional Engineer

Re: Report from Rood Engineering Inc. dated October 11, 2017 (the “Report”) for the identified drainage works.

ii) Other public presentations (if any).

Moved by
Seconded by

That the Presentation by Gerard Rood be received and that the Report for Thompson Drain, Bridges for Kelly Strong and Davin & Karen Kendrick (Part of Lots 31 & 32, N.M.R. Concession) & Updated Maintenance Schedules Geographical Twp. Of Colchester North, REI Project 2015D016, Town of Essex, County of Essex as prepared by Gerard Rood, Professional Engineer dated October 11th, 2017 be adopted, that a provisional by-law be prepared for Council's consideration and that the Report proceed to a Court of Revision to be scheduled.

4. Adjournment

Moved by _____

Seconded by _____

That the meeting be adjourned at _____ PM.

THOMPSON DRAIN

Bridges for Kelly Strong and Davin & Karen Kendrick

and Updated Maintenance Schedule

Geographic Township of Colchester North



TOWN OF ESSEX

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

Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

Leamington, Ontario N8H 1G6

519-322-1621

REI Project 2016D025

October 11th, 2017

October 11th, 2017

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

Mayor McDermott and Members of Council:

**THOMPSON DRAIN
Kelly Strong Bridge and Davin & Karen Kendrick Bridge
(Part of Lots 31 & 32, N.M.R. Concession)
and Updated Maintenance Schedule
Geographic Twp. of Colchester North
Project REI2016D025
Town of Essex, County of Essex**

I. INTRODUCTION

In accordance with the instructions received from you by letter of April 7th, 2016, from your Manager, Legislative Services (Clerk), Robert Auger, we have proceeded with an Engineer's Report to review the existing drainage works and area served by the Thompson Drain. The Engineer's Report provides for the construction of a replacement and new access bridge in the Thompson Drain, and an updated maintenance schedule of assessment. The proposed bridge replacement is intended to provide safer access for the agricultural lands owned by Kelly Strong, in Part of Lot 31, N.M.R. Concession, in the Geographic Township of Colchester North. Additionally, with the new surplus dwelling severance of Parcel 470-00520, a farm entrance is needed to provide access for servicing Davin & Karen Kendrick's agricultural lands. The Thompson Drain is an open drain with a number of access bridges. The drain was constructed pursuant to the Drainage Act. A plan showing the Thompson Drain alignment, as well as the general location of the above-mentioned bridges, is included herein as part of the report.

These investigations were initiated by resolutions passed by Council to prepare a new maintenance schedule including the variation of the assessment on the Thompson Drain so that the cost of future maintenance works on this drain system may be more fairly assessed, and to provide for the replacement and new access bridges to serve the Strong and Kendrick Parcels. This investigation, our instructions, and this construction and maintenance report are in accordance with Sections 76 and 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010". We have performed all of the necessary survey, investigations, etcetera for the proposed bridge, as well as the Thompson Drain, and we report thereon as follows.

The Town of Essex is proposing to undertake maintenance works on the Thompson Drain. Land boundary and drainage changes, new owners, and updated provisions for bridge maintenance cost sharing have arisen, such that a variation of the current Schedule of Assessment is necessary in order to properly distribute the cost of maintenance on this drain system to all affected landowners. This variation in assessment establishes a Maintenance Schedule of

Assessment which shall provide a basis for levying any future maintenance costs for work to both the open drain and the bridges.

II. DRAINAGE HISTORY

From our review of the Town's drainage files, we have determined that the last major repair and improvements to the Thompson Drain was completed under an Engineer's Report dated April 24th, 1969 prepared by C.G.R. Armstrong, P.Eng. The work included in said report consisted of drain cleaning, improvement, brushing and grubbing, and bridge cleaning.

The Thompson Drain is located entirely within the Town of Essex. The drainage basin served by the Thompson Drain consists of approximately 133.10 hectares (328.9 acres). The Thompson Drain starts at the outlet located on the east side of Batten Road, Pt. Lot 31, N.M.R. Concession, and proceeds easterly along the north side of County Road 12 to the approx. Station 1+463 metres. This station lies just west of the agricultural access bridge serving Parcel 470-00205.

We have utilized the plans within the Armstrong report to establish the size parameters for the drain and the details to be used in establishing the bridge culvert installations. We have also used this report to establish the drain profile grades, and to assist us in establishing the design grade for the subject access bridge installations. The Schedule of Assessment in the latest drainage report was used as a guide to establish the upstream watershed area and flows to be used in the design of the bridges. Additionally, the February 3rd, 1976 Schedule of Assessment for the Essex Outlet Drain prepared by C.G.R. Armstrong, P.Eng., and the April 30th, 1976 report prepared by E.O. LaFontaine, P.Eng. was used to investigate the north watershed limits of the Thompson Drain.

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 June 13th, 2017. The following people were in attendance at said meeting: Wilfred Strong, David Burstyn, Ron Kendrick, Terry Brockman, Tanya Tuzlova (Essex Drainage Clerk), Norm Nussio (Essex Assistant Drainage Superintendent), Dan Boudreau (Essex Drainage Superintendent), and Gerard Rood (Rood Engineering).

Details of the proposed bridge works were reviewed. It was confirmed that the replacement Bridge No. 1 for Parcel 470-00560 should be relocated to the east limit of the agricultural lands abutting the west residential property limit to provide better access for operations. The existing concrete pipe bridge is too narrow, spalling badly and has severely deteriorated endwalls with significant sink holes forming. The old structure will be abandoned and removed, and the drain bank will be stabilized as part of the work. Furthermore, due to the surplus dwelling severance of Parcel 470-00520, a new bridge was needed to provide safe access serving the agricultural lands. This will form Bridge No. 3, as seen on the Watershed Plan, and will be located approximately 15.9 metres from its east property limit between tile outlets as requested by Davin Kendrick.

We advised the owners that the minimum standard top width for an access bridge is 6.10 metres (20 ft.) and that the bridge centreline location will need to be established with them. Wilfred Strong, who proxied for Kelly Strong was advised that because Bridge No. 1 is a replacement bridge, the cost of the new replacement access bridge construction, as well as all the cost associated with same for the preparation of the Engineer's Report would be shared by

the abutting owner and upstream lands and roads. For Bridge No. 3, Davin Kendrick was advised that since this bridge access was needed to serve the agricultural lands due to it's severance, the cost of the new access bridge construction, as well as all the cost associated with it for the preparation of the Engineer's Report would be borne 100 percent to their Parcel 470-00520. Any cost for additional top width will be borne by the owners for construction and for future maintenance.

We went on to discuss that sloped quarried limestone on filter cloth end protection would likely be the most economical based on previous similar bridges, but concrete filled jute bag ends or precast concrete blocks for the installation, like those on some other newer bridges, would be checked and the Engineer would contact the owner to review the engineering cost estimates if costs were comparable. Dave Burstyn mentioned how he needs his end walls to be maintained on his bridge. It was discussed that he can put in a notice for maintenance after the report is completed.

The overall drainage report procedure, future maintenance processes, and grant eligibility were generally reviewed with the owners. They were also advised that the works will be subject to the approval of the Department of Fisheries and Oceans (D.F.O.), the Ministry of Natural Resources & Forestry (M.N.R.F.), and the Essex Region Conservation Authority (E.R.C.A.). We further discussed bridge maintenance, sizing, and material of the proposed bridges, suggesting that a corrugated aluminized steel pipe will likely be employed similar to the more recent bridges a short distance upstream and downstream. It was further discussed that the current 1969 report is quite old and there have been several severances, so that the drain requires an updated maintenance schedule to properly assess future maintenance, and this will be included as part of the drainage report.

Terry Brockman, who proxied for Cindy Brockman discussed the option of widening his bridge to 9.14 metres (30 ft.) top width. Dan Boudreau explained that if he wants a wider access for their lands, it will need to be completed under the engineer's report instead of under maintenance. It was established that bridge cost sharing will be completed and reviewed with him once completed.

A landowner mentioned how there are road crossing pipes from the south draining into the Thompson Drain. It was discussed that these pipes will be surveyed, with the road and land owners being assessed accordingly. The north limits of the Watershed Plan for the Thompson Drain will also be investigated along the Canaan Drain with any necessary changes being made.

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 of the entire length of the Thompson Drain, including taking the necessary levels and details to establish the design parameters for the installation of the replacement Bridge No. 1 and the new Bridge No. 3.

A bench mark was looped from previous work carried out on the drain and was utilized in establishing a site bench mark near the location of each bridge. We surveyed the drain both upstream and downstream of the proposed access bridges and picked up the existing concrete bridges and culvert elevations in order to establish a design grade profile for the installation of the replacement and new bridges. We also took cross-sections of the Thompson Drain at the general location of the proposed bridges, as necessary for us to complete our design calculations, estimates and specifications.

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

For the purposes of establishing the watershed area upstream of the proposed bridges, and determining the bridge sizes required, we investigated and reviewed the past drainage reports on the Thompson Drain, and obtained drainage reference information from the Town. We also made a visual inspection of the lands along the drain and noted if there were any surface swales or tiles evident along the Thompson Drain that might conduct flows to the drain.

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. We further recommend that the existing structure No. 1 be abandoned pursuant to Section 19 of the Drainage Act and that the new replacement Bridge No. 1 and new Bridge No. 3 form part of the Municipal drain once completed, along with all the other existing structures shown on the plans.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owners, we would recommend that a replacement and new access bridge be constructed in the Thompson Drain at the locations and to the general parameters as established in our design drawings attached herein. We further recommend that when other existing access bridges in the drain require replacement, that the structures be replaced in accordance with the bridge summary attached to this report and labelled **Schedule "A"**. All new pipes shall be set with 10% of their required diameter embedded in the drain bottom as spelled out further in this report, and in accordance with the report Specifications.

During the course of our investigations, this drainage project was discussed and reviewed with E.R.C.A., to deal with any Authority and D.F.O. issues and comments related to this Municipal drain. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be embedded below the design or existing bottom of the drain a minimum of 10% of the bridge opening height, or use of a clear span structure 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 corrugated pipe for each access 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 Thompson Drain is located within the Regulated Area and is under the jurisdiction of the E.R.C.A., and therefore all work has to comply with the current mitigation provisions of the E.R.C.A. and D.F.O. Details of these mitigation measures are included in the Specifications and **Appendix "REI-A"** forming part of this report.

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

In order to properly assess any maintenance works to the Thompson Drain it will be necessary to vary the Schedule of Assessment within the current governing Engineer's Report dated April 24th, 1969 prepared by C.G.R. Armstrong, P.Eng. We recommend that the current Schedule of Assessment be varied and same has been prepared and provided within this report.

To establish a new Schedule of Assessment for the Thompson Drain, a value of \$4,000.00 has been utilized as a basis for the future cost sharing of maintenance works. This amount was distributed amongst the lands and roads affected within the watershed. The amount utilized in the Maintenance Schedule of Assessment does not authorize expenditure of this amount but only provides an arbitrary value for the purpose of establishing a relative distribution of cost amongst the property owners and roads affected by the maintenance work. When work is done to any portion of the Thompson Drain, the costs shall be assessed in accordance with the Maintenance Schedule of Assessment for the Drain and the provisions in the Drainage Act.

Furthermore, we recommend that the Strong bridge be replaced and relocated as shown and detailed on the attached plans. We also recommend that a new bridge be constructed and located within the Thompson Drain to serve the agricultural lands for the Kendrick Parcel 470-00520. We recommend that the cost for these accesses be assessed in accordance with the Construction Schedule of Assessment included in this report, and that future maintenance costs for these bridges and the other existing structures be assessed in accordance with the bridge cost sharing table outlined in this report.

We find that all the work for the construction of the bridges can be carried out from the road allowance and within the drain and immediate area of the bridges. 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 a replacement access bridge be constructed in the Thompson Drain to serve the agricultural lands of Kelly Strong, in Part of Lot 31, N.M.R. Concession, and a new bridge be constructed to serve the Kendrick agricultural lands in Part of Lot 32, N.M.R. Concession 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 THREE THOUSAND SIX HUNDRED DOLLARS (\$53,600.00)**, made up as follows:

CONSTRUCTION

- Item 1) Provide all labour, equipment and material to construct a new access bridge consisting of 14.0 metres (45.9 ft.) of 1500mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugation profile, 9-Corr. wide aluminized bolted coupler, including sloped quarried limestone on filter cloth end protection, excavation, granular bedding and backfill, granular approaches, tile diversions, excavation, compaction, removal of existing structure and restoration of drain,

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	hauling, cleanup and restoration, complete. (Strong Bridge)	Lump Sum	\$	18,100.00
Item 2)	Provide all labour, equipment and material to construct a new access bridge consisting of 13.0 metres (42.7 ft.) of 1400mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugation profile, 9-Corr. wide aluminized bolted coupler, including sloped quarried limestone on filter cloth end protection, excavation, granular bedding and backfill, granular approaches, tile diversions, excavation, compaction, hauling, cleanup and restoration, complete. (Kendrick Bridge)	Lump Sum	\$	17,000.00
	Net H.S.T. (1.76%)		\$	620.00
TOTAL FOR CONSTRUCTION				\$ 35,720.00

INCIDENTALS

1)	Report, Estimate, and Specifications		\$	4,800.00
2)	Survey, Assistants, Expenses, Drawings, Duplication Cost of Report and Drawings, Consideration Meeting, etcetera		\$	4,750.00
3)	Estimated Cost of Preparing Tender Documents		\$	1,200.00
4)	Estimated Cost of Construction Supervision and Inspection (based on 2 days)		\$	1,600.00
5)	Net H.S.T. on Items Above (1.76%)		\$	183.00
6)	Estimated Cost of E.R.C.A. permit		\$	150.00
7)	Estimated Contingency Allowance		\$	1,197.00
TOTAL FOR INCIDENTALS				\$ 13,880.00
TOTAL FOR CONSTRUCTION (brought forward)				\$ 35,720.00
TOTAL ESTIMATE FOR BRIDGE CONSTRUCTION				\$ 49,600.00
TOTAL ESTIMATED COST FOR MAINTENANCE SCHEDULE				\$ 4,000.00

VII. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the replacement and new access bridges. The design drawings show the subject bridge 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. ASSESSMENT SCHEDULE AND MAINTENANCE WORKS

We would recommend that all of the costs associated with the construction of the replacement access Bridge No. 1, and the incidental costs associated with same, be assessed against the residential lands of Kelly Strong (470-00560), in Part of Lot 31, N.M.R. Concession, and all upstream affected lands and roads in the Town of Essex. We would also recommend that all the costs associated with the construction of the new access Bridge No. 3, and the incidental costs associated with same, be assessed 100% against the agricultural lands of Davin & Karen Kendrick (470-00520), in Part of Lot 32, N.M.R. Concession, because this is a first bridge installation. A Construction Schedule of Assessment has been prepared and included herein to indicate the lands and roads assessed for these access bridge installations.

On September 22nd, 2005, the Ontario Ministry of Agriculture, Food, and Rural Affairs (O.M.A.F.R.A.) issued Administrative Policies for the Agricultural Drainage Infrastructure Program (A.D.I.P.). This program has re-instated financial assistance for eligible costs and assessed lands pursuant to the Drainage Act. Sections 85 to 90 of the Drainage Act allow the Minister to provide grants for various activities under said Act. Sections 85 to 87 make it very clear that grants are provided at the discretion of the Minister. Based on the current A.D.I.P., "lands used for agricultural purposes" may be eligible for a grant in the amount of 1/3 of their total assessment. The new policies define "lands used for agricultural purposes" as those lands eligible for the "Farm Property Class Tax Rate". The eligible lands have been determined from the Ministry AgMaps geographic information portal. Properties that meet the criteria for "lands used for agricultural purposes" are shown in the attached assessment schedule under the heading **"5. PRIVATELY OWNED AGRICULTURAL LANDS (grantable)"** and are expected to be eligible for the 1/3 grant from O.M.A.F.R.A.

We recommend that an application be made by the Town, on completion of the construction and any future maintenance work, to the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) in accordance with Section 88 of the "Drainage Act R.S.O. 1990, Chapter D.17, as amended 2010" for this grant. Because the Kendrick bridge is required due to a severance after 2005, the costs for the bridge are not eligible for grant in accordance with the current A.D.I.P. Policies, and the Construction Schedule of Assessment has shown this portion of the assessment under the heading **"5. PRIVATELY OWNED AGRICULTURAL LANDS (non-grantable)"**. This report will make the new bridge part of the drainage works and therefore any future maintenance costs associated with same will be eligible for grants in accordance with the policies.

After the completion of the construction of these access bridges, all of the bridges in the drain shall be maintained in the future by the Town of Essex. We would also recommend that these

access bridges newly constructed in the drain and the existing bridges, for which the future maintenance costs are to be borne by the abutting affected landowner 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 this bridge culvert require removal as part of the maintenance works, these surfaces should also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guard rails or other special features exist that will be impacted by the maintenance work, they are also to be removed and restored or replaced as part of the bridge maintenance work. However, the cost of the supply and installation of any surface material other than Granular "A" material, and the cost of removal and restoration or replacement, if necessary, of any special features, shall be totally assessed to the benefiting adjoining owner served by said access bridge.

We have prepared a Maintenance Schedule of Assessment to be utilized for assessing costs against the affected lands and roads for any future maintenance works conducted to the Thompson Drain and same has been attached herein. As previously mentioned, the assessment proportions as outlined within the Maintenance Schedule of Assessment have been established on the basis of an assumed future maintenance cost of \$4,000.00, and it should be understood that the maintenance charges outlined in the attached Maintenance Schedule of Assessment will be assessed as part of this report preparation. Also, for the purposes of future maintenance on the entire length of the drain, all costs shall be levied against the lands and roads within the watershed in accordance with the attached Maintenance Schedule of Assessment. The physical dimensions which control the extent of maintenance works permitted on this drain shall be limited to that which has been set out in the attached profile plan.

When any works of maintenance are required to the existing 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.

Thompson Drain
Bridge Sharing Summary

<u>Bridge No.</u>	<u>Roll No.</u>	<u>Owners</u>	<u>Class</u>	<u>Owners Share</u>	<u>Upstream Share</u>
1.	470-00560	Kelly Strong	G	39.0%	61.0%
2.	470-00550	Kelly & Wilfred Strong	NG	43.9 %	56.1%
3.	470-00520	Davin & Karen Kendrick	NG	48.7%	51.3%
4.	470-?????	Jakob Strong	NG	48.7%	51.3%
5.	470-00500	Cindy Brockman	G	50.7%	49.3%
6.	470-00400	Wayne Lassaline	NG	55.4%	44.6%

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7.	470-00305	Jeffrey Shepley	G	68.4%	31.6%
8.	470-00300	Gordon Teskey & Jo-Ann Ferguson	G	62.0%	38.0%

Should any works of maintenance be required to the existing access bridges, the cost will be shared as noted in the above table. Where parcels have more than one bridge, the downstream one is considered the primary one and the cost is shared, while the upstream bridge is secondary and 100% cost to the owner. The share indicated for the Owner shall be assessed as a Benefit to the bridge Owner 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 Maintenance Schedules of Assessment established and included herein.

The Maintenance Schedule of Assessment included herein has been developed on the basis of an estimated cost of \$4,000.00. The actual cost of maintenance work on the drain shall be assessed against the lands and roads in the same relative proportions as shown therein, subject to any future variations that may be made under the authority of the "Drainage Act R.S.O. 1990, Chapter D.17, as amended 2010".

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

All of which is respectfully submitted.

Rood Engineering Inc.



Gerard Rood, P.Eng.



att.

ROOD ENGINEERING INC.

Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

CONSTRUCTION SCHEDULE OF ASSESSMENT
THOMPSON DRAIN
(Strong Bridge No. 1 & Kendrick Bridge No. 3)
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 12		County of Essex	2.711	6.70	\$ -	\$ 1,543.00	\$ 1,543.00
Total on Municipal Lands.....						\$ -	\$ 1,543.00	\$ 1,543.00

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
NMR	34	470-00200	Burstyn Farms Limited	0.664	1.64	\$ -	\$ 172.00	\$ 172.00
NMR	33	470-00400	Wayne Lassaline	0.697	1.72	\$ -	\$ 180.00	\$ 180.00
NMR	32	470-00???	Jakob Strong	0.384	0.95	\$ -	\$ 119.00	\$ 119.00
NMR	31	470-00550	Wilfred & Kelly Strong	0.929	2.30	\$ -	\$ 211.00	\$ 211.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ -	\$ 682.00	\$ 682.00

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
SMR	33 & 34	400-00700	Burstyn Farms Limited	12.141	30.00	\$ -	\$ 1,256.00	\$ 1,256.00

Con. or Plan <u>No.</u>	Lot or Part of Lot	Tax Roll <u>No.</u>	<u>Owner's Name</u>	Hectares <u>Afft'd</u>	Acres <u>Afft'd</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
NMR	33 & 34	470-00205	David Burstyn	22.332	55.18	\$ -	\$ 2,311.00	\$ 2,311.00
NMR	33	470-00300	Jo-Ann Ferguson & Gordon Teskey	5.997	14.82	\$ -	\$ 621.00	\$ 621.00
NMR	33	470-00305	Jeffrey Shepley	28.389	70.15	\$ -	\$ 2,937.00	\$ 2,937.00
NMR	32	470-00500	Cindy Brockman	19.956	49.31	\$ -	\$ 2,065.00	\$ 2,065.00
NMR	32	470-00520	Davin & Karen Kendrick	20.649	51.02		\$ 2,136.00	\$ 2,136.00
NMR	31	470-00560	Kelly Strong	7.733	19.11	\$ 11,228.00	\$ 800.00	\$ 12,028.00
NMR	31	470-00700	James & Robert Chortos	-	0.00	\$ -	\$ -	\$ -
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 11,228.00	\$ 12,126.00	\$ 23,354.00

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

Con. or Plan <u>No.</u>	Lot or Part of Lot	Tax Roll <u>No.</u>	<u>Owner's Name</u>	Hectares <u>Afft'd</u>	Acres <u>Afft'd</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
NMR	32	470-00520	Davin & Karen Kendrick	20.649	51.02	\$ 24,021.00	\$ -	\$ 24,021.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						\$ 24,021.00	\$ -	\$ 24,021.00
TOTAL ASSESSMENT				122.58	302.90	\$ 35,249.00	\$ 14,351.00	\$ 49,600.00

1 Hectare = 2.471 Acres
 Project No. REI2016D025
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MAINTENANCE SCHEDULE OF ASSESSMENT

THOMPSON DRAIN

TOWN OF ESSEX

3. MUNICIPAL LANDS:

Con. or Plan <u>No.</u>	Lot or Part of Lot	Tax Roll <u>No.</u>	<u>Owner's Name</u>	Hectares <u>Afft'd</u>	Acres <u>Afft'd</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
	County Road 12		County of Essex	2.711	6.70	\$ 598.00	\$ 155.00	\$ 753.00
Total on Municipal Lands.....						\$ 598.00	\$ 155.00	\$ 753.00

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Con. or Plan <u>No.</u>	Lot or Part of Lot	Tax Roll <u>No.</u>	<u>Owner's Name</u>	Hectares <u>Afft'd</u>	Acres <u>Afft'd</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
NMR	34	470-00200	Burstyn Farms Limited	0.664	1.64	\$ 39.00	\$ 24.00	\$ 63.00
NMR	33	470-00400	Wayne Lassaline	0.697	1.72	\$ 83.00	\$ 19.00	\$ 102.00
NMR	32	470-00???	Jakob Strong	0.384	0.95	\$ 52.00	\$ 11.00	\$ 63.00
NMR	31	470-00550	Wilfred & Kelly Strong	0.929	2.30	\$ 83.00	\$ 14.00	\$ 97.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 257.00	\$ 68.00	\$ 325.00

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Con. or Plan <u>No.</u>	Lot or Part <u>of Lot</u>	Tax Roll <u>No.</u>	<u>Owner's Name</u>	Hectares <u>Afft'd</u>	Acres <u>Afft'd</u>	Value of <u>Benefit</u>	Value of <u>Outlet</u>	TOTAL <u>VALUE</u>
SMR	33 & 34	400-00700	Burstyn Farms Limited	12.141	30.00	\$ 135.00	\$ 134.00	\$ 269.00
NMR	33 & 34	470-00205	David Burstyn	22.332	55.18	\$ 223.00	\$ 309.00	\$ 532.00
NMR	33	470-00300	Jo-Ann Ferguson & Gordon Teskey	5.997	14.82	\$ 213.00	\$ 57.00	\$ 270.00
NMR	33	470-00305	Jeffrey Shepley	28.389	70.15	\$ 264.00	\$ 336.00	\$ 600.00
NMR	32	470-00500	Cindy Brockman	19.956	49.31	\$ 172.00	\$ 207.00	\$ 379.00
NMR	32	470-00520	Davin & Karen Kendrick	20.649	51.02	\$ 178.00	\$ 178.00	\$ 356.00
NMR	31	470-00560	Kelly Strong	19.333	47.77	\$ 170.00	\$ 118.00	\$ 288.00
NMR	31	470-00700	James & Robert Chortos	1.619	4.00	\$ 222.00	\$ 6.00	\$ 228.00
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 1,577.00	\$ 1,345.00	\$ 2,922.00
TOTAL ASSESSMENT				135.801	335.57	\$ 2,432.00	\$ 1,568.00	\$ 4,000.00

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1 Hectare = 2.471 Acres
Project No. REI2016D025
October 11th, 2017

SCHEDULE "A"
Thompson Drain Bridge Summary

<u>Bridge No.</u> <u>Ex. Structure</u>	<u>Roll No.</u>	<u>Owners</u>	<u>Notes</u>	<u>Required</u> <u>Size</u>	<u>Class</u>	<u>% to</u> <u>Abutting</u> <u>Owners</u>	<u>% to</u> <u>Upstream</u> <u>Owners</u>
1. Conc. Box	470-00560	Kelly Strong	Primary access for farm for Thompson Drain – rip rap ends	1500mm C.S.P.	G	39.0%	61.0%
2. 1070m C.S.P.	470-00550	Kelly & Wilfred Strong	Residential – broken conc. pieces endwalls, pipe needs lowering and larger size; has extra top width	1500mm C.S.P.	NG	43.9 %	56.1%
3. none	470-00520	Davin & Karen Kendrick	Primary access for farm for Thompson Drain – rip rap ends	1400mm C.S.P.	G	48.7%	51.3%
4. 1070mm C.S.P.	470-00520	Jakob Strong	Residential – broken concrete pieces endwalls, need larger size pipe	1400mm C.S.P.	NG	48.7%	51.3%
5. 1070mm Conc.	470-00500	Cindy Brockman	Farm access – broken conc. pieces endwalls, replace with 15m long pipe and sloped ends	1400mm C.S.P.	G	50.7%	49.3%
6. 1100mm C.S.P.	470-00400	Wayne Lassaline	Residential - jute bag ends, has extra top width	1400mm C.S.P.	NG	55.4%	44.6%
7. 1000mm C.S.P.	470-00305	Jeffrey Shepley	Primary access for farm for Thompson Drain – precast concrete block ends; has extra top width	1200mm C.S.P.	G	68.4%	31.6%
8. 1070mm Conc.	470-00300	Gordon Teskey & Jo-Ann Ferguson	Primary access for farm for Thompson Drain – broken conc. pieces ends; pipe joints expanding, sink holes forming;	1200mm C.S.P.	G	62.0%	38.0%

SPECIFICATIONS

THOMPSON DRAIN

Bridges for Kelly Strong and Davin & Karen Kendrick

and Future Maintenance

(Geographic Township of Colchester North)

TOWN OF ESSEX

I. GENERAL SCOPE OF WORK

The Contractor shall provide all material, labour, and equipment to construct a replacement access Bridge No. 1 for Kelly Strong consisting of 14.0 metres (45.9 ft.) of 1500mm diameter, 125mm X 25mm corrugation, aluminized steel pipe, 2.0mm thick, in the Thompson Drain. The replacement access bridge shall be relocated and constructed on the east frontal property limit of Parcel 470-00560, and in accordance with the information as shown on the plans in **Appendix "REI-E"**. This location shall be the exact designated location of this replacement farm access bridge culvert unless otherwise directed by the property owner and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the replacement access bridge must be approved in writing by the Engineer.

The Contractor shall provide all material, labour, and equipment to construct a new farm access Bridge No. 3 for Davin & Karen Kendrick consisting of 13.0 metres (42.7 ft.) of 1400mm diameter, 125mm X 25mm corrugation, aluminized steel pipe, 2.0mm thick, in the Thompson Drain. The new access bridge shall be constructed so that the centre of the pipe is placed approx. 15.9 metres west of the west residential property limit for Jakob Strong Parcel 470-00???, between the existing field tiles, and in accordance with the information as shown on the plans in **Appendix "REI-E"**. This location shall be the exact designated location of this new farm access bridge culvert unless otherwise directed by the property owner and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the new access bridge must be approved in writing by the Engineer.

The general layout of these access bridges and other ancillary work shall be provided as shown and detailed in the accompanying drawing attached within **Appendix "REI-E"**. Bench Marks have been set near each proposed access bridge so that same can be utilized for the setting of the new bridge culverts grade. The **Bench Marks** are as follows:

- I. *"top nut of fire hydrant located on the south side of County Road 12 and approximately 13.1 metres west of the east end of the proposed Bridge No. 1", with same being Elevation 194.498 metres.*
- II. *"top centre of water valve located on the north side of Count Road 12 and approximately 16.2 metres east of the east end of proposed Bridge No. 3", with same being Elevation 193.586 metres.*

For future maintenance work, the Contractor shall supply and install access bridges in accordance with the tender requirements established by the Town, and utilizing the sizing information from the Town, and to the design grades shown on the profiles in

Specifications - Thompson Drain 2017-10-11
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Appendix "REI-E" allowing for embedment requirements. All works shall be carried out in compliance with any regulatory requirements, permits, and the general specifications as outlined below and in the attached Appendices. Access bridges shall have a minimum top width of 6.1 metres (20') or match the existing structure if it is wider. Required pipe sizes are shown in **Schedule "A"** of the drainage report.

The Thompson Drain currently comprises of an open Municipal drain generally located along the north side of County Road 12 from near County Road 23 west to Batten Road. The work under this project generally comprises of the construction of a replacement access bridge for the agricultural lands of Kelly Strong and a new farm access bridge serving the lands of Davin & Karen Kendrick. The work on the bridges being replaced and constructed includes the removal of the existing structure on the Strong Parcel 470-00560; the installation of a new culvert at the locations shown on the plans in **Appendix "REI-E"**; new culvert end treatments comprising of sloped quarried limestone on filter cloth end protection; granular approaches and backfill; and granular transition areas.

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 bridge construction shall be of the size, type, depth, etcetera, as is shown in the accompanying drawings, as determined from the Bench Marks, and as may be further laid out at the site at the time of construction. All work carried out under this project shall be completed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

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

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 Batten Sideroad Drain. 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. The Contractor shall provide temporary control measures in accordance with O.P.S.S. 805 dated November 2010 or as subsequently amended or as otherwise provided for in these specifications.

All of the work shall be carried out in accordance with any permits or authorizations issued by the Essex Region Conservation Authority (E.R.C.A.) or the Department of Fisheries and Oceans (D.F.O.), copies of which will be provided, if available, and the notes in **Appendix "REI-A"**. The Contractor is advised that no work may be carried out in the existing drain from March 15th to June 30th of any given year because the drain is directly connected to a downstream area that is classified as sensitive to impacts on aquatic life and habitat by E.R.C.A. and D.F.O.

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:

- a) 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.

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(Bridges for Kelly Strong and Davin & Karen Kendrick, Parcels 470-00560 and 470-00520)
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- b) 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.
- c) 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 related Ontario Provincial Standards. It is incumbent on the proponent and their Contractors to ensure that sediment and erosion control measures are functioning properly and are maintained and upgraded as required.
- d) Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.
- e) 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.

III. M.N.R.F. CONSIDERATIONS

The Contractor is to note that this project has gone through the Ministry of Natural Resources and Forestry (M.N.R.F.) screening process by way of a Species at Risk (S.A.R.) review of the M.N.R.F. Endangered Species Act, 2007 former agreement with the Town. Although no species are indicated on the agreement plans for this site, turtles and snakes are considered sensitive to the area and mobile, and Schedule 'C' of the agreement has provisions to protect them and mitigate any impacts. A copy of same is included within **Appendix "B"**.

The Contractor is to review **Appendix "B"** in detail and is required to comply in all regards with the contents of said M.N.R.F. measures, and follow the special requirements therein included during construction.

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project for the Strong Bridge No. 1 and Kendrick Bridge No. 3 extends along the north side of County Road 12. Future maintenance works for other bridges shall extend along the north side of County Road 12. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the driveway as necessary to carry out the removal of the existing access bridge and to construct the new replacement access bridge, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridge to carry out the required construction of the removal and new structure installation and ancillary work.

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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 County Road 12 for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer, and the County of Essex, 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.

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

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

VI. FENCING

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

VII. DETAILS OF OPEN DRAIN WORK

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

The drain shall be of the size, type, depth, etcetera as shown on the accompanying drawings. When completed, the drain shall have a uniform and even bottom and in no case shall such bottom project above the grade line, as shown on the accompanying drawings, and as determined from the Bench Marks. The finished side slopes of the drain shall be 2.0 metres horizontal to 1.0 metre vertical.

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

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

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

VIII. DETAILS OF BRIDGE WORK

The existing Strong Bridge No. 1 slated to be removed shall be replaced with new aluminized steel Type II Hel-Cor pipe. The new Kendrick Bridge No. 3 shall be installed with new aluminized steel Type II Hel-Cor pipe. The new replacement access bridge installations completed under future maintenance shall comprise of aluminized steel Type II helical pipe. All piping sections shall be connected by the use of 9 corrugation (9-C) bolted couplers installed around the complete circumference of the pipe in accordance with the manufacturer's recommendation. Each coupler shall be wrapped in filter cloth material around the complete circumference to ensure that there will be no soil migration through the joints and into the pipe through said connections.

The culvert pipe replacement and new pipe installation on this project shall be set to the grades as shown on the plans or as otherwise established herein and the Town Drainage Superintendent or the Consulting Engineer may make minor changes to the bridge alignment as they deem necessary to suit the site conditions. All work shall be carried out in general accordance with the items in the **"STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"** attached to this report and labelled **Appendix "REI-C"**.

IX. CORRUGATED STEEL PIPE INSTALLATION

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

The Contractor shall note that the placement of any new culvert pipe shall be performed totally in the dry and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the pipe and for a distance of 3.05 metres (10 ft.) upstream and downstream of the pipe. The Contractor

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shall note that the pipe inverts are set at least 10% of the pipe diameter (or the pipe rise) below the drain bottom to provide the embedment required by E.R.C.A. and D.F.O. and to meet the minimum cover requirements for the pipe.

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

For the access bridge installation, once the new aluminized steel type II corrugated pipe has been satisfactorily set in place, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. Form 1010 with the following exception. The top 305mm (12") of the backfill material for the full top width of the access, and the full top width of the drain or the excavated trench, and any approaches to the south and transitions to the north shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. All of the driveway approach areas extending from the roadway to the south face of the new bridge culvert shall be backfilled with compacted granular material M.T.O. Type "A" O.P.S.S. Form 1010, but only after all topsoil material has been completely removed and disposed of, and the minimum thickness of this granular material shall be 305mm (12"). All areas outside of the access driveway shall be backfilled with native material compacted to 96% of Standard Proctor Density and topped with a minimum of 50mm of topsoil, and shall be seeded and mulched.

For hard surface driveway crossings, the top 305mm (12") of the backfill over the pipe below the hard surface treatment shall comprise granular material M.T.O. Type "A" O.P.S.S. Form 1010 compacted to a minimum of 100% Standard Proctor Density. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the pipe. To ensure that no damage is caused to the proposed pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Consulting Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work. The Contractor shall restore the asphalt surface by placing a minimum of the existing thickness or a 90mm minimum thickness of Type HL-4 hot mix asphalt. The asphalt shall be supplied and placed in two (2) approximately equal lifts compacted to a value ranging from 92% to 96% of maximum relative density as per O.P.S.S. 310. For existing concrete driveways, the Contractor shall carefully remove the concrete to the nearest expansion joint. The concrete driveway shall be restored to the original length and width that was removed and include 150mm thick, 30MPa concrete, with 6% \pm 1% air entrainment and 6x6-6/6 welded wire fabric reinforcing installed at the midpoint of the slab. All slab surfaces shall be finished to provide an appearance approximating the finish on the existing concrete driveway abutting the replacement.

The Contractor will be responsible to restore any damage caused to the roadways at its cost. All damaged hard surface roadway areas shall be neatly saw cut and the damaged materials removed and disposed of by the Contractor prior to carrying out any restoration work. The extent of the repairs shall be established in consultation with the Municipal Drainage

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Superintendent, the Road Authority, and the Consulting Engineer and the repairs shall be completed to their full satisfaction.

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

The Contractor shall also note that the placing of the new access bridge culvert shall be completed so that it totally complies with the parameters established and noted in the Bridge Details and Tables for the culvert replacement including **Schedule "A"**. The culvert shall be set on an even grade and the placement shall be performed totally in the dry, and the Contractor should be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor shall also be required to supply a minimum of 100mm (4") of 20mm (3/4") clear stone bedding underneath the culvert pipe extending from the bottom of the drain to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. Furthermore, if an unsound base is encountered, it must be removed and replaced with 20mm (3/4") clear stone satisfactorily compacted in place to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor is to note that when replacing an access bridge or enclosure culvert, it shall be required to excavate a trench having a width not less than the new pipe outside diameter plus a 600mm working width on both sides of the new pipe to allow for proper installation of granular backfill and compaction of same. The Contractor shall also note that all culvert pipe installations are to be carried out with a minimum of 10% of their diameter or rise embedded below the drain design bottom, as shown and noted on the plan for each of the access bridge installations.

X. REMOVALS

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

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

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

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

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the accompanying drawings and as noted in the Standard Specifications in **Appendix "REI-C"**. In all cases, the concrete filled jute bag headwalls shall be topped with a minimum 100mm (4") thick continuous concrete cap comprising 30mPa concrete with 6% \pm 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 this report and labelled **Appendix "REI-C"**. The Contractor shall comply in all respects with the General Conditions included in Item 4 and the **"Typical Concrete Filled Jute Bag Headwall End Protection"** detail also shown therein.

The Contractor shall install interlocking precast concrete blocks with filter cloth backing for walls on both ends of the bridges requiring same. The blocks shall be minimum 600X600X1200mm in size as available from Underground Specialties - Wolseley, Windsor, Ontario, or equal, and installed as set out in **Appendix "REI-C"**. Vertical joints shall be staggered by use of half blocks where needed and wingwall deflections when required shall employ 45-degree angled blocks. Voids between the blocks and the pipe shall be grouted with 30mPa concrete having 6% \pm 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 or tipped slightly back towards the driveway. Where the block walls extend more than 1.8 metres in height, the supplier shall provide the Contractor with uni-axial geogrid (SG350 or equivalent) reinforcement for installation to tie the wall back into the granular backfill. The Contractor, in all cases, shall comply with these specifications and upon completion of the stacked precast concrete end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone on filter cloth rock protection adjacent to the headwalls at each corner of the bridge. All rock protection shall be 1.0 metres wide and 305mm (12") thick, installed on non-woven filter cloth, and shall be installed in accordance with Item 2) of the "Standard Specifications for Access Bridge Construction". The synthetic filter mat to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products through Underground Specialties - Wolseley in Windsor,

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Ontario or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Industries Amherst Quarries, in Amherstburg, Ontario, or equal.

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

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

The quarried limestone erosion protection shall be embedded into the sideslopes of the drain a minimum thickness of 305mm and shall be underlain in all cases with non-woven synthetic filter mat. The filter mat shall not only be laid along the flat portion of the erosion protection, but also contoured to the exterior limits of the quarried limestone and the unprotected slope. The width of the erosion protection shall be as established in the accompanying drawings or as otherwise directed by the Town Drainage Superintendent or the Consulting Engineer during construction. In placing the erosion protection, the Contractor shall carefully tamp the quarried limestone pieces into place with the use of the excavator bucket so that the erosion protection when completed will be consistent, uniform and tightly laid. In no instance shall the quarried limestone protrude beyond the exterior contour of the unprotected drain sideslopes along either side of said protection. The synthetic filter mat fabric to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Aggregates Amherst Quarries, in Amherstburg, Ontario, or equal.

XII. BENCH MARKS

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

For each of the bridge replacements and new bridges, the plans include details illustrating the work to be carried out. For each bridge detail a Bench Mark has been indicated and the Elevation has been shown and may be utilized by the Contractor in carrying out its work. The Contractor shall note that in each case a specific design elevation grade has been provided for

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the invert at each end of the pipe in the table accompanying each detail. The table also sets out the pipe size, materials, and other requirements relative to the installation of the culvert structure. In all cases, the Contractor is to utilize the specified drain grade to set any new pipe installation. The Contractor shall ensure that it takes note of the direction of flow and sets all pipes to assure that all grades flow from east to west to match the direction of flow within the drain. The Contractor's attention is drawn to the fact that the pipe invert grades established herein provide for the pipes to be set at least 10% of their diameter or pipe rise below the existing drain bottom or the design grade of the drain, whichever is lower.

XIII. ANCILLARY WORK

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

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

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

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

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

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

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

XIV. 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.

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XV. SPECIAL PROVISIONS FOR REPLACEMENT, REPAIR AND IMPROVEMENTS

The Contractor shall provide for the construction and improvements to the access bridges and enclosures along the Thompson Drain, for the structures noted, as follows:

Existing Bridge No. 1

The Contractor shall completely remove the existing concrete pipe, headwalls and any end protection that currently exists. The Contractor will then be required to restore the drain cross section at the former bridge location to match the upstream and downstream drain cross sections. All disturbed areas shall be restored with topsoil, seed and mulch as set out above.

New Replacement Bridge No. 1

When completed, the replacement access bridge along the centreline of the new culvert shall have a total top width, including the top width of the sloped quarried limestone on filter cloth end protection, of approximately 7.4 metres (24.3 ft.) and a travelled driveway width of 6.3 metres (20.7 ft.). The sloped quarried limestone on filter cloth end protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical, and shall extend from the invert of the new corrugated aluminized steel pipe structure to the top elevation of the driveway. The proposed pipe inverts are set approximately 150mm below the drain design grade.

The aluminized corrugated steel pipe to be provided for this project is to be supplied as no more than two (2) sections with a minimum length of 3.0 metres and joined together with a 9C (corrugation) aluminized bolted coupler. The aluminized corrugated steel pipe to be utilized for this bridge installation must be a minimum of 2.0mm thick with 125mm by 25mm corrugations and shall be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain.

Also, for use by the Contractor, we have established a Bench Mark near the site. This Bench Mark is the *"top nut of fire hydrant located on the south side of County Road 12 and approximately 13.1 metres west of the east end of the proposed Bridge No. 1"*, with same being **Elevation 194.498 metres**.

The new pipe culvert and the backfilling are to be placed on the following basis:

- i) The **east (upstream) invert** of the proposed bridge structure is to be set at Elevation **191.590 metres**.
- ii) The **west (downstream) invert** of the proposed bridge structure is to be set at Elevation **191.583 metres**.
- iii) The centreline of driveway for this bridge installation shall be set to match the existing gravel shoulder edge, Elevation **193.787 metres** directly over top of the culvert pipe, and approximately Elevation **193.525 metres** at approximately the north top of bank limit. 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 access bridge installation. The Contractor is also to check that the invert grades are correct by referencing the Bench Mark.

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New Bridge No. 3

When completed, the new access bridge along the centreline of the new culvert shall have a total top width, including the top width of the sloped quarried limestone on filter cloth end protection, of approximately 7.2 metres (23.6 ft.) and a travelled driveway width of 6.1 metres (20.1 ft.). The sloped quarried limestone on filter cloth end protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical, and shall extend from the invert of the new corrugated aluminized steel pipe structure to the top elevation of the driveway. The proposed pipe inverts are set approximately 140mm below the drain design grade.

The aluminized corrugated steel pipe to be provided for this project is to be supplied as no more than two (2) sections with a minimum length of 3.0 metres and joined together with a 9C (corrugation) aluminized bolted coupler. The aluminized corrugated steel pipe to be utilized for this bridge installation must be a minimum of 2.0mm thick with 125mm by 25mm corrugations and shall be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain.

Also, for use by the Contractor, we have established a Bench Mark near the site. This Bench Mark is the *"top centre of water valve located on the north side of County Road 12 and approximately 16.2 metres east of the east end of the proposed Bridge No. 3"*, with same being **Elevation 193.586 metres**.

The new pipe culvert and the backfilling are to be placed on the following basis:

- i) The **east (upstream) invert** of the proposed bridge structure is to be set at Elevation **191.711** metres.
- ii) The **west (downstream) invert** of the proposed bridge structure is to be set at Elevation **191.705** metres.
- iii) The centreline of driveway for this bridge installation shall be set to match the existing gravel shoulder edge, Elevation **193.638** metres directly over top of the culvert pipe, and approximately Elevation **193.595** metres at approximately the north top of bank limit. 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 access bridge installation. The Contractor is also to check that the invert grades are correct by referencing the Bench Mark.

New Bridge Installations

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

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The Contractor shall also note that the installation of the access bridge culverts is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the bridge and for a distance of 3.05 metres (10.0 ft.) both upstream and downstream of said bridges. The design parameters of the Drain at the location of this new access bridge installation consists of a 0.91m (3.0 ft.) bottom width, 0.05% grade, and 2.0 horizontal to 1.0 vertical bank side slopes. The Contractor shall be required to cut any brush and strip the existing drain sideslopes of any vegetation as part of the grubbing operation. The Contractor shall also be required to dispose of all excavated and deleterious materials, as well as any grubbed out materials, to a site to be obtained by it at its own expense. The Contractor shall note that the survey indicates that the existing drain bottom is higher than the design grade. The Contractor shall be required to provide any and all labour, material and equipment to set the bridge to the required design grades. The Contractor shall also be required to supply, if necessary for a stable base, a minimum thickness of 150mm (6") of 20mm (3/4") clear stone bedding underneath the culvert meeting O.P.S.S. 1004, 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 aluminized corrugated steel pipe has been satisfactorily set in place, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. Form 1010, with the exception of the top 305mm (12") of the backfill material for the full top width of the drain and the access bridge, which shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. The end slopes of the backfill material over the corrugated steel pipe from the bottom of said structure to the top driveway elevation shall be quarried limestone on filter cloth protection. The end walls shall be extended around onto the drain banks in line with the end of the new pipe, all as shown on the plans. The driveway entrance shall be constructed with a 5.0 metre radius on each road side corner, all as shown on the plans included in **Appendix "REI-E"**.

The Contractor shall also perform the necessary excavation to extend the width of the driveway southerly from the south bank of the drain to the north limit of the roadway gravel. This driveway approach into the property, from the existing edge of gravel to approximately the north 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 length, and include a 5.0m radius daylighting section at the roadside edge of the gravel shoulder, as shown on the plans. The gravel backfill shall also extend across the pipe to approximately the north top of bank limit as shown on the plans.

Once the new aluminized corrugated steel bridge pipes have been set in place and the Contractor has completely backfilled same with compacted granular material, it shall install the quarried limestone on filter cloth endwall protection. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 2), 3), and 4) of the **"Standard Specifications for Access Bridge Construction"** attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in Item 4) of said Appendix. The Contractor, in all cases, shall comply with these specifications and upon completion of the sloped quarried limestone end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone on filter cloth rock protection on each end of the pipe. All rock protection shall be 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 fabric to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products through Underground Specialties - Wolseley in Windsor,

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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 Quarry, in Amherstburg, Ontario, or equal.

The corrugated steel pipe structures for these installations shall be provided with a minimum depth of cover measured from the obvert of the corrugated steel material to the top of the granular backfill of 305mm (12") and if the culvert is placed at its proper elevations, this should be easily achieved. If the Contractor finds that the 305mm (12") minimum 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 minimum cover requirement is **critical** and must be attained. In order for this new access bridge structure to properly fit the channel parameters, all of the design grade elevations provided in the specifications and plans must be strictly adhered to.

The Contractor shall also be required to provide all labour, equipment and material to provide granular fill to all boulevard areas as noted on the plans. As part of the work provided for the construction of the access bridge, the Contractor shall be required to protect or extend any existing tile and/or culvert ends which conflict with the bridge installation. All existing tile drains, where required, shall be diverted and extended to the ends of the new access bridge culvert and shall be extended and installed in accordance with the "Standard Lateral Tile Detail" as shown in **Appendix "REI-C"**, unless otherwise noted. Connections shall be made using manufacturer's couplers wherever possible.

The Contractor is to note that the granular driveway approaches extending from the roadway north 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 98%, and that any native fill material to be used for the construction shall be compacted in place to a minimum Standard Proctor Density of 95%.

Once the new access bridges have been completed, all newly excavated and disturbed areas shall be restored by the Contractor including topsoil placement and seeding and mulching as specified below.

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

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

The placing and grading of any topsoil shall be carefully and meticulously carried out in accordance with Ontario Provincial Standard Specifications, Form 802 dated November 2010, or as subsequently amended, or as amended by these specifications and be readied for the seeding and mulching process. The seeding and mulching of all of the above mentioned areas shall comply in all regards to Ontario Provincial Standard Specifications, Form 803 dated November 2010 and Form 804, dated November 2013, or as subsequently amended, or as amended by these specifications. The seeding mixture shall be the Standard Roadside Mix

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(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.

The Contractor shall completely remove the existing topsoil and vegetation in the area of the proposed new replacement bridges and clean out the drain bottom. The Contractor will then be required to install the new aluminized steel pipes as set out in the chart forming part of the details for Bridge No. 1 & Bridge No. 3 on the plans. The Contractor shall install sloped quarried limestone on filter cloth protection on each end. The Contractor shall protect the tile outlets on the banks at each end of the structure and divert and extend same as necessary to accommodate the replacement culvert. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

XVI. 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 Municipality of Leamington 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 Municipality of Leamington 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, etc., from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.
- e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational

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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.

Specifications - Thompson Drain

2017-10-11

(Bridges for Kelly Strong and Davin & Karen Kendrick, Parcels 470-00560 and 470-00520)
and Future Maintenance
Town of Essex - REI2016D025

- l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$2,000,000.00 on this project, and shall name the Municipality of Leamington and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the 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 45 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:
 - i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
 - ii) proof of advertising
 - iii) a Statutory Declaration, in a form satisfactory to the Consulting Engineer and the Municipality, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged or provided for by payment into Court.

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

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

APPENDIX "REI-A"

Measures to Avoid Causing Harm to Fish and Fish Habitat

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

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

Measures

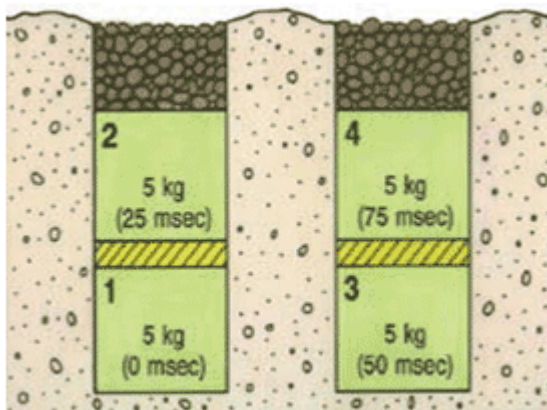
- Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish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

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

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

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

Figure 1: Sample Blasting Arrangement



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

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

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

Date modified:
2013-11-25

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

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

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

APPENDIX "REI-B"

SCHEDULE C

MITIGATION PLAN

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

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

PART A. DEFINITIONS

1. Definitions:

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

"DFO" means Fisheries and Oceans Canada;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS

2. Process Charts

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

3. Review of Documentation

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

4. Sensitive Areas Maps

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

5. Prior Notification to Seek Direction

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

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

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

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

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

6. General Mitigation Measures

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

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

PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS

ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES

7. Activities undertaken in Sensitive Areas for Mussels

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

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

8. Training and Required On Site Materials for Turtles

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

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

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

10. Measures for Encounters with Turtles During a Sensitive Period

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

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

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

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

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

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

13. Release of Captured Individuals Outside of a Sensitive Period

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

14. Measures for Dead Turtles

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

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

15. Training and Required On Site Materials for Snakes

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

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

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

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

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

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

17. Measures for Encounters with Snakes During a Sensitive Period

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

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

18. Measures for Encounters with Snake Nests

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

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

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

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

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

20. Release of Captured Individuals Outside of a Sensitive Period

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

21. Measures for Dead Snakes

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

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

ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS

22. Activities Undertaken in Sensitive Areas for Herbaceous Plants

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

ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES

23. Additional Measures for Butternut

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

24. Measures for Other Trees

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

PART D. MONITORING AND REPORTING REQUIREMENTS

25. Compliance Monitoring.

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

26. Reporting

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

27. Review

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

APPENDIX "REI-C"

STANDARD SPECIFICATIONS

FOR ACCESS BRIDGE CONSTRUCTION

1. CONCRETE FILLED JUTE BAG HEADWALLS

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

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

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

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

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

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

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

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

2. QUARRIED LIMESTONE ENDWALLS

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

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

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

3. BRIDGE BACKFILL

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

4. GENERAL

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

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

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

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

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

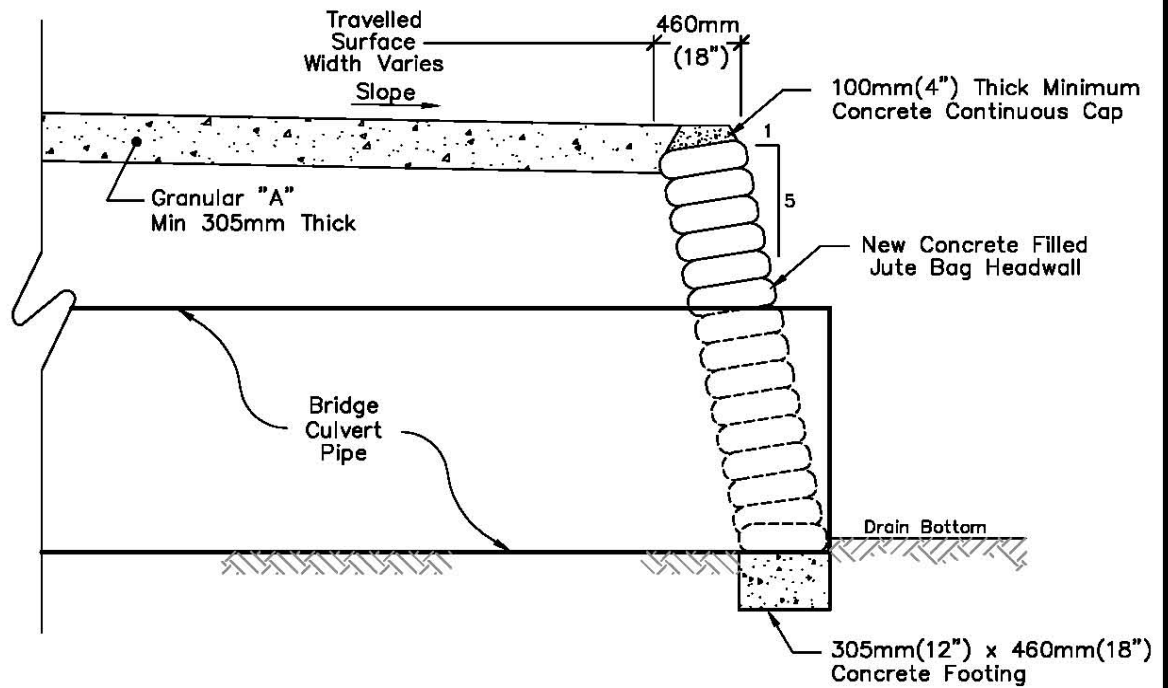
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

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

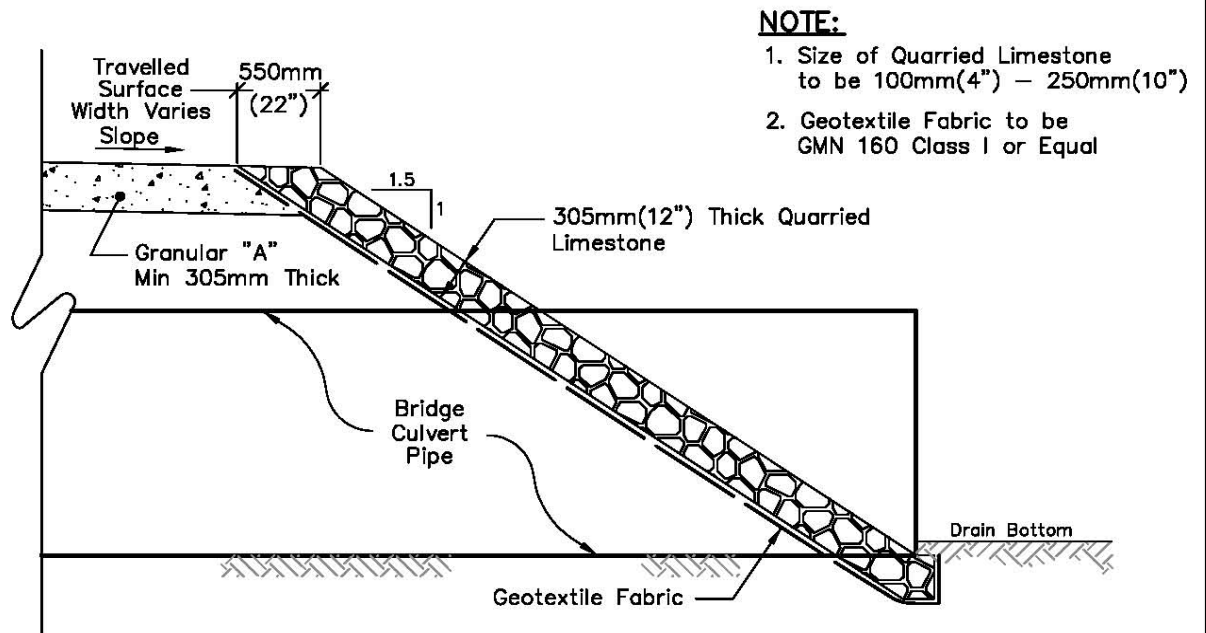
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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

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



Typical Jute Bag Headwall



Typical Quarried Limestone End Protection

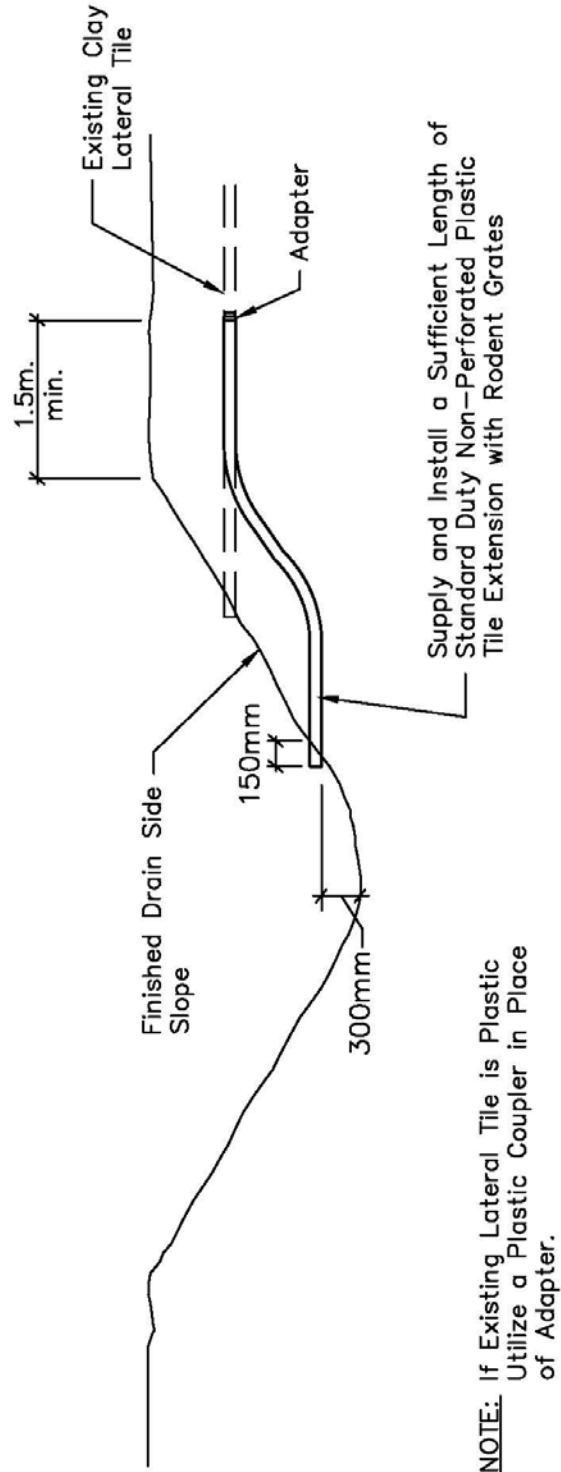
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

Leamington, Ontario N8H 1G6

519-322-1621



STANDARD LATERAL TILE DETAIL

N.T.S.



Block Headwall Installation Instructions for Culverts

1. A swift lift device will be required to place the blocks. A 75mm eye bolt will be required to place the caps.
2. The bottom course of blocks shall be founded on a firm solid base. The contractor shall provide a minimum levelling course of 150mm of compacted 3/4" Clear Stone, or a 100% compacted granular A, or lean concrete as a foundation base.
3. Ensure that the base is level and flat as this will greatly improve speed of installation.
4. On new culverts a minimum of 150mm of block wall will extend below the culvert to prevent scouring under the culvert.
5. The bottom course of blocks shall be embedded into the drain bottom to achieve the desired top elevation of the wall.
6. Blocks shall extend from the pipe invert across the full height and width of the drain and be imbedded a minimum of 300mm into the drain banks. Where possible the top of the block wall will match the height of the completed driveway.
7. Blocks shall be placed such that all joints are staggered.
8. Any excavation voids on the ends of block walls below subsequent block layers shall be filled with ¾" Clear Stone.
9. Where block walls extend beyond three blocks in height, they should be battered a minimum of 1 unit horizontal for every 10 units vertical throughout the wall's full height and width. This can be achieved using pre-battered base blocks, or by careful preparation of the base.
10. Filter cloth (270R or equivalent) should be placed behind the wall to prevent the migration of fill material through the joints.
11. The walls should be backfilled with a free draining granular fill.
12. A uni-axial geogrid (SG350 or equivalent) should be used to tie back the headwalls where walls extend beyond 1.8m in height.
13. The face of the block wall shall not extend beyond the end of the pipe culvert.
14. Any gaps between the blocks and culvert shall be sealed with non-shrink grout for the full depth of the block.

SCHEDULE "A"
Thompson Drain Bridge Summary

<u>Bridge No.</u> <u>Ex. Structure</u>	<u>Roll No.</u>	<u>Owners</u>	<u>Notes</u>	<u>Required Size</u>	<u>Class</u>	<u>% to Abutting Owners</u>	<u>% to Upstream Owners</u>
1. Conc. Box	470-00560	Kelly Strong	Primary access for farm for Thompson Drain – rip rap ends	1500mm C.S.P.	G	39.0%	61.0%
2. 1070m C.S.P.	470-00550	Kelly & Wilfred Strong	Residential – broken conc. pieces endwalls, pipe needs lowering and larger size; has extra top width	1500mm C.S.P.	NG	43.9 %	56.1%
3. none	470-00520	Davin & Karen Kendrick	Primary access for farm for Thompson Drain – rip rap ends	1400mm C.S.P.	G	48.7%	51.3%
4. 1070mm C.S.P.	470-00520	Jakob Strong	Residential – broken concrete pieces endwalls, need larger size pipe	1400mm C.S.P.	NG	48.7%	51.3%
5. 1070mm Conc.	470-00500	Cindy Brockman	Farm access – broken conc. pieces endwalls, replace with 15m long pipe and sloped ends	1400mm C.S.P.	G	50.7%	49.3%
6. 1100mm C.S.P.	470-00400	Wayne Lassaline	Residential - jute bag ends, has extra top width	1400mm C.S.P.	NG	55.4%	44.6%
7. 1000mm C.S.P.	470-00305	Jeffrey Shepley	Primary access for farm for Thompson Drain – precast concrete block ends; has extra top width	1200mm C.S.P.	G	68.4%	31.6%
8. 1070mm Conc.	470-00300	Gordon Teskey & Jo-Ann Ferguson	Primary access for farm for Thompson Drain – broken conc. pieces ends; pipe joints expanding, sink holes forming;	1200mm C.S.P.	G	62.0%	38.0%

APPENDIX "REI-D"

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

APPENDIX "REI-E"

WATERSHED & KEY PLAN

OF THE

THOMPSON DRAIN
(Geographic Township of Colchester North)

IN THE

TOWN OF ESSEX • ONTARIO

IN THE

COUNTY OF ESSEX

Gerard Road
GERARD ROAD, P.ENG.

**ROOD
ENGINEERING
INC.**

CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: October 11th, 2017

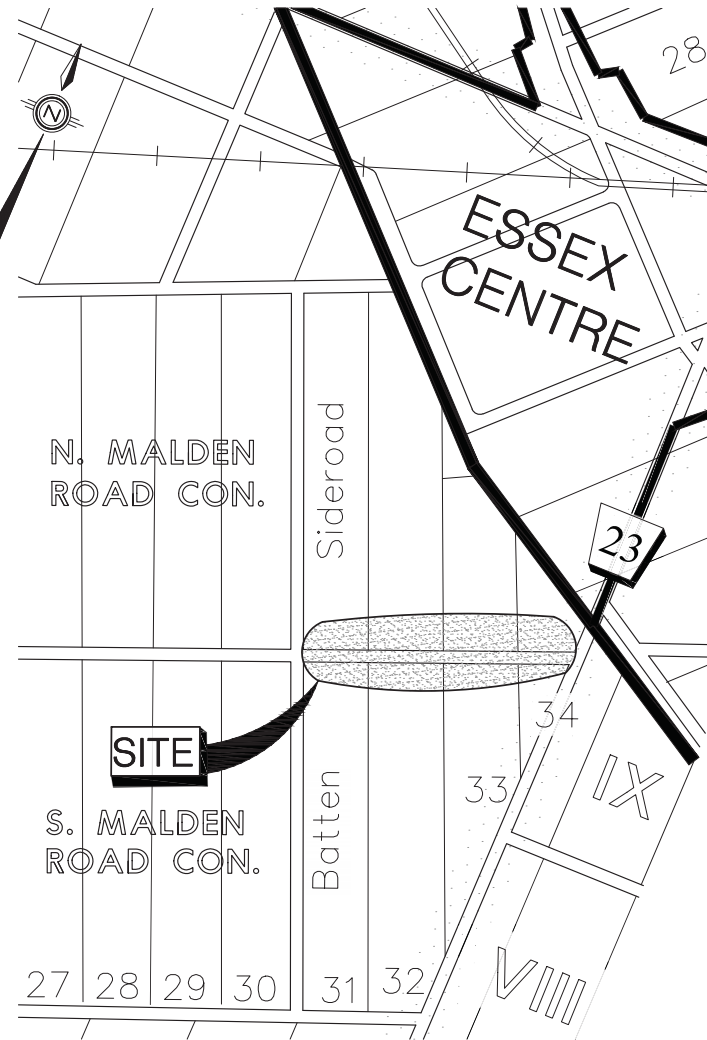
TOWN OF ESSEX

MAYOR: RON McDERMOTT
CLERK: ROBERT AUGER
DRAINAGE
SUPERINTENDENT: DAN BOUDREAU



BENCHMARKS:

1. TOP CENTRELINE OF NORTH CONCRETE CURB OF THE CONCRETE BOX CULVERT RUNNING UNDER COUNTY ROAD 12 EAST OF BATTEN SIDEROAD.
ELEV. = 194.194m
2. TOP NUT OF FIRE HYDRANT LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 12 IMMEDIATELY EAST OF MN 2917.
ELEV. = 194.498m
3. TOP NUT OF FIRE HYDRANT LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 12 IMMEDIATELY EAST OF MN 2949.
ELEV. = 194.493m
4. TOP NUT OF FIRE HYDRANT LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 12 IMMEDIATELY WEST OF COUNTY ROAD 23 ON MN 2995.
ELEV. = 194.972m

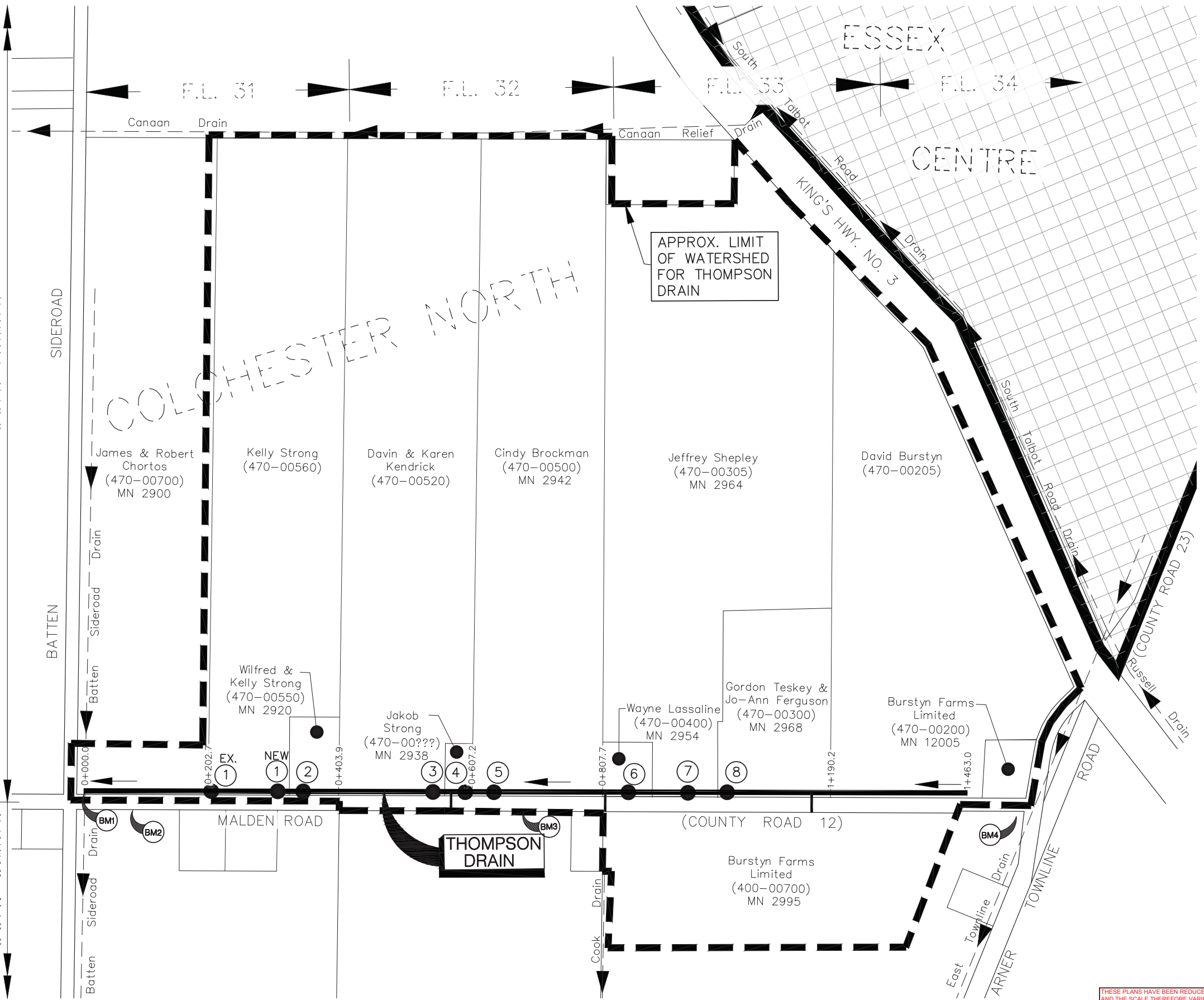


KEY PLAN

Scale = 1:50,000

CON. N.M.R.

CON. S.M.R.

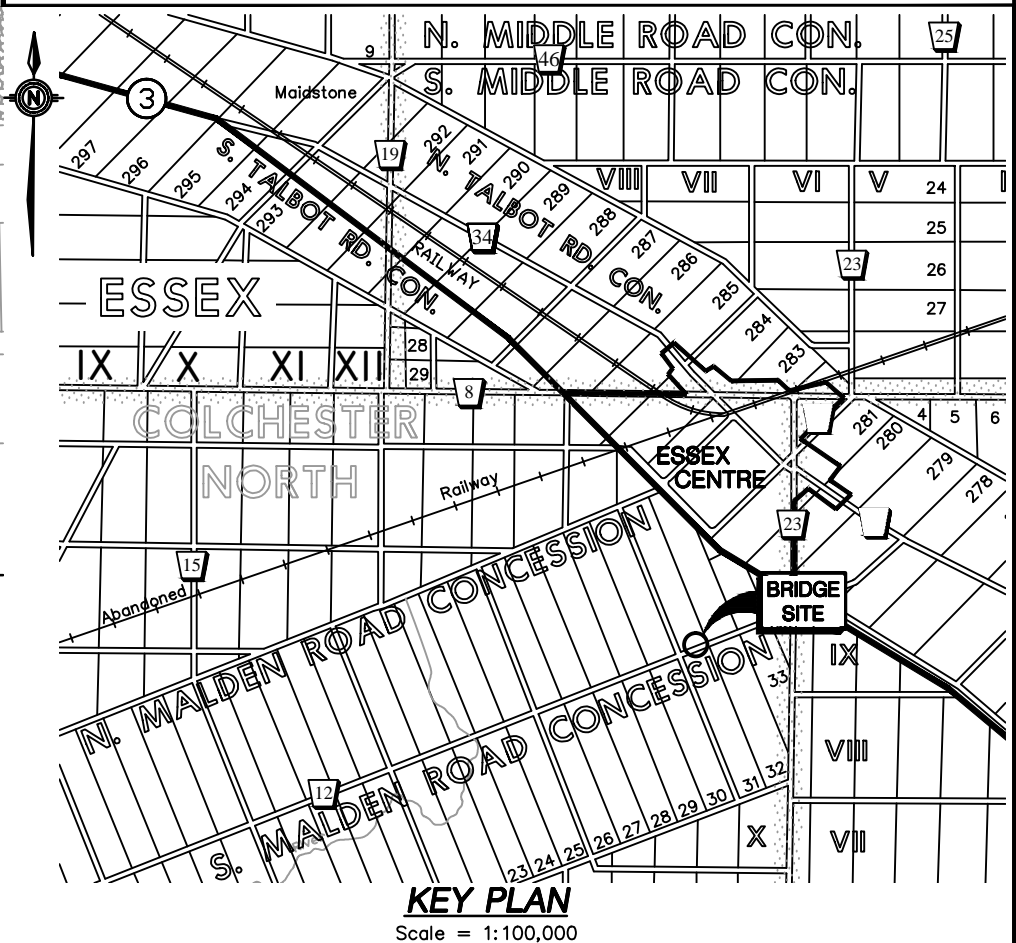
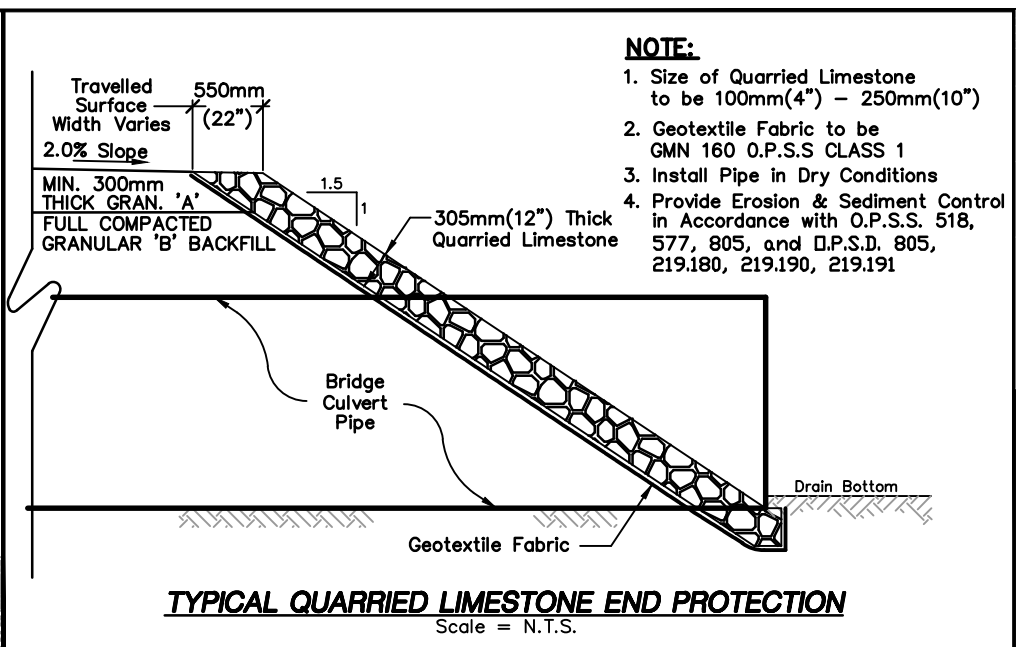
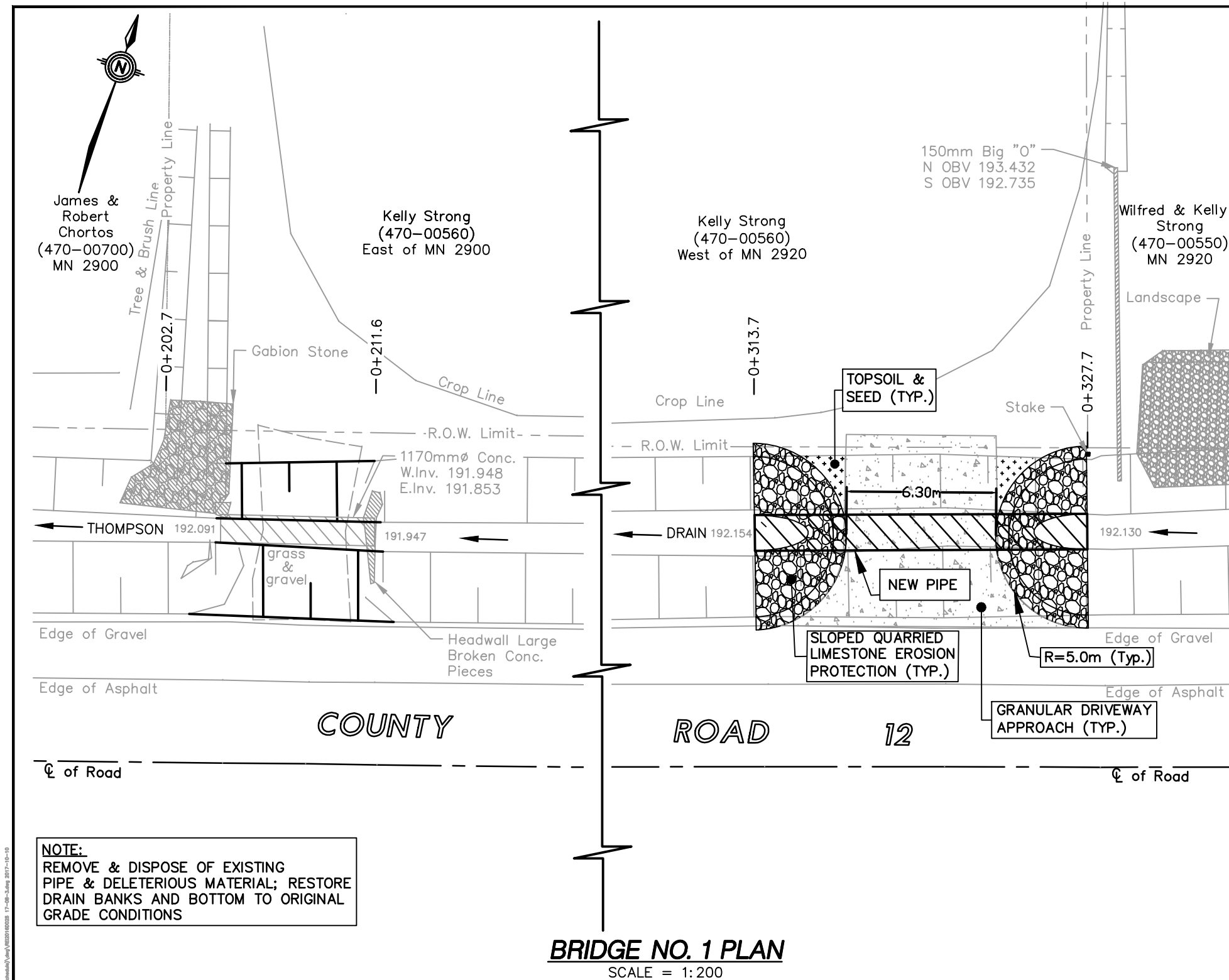


WATERSHED PLAN

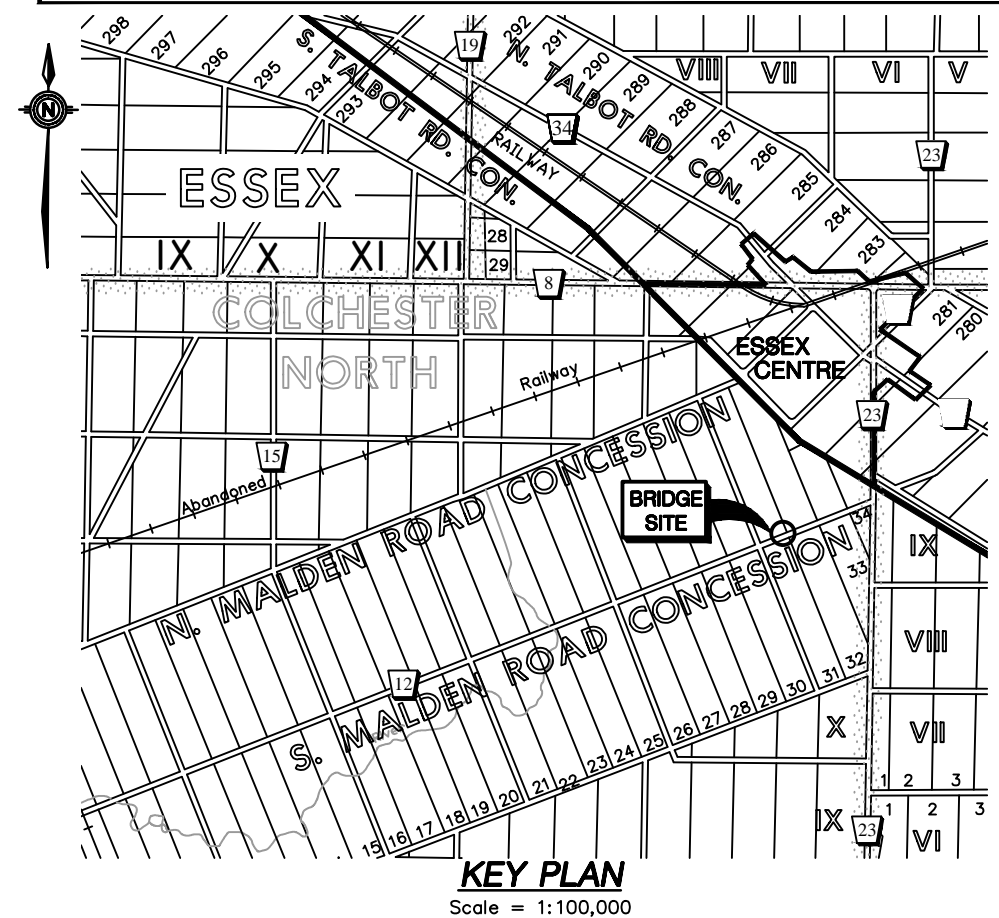
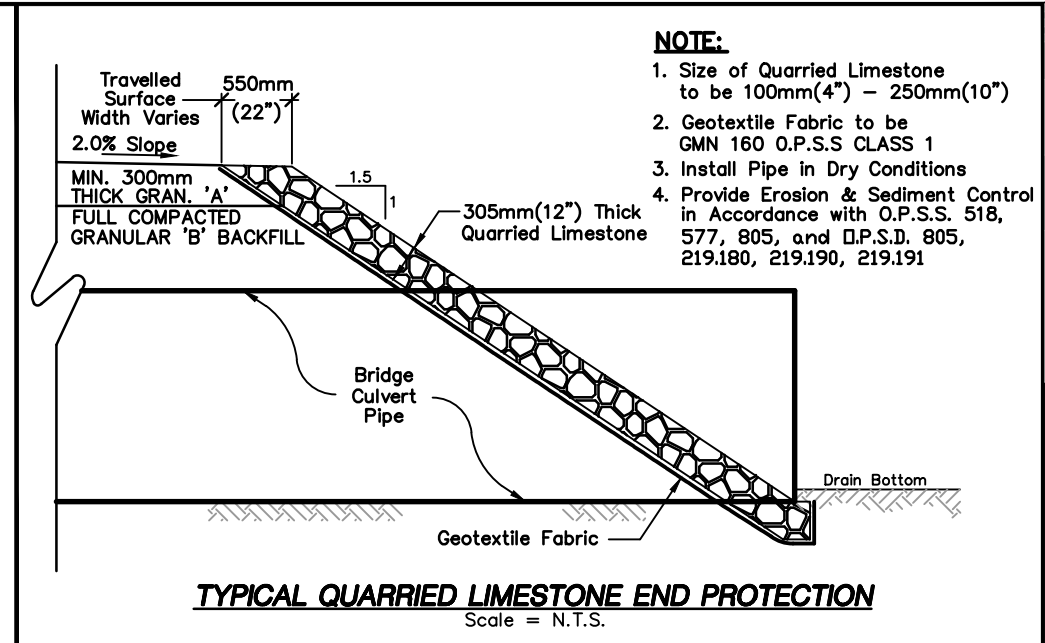
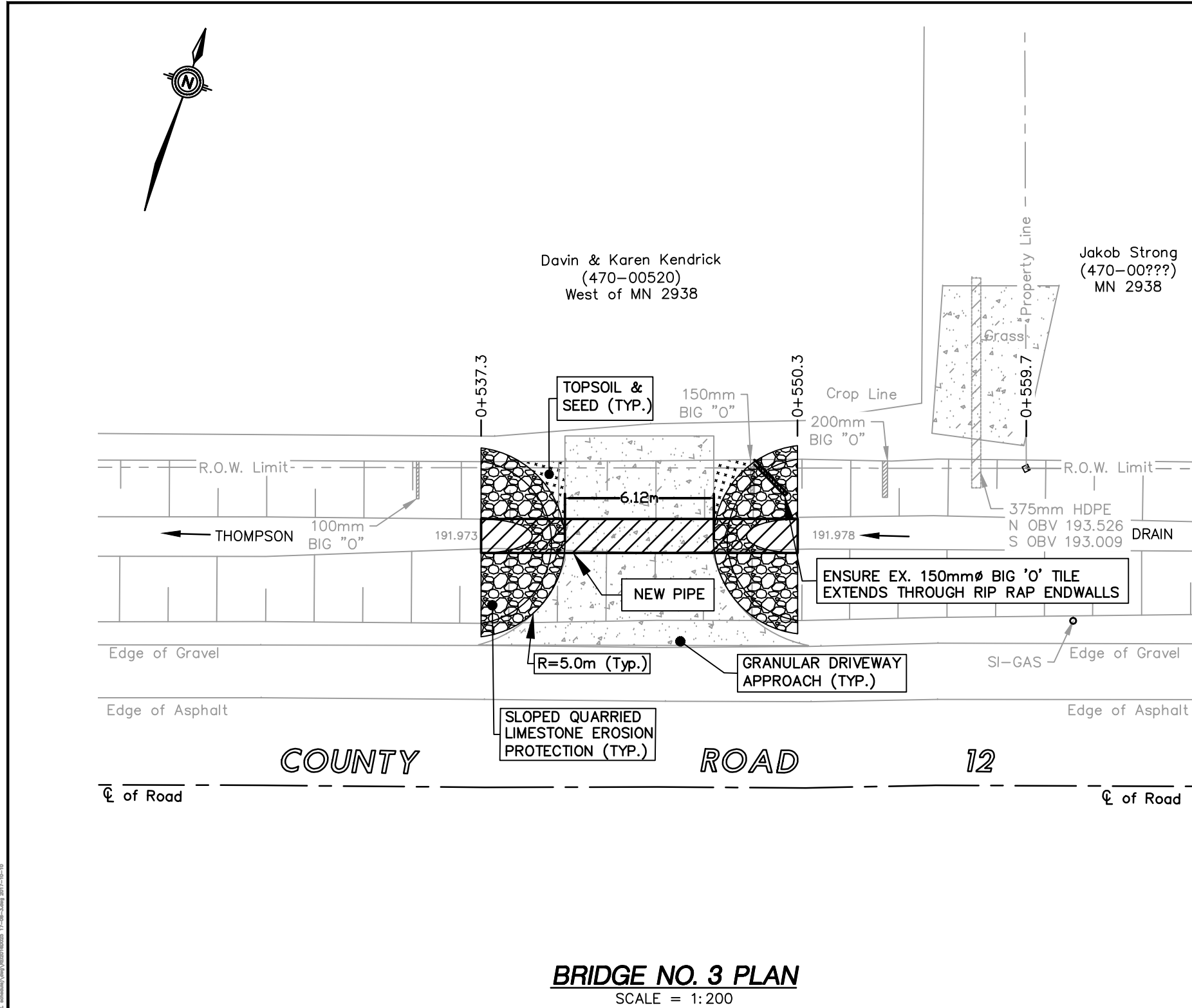
Scale = 1:3,000

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: REI2016D025.DWG
FILE No.: REI2016D025 SHEET No.: 1 OF 4



BENCHMARK: TOP NUT OF FIRE HYDRANT LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 12 IMMEDIATELY EAST OF MN 2917 ELEV. = 194.498m						THOMPSON DRAIN BRIDGE REPLACEMENT FOR KELLY STRONG (470-00560) (GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH) IN THE TOWN OF ESSEX IN THE COUNTY OF ESSEX • ONTARIO		ROOD ENGINEERING INC. CONSULTING ENGINEERS Leamington, Ontario 519-322-1621	
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:			FILE No.:	DRAWN BY: L.V
1500mmø	14.0m (45.93 FT.)	2.0mm (14.0 GA.)	125 X 25mm	ALUMINIZED C.S.P	UPSTREAM INV. (E) = 191.590m DOWNSTREAM INV. (W) = 191.583m ℄ TOP OF DRIVEWAY = 193.787m DRAIN GRADE = 0.05%			2016D025	PLOT CODE: 1:1 FILE: REI2016D025.DWG
								DATE: 2017-10-11	
								APPENDIX 'E'	
								2 OF 4	



BENCHMARK:
TOP CENTRE OF WATER VALVE LOCATED ON THE NORTH SIDE OF COUNTY ROAD 12 AND APPROXIMATELY 16.2 METRES EAST OF PROPOSED BRIDGE NO.3
ELEV. = 193.586m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1400mmØ	13m (42.65 FT.)	2.0mm (14.0 GA.)	125 X 25mm	ALUMINIZED C.S.P	UPSTREAM INV. (E) = 191.711m DOWNSTREAM INV. (W) = 191.705m ℄ TOP OF DRIVEWAY = 193.638m DRAIN GRADE = 0.05%

THOMPSON DRAIN
NEW BRIDGE FOR DAVIN & KAREN KENDRICK (470-00520)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2017-10-11

FILE No.: 2016D025	DRAWN BY: L.V PLOT CODE: 1:1 FILE: REI2016D025	APPENDIX 'E' 3 OF 4
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