

WEST BRANCH OF THE
EAST BRANCH DELISLE DRAIN
E09DE(25)

New Bridge for Rosemary Jobin and Francis Lafferty

& Updated Maintenance Schedule

Geographic Township of Sandwich South

TOWN OF TECUMSEH



Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario N8N 1W9
519-735-2184

Rood Engineering Inc.
Consulting Engineers
9 Nelson Street
Leamington, Ontario N8H 1G6
519-322-1621

Project REI2019D010
November 18th, 2019

November 18th, 2019

Mayor and Municipal Council
Corporation of the Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario
N8N 1W9

Mayor McNamara and Members of Council:

**WEST BRANCH OF THE EAST BRANCH DELISLE DRAIN
E09DE(25) - Geographic Twp. of Sandwich South
Project REI2019D010
Town of Tecumseh, County of Essex**

I. INTRODUCTION

In accordance with the instructions provided at your February 12th, 2019 meeting and received from the Town by letter dated February 14th, 2019, from Laura Moy your Director Corporate Services and Clerk, we have prepared the following report that provides for the construction of a new bridge required for a severance together with ancillary work including updating the assessment schedule to reflect the parcel severance. The West Branch of the East Branch Delisle Drain comprises of an open drain generally located along the south side of County Road 34 extending from an outlet in the East Branch of Delisle Drain at the line between Lots 294 and 295 S.T.R. Concession westerly to its top end near the intersection of County Road 34 and King's Highway No. 3, in the geographic township of Sandwich South, Town of Tecumseh. A plan showing the West Branch of the East Branch Delisle Drain, as well as the general location of the bridges along the drain, is included herein as part of the report.

Our appointment and the works relative to the construction of the new access bridge in the West Branch of the East Branch Delisle Drain, proposed under this report, is in accordance with Section 78, and the updated maintenance schedule in accordance with Section 76 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010". We have performed all of the necessary survey, investigations, etcetera, for the proposed new bridge in the drain, and watershed update and we report thereon as follows.

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(Geographic Township of Sandwich South)
Town of Tecumseh - REI2019D010

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II. BACKGROUND

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

- | | | | |
|----|-------------------|---------------------------------------|---------------------------|
| 1) | June 7th, 1960 | East Branch of the Delisle Drain | C.G.R. Armstrong, P.Eng. |
| 2) | August 31st, 1977 | West Branch of the East Delisle Drain | Maurice Armstrong, P.Eng. |

The 1977 report by Maurice Armstrong, P.Eng. provided for general repairs and improvements to the entire length of the drain and has the latest profile for the grading of the drain.

We arranged with the Town to provide us with the updated assessment roll information for the affected parcels including the recent severance. We also reviewed reports for the abutting West Branch Delisle Drain and East Branch Delisle Drain and spoke to the owners during the on-site meeting to help in establishing the current watershed limit for the West Branch of the East Branch Delisle Drain.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the drainage information provided by the Town, we arranged with the Town Drainage Superintendent Sam Paglia, P.Eng., to schedule an on-site meeting for March 12th, 2019. The following people were in attendance at said meeting: Tania Jobin, Frank Lafferty, Norm Sweet, Mark Fishleigh (County of Essex), Sam Paglia (Town Drainage Superintendent), and Gerard Rood (Rood Engineering).

Details of the drain were discussed, and the primary concern was installing a new bridge for a land severance. It was discussed that the bridges along the drain would be inspected and owners of the bridges would be contacted if there were concerns with any of the structures. Once the work scope is confirmed, a final report is then prepared and submitted to Council and goes through the Drainage Act process of a Consideration meeting and Court of Revision meeting.

Mr. Rood asked the Town and owners to provide information on any drainage changes that they might be aware of. The last report assessed most of the area immediately to the south of the drain. Frank Lafferty stated that he was going to locate field tiles and let Sam Paglia know once complete. Mr. Paglia will go out and shoot them and a bench mark on the fire hydrant with their GPS equipment and send the information to Rood Engineering.

Ms. Jobin pointed out the approximate bridge location between tile outlets. The pipe material was discussed, and the owners are okay with using a plastic pipe. Rip rap on filter cloth sloped

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ends is anticipated to be the most cost effective treatment. A bridge travelled top width of 6.1m (20') is sufficient for them.

Cost sharing of work to the bridge was discussed, with the owner being advised that 100% of the initial cost to install the bridge is assessed to them, with future maintenance costs to be shared as set out in the drainage report. It was discussed that it would be economical to do an updated maintenance schedule for this drain with the bridge report. Sam Paglia pointed out that the County of Essex bears the cost for the drainage from County Road 34. The Town expects to hold a Public Information Centre meeting with the owners to review the Draft report and get their input and address their questions on the project. It was discussed that owners may debenture the cost of \$5,000.00 or greater for the drainage work over a 5 year period to reduce the immediate cost burden of their assessment for the work.

IV. FIELD SURVEY AND INVESTIGATIONS

Subsequent to the on-site meeting we arranged for a topographic survey of the drain and bridge to be completed. We further arranged to get updated assessment roll information from the Town and obtained information on the tax class of each of the properties affected by the Municipal Drain.

The Town made initial submissions to the Essex Region Conservation Authority (E.R.C.A.) regarding their requirements or any D.F.O. (Department of Fisheries and Oceans) requirements for work that would be proposed to be carried out on the West Branch of the East Branch Delisle Drain. We also reviewed the Town maps for fish and mussel species at risk and find that there are no species indicated in the vicinity of this project. A copy of the concerns and requirements to satisfy E.R.C.A. and D.F.O. is included in **Appendix "REI-A"** of this report.

We also arranged to review the Ministry of Natural Resources & Forestry (M.N.R.F.) Species at Risk (S.A.R.) Mitigation Plan for Drainage Works (March 2018-17-4938) that the Town has prepared to address the Endangered Species Act, 2007. Section 6.0 of the Mitigation Plan indicates that snake species are a concern for this work area and although turtles are not indicated, they are mobile and could be encountered. The Mitigation Plan includes measures to be followed as outlined in "Section 7.0 Mitigation Measures" of the document and a copy of same as it relates to turtles and snakes is included in **Appendix "REI-B"**. Providing mitigation requirements are implemented, it was concluded that present wildlife Species at Risk will be protected from negative impacts and the works will not contravene Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007 as administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.). Based on this information we find that the Town can proceed with the eligible repairs, maintenance and improvements to the drain as they are exempt under Sections 9 and 10 of the Act, provided that they follow the rules within Ontario Regulation 242/08 and the Mitigation Measures in their S.A.R. Mitigation Plan. To address these requirements the Town has established comprehensive mitigation measures as well as species identification guides for reference. Copies of the measures and guides shall be

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provided to the successful Tenderer for use during construction, and these documents are available for viewing by any interested parties at the Town office.

V. PUBLIC INFORMATION CENTRE AND THE DRAINAGE ACT

Arrangements were made to meet at the bridge site on November 15th, 2019 with the Drainage Superintendent and interested owners to discuss this Draft drainage report dated October 10th, 2019 for this project. The following people were in attendance at said meeting: Frank Lafferty, Norm Sweet, Cam Hedges (Town Assistant Drainage Superintendent), Sam Paglia (Town Drainage Superintendent), Kory Snelgrove (Rood Engineering) and Gerard Rood (Rood Engineering). Mr. Lafferty questioned the need for a second access bridge to serve his parcel of land. It was pointed out that the parcel is bisected by the East Branch of Delisle Drain and that the west portion of the parcel has no access due to the severance that was done. The proposed 600mm diameter pipe will provide the required access in a cost effective manner. The procedures under the Drainage Act were reviewed and the next steps were detailed. It should be noted that the Public Information Centre (P.I.C.) is not a requirement under the Drainage Act but the Town holds these meetings to address questions and concerns and to solicit comments from the affected owners for use in finalizing the drainage report.

Owners were reminded that they have the opportunity to present their concerns to Council regarding the report details at the Consideration meeting and assessment questions at the Court of Revision meeting, along with appeal rights to the Agriculture, Food and Rural Affairs Appeals Tribunal (A.F.R.A.A.T.) and to the Drainage Referee as provided for in the Drainage Act.

The Drainage Act definitions and applicable clarifications are as follows:

“Benefit” means the advantages to any lands, roads, buildings or other structures from the construction, improvement, repair or maintenance of a drainage works such as will result in a higher market value or increased crop production or improved appearance or better control of surface or subsurface water, or any other advantages relating to the betterment of lands, roads, buildings or other structures.

“Outlet liability” means the part of the cost of the construction, improvement or maintenance of a drainage works that is required to provide such outlet or improved outlet. Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or indirectly through the medium of any other drainage works or of a swale, ravine, creek or watercourse, may be assessed for outlet liability. The assessment for outlet liability shall be based upon the volume and rate of flow of the water artificially caused to flow upon the injured land or road or into the drainage works from the lands and roads liable for such assessments. Every drainage works constructed under this Act shall be continued to a sufficient outlet.

Owners are advised that they have a legal responsibility to convey their drainage to a sufficient outlet. For this reason, they have a share in the cost for upkeep of the drain downstream of their lands and this obligation is reflected in the assessment for Outlet Liability. Owners are reminded that the responsibility for carrying out maintenance on a Municipal drain rests with the Town as set out in the Drainage Act. Any owner can notify the Town that the drain requires maintenance and the Town has to take action pursuant to the Act. This system is generally reactive and requires the property owners to raise their concerns and issues to the Town. Owners are

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reminded that keeping brush clear along their portion of the drain and having buffer strips provides them with a direct benefit of improved crop yield and preservation of topsoil on their lands. Owners have an Outlet Liability for the downstream portion of the drain. The owners are reminded that Municipal drainage is a communal project and basically a user pay system. Municipal Drains are established through preparation of a drainage report under the Drainage Act and by Town Council adoption under by-law. As an example, when work is carried out on a Municipal Drain downstream of the affected Drain, the owners in the affected Municipal Drain sub-watershed that are outletting to the downstream Municipal Drain will be responsible for a portion of the cost, along with the other owners in the downstream Municipal Drain watershed adjacent and upstream of the work that is conducted. Owners are advised of the 1/3 grant available to agricultural lands that qualify for the Farm Property Class Tax Rate and should be aware that the Town administers the grant process and reflects any available grant on the final billing to each qualified owner.

Owners may appeal their assessment as set out in the drainage report. They are advised that they should submit their appeal to the Court of Revision 10 days before the scheduled date of the meeting; however, the Court of Revision can agree to hear appeals presented at the meeting. If owners are still dissatisfied with the report after that meeting, they may submit an appeal to the Agriculture, Food and Rural Affairs Appeals Tribunal through the Town Clerk within 21 days of the closing of the Court of Revision pursuant to Section 54 of the Drainage Act.

The cost sharing for bridges and enclosures is based on the location of same along the overall length of the drainage system. Each owner has the right for one access across each Municipal drain. The owner generally pays 100% of the cost for the first bridge installation and it becomes part of the drain when included in an engineer's report and is then to be maintained by the drain with costs shared as set out in the drainage report.

Owners should be aware that existing grass buffers and accesses will be protected and maintained as set out in the report specifications. Allowances as set out in the report are to offset damages to lands from the construction work and excavated material disposal. Owners are advised that the Contractor is responsible to remove any sticks and rocks (cobbles) etcetera from the spread materials and the Contractor is responsible to guarantee the work performed on the drain with a maintenance period of one year from the date of substantial completion.

VII. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the 1977 report plans by engineer Maurice Armstrong provides a good fit to the existing profile of the drain. Said report provided for improvements to the open drain that still appear to suit the current conditions of the watershed.

Based on our detailed survey, investigations, examinations, and discussions with the affected Owners and governing Authorities, we would recommend that the bridge installation work be carried out as follows:

- a) We recommend that all construction works, be carried out in accordance with the requirements established by E.R.C.A. and D.F.O. as set out in the documents within **Appendix "REI-A"** attached to this report.

- b) As this is an existing Municipal drain, with the channel and access culverts designed to have a 1:2 year storm capacity, the new culvert has also been designed to have a minimum capacity for a 1:2 year storm flow including allowance for embedment. Since conditions have not changed and there is no information to indicate any new species concerns, the bridge installation can be carried out based on the provisions included within the Species at Risk (S.A.R.) Mitigation Plan for Drainage Works (March 2018-17-4938) that the Town has prepared to address the Endangered Species Act, 2007. Section 6.0 of the Mitigation Plan indicates that snake species are a concern for this work area and although turtles are not indicated, they are mobile and could be encountered. The Mitigation Plan includes measures to be followed as outlined in "Section 7.0 Mitigation Measures" of the document and a copy of same as it relates to turtles and snakes is included in **Appendix "REI-B"**. Provided that mitigation requirements are implemented, it was concluded that present wildlife Species at Risk will be protected from negative impacts and the works will not contravene Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007 as administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.) as included in **Appendix "REI-B"** for reference by the land owners, the Town of Tecumseh, and the Contractor who will be conducting the works.
- c) As provided for in this report we recommend that the bridge being installed in the drain be constructed as outlined further in this report including the specifications and the plans that form part of the report.
- d) We recommend that the drain be kept up in the future by the Town and the cost of the work be assessed on a pro-rata basis with the values shown in the attached Maintenance Schedule of Assessment.
- e) The existing drain has some buffer strips and grass areas along the Municipal drain that reduce the amount of erosion and the sediment entering the drain and enhance water quality. We recommend that the existing grass areas and buffer strips be protected as part of this project and during future maintenance on the drain.

We recommend that the West Branch of the East Branch Delisle Drain have a new bridge installed in it, in accordance with this report, the attached specifications and the accompanying drawings, and that all works associated with same be carried out pursuant to Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

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VIII. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **SIXTEEN THOUSAND NINE HUNDRED FIFTY DOLLARS (\$16,950.00)**, made up as follows:

CONSTRUCTION

Item 1)	Provide all labour, equipment and material to construct a new access bridge consisting of 11.0 metres (36.1 ft.) of 600mm diameter 320kPa Boss 2000 H.D.P.E. smoothwall pipe and quarried limestone on filter cloth end walls, granular bedding and backfill, granular approaches, excavation, compaction, hauling, cleanup and restoration, complete.	Lump Sum	\$	7,500.00
	Net H.S.T. (1.76%) on Construction		\$	132.00
				<hr/>
TOTAL FOR CONSTRUCTION			\$	7,632.00
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INCIDENTALS

1)	Report, Estimate, & Specifications	\$	2,500.00
2)	Survey, Assistants, Expenses, and Drawings	\$	3,000.00
3)	Duplication Cost of Report and Drawings	\$	800.00
4)	Estimated Cost of Letting Contract	\$	1,000.00
5)	Estimated Cost of Layout and Staking	\$	500.00
6)	Estimated Cost of Supervision and Inspection During Construction (based on 1 day duration)	\$	800.00
7)	Net H.S.T. on Incidental Items Above (1.76%)	\$	152.00
8)	Estimated Cost of Interim Financing	\$	100.00

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9) Contingency Allowance	\$ 466.00
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TOTAL FOR INCIDENTALS	\$ 9,318.00
TOTAL FOR CONSTRUCTION (brought forward)	\$ 7,632.00
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TOTAL ESTIMATE	\$ 16,950.00
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IX. DRAWINGS AND SPECIFICATIONS

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

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

X. SCHEDULE OF ASSESSMENT

We would recommend that all of the costs associated with the construction of this new access bridge, and the preparation of this Engineer's report, be assessed against the agricultural lands of Rosemary Jobin and Frank Lafferty (460-03400), in Part of Lot 295, Concession S.T.R. in the Town of Tecumseh. A Schedule of Assessment has been prepared and included herein to indicate the lands assessed for this new farm access bridge installation.

It has been clearly established that this new access bridge is being provided to serve as the access from County Road 34 to an existing agricultural farm parcel. Pursuant to the current Agricultural Drainage Infrastructure Program (A.D.I.P.) Policies that are in place, it is anticipated that these lands designated as Farm Property Tax Class will **not** be eligible for a grant from the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) in the amount of 1/3 of their total assessment for this project because the severance was recently granted and required the new bridge to be installed, and the severance was made after the 2004 cut-off date in the Policies.

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

XI. FUTURE MAINTENANCE

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

After the completion of all of the works included within this report, the new access bridge within the Drain shall be maintained in the future by the Town of Tecumseh. Furthermore, if any maintenance work is required to this access bridge in the future, we recommend that 61.0% of the future maintenance costs shall be assessed as a Benefit against the abutting property (Parcel 460-03400) being served by the access bridge, which is currently owned by Rosemary Jobin and Frank Lafferty, in Part of Lot 295 Concession S.T.R., and the remaining balance of 39.0% be assessed pro-rata against the upstream lands and roads based on their Outlet Liability assessment in the attached Maintenance Schedule of Assessment. This sharing reflects that the owner has requested a bridge with the standard 6.1 metre (20 feet) travelled top width that is normally shared between the owner and upstream affected lands and roads.

We recommend that any future maintenance work on the drain be carried out in accordance with the 1977 drainage report and plans and be assessed in accordance with the attached updated Maintenance Schedule of Assessment on a pro-rata basis using the actual cost of the works. We further recommend that due to similar sizing, any future costs for maintenance works to the existing bridges in the drain be assessed on the basis of 61.0% Benefit to the abutting parcel served by the bridge with the balance of 39.0% assessed pro-rata against the upstream lands and roads based on their Outlet Liability assessment in the attached Maintenance Schedule of Assessment.

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We further recommend that the maintenance cost sharing as set out above shall remain as aforesaid until otherwise determined and re-established under the provisions of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

All of which is respectfully submitted.

Rood Engineering Inc.

Gerard Rood

Gerard Rood, P.Eng.



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att.

ROOD ENGINEERING INC.

Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
WEST BRANCH OF THE EAST BRANCH DELISLE DRAIN
Town of Tecumseh

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

<u>Tax Roll No.</u>	<u>Con. or Plan No.</u>	<u>Lot or Part of Lot</u>	<u>Acres Owned</u>	<u>Acres Afft'd</u>	<u>Hectares Afft'd</u>	<u>Owner's Name</u>	<u>Value of Benefit</u>	<u>Value of Outlet</u>	<u>Value of Special Benefit</u>	<u>TOTAL VALUE</u>
460-03400	STR	294 & 295	26.89	0.40	0.162	Rosemary Jobin & Francis Lafferty	\$ 10,340.00	\$ 6,610.00	\$ -	\$ 16,950.00
Total on Privately Owned - Agricultural Lands (grantable).....							<u>\$ 10,340.00</u>	<u>\$ 6,610.00</u>	<u>\$ -</u>	<u>\$ 16,950.00</u>
TOTAL ASSESSMENT				0.40	0.16		<u>\$ 10,340.00</u>	<u>\$ 6,610.00</u>	<u>\$ -</u>	<u>\$ 16,950.00</u>

1 Hectare = 2.471 Acres
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MAINTENANCE SCHEDULE OF ASSESSMENT
WEST BRANCH OF THE EAST BRANCH DELISLE DRAIN
Town of Tecumseh

2. ONTARIO LANDS:

<u>Tax Roll No.</u>	<u>Con. or Plan No.</u>	<u>Lot or Part of Lot</u>	<u>Acres Owned</u>	<u>Acres Afft'd</u>	<u>Hectares Afft'd</u>	<u>Owner's Name</u>	<u>Value of Benefit</u>	<u>Value of Outlet</u>	<u>Value of Special Benefit</u>	<u>TOTAL VALUE</u>
		King's Highway No. 3		1.39	0.563	Ministry of Transportation Ontario	\$ 422.00	\$ 1,711.00	\$ -	\$ 2,133.00
Total on Ontario Lands.....							<u>\$ 422.00</u>	<u>\$ 1,711.00</u>	<u>\$ -</u>	<u>\$ 2,133.00</u>

3. MUNICIPAL LANDS:

<u>Tax Roll No.</u>	<u>Con. or Plan No.</u>	<u>Lot or Part of Lot</u>	<u>Acres Owned</u>	<u>Acres Afft'd</u>	<u>Hectares Afft'd</u>	<u>Owner's Name</u>	<u>Value of Benefit</u>	<u>Value of Outlet</u>	<u>Value of Special Benefit</u>	<u>TOTAL VALUE</u>
		County Road 34		3.37	1.364	County of Essex	\$ 680.00	\$ 1,369.00	\$ -	\$ 2,049.00
Total on Municipal Lands.....							<u>\$ 680.00</u>	<u>\$ 1,369.00</u>	<u>\$ -</u>	<u>\$ 2,049.00</u>

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

<u>Tax Roll No.</u>	<u>Con. or Plan No.</u>	<u>Lot or Part of Lot</u>	<u>Acres Owned</u>	<u>Acres Afft'd</u>	<u>Hectares Afft'd</u>	<u>Owner's Name</u>	<u>Value of Benefit</u>	<u>Value of Outlet</u>	<u>Value of Special Benefit</u>	<u>TOTAL VALUE</u>
460-03500	STR	295	0.24	0.14	0.057	Paul Chauvin	\$ 84.00	\$ 82.00	\$ -	\$ 166.00
460-034??	STR	295	0.75	0.75	0.304	Rosemary Jobin & Francis Lafferty	\$ 448.00	\$ 327.00	\$ -	\$ 775.00
Total on Privately Owned - Non-Agricultural Lands.....							<u>\$ 532.00</u>	<u>\$ 409.00</u>	<u>\$ -</u>	<u>\$ 941.00</u>

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
460-03350	STR	295	3.25	3.25	1.315	John Lafferty & Norman Sweet	\$ 970.00	\$ 1,112.00	\$ -	\$ 2,082.00
460-03400	STR	294 & 295	26.89	6.00	2.428	Rosemary Jobin & Francis Lafferty	\$ 1,791.00	\$ 1,004.00	\$ -	\$ 2,795.00
Total on Privately Owned - Agricultural Lands (grantable).....							<u>\$ 2,761.00</u>	<u>\$ 2,116.00</u>	<u>\$ -</u>	<u>\$ 4,877.00</u>
TOTAL ASSESSMENT				14.90	6.03		<u>\$ 4,395.00</u>	<u>\$ 5,605.00</u>	<u>\$ -</u>	<u>\$ 10,000.00</u>
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1 Hectare = 2.471 Acres
Project No. REI2019D010
November 18th, 2019

SPECIFICATIONS

WEST BRANCH OF THE EAST BRANCH DELISLE DRAIN

New Bridge for Rosemary Jobin and Francis Lafferty & Updated Maintenance Schedule

(Geographic Township of Sandwich South)

TOWN OF TECUMSEH

I. GENERAL SCOPE OF WORK

The West Branch of the East Branch Delisle Drain currently comprises of an open Municipal drain generally located along the south side of County Road 34. The work under this project generally comprises of installation of a new access bridge for a severance of the Rosemary Jobin and Frank Lafferty lands. The work on the bridge being installed includes the installation of a new culvert near Station 0+172.3; new culvert end treatments comprising of sloped quarried limestone on filter cloth end protection; granular approaches and backfill; and granular transition areas.

The Contractor shall provide all material, labour, and equipment to construct a new access bridge for the Jobin & Lafferty parcel, located just east of the property line separating the Jobin & Lafferty and Lafferty & Sweet parcels; consisting of 11.0 metres (36.09 ft.) of 600mm diameter, standard corrugation, smooth wall Boss 2000 H.D.P.E. 320kPa pipe in the West Branch of East Branch Delisle Drain. The new access bridge shall be constructed so that the bridge is approximately 5.0 metres (16.4 ft.) east of the hydro pole located in the north east corner of the Lafferty & Sweet parcel, as seen on the attached plans. This location shall be the exact designated location of this access bridge culvert unless otherwise directed by the property owner and the Town Drainage Superintendent, prior to the construction of same. Any changes to the location of the new access bridge must be approved in writing by the Engineer. The general layout of the access bridge and other ancillary work shall be provided as shown and detailed in the accompanying drawing attached within **Appendix "REI-E"**. A Benchmark has been set near the proposed access bridge so that same can be utilized for the setting of the new bridge culvert invert grades and restoring the drain. The Benchmark is described in the detail plan for the bridge culvert installation along with its elevation.

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

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

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

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

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

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

The Contractor is to note that the Ministry of Environment, Conservation and Parks (M.E.C.P.) screening process by way of a Species at Risk (S.A.R.) review of the M.E.C.P. "Endangered Species Act, 2007" (E.S.A.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. prior to construction. This Section allows the Town to conduct eligible works of repair, maintenance and improvement to existing municipal drains under the Drainage Act, and exemptions from Sections 9 and 10 of the E.S.A., provided that the requirements are followed in accordance with Ontario Regulation 242/08. The results of the review will be provided to the Contractor and copies of the mitigation measures, habitat protection and identification sheets will be included within **Appendix "REI-B"** as part of the Town of Tecumseh March 2018 Species at Risk Mitigation Plan.

Providing mitigation requirements are implemented, it was concluded that present wildlife Species at Risk will be protected from negative impacts and the works will not contravene Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007.

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

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the south side of County Road 34. 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 construction of the new access bridge, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridge to carry out the required construction of the new structure installation and ancillary work.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close County Road 34 for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the County of Essex and Town of Tecumseh Public Works.

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the lawn areas of residential properties. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

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

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

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

VI. FENCING

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

replace the fence using the new materials and the materials from the present fence shall remain the property of the Owner.

VII. TOPSOIL, SEED AND MULCH

The Contractor shall be required to restore all existing grassed areas and drain side slopes damaged by the structure 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.

VIII. DETAILS OF BRIDGE WORK

When completed, the new access bridge along the centreline of the new culvert shall have a total top width, including the top width of the quarried limestone on filter cloth end walls, of approximately 7.2 metres (23.6 ft.) and a driveway travelled top width of 6.10 metres (20.0 ft.). The quarried limestone on filter cloth end wall protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical and shall extend from the end of the new smooth wall H.D.P.E pipe structure to the top elevation of the driveway. The proposed pipe inverts are set approximately 60mm below the drain design grade. The smooth wall H.D.P.E. pipe to be provided for this project is to be supplied as no more than two (2) approximately equal lengths of pipe for the bridge and joined together with a wrap coupler with non-woven geotextile filter cloth wrapped around it, secured in accordance with the manufacturer's recommendations. The smooth wall H.D.P.E pipe to be utilized for this bridge installation must be a minimum of 320kPa strength with standard corrugations and pipe ends anchored against flotation and shall be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain.

The Contractor shall also note that the placement of the new access bridge culvert is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to

ensure same, all to the full satisfaction of the Town Drainage Superintendent or Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the bridge pipe and for a distance of 3.0 metres (10 ft.) both upstream and downstream of said pipe. The design parameters of the West Branch of East Branch Delisle Drain at the location of this new access bridge installation consists of a 0.91m (3.0 ft.) bottom width, 0.05% grade, and 1.5 horizontal to 1.0 vertical sideslopes. The Contractor shall be required to cut any brush and strip the existing drain sideslopes of any vegetation as part of the grubbing operation. The Contractor shall also dispose of all excavated and deleterious materials, as well as any grubbed out materials, to a site to be obtained by it at its own expense. The Contractor shall note that the survey indicates that the existing drain bottom is slightly above the design grade. The Contractor shall be required to provide any and all labour, material and equipment to set the pipe to the required design grades. The Contractor shall also be required to supply, if necessary for a solid base, a minimum thickness of 150mm (6") of 20mm (3/4") clear stone bedding underneath the culvert pipe, extending from the bottom of the excavation to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

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

Once the H.D.P.E pipe has been satisfactorily set in place at the site, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. (Ontario Provincial Standard Specification) Form 1010, with the exception of the top 305mm (12") of the backfill material for the full top width of the drain and the access bridge, which shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. The end slopes of the backfill material over the H.D.P.E pipe from the invert of said pipe to the top of driveway elevation shall be constructed to allow for installation of quarried limestone on filter cloth erosion protection.

The Contractor shall also perform the necessary excavation to extend the driveway beyond the north and south top of bank for the West Branch of East Branch Delisle Drain as illustrated on the plan. This driveway approach from the existing edge of gravel shoulder to the north top of bank shall remain a grass and dirt entrance to the bridge, as this coincides with the greater distance between the existing gravel shoulder and north top bank. When the Owner wishes to proceed with the construction of a gravel driveway from the road to the bridge, the Owner will be required to get a permit from the Count of Essex and comply with their requirements. The gravel backfill shall consist of a minimum of 305mm (12") of granular material M.T.O. Type "A" satisfactorily compacted in place and extend across the pipe to approximately 1.0m past the north and south top of bank limit as shown on the plans.

Once the smooth wall H.D.P.E pipe has been set in place at the required location, the Contractor shall completely backfill same with granular material, and install the quarried limestone on filter cloth protection on both ends of the bridge. The end walls shall be extended around onto the drain banks in line with the end of the bridge culvert pipe as shown on the plans included in **Appendix "REI-E"**. 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, 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 H.D.P.E pipe for this installation shall be provided with a depth of cover measured from the top of the plastic pipe to the top of the granular backfill of approximately 0.607m (1.99 ft.) for the new bridge and if the culvert is placed at its proper elevations, this should be easily achieved. If the Contractor finds that the specified cover is not being met, they shall notify the Drainage Superintendent and the Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The cover requirement is **critical** and must be attained. In order for this new access bridge culvert to properly fit the channel parameters, all of the design grade elevations provided below must be strictly adhered to.

Also, for use by the Contractor, we have established a Benchmark near the site. This Benchmark is the *"top nut of Fire Hydrant (ID: SS248) located on the south side of County Road 34 approximately 15 metres west of proposed new bridge, across the road from Maidstone Recreation Centre Municipal Number (M.N.) 10720"*, with same being **Elevation 190.634 metres**. The new pipe culvert and the backfilling are to be placed on the following basis:

- i) The **West (upstream) invert** of the proposed bridge culvert is to be set at Elevation **188.254 metres**.
- ii) The **East (downstream) invert** of the proposed bridge culvert is to be set at Elevation **188.248 metres**.
- iii) The centreline of driveway for this bridge installation shall be set to approximately Elevation **189.470 metres** at the existing north top of bank, Elevation **189.455 metres** at the culvert pipe centreline, and Elevation **189.403 metres** at approximately 1.0 metre south of the south top of bank and then graded to match the existing ground elevation at each end of the

granular approaches. The access bridge driveway, in all cases, shall be graded with a cross-fall from the centreline of the driveway to the outer edges of the driveway at an approximate grade of 1.50%.

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

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

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

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

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

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

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

in all regards to Ontario Provincial Standard Specifications, Form 803 dated November 2010 and Form 804, dated November 2013, or as subsequently amended, or as amended by these specifications. The seeding mixture shall be the Standard Roadside Mix (Canada No. 1 Lawn Grass Seed Mixture) as set out in O.P.S.S. 804. All cleanup and restoration work shall be performed to the full satisfaction of the Town Drainage Superintendent or Engineer.

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

IX. GENERAL CONDITIONS

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

and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.

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

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

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

- l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project; and shall name the County of Essex and Town of Tecumseh and their officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.
- m) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:
 - i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
 - ii) proof of advertising

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

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

APPENDIX "REI-A"

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

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

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

Measures to Avoid Causing Harm to Fish and Fish Habitat

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

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

Measures

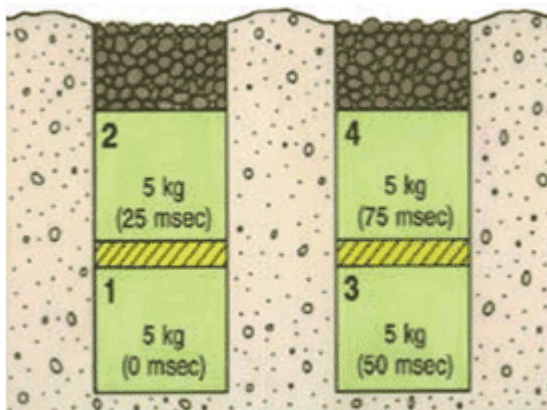
- Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish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

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

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

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

Figure 1: Sample Blasting Arrangement



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

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

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

Date modified:
2013-11-25

APPENDIX "REI-B"

5.0 Location

Located along the southern shores of Lake St. Clair in Essex County and in the Essex Region Watershed, the Town of Tecumseh (Study Area) encompasses a geographic area of 9,538.60 hectares (ha) that is bordered by the City of Windsor and the Town of LaSalle on its western side and the Town of Lakeshore to the east and shown on **Figure 1** (Essex Region Conservation Authority (ERCA), 2013). There are four (4) subwatersheds (total area): Pike Creek subwatershed (8,993 ha), Canard River subwatershed (34,776 ha), Tecumseh Area Drainage subwatershed (1,150 ha), Turkey Creek subwatershed (6,112 ha), and Little River subwatershed (6,490 ha) that traverse the lands within the Town's boundaries (ERCA, 2011). Approximately 95.15% (9,079.38 ha) of the landscape consists of anthropogenic features (residential, commercial, agricultural, etc.) while the remaining 4.81% (459.22 ha) is made up of natural areas (terrestrial (4.49%) and other terrestrial (0.32%)) (ERCA, 2013).

There are one hundred and twenty (120) municipal drains measuring 221 kilometers (km) within the Town of Tecumseh (Town of Tecumseh, 2014). Through our background review we identified 3 dominant habitat types surrounding/within the drains that have potential to provide habitat for SAR. Habitats consist of:

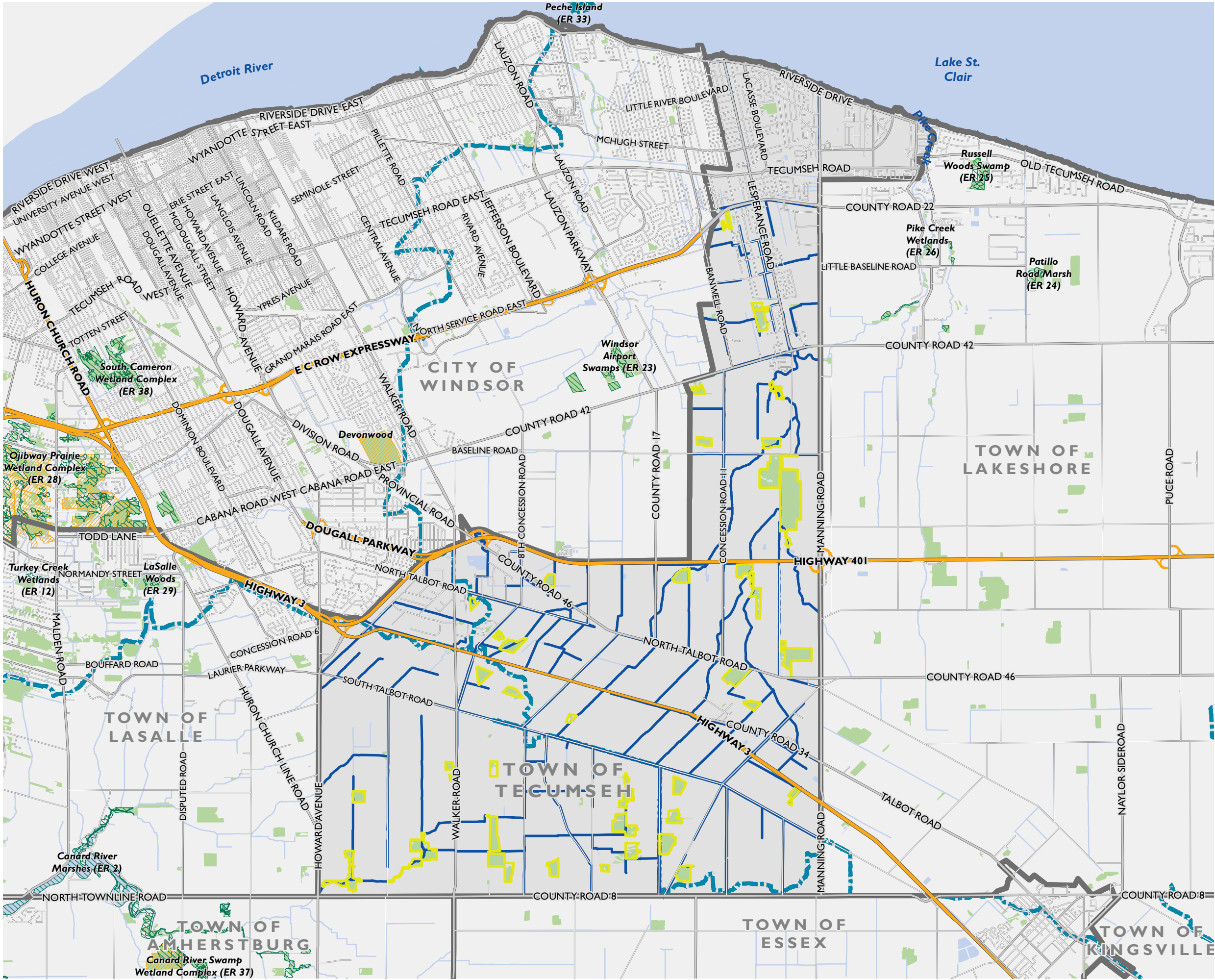
Existing Natural Features:

- Forest

Existing Anthropogenic Features:

- Urban (residential, commercial, recreational, right-of-ways)
- Agricultural (row crop, hayfield, old abandoned fields)

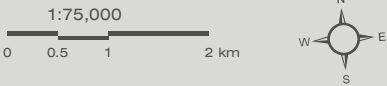
Within the Town, there are no forest patches greater than 100 ha in size with the largest being Fairplay Woods (an Environmentally Significant Area (ESA)) which spans a total area of 52.9 ha (ERCA, 2013). There are 2 forest patches that contain 200 m interior forest and 16 patches that contain 100 m interior forest (ERCA, 2013). In accordance with subparagraph i, of paragraph 2, of subsection 6 under Section 23.9 of O.Reg. 242/08, **Drainage Maps** have been prepared that show drain locations, surrounding land use types, proximity to sensitive natural features (e.g. Forest) and potential SAR habitat that exists within the Town's jurisdiction (see **Appendix B**). A list of all the drains and adjacent habitat type(s) has been provided in **Appendix B** following the Drainage Maps. In addition, a **Tecumseh Drain Database** (provided electronically) contains the drain names, adjacent habitat types, and relevant information found during our background review from the MNRF and ERCA.



TOWN OF TECUMSEH

NATURAL FEATURES
FIGURE 1

- Mainland
- Provincially Significant Wetland
- ANSI, Life Science
- Natural Heritage System
- Municipal Drain
- Quaternary Watershed
- Water Body
- Woodland



MAP DRAWING INFORMATION:
DATA PROVIDED BY MNR, TOWN OF TECUMSEH

MAP CREATED BY: GM
MAP CHECKED BY: KM/AB
MAP PROJECTION: NAD 1983 UTM Zone 17N



PROJECT: 174938
STATUS: FINAL
DATE: 2017-12-08

6.0 Species at Risk

A review of secondary source information, including the expired MNRF Agreement¹, Natural Heritage Information Centre (NHIC) GIS Database records (i.e. 1 km squares that overlap the Study Area) were reviewed to gather a list of the SAR that have the potential to occur within the Town's boundaries. A total of sixty-six (66) species listed as either endangered or threatened on the SARO list (O.Reg. 230/08) were identified to occur within the Study Area (see **Appendix C**). One Restricted Species Record was also identified in 1988 (NHIC 1 km Square 17LG4478).

The habitat requirements for each of the sixty-six species was crossed referenced with habitats identified within the Study Area. A total of Nineteen (19) species listed as endangered or threatened were identified as having potential habitat within the Study Area drains, consisting of Turtles (2 species), Snakes (2 species), Fishes (2 species), Birds (3 species), and Plants (10 species). **Table 2** lists the SAR, preferred habitat type(s) (Forest, Agricultural, Urban or All), need for water presence (requirement for some species), and the dates during the year when the species is likely to be carrying out sensitive life processes, referred to herein as the Restricted Activity Period (RAP).

Four (4) species listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08 were identified as having the potential to occur within the Town of Tecumseh drains, these species include: Pugnose Minnow (*Opsopoeodus emiliae*) (1 fish species), False Hop Sedge (*Carex lupuliformis*), Heart-leaved Plantain (*Plantago cordata*) and Scarlet Ammannia (*Ammannia robusta*) (3 plant species). Since these species are listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08, this mitigation plan cannot be used for these species and as such, they have not been included in **Table 2** below. Permitting related to these species may be required when working in specific drains. More information on these species, their habitat preferences, known distribution within the area and steps that need to be taken to determine whether a permit is required are outlined in **Appendix D**.

Table 2: Species at Risk with Potential to Occur within the Study Area

Scientific Name	Common Name	ESA ¹	Preferred Habitat Type ²	Restricted Activity Period
Turtles (2 species)				
<i>Emydoidea blandingii</i>	Blanding's Turtle	THR	Forest, Water is present	November 1 to April 30 Important to Note: Activities that require water level reduction cannot occur in areas when and where turtles are hibernating (paragraph 6, subsection 13, under Section 23.9 of O.Reg. 242/08).
<i>Apalone spinifera</i>	Spiny Softshell	THR	Forest, Water is present	

¹ Agreement under Section 23 of O.Reg. 242/08 made under the ESA, 2007 (File # AY-23D-010-10)



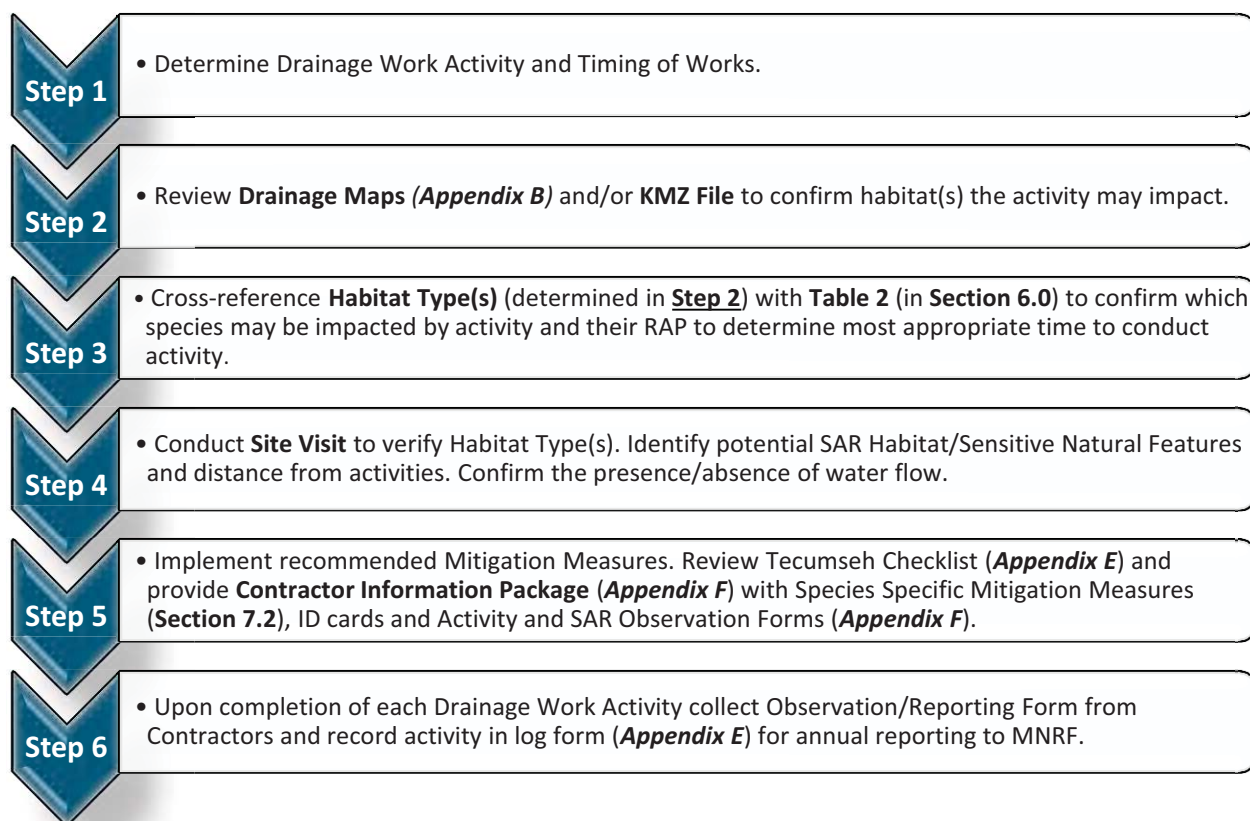
Scientific Name	Common Name	ESA ¹	Preferred Habitat Type ²	Restricted Activity Period
Snakes (2 species)				
<i>Pantherophis gloydi</i>	Eastern Foxsnake (Carolinian population)	END	All ³	September 20 to May 31
<i>Thamnophis butleri</i>	Butler's Gartersnake	END	All ³	
Fishes (2 species)				
<i>Notropis anogenus</i>	Pugnose Shiner	END	Water is present	March 15 to June 30
<i>Lepisosteus oculatus</i>	Spotted Gar	THR		
Birds (3 species)				
<i>Dolichonyx oryzivorus</i>	Bobolink	THR	Agricultural	May 1 to July 15
<i>Sturnella magna</i>	Eastern Meadowlark	THR	Agricultural	
<i>Hirundo rustica</i>	Barn Swallow	THR	All ³	
Vascular Plants (10 species)				
<i>Gymnocladus dioicus</i>	Kentucky Coffee-tree	THR	Forest	Not Applicable
<i>Liparis liliifolia</i>	Purple Twayblade	THR	Forest	
<i>Cornus florida</i>	Eastern Flowering Dogwood	END	Forest	
<i>Castanea dentata</i>	American Chestnut	END	Forest	
<i>Juglans cinerea</i>	Butternut	END	Forest	
<i>Morus rubra</i>	Red Mulberry	END	Forest	
<i>Aletris farinosa</i>	Colicroot	THR	Agricultural, Forest	
<i>Smilax rotundifolia</i>	Round-leaved Greenbrier (Great Lakes Plains population)	THR	Forest	
<i>Liatris spicata</i>	Dense Blazing Star	THR	Agricultural	
<i>Symphyotrichum praealtum</i>	Willowleaf Aster	THR	Forest	

¹Endangered Species Act – status as defined by O.Reg. 242/08 as of April 27, 2017; ²Preferred Habitat Types – The habitat types listed are areas where a SAR has the potential to occur. It should be noted that species have the potential to occur outside of these habitats; ³All – Structures such as culverts and bridges may provide suitable habitat for nesting Barn Swallow. Culverts, rip rap and gabion baskets also have the potential to provide nesting and/or hibernaculum for snake species.



7.0 Mitigation Measures

Based on the types of drainage work activities outlined above (in Section 2.0) and the potential for SAR and SAR habitat within and adjacent to the drainage features, the following best practices and mitigation measures are recommended when conducting drainage works. Prior to starting drainage works, the following steps are recommended to help determine the appropriate mitigation/management measures:



7.1 General Mitigation Measures

The following mitigation measures are recommended to avoid or minimize impacts to the natural environment when conducting drainage works. Following this section species specific mitigation measures are provided.

When planning for drainage works, activities should be planned outside of sensitive timing windows for all wildlife species wherever possible. **Table 2** in Section 6.0 indicates the Restricted Activity Periods for the different SAR having the potential to occur within the Study Area. **Table 3** indicates sensitive timing windows for various types of wildlife (including SAR) based on habitat types.

This information can be used to determine what time(s) of year may be sensitive at a particular site, based on which types of habitat and wildlife are present.

Where possible, activities are recommended to be planned outside of these sensitive time(s); otherwise additional species specific mitigation measures are recommended and/or consultation with the MNRF.

Table 3: Sensitive Timing Windows for other Wildlife Species (including SAR)

Habitat Type	Wildlife	Sensitive Timing Windows
Agricultural (Hayfields and pastures)	Migratory Birds	March through July (breeding season for most species)
Waterbodies	Migratory Birds (including waterfowl)	March through Mid-August
	Turtles and Amphibians	March through Mid-August; and Mid-October through March (for overwintering wildlife, including turtles).
	Mammals	March through mid-August; and Mid-October through March (overwintering wildlife)
	Fish	In-water timing restriction for warmwater fishes March 15 to June 30.
Forest	Migratory Birds	March through mid-August
	Mammals	March through mid-August; and Mid-October through March (overwintering wildlife)
	Snakes	March through mid-August; and Mid-October through March (overwintering wildlife)
Urban	Snakes	March through mid-August; and October through March (overwintering wildlife)
	Mammals	October through March (overwintering wildlife)

The following list provides general measures that are recommended when conducting any drainage work activities:

- **Bats:** The work associated with drainage maintenance covered under this management plan would typically not include the removal of trees. As such, the potential for drainage work activities to impact bat SAR is low. However, if a tree that exhibits a diameter at breast height of 25 cm or greater or a tree that exhibits loose shaggy bark requires removal for drainage works, removal should be completed between November 1 and March 1, outside of the active season for bats. If the tree removal needs to occur during the active season, removal should be completed after dusk.
- Review species specific seasonal timing windows to avoid sensitive periods for species
- Where possible, abide by regulatory timing windows and setback distances and avoid regulated habitat features
- Minimize duration of in-water work (where applicable)



- Any in-stream work should be conducted during periods of low flow
- Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation
- Conduct wildlife sweeps prior to the commencement of drainage work activities to determine if SAR (or other wildlife) are present at the site and engaged in critical life processes (e.g. nesting, etc.)
- Following the wildlife sweep, the area of activity is to be isolated with silt fencing to keep SAR and other wildlife from entering the work space area.
- Develop and implement an erosion and sediment control plan for the site that minimizes the risk of sedimentation to the drain during all phases of an activity. 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 drain of settling basin and runoff water is clear. Following the DFO's Measures to Avoid Harm (as outlined on DFO's website: <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html>), an erosion and sediment control plan, where applicable, is to include the following:
 - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the drain
 - 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 the drain
 - Site isolation measures, where required, to contain suspended sediment
 - Measures for containing and stabilizing waste materials generated from activities are stored away from any water bodies and prevent materials from re-entering water bodies
 - Erosion and sediment control measures are inspected and maintained on a regular basis during drainage works
 - Any damages to erosion and control measures are to be repaired immediately
 - Removal of non-biodegradable erosion and sediment control materials once site has been stabilized
- ***Phragmites*** is a non-native perennial grass species that has been observed throughout much of the province and Tecumseh, developing tall dense stands that degrade wetlands and other features by outcompeting native vegetation and changing habitat. To further prevent the spread and introduction of this unwanted species in the province, the provincial government has regulated invasive *Phragmites* as restricted under the *Invasive Species Act*, 2015. Restricted species under the Act, prohibits i) the transport of species into any provincial park and conservation reserve and ii) the deposit or release of species in Ontario. For further information on the *Invasive Species Act*, 2015 please visit: www.ontario.ca/invasionON. It is recommended that care be taken when working in areas with *Phragmites* and efforts be taken to prevent further spread of species through equipment transfer. Methods to prevent the spread of *Phragmites* while conducting drainage works should include:
 - Inspection of vehicles, equipment and heavy machinery thoroughly inside and out for accumulation of dirt, plant material or snow/ice, including the underside of vehicles, radiators, spare tires, foot wells and bumpers before entering onto a site. Remove any guards, covers, plates or other easy to remove external equipment;



- Inspections should be completed when: moving vehicles out of local area of operation; moving machinery between properties or sites within the same property where invasive species may be present or known to occur; and using machinery along roadsides, in ditches and along watercourses.
- Vehicles, equipment and heavy machinery should be cleaned: before moving out of local area where invasive species has been identified or known to occur; and when accumulations of dirt, plant material or snow/ice has been observed.
- Clean vehicles, equipment and heavy machinery in an area where risk of contamination is low, ideally on a mud free hard surface, at least 30 m away from any watercourse, waterbody, wetland or other natural area, if possible. Where risk of runoff is high, cleaning stations should be contained by sediment fence as per standard erosion and sediment control specifications.
- Remove large accumulations of dirt, using a compressed air device, high pressure hose or other device as necessary. Clean the vehicle starting at the top and working down, with particular attention to the undersides, wheels, wheel arches, guards, chassis, engine bays, grills and other attachments.
- Clean inside vehicles by sweeping, vacuuming or using compressed air device including floor, foot wells, pedals, seats and under the seats.

Additional details on cleaning equipment and/or managing invasive species can be found in the Clean Equipment Protocol for Industry (J. Halloran, et al., 2013) and online at the Government of Ontario's website: <https://www.ontario.ca/page/stop-spread-invasive-species>.

7.2 Species Specific Mitigation Plans

In the event a SAR or SAR habitat has been identified within the proposed area for drainage work activity, the following information should be clearly conveyed to the on-site staff as part of the drainage works protocol, via notes or plans and on-site briefings with construction/personnel:

- Schedule for pre-construction activities such as wildlife inspections, silt fencing installation and contractor briefing.
- Description of wildlife mitigation measures to be used during drainage work activities, including:
 - Placement and specifications of required protection measures (e.g. fencing, signage)
 - Phasing and direction of site clearing activities
 - Any recommendations regarding access routes for equipment, vehicle parking, materials, stockpiling, etc.
- Guidance on what to do in the event of a wildlife encounter, including SAR and arrangements for dealing with injured or orphaned animals (as indicated in **Table 5** and **Appendix F**). This guidance should be summarized in a handout suitable for quick reference by on-site staff.
- SAR awareness training should be provided to all on-site staff, including truck drivers.

In the Contractor Information Package (**Appendix F**) Dillon has provided SAR identification sheets for SAR with the potential to occur within the Study Area.

7.2.1 Species Specific Mitigation Measures for Snake Species

Snake species can be found in a variety of habitat types and most of the drainage work activities have the potential to encounter snakes. Particular attention should be given when conducting works on catch basins, culverts, rip rap and crossing structures, as snakes carry out sensitive life processes in structures such as these. **Table 4** shows the sensitive timing windows for snake species when carrying out life processes related to hibernation and staging.

Table 4: Sensitive Timing Windows for Snake Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes ¹	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Hibernation																																				
Staging																																				

¹Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

Table 5 below outlines the recommended mitigation measures to avoid impacts to snake species during and outside of RAP. Photographs of habitat observed within and adjacent to drains that have the potential to support SAR snakes, have been included in **Appendix G** (Photographs #1 - 4).

Table 5: Mitigation Measures for Snake Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Snakes in Study Area
Eastern Foxsnake (Carolinian population) and Butler's Gartersnake	<ul style="list-style-type: none">• Preconstruction planning that includes review for potential habitat.• During site visit, verify if attributes of regulated habitat occur and delineate where possible.• Establish constraints for activities, where possible, that abide by timing windows and setback distances and avoid regulated habitat features• Narrow construction footprint if possible.• Flag or fence off environmentally sensitive areas prior to drainage work activity. Bury fencing a minimum of 10 – 20 cm and vertical height of at least 60 cm. Note, stakes should be installed on the activity side to prevent snake use of stakes to climb fence.• Complete wildlife sweep within the exclusion area following fence installation to ensure no trapped wildlife.• Staff/workers conducting drainage works should be trained in snake species identification and procedures if encountered (review and sign off form in Contractor Information Package)• One staff member/worker or qualified biologist should be trained in proper snake handling procedures and protocols outlined in Section 2 of the Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (Included in the Contractor Information Package). This person should be onsite at all times (when required) for the potential capture, temporary holding, transfer and release of any snakes encountered during construction. A minimum of two holding tubs and cotton sacks should be onsite at all times.• Prior to commencement of daily drainage work activity, the area should be cleared of snakes through machinery inspections (e.g. wheels, engine compartment) each morning and after machinery is left idle for more than one (1) hour if left on site during the snake active season.• If a nest is uncovered during drainage work activity:<ul style="list-style-type: none">◦ Collect any displaced or damaged eggs and transfer them to a holding tub◦ Capture and transfer all injured dispersing juveniles of that species into a light-coloured drawstring cotton sack◦ Place all cotton sacks with the captured injured individuals into a holding tub out of direct sunlight◦ Immediately contact the MNRF to seek direction and to arrange for transfer of the injured individuals◦ 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◦ Do not drive over the nest site or conduct any activities within 5 m of the nest site◦ Do not place any dredged materials removed from drainage works on top of the nest site◦ 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◦ Where there are no collected eggs or captured individuals, contact the MNRF within 24 hours to provide information on the location of the nest• Any injured captured snakes should be stored outside of direct sunlight and the MNRF should immediately be contacted to seek direction and to arrange for transfer. MNRF may require transfer to the nearest MNRF authorized Wildlife Rehabilitator. Contact Information for Authorized Wildlife Rehabilitator can be found in SAR Information Sheets (Appendix F).• If conducting drainage works during a species sensitive timing window and one or more individuals belonging to a snake species is encountered or active hibernacula is discovered:<ul style="list-style-type: none">◦ Trained staff/worker or qualified biologist shall capture and transfer all injured and uninjured individual snakes of that species into individual light-coloured, drawstring cotton sacks◦ Place cotton sacks into a holding tub◦ Ensure that the holding tub with captured individuals is stored at a cool temperature to protect snakes from freezing until the individuals can be retrieved or transferred◦ If an active hibernacula is uncovered cease all work and immediately, contact MNRF to seek advice and arrange for transfer and/or removal• If conducting drainage works outside of a species sensitive timing window and one or more individuals belonging to a snake species is encountered:<ul style="list-style-type: none">◦ Briefly stop the activity for a reasonable period of time to allow any uninjured individual snakes of that species to leave the work area◦ If the individuals do not leave the work area after the activity is briefly stopped, trained staff/worker or qualified biologist shall capture all uninjured individuals and release them in accordance with the methods outlined below◦ 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 into a holding tub which shall be stored out of direct sunlight for a maximum of 24 hours before releasing them in accordance with the methods outlined below◦ Capture and transfer any individuals injured as a result of conducting drainage works into a holding tub separate from any holding tub containing uninjured individuals◦ Store all captured injured individuals out of direct sunlight and immediately contact the MNRF to seek direction and to arrange their transfer• Uninjured individuals captured during drainage works, are to be released within 24 hours of capture, in an area immediately adjacent to the drainage works with natural vegetation cover within 50 m and out of harm’s way (as per subsections 2.3 and 2.4 of Handling Manual included in the Contractor Information Package; Appendix F).



Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Snakes in Study Area
	<ul style="list-style-type: none">• Uninjured individuals captured during drainage works, are to be released within 24 hours of capture, in an area immediately adjacent to the drainage works with natural vegetation cover within 50 m and out of harm’s way (as per subsections 2.3 and 2.4 of Handling Manual included in the Contractor Information Package; Appendix F).• Where one or more individuals belonging to a snake species is killed as a result of drainage work activity, or a person finds a deceased individual of a snake species, the following measures should be followed:<ul style="list-style-type: none">◦ Collect and transfer any dead individuals into a holding tub outside of direct sunlight; and,◦ Contact the MNRF within 72 hours to seek direction and to arrange for the transfer of the carcasses of the dead individuals.• If the methods of handling snakes outlined in subsection 2.3 and 2.4 of the Handling Manuals are not applicable due to a snake’s injuries, use a shovel or flat object to pick up the snake, ensuring that injured areas are supported and place in a large plastic bin or bucket with a lid with air holes. Immediately transport the turtle to an MNRF authorized veterinarian or wildlife rehabilitator and contact the MNRF. Contact Information for Authorized Wildlife Rehabilitator can be found in Appendix F and on SAR Information Sheets (Appendix F).• Complete a SAR Encounter Reporting Form included in Contractor Information Package (Appendix F).

7.2.2 Species Specific Mitigation Measures for Turtle Species

Turtles can generally be found associated with large slow moving water features that have logs or stumps for basking. For nesting, turtles prefer moist well drained, loose soils for digging and on a gradual typically south facing slope. Species such as Blanding's Turtle and Spiny Softshell hibernate underwater in permanent waterbodies. Sensitive timing windows for turtle species includes the nesting period and has been provided in **Table 6**.

When conducting drainage works where there is potential for turtle species to be hibernating, water level **cannot be reduced** as per Paragraph 6 of subsection 13 of Section 23.9 of O.Reg. 242/08.

Table 6: Restricted Activity Period for Turtle Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes ¹	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Hibernation																																				

¹Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

In **Table 7** below, the recommended mitigation measures to avoid impacts to turtle species during and outside sensitive timing windows and what to do when turtles or turtle nests are encountered is provided. Photographs of habitat observed within and adjacent to drains that have the potential to support SAR Turtles, have been included in **Appendix G** (Photographs #5 - 6).

Table 7: Mitigation Measures for Turtle Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Turtles within the Study Area
Blanding's Turtle	<ul style="list-style-type: none">• Preconstruction planning that includes review for potential habitat.• During site visit, verify if attributes of regulated habitat occur and delineate where possible.• Establish constraints for activities, where possible, that abide by timing windows, setback distances and avoid regulated habitat features.• Narrow construction footprint if possible.• Flag or fence off environmentally sensitive areas prior to drainage work activity. Bury fencing a minimum of 10 – 20cm and vertical height of at least 60 cm.• Complete wildlife sweep within the exclusion/construction area following fence installation to ensure no trapped wildlife.• Staff/workers conducting drainage works should be trained in turtle species identification and procedures if encountered (Review and sign off form in the Contractor Information Package; Appendix F).• One staff member/worker or qualified biologist should be trained in proper turtle handling procedures and protocols outlined in Section 1 of the Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (provided in the Contractor Information Package; Appendix F). This person should be onsite at all times (when required) for the potential capture, temporary holding, transfer and release of any turtles encountered during construction. A minimum of two holding tubs and cotton sacks should be onsite at all times.• If construction is planned to commence during the turtle nesting period, prior to site preparation a turtle nesting search should be completed to identify turtle nests. If nests are encountered, the MNRF must be consulted immediately. Nests should be relocated to an appropriate facility for incubation with MNRF approval. Contact information for MNRF Authorized Wildlife Rehabilitator can be found in SAR Information Sheets (Appendix F).• Drainage work activity related to excavation of sediment or disturbance to banks should be avoided during the sensitive timing windows for turtles.• During turtle hibernation periods, water in drains or ditches cannot be reduced.• Prior to commencement of daily activity, the area should be cleared of turtles and turtle nests by a specially trained staff member or qualified biologist.
Spiny Softshell	<ul style="list-style-type: none">• Do not disturb a turtle encountered laying eggs and do not conduct activities within 20 m of the turtle while it is laying eggs.• If conducting drainage works during a species sensitive timing window and one or more individuals belonging to a turtle species is encountered:<ul style="list-style-type: none">◦ Trained staff/worker or qualified biologist shall capture and transfer all injured and uninjured individuals of that species to a holding tub◦ Capture and transfer all individuals injured as a result of the drainage work activity into a holding tub separate from any holding tub containing uninjured individuals◦ Ensure that the holding tub with captured individuals is stored at a cool temperature until the individuals can be retrieved or transferred◦ Contact the MNRF immediately to seek advice and arrange for transfer and/or removal• If a nest is uncovered during construction, immediately stop all activity near the nest. Cover the nest with soil or organic material. Do not drive within 5 m of the nest and contact the MNRF within 24 hours if no eggs or individuals were captured/collected.• Isolate material stockpile areas with fencing.• Any injured captured turtles should be stored outside of direct sunlight and the MNRF should immediately be contacted to seek direction and to arrange for transfer.• Machinery should be inspected each morning (e.g. under vehicles) for presence of turtles.• Uninjured individuals captured during drainage works, are to be released within 1 hour of capture, out of harm’s way no more than 125 m of where it was found, unless absolutely necessary. If it is not possible to relocate the turtle within 125 m of the capture location, contact the MNRF for further direction. MNRF may require transport of turtle(s) to MNRF Authorized Wildlife Rehabilitator or Veterinarian. Contact information can be found in Appendix F.• If the methods of handling turtles outlined in subsection 1.3 of the Handling Protocol are not possible due to a turtle’s injuries, use a shovel or flat object to pick up the turtle, ensuring that injured areas are supported and place in a large plastic bin or bucket with a lid with air holes. Immediately transport the turtle to an MNRF Authorized Wildlife Rehabilitator or Veterinarian and contact the MNRF. Contact Information for Authorized Wildlife Rehabilitator can be found in Appendix F and on SAR Information Sheets (Appendix F). See subsection 1.7 of the Handling Manual (included in the Contractor Information Package; Appendix F) for more details.• Complete a SAR Encounter Reporting Form included in the Contractor Information Package (Appendix F).



7.2.3 Species Specific Mitigation Measures for Aquatic Species

Review of background information including, DFO's Aquatic SAR Mapping (Map 29 of 33), NHIC and MNRF Agreement² identified 10 fish and 10 mollusc species listed as endangered or threatened under the ESA, 2007 with occurrence records within and/or adjacent to the Study Area. Of the 20 aquatic SAR identified only two fish species have been included in the Plan based on the presence of suitable habitat within the Study Area drains.

Although suitable habitat for SAR mussel species was not identified during our background review and site visits, if at any time a mussel species (of any type) are encountered, stop work and contact DFO for direction on how to proceed. A SAR Information Sheet for mussels species found during the background review has been provided in **Appendix F**.

Watercourses and drains identified during the background review and subsequent field investigations found all features to be of warm water thermal regime and to support warm water fish species. **Table 8** below indicates the in-water timing window restriction for warm water fish species. **Table 9** provides a list of recommended measures to follow to avoid impacts to fish species. As previously mentioned, activities that affect a species listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08 still require a permit to conduct drainage works (see **Appendix D** for details). DFO's *Guidance for Maintaining and Repairing Municipal Drains in Ontario version 1.0* (2017) document should be consulted when conducting all drainage works.

Table 8: In-water Timing Window Restriction for Warm Water Fish Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes ¹	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
In-water Restriction																																				

¹Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

² Agreement under Section 23 of O.Reg. 242/08 made under the ESA, 2007 (File # AY-23D-010-10).

Table 9: Mitigation Measures for Aquatic Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Aquatic Species within the Study Area
Pugnose Shiner	<ul style="list-style-type: none"> • Consult with MNRF if in-water timing window restrictions cannot be adhered to. • Allow for fish salvage within the isolated work area prior to dewatering. • Limit duration of in-water work as much as possible. • Conduct in-stream work during periods of low flow to reduce the risk to fish and their habitat and 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. Suspend in-stream work immediately if sedimentation is detected. • Implement water quality monitoring if required. • Ensure equipment is clean and free of leaks. 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. • Alter activities to reduce disturbance to species and habitat and follow current DFO Measures to Avoid Harm
Spotted Gar	<ul style="list-style-type: none"> • If federally listed SAR fish are encountered or have the potential to be present, contact the DFO to review next steps. • If SAR encountered, complete a SAR Encounter Reporting Form that will be included in the annual reporting.



7.2.4 Species Specific Mitigation Measures for Bird Species

Environment and Climate Change Canada (ECCC) identifies general nesting periods for migratory birds in Canada. Essex County is located within nesting zone C1, **Table 10** provides the RAPs for two habitat types: open field habitat and forest habitat. The RAPs provided are based on 61-100% of the migratory bird species predicted to be nesting during the identified time period (as indicated on the ECCC C1 nesting zone table).

Table 10: Restricted Activity Period for Bird Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes ¹	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Open																																				
Forest																																				

¹Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNR Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

Based on our review of potential SAR birds to occur within the Study Area, the following mitigation measures are recommended while conducting drainage work activities:

Table 11: Mitigation Measures for Bird Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Birds within the Study Area
Bobolink	<ul style="list-style-type: none"> • Planning activities should include review of area for potential habitat (including box culverts and bridges for Barn Swallow nests). • Limit construction footprint where possible. • Conduct work outside of the RAP for birds where possible.
Eastern Meadowlark	<ul style="list-style-type: none"> • Pre-construction activities should include bird nest sweeps if activities occur during migratory bird sensitive timing window identified in Table 10, above. • Protect active nests by flagging or fencing off an appropriate setback distance. • Suspend activity if active habitat is discovered that cannot be adequately setback from.
Barn Swallow	<ul style="list-style-type: none"> • Maintain habitat connections where possible during activities. • Implement measures to restore lost habitat/ habitat connections. • If sensitive habitat is on site, a qualified biologist should be on site daily. • If SAR encountered, complete a SAR Encounter Reporting Form that will be included in the annual submission to the MNRF.



7.2.5 Species Specific Mitigation Measures for Vegetation Communities

Potential impacts to plant SAR may include trampling by personnel or equipment, alteration of growing conditions (e.g. soil compaction, sunlight availability, and moisture regime), disturbance to localized seed bank and introduction of invasive species. Mitigation measures that will be incorporated during drainage work activities to minimize the impacts to adjacent forest communities and SAR vegetation include:

- Planning activities should include review of area for identification of potential SAR vegetation.
- Limit construction footprint where possible to minimize the disturbance to plant species.
- Installing temporary erosion and sediment control measures prior to activity, and maintaining them throughout activity, including routinely inspecting and repairing them, as required. Enhanced sediment and erosion control measures will be implemented for sensitive areas where SAR habitat has been identified within and abutting the work site.
- Vegetation that does not require removal for the purposes of construction will be protected through the installation and maintenance of temporary vegetation protection fencing (e.g. snow fencing or erosion sediment control fencing). This includes protection of any SAR trees identified.
- Equipment, materials and other construction activities will not be permitted in zones delineated for protection.
- If drainage work activity cannot be undertaken without disturbing a SAR plant(s), the Town should contact the MNRF for additional site-specific measures.
- Operational procedures and Best Management Practices for handling material and excess material, and spill prevention will be implemented. Vehicular and equipment maintenance and refuelling will be carried out in a controlled manner, and where applicable, at designated maintenance areas. Refuelling will not be permitted within 30 m of any forest, or watercourse.
- Stabilize and re-vegetate exposed soil surfaces as soon as possible following activities, using native groundcover seed mixes and plantings.



APPENDIX "REI-C"

STANDARD SPECIFICATIONS **FOR ACCESS BRIDGE CONSTRUCTION**

1. PRECAST CONCRETE BLOCK & CONCRETE FILLED JUTE BAG HEADWALLS

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

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

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

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

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

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

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

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

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

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

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

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

2. QUARRIED LIMESTONE ENDWALLS

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

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

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

3. BRIDGE BACKFILL

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

4. GENERAL

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

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

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

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

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

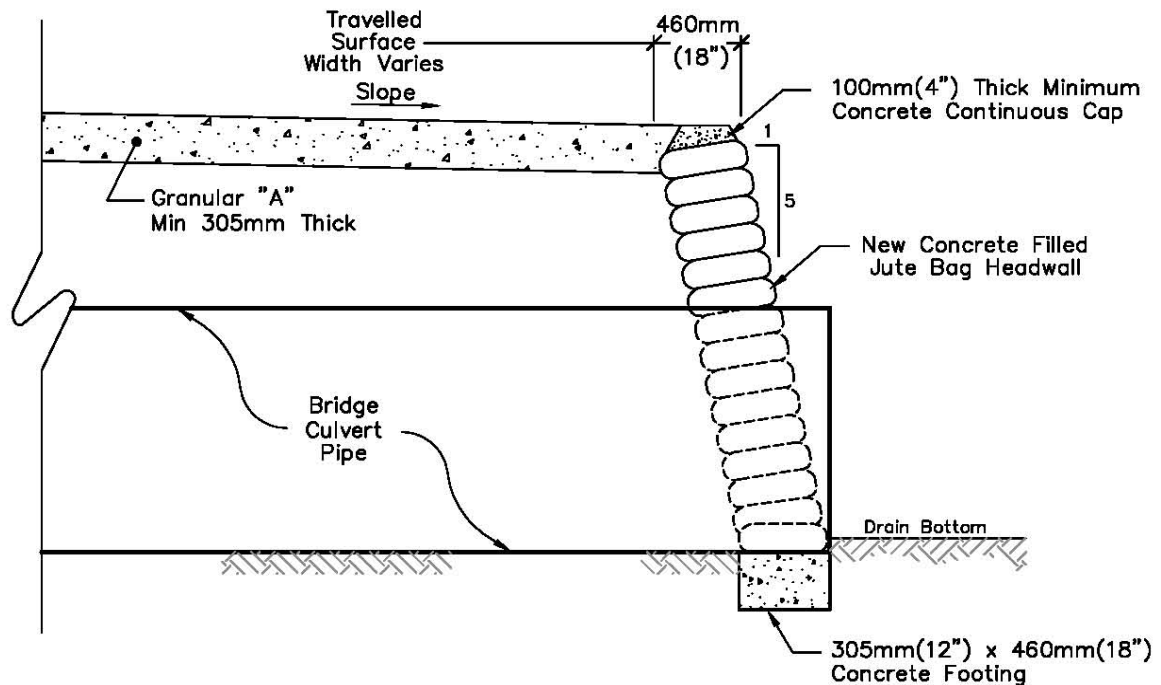
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

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

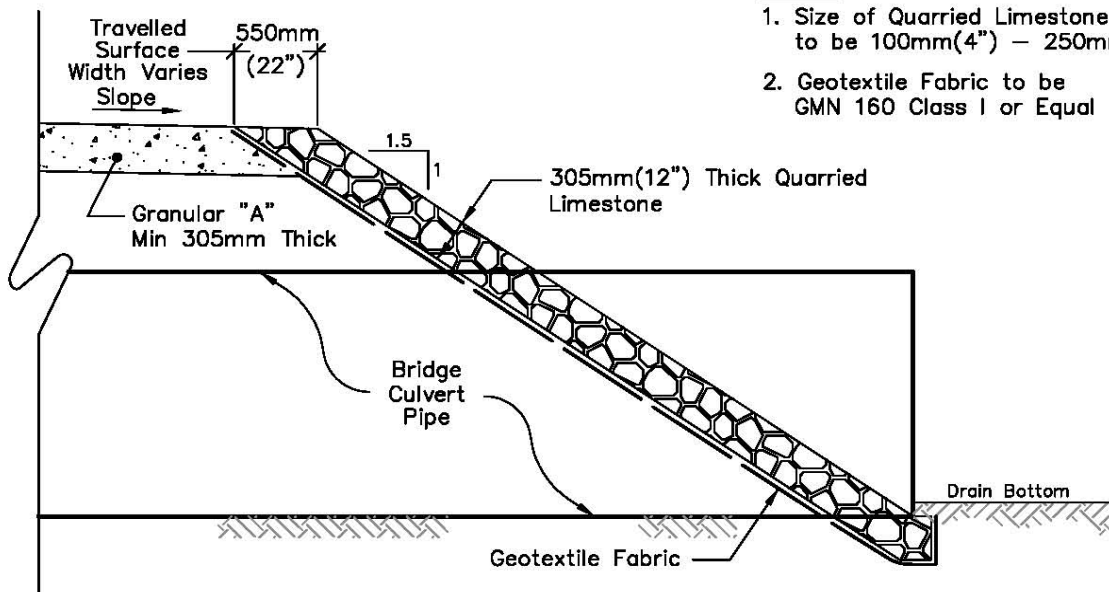
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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

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



Typical Jute Bag Headwall



NOTE:

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

Typical Quarried Limestone End Protection

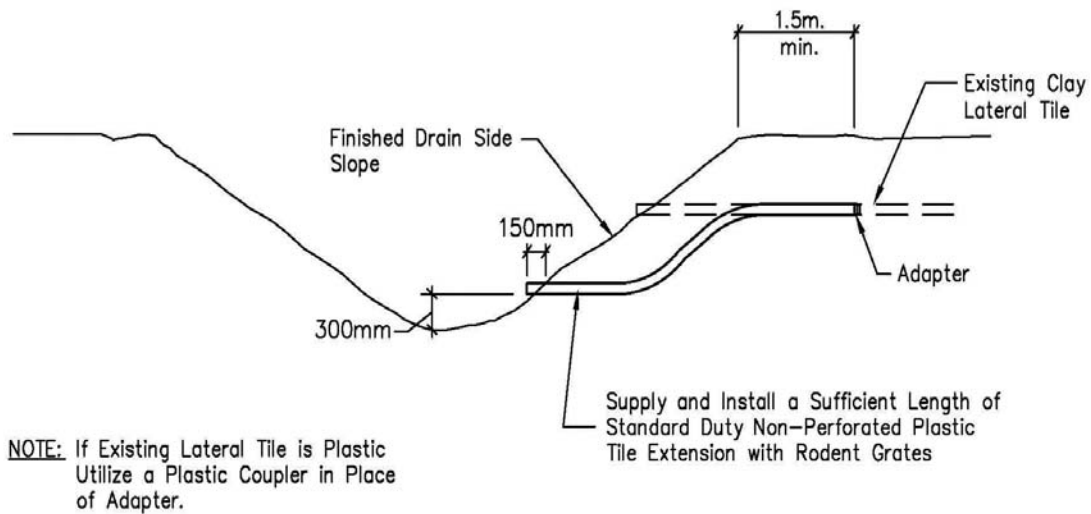
Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

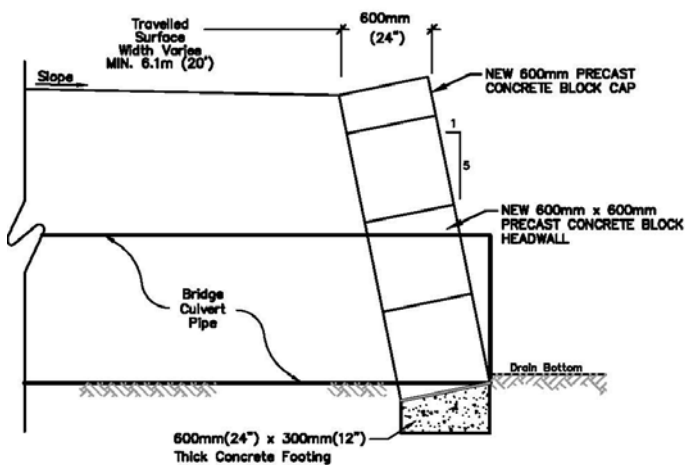
Leamington, Ontario N8H 1G6

519-322-1621



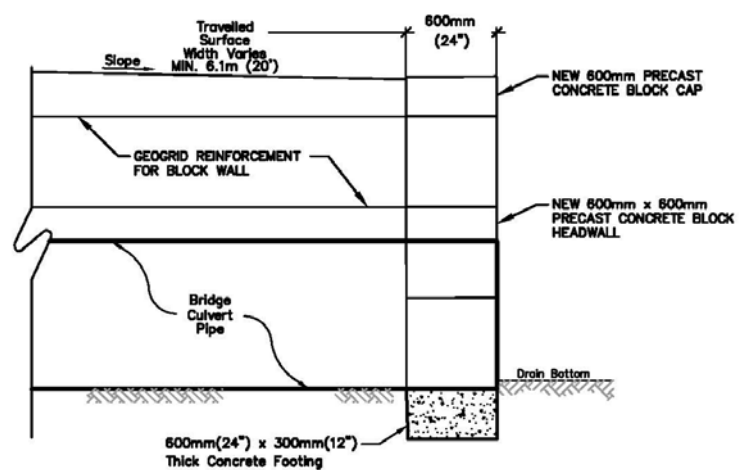
STANDARD LATERAL TILE DETAIL

N.T.S.



TYPICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.

APPENDIX "REI-D"

THE CORPORATION OF THE TOWN OF TECUMSEH

BY-LAW NO. 2007-51

Being a by-law to amend By-law No. 2007-41 to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh.

WHEREAS Council considers excessive smoke, smell, airborne sparks or embers to be or could become or cause public nuisances by creating negative health effects on neighbouring residents, increasing fire exposure hazards, infringing the enjoyment of the use of neighbouring properties and generating false or nuisance alarms;

AND WHEREAS Council is empowered under Section 128 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, to pass by-laws to prohibit and regulate public nuisances, including matters that, in the opinion of Council are, or could become or cause public nuisances;

AND WHEREAS in accordance with Section 425 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, a municipality may pass by-laws providing that a person who contravenes a by-law of the municipality passed under this Act is guilty of an offence;

AND WHEREAS Section 444 of the *Municipal Act* 2001, c. 25 states if a municipality is satisfied that a contravention of a by-law of the municipality passed under this Act has occurred, the municipality may make an order requiring the person who contravened the by-law or who caused or permitted the contravention or the owner or occupier of the land on which the contravention occurred to discontinue the contravening activity;

AND WHEREAS the Council of The Corporation of the Town of Tecumseh enacted By-law No. 2007-41 on the 26th day of June, 2007 to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh;

AND WHEREAS the Council of The Corporation of the Town of Tecumseh is desirous of amending By-law No. 2007-41;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF TECUMSEH ENACTS AS FOLLOWS:

1. **That** paragraph 4.9 be deleted and replaced with the following paragraph:
 - 4.9 Permitted fires, except those described in Section 4.4, shall,
 - a) be kept to manageable size that shall not be greater than one (1) square metre with flames no higher than one (1) metre in height; and,
 - b) in residentially zoned areas, be completely extinguished by 2:00 a.m.
2. **That** paragraph 5.2 be deleted and replaced with the following paragraph:
 - 5.2 An application for a Permit must be completed on the form/forms provided by the Tecumseh Fire/Rescue Services.

3. **That** paragraph 5.3 be deleted and replaced with the following paragraph:

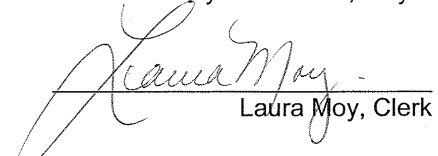
5.3 An application must be filed with the Chief Fire Official of the Tecumseh Fire/Rescue Services. Approved permits must be retained and presented to an attending fire official in the event that there is a need for a fire official to attend at the burn location due to complaint.

4. **That** this by-law shall take full force and effect on the third and final reading.

READ a first, second, third time and finally passed this 11th day of September, 2007.



Gary McNamara, Mayor



Laura Moy, Clerk

THE CORPORATION OF THE TOWN OF TECUMSEH

BY-LAW NUMBER 2007-41

A by-law to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh.

WHEREAS Council considers excessive smoke, smell, airborne sparks or embers to be or could become or cause public nuisances by creating negative health effects on neighbouring residents, increasing fire exposure hazards, infringing on the enjoyment of the use of neighbouring properties and generating false or nuisance alarms;

AND WHEREAS Council is empowered under Section 128 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, to pass bylaws to prohibit and regulate public nuisances, including matters that, in the opinion of Council are, or could become or cause public nuisances;

AND WHEREAS in accordance with Section 425 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, a municipality may pass by-laws providing that a person who contravenes a by-law of the municipality passed under this Act is guilty of an offence;

AND WHEREAS Section 444 of the *Municipal Act* 2001 c. 25 states if a municipality is satisfied that a contravention of a by-law of the municipality passed under this Act has occurred, the municipality may make an order requiring the person who contravened the by-law or who caused or permitted the contravention or the owner or occupier of the land on which the contravention occurred to discontinue the contravening activity;

AND WHEREAS Section 446(1) of the *Municipal Act* 2001 c.25 states that if a municipality has the authority under this or any other Act or under a by-law under this or any other Act to direct or require a person to do a matter or thing, the municipality may:

- provide that, in default of it being done by the person directed or required to do it, the matter or thing shall be done at the person's expense;
- enter upon land at any reasonable time;
- recover the costs of doing a matter or thing from the person directed or required to do it by action or by adding the costs to the tax roll and collecting them in the same manner as property taxes; and
- that costs include interest calculated at a rate of 15 per cent or such lesser rate as may be determined by the municipality, calculated for the period commencing on the day the municipality incurs the costs;
- the costs, including interest, constitutes a lien on the land upon the registration in the proper land registry office of a notice of lien;

AND WHEREAS Section 390 of the *Municipal Act* 2001 c.25 provides that a "person" includes a municipality and a local board and the Crown;

AND WHEREAS Section 426 of the *Municipal Act* 2001 c. 25 provides that no person shall hinder or obstruct, or attempt to hinder or obstruct any person exercising a power or performing a duty under this Act or a by-law under this Act and that any person who contravenes subsection (1) is guilty of an offence;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF TECUMSEH ENACTS AS FOLLOWS:

1. DEFINITIONS

In this By-law:

- 1.1 "Burning Appliance" means any device designed or engineered to have a fire set within a contained area and totally enclosed by various means of screening and/or other methods.
- 1.2 "By-law Enforcement Officer" means the municipal person appointed by the Town of Tecumseh who shall be responsible for the enforcement of the provisions of this by-law.
- 1.3 "Chief Fire Official" means the Fire Chief of the Tecumseh Fire/ Rescue Services or designate.
- 1.4 "Competent Adult" means any person (18 years of age or older) who, in the opinion of those charged with enforcement of this By-Law, is capable of exercising the required judgement and capable of performing the necessary actions to control and prevent its unwanted spread.
- 1.5 "Farmer" means the owner or operator of an agricultural operation within an area zoned for agricultural pursuant to the *Farming & Food Protection Act*, 1998.
- 1.6 "Farmlands" means land designated "agricultural".
- 1.7 "Firefighter" means any person or any rank of person employed in, or appointed to the Tecumseh Fire/Rescue Services and assigned to undertake fire protection or fire prevention services.
- 1.8 "Full Cost Recovery Basis" has the meaning as described in Schedule "A" attached hereto.
- 1.9 "Open Air" means any open place, yard, field, lot, part lot or construction area which is not enclosed by a building or structure.
- 1.10 "Open Air Burning" means any fire set in the Open Air.
- 1.11 "Owner" means the registered owner or any person, firm or corporation having control over, or possession, of any portion of the building or property under consideration and includes the persons in the building or on the property.
- 1.12 "Permit" means a permit issued by the Chief Fire Official to set a fire in the Open Air for a specified date and period of time.
- 1.13 "Person" means an individual, business, a partnership or a corporation.
- 1.14 "Pit" means an area dug into the ground and/or surrounded by materials designed to contain the fire and prevent its spread to areas beyond the Pit.
- 1.15 "Police Officer" means any member of the Ontario Provincial Police.
- 1.16 "Tenant" means the occupant having possession or Person having control of a property or premises.
- 1.17 "Town" means The Corporation of the Town of Tecumseh.

2. ADMINISTRATION AND ENFORCEMENT

- 2.1 The Chief Fire Official shall be responsible for the administration of this by-law.
- 2.2 Enforcement of this by-law is the responsibility of the Chief Fire Official, any Fire-fighter, any Police Officer or any By-law Enforcement Officer.
- 2.3 The Chief Fire Official may refuse to issue a Permit or revoke any or all issued Permits.
- 2.4 The Fire Chief, Firefighters or Police Officers may, at all times enter and inspect any property or premises in order to ascertain whether the provisions of this by-law are complied with and to enforce or carry into effect the by-law.
- 2.5 Any person who fails to comply with the provisions of this by-law or fails to extinguish a fire once notification to do so has been given to him by the Chief Fire Official, a Police Officer or a Firefighter shall, in addition to any penalty provided herein, be liable to the municipality for all expenses incurred for the purposes of controlling and extinguishing of any fire so set or left to burn and such expenses may be recovered by court action or in a like manner as municipal taxes.

3. ENVIRONMENT

- 3.1 All Open Air Burning shall comply with the provisions of the *Environmental Protection Act*, R.S.O. 1990. c. E19.
- 3.2 No Open Air Burning shall be permitted when a smog alert has been issued for the region of Essex County, which includes the Town.
- 3.3 No Open Fire shall be started or maintained when wind condition is in such direction or intensity so as to cause any or all of the following:
 - (a) decrease in visibility on any highway or roadway;
 - (b) threaten a rapid spread of fire through a grass or brush area;
 - (c) smoke which causes annoyance or irritation to adjacent persons, properties or premises.

4. GENERAL PROVISIONS

- 4.1 No Person being the Owner or Tenant in possession of lands within the Town shall allow a fire to be set or burn on such lands unless a Permit has been obtained.
- 4.2 No Person shall allow a fire to be set or burned exceeding the requirements of Sections 4.8 and 4.9.
- 4.3 Notwithstanding any provisions herein, no Person shall set or maintain a fire,
 - (a) in contravention of the *Ontario Fire Code*, the *Environmental Protection Act* or any other statutory requirements of the Province of Ontario or the Government of Canada;
 - (b) where the consumption of material or size and area of the fire will exceed the limits set by the Chief Fire Official and/or listed within this by-law in Sections 4.8 and 4.9.

- 4.4 (a) No Permit shall be required for domestic barbeques or permanent outdoor fireplaces used solely for the cooking of food on a grill and extinguished immediately upon completion of the cooking process or any Burning Appliance, or a Pit or open area where the requirements of Sections 4.8 and 4.9 are not exceeded;
- (b) installation and location of Burning Appliances must meet the manufacturer's specifications.
- 4.5 (a) A farmer who intends to set or maintain a fire in the Open Air on a specified day for disposal of vegetable matter or vegetation on Farmlands which is normal and incidental for farming purposes shall obtain a Permit to cover the period of the proposed Open Air fire, and will be required to notify the Tecumseh Fire/Rescue Services for each day that the proposed Open Air fire will take place;
- (b) an Open Air fire shall be supervised by a Competent Adult equipped with sufficient equipment to control and contain the Open Air fire to prevent the spread of the Open Air fire that would endanger or put at risk other properties or premises;
- (c) an Open Air fire shall be restricted to daylight hours only;
- (d) an Open Air fire shall be surrounded by a tilled area wide enough to prevent an Open Air fire from jumping across the tilled area and to maintain the area of the burn to be no greater than one (1) hectare in size;
- (e) the leading edge of the flame of an Open Air fire shall not exceed thirty (30) metres in length.
- 4.6 No Person shall set any fire in the Open Air to burn asphalt products, tires, treated wood, construction materials or rubble, kitchen garbage or any garbage or trash, rubber plastics and like items.
- 4.7 No Person shall set any fire in the Open Air except where permitted and only in the presence of a Competent Adult. The Competent Adult shall not leave the burning operation until such time as the fire has been completely extinguished and there is no threat of re-ignition or spreading of the fire.
- 4.8 Every Person that starts a fire in the Open Air shall ensure that there are adequate tools and/or water on hand to contain or extinguish the fire.
- 4.9 Permitted fires, except those described in Section 4.4, shall be kept to manageable size that shall not be greater than one (1) square metre with flames no higher than one (1) metre in height.
- 4.10 Every Person who sets an Open Air fire in the Town of Tecumseh shall be:
- (a) responsible and liable for any damage to property or injury to person occasioned by said fire;
- (b) liable for all costs incurred by the Town of Tecumseh, including but not limited to, the Fire/Rescue Services, including personnel and other agencies called to control and extinguish said fire on a Full Cost Recovery Basis. All fees and charges to be paid under this subsection shall be payable in the manner and subject any interest and penalties set forth in paragraph 5 and 6 of the Administrative Fees and Charges By-law 2007-12, as may be amended or repealed from time to time;

- (c) the fees and charges under this section shall not be payable by that class of persons which have obtained a permit for an Open Air fire and complied with the terms of such permit.

- 4.11 Notwithstanding the aforementioned sections listed herein, the Fire Chief may issue a Permit upon application and approve the setting of any fire subject to the fire being adequately supervised and controlled through special conditions addressed by the Chief Fire Official.
- 4.12 No fire shall be set to dispose of commercial, industrial or construction waste or other like materials in areas zoned for commercial or industrial occupancies and such aforementioned materials shall not be transported to residential or agricultural areas for burning purposes.
- 4.13 No fires shall be set at construction and/or demolition sites for the purpose of disposing of waste, building material or rubble.

5. FIRES REQUIRING PERMITS

- 5.1 Except as provided in section 4.3 of this by-law, no Person shall set, maintain or cause to be set or maintained, a fire in the Open Air unless a Permit has been issued by the Chief Fire Official.
- 5.2 An application for a Permit must be completed on the form/forms provided by the Tecumseh Fire/Rescue Services. Such forms are available to fill out by telephone call to Tecumseh Fire Station No. 1, Monday to Friday from 08:30 hr to 16:30 hr.
- 5.3 Each completed application for a Permit must be filed with the Chief Fire Official of the Tecumseh Fire/Rescue Services, at the administration offices located at 985 Lesperance Road, Tecumseh, Ontario.
- 5.4 In issuing a Permit under this part for Open Air Burning, the Chief Fire Official may impose any additional requirements or conditions as may be deemed necessary.

6. OFFENCES

- 6.1 (a) Any person who contravenes any of the provisions of this by-law is guilty of an Offence;
- (b) any person who hinders or obstructs a person lawfully carrying out the enforcement of this by-law is guilty of an Offence.

7. FINES

- 7.1 Every Person who is convicted of an Offence is liable to a Fine of not more than Five Thousand (\$5,000.00) Dollars as provided for in the *Provincial Offences Act*, R. S.O. 1990, Chap. P.33.

8. SEVERABILITY

- 8.1 If any section or sections of this by-law or parts thereof are found in any court to be illegal or beyond the power of Council to enact, such section or sections or parts thereof shall be deemed severable and all other sections or parts of this by-law shall be deemed separate and independent there from and enacted as such.

9. **SHORT TITLE**

9.1 The short title of this by-law shall be TECUMSEH OPEN AIR BURNING BY-LAW.

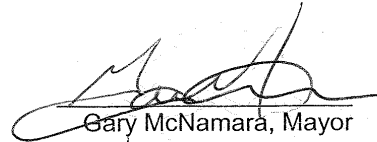
10. **EFFECTIVE DATE**

10.1 This by-law shall come into full force and take effect on the 1st day of July, 2007.

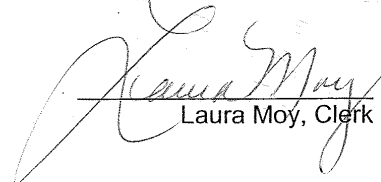
11. **REPEAL**

11.1 By-law No. 2005-57 is hereby repealed.

READ a first, second, third time and finally passed this 26th day of June, 2007.



Gary McNamara, Mayor



Laura Moy, Clerk

SCHEDULE "A"
By-law Number 2007-41

**THE CORPORATION OF THE TOWN OF TECUMSEH
TECUMSEH FIRE/RESCUE SERVICES EQUIPMENT SERVICES RATES**

"Full Cost Recovery Basis" includes any and all charges and costs howsoever incurred by the Town directly or indirectly in controlling and extinguishing the Open Air fire and shall include without limitations:

Emergency Services Rendered:

- (a) \$350.00 first hour or part thereof per piece of equipment;
- (b) \$175.00 each additional half-hour or part thereof per piece of equipment;
- (c) \$42.00 first hour or part thereof per firefighter who responds to the call;
- (d) \$27.50 for each additional hour or part thereof per firefighter until all equipment is cleaned, checked and returned to service;
- (e) the cost of all extinguishing agents required to extinguish the fire.

No Emergency Services Rendered:

- (a) \$350.00 flat rate per piece of equipment where services are not required nor provided;
- (b) \$42.00 flat rate per firefighter who responds to the call for service.

APPENDIX "REI-E"

WATERSHED PLAN, BRIDGE AND KEY PLAN, PROFILE, & SECTIONS

OF THE

WEST BRANCH OF EAST BRANCH DELISLE DRAIN

(New Bridge for Francis Lafferty & Rosemary Jobin, 460-03400)

(Geographic Township of Sandwich South)

IN THE

TOWN OF TECUMSEH

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rood
GERARD ROOD, P.ENG.

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



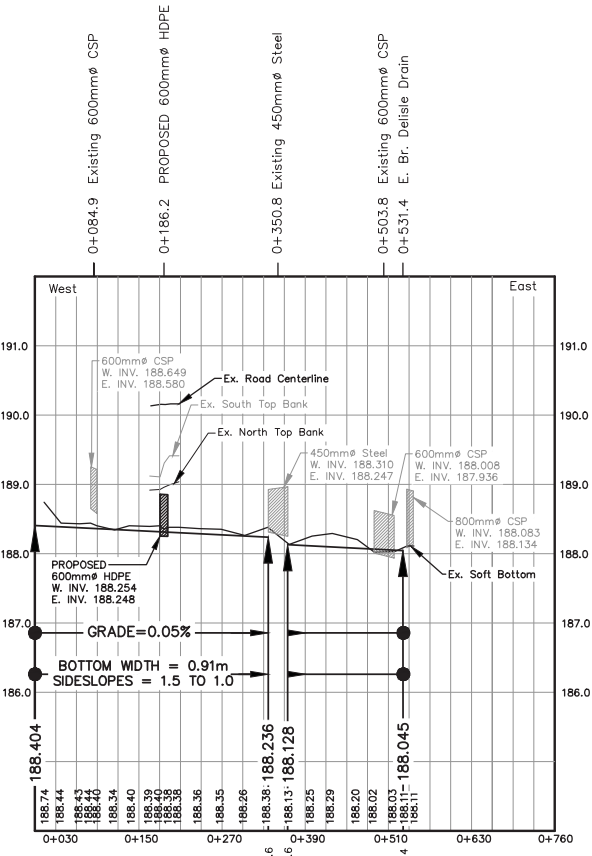
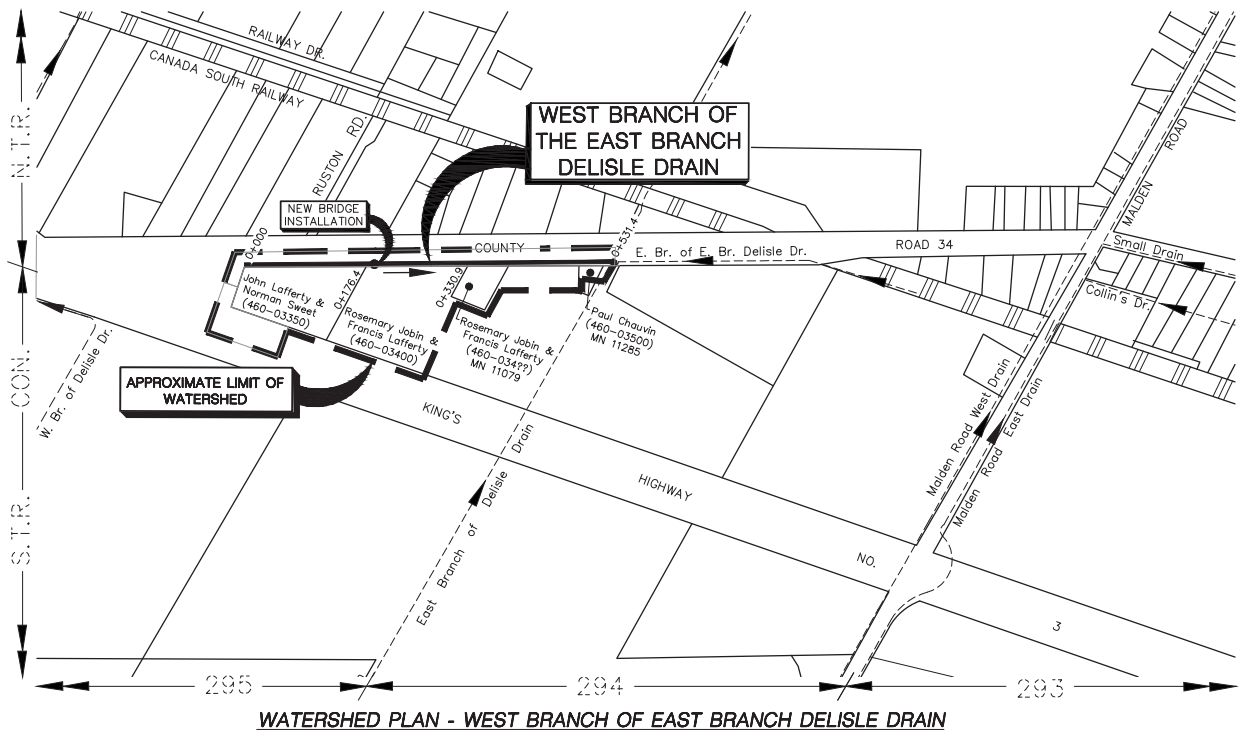
DATE: November 18th, 2019

TOWN OF TECUMSEH

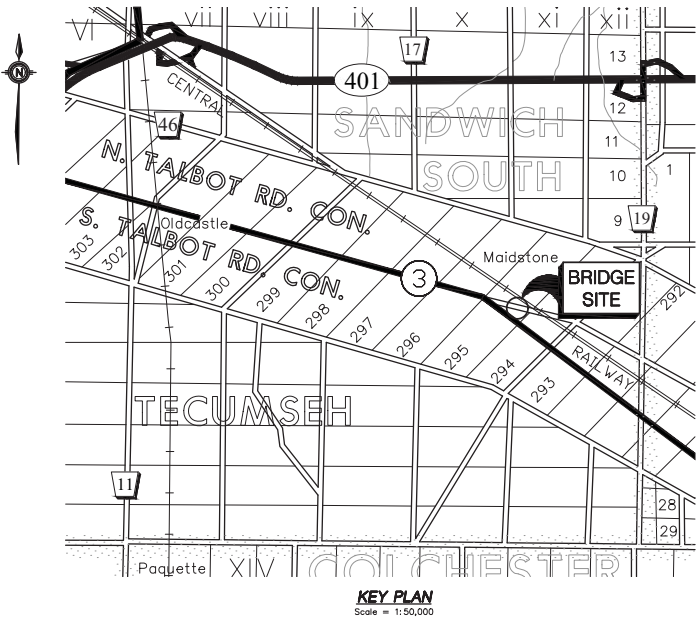
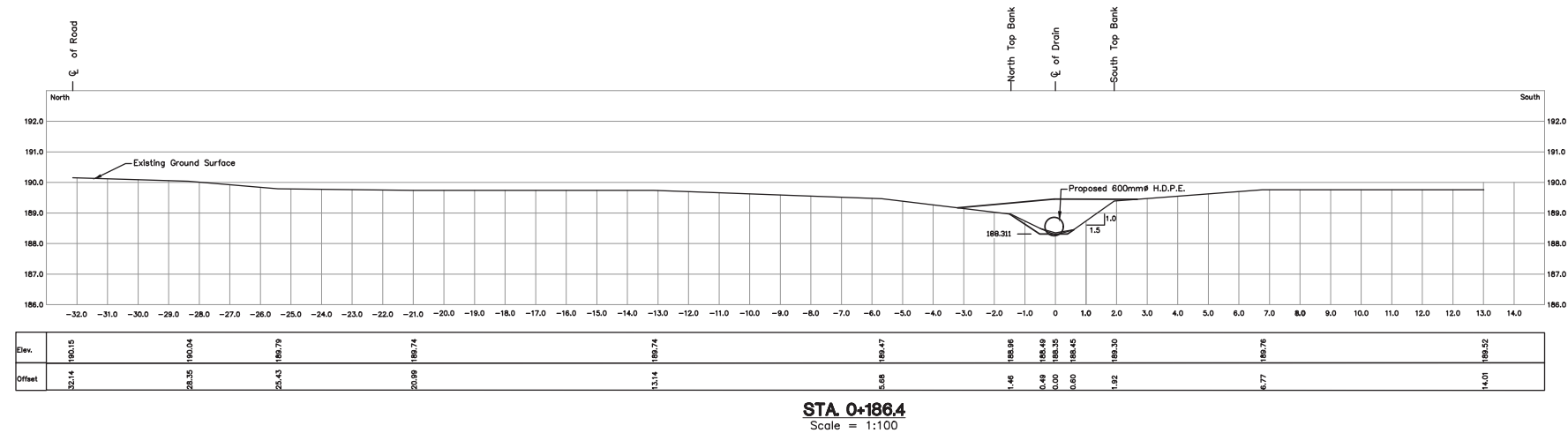
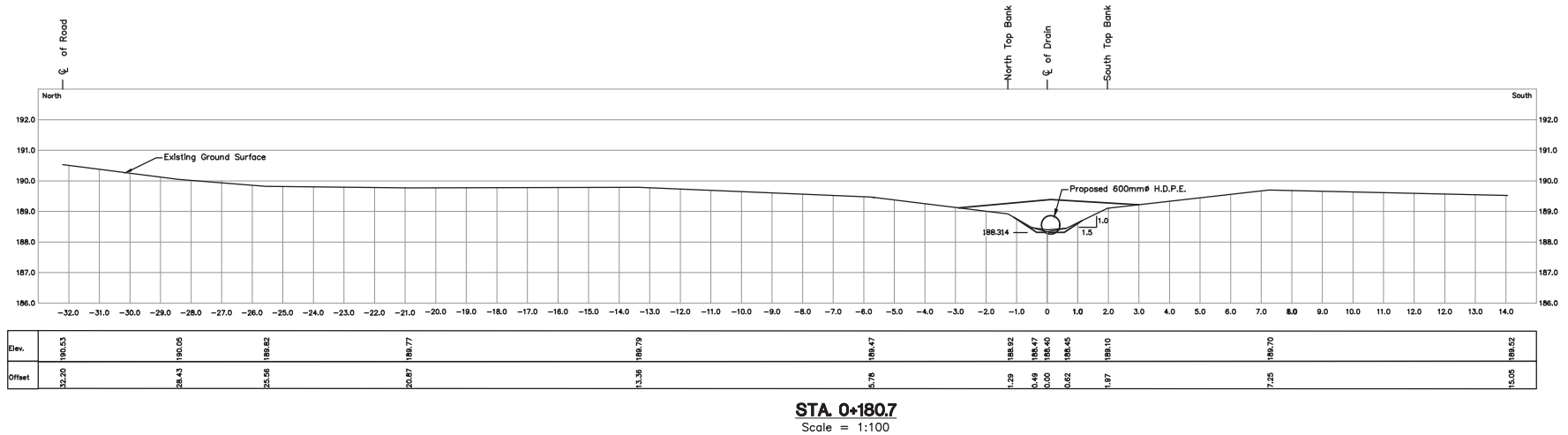
MAYOR: Gary McNamara
CLERK: Laura Moy
DRAINAGE SUPERINTENDENT: Sam Paglia, P.Eng.

BENCHMARKS:

TOP NUT OF FIRE HYDRANT (ID: SS248) LOCATED ON THE SOUTH SIDE OF COUNTY ROAD 34 APPROXIMATELY 15 METRES WEST OF PROPOSED BRIDGE ACROSS THE ROAD FROM MAIDSTONE RECREATION CENTRE
ELEV: 190.634m



PROFILE - WEST BRANCH OF EAST BRANCH DELISLE DRAIN
SCALE=1:5000 hor.
1:50 vert.



KEY PLAN
Scale = 1:50,000

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

DRAWN BY: K.D. & K.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2019D010.DWG
FILE No.: REI2019D010
SHEET No.: 1 OF 2

