

**HURLEY RELIEF BRANCH DRAIN &
UPPER PART OF HURLEY RELIEF DRAIN**

E09HU(44)

Part of Lots 11 & 12, Concession 8

Geographic Township of Sandwich South

TOWN OF TECUMSEH



***Town of Tecumseh
917 Lesperance Road
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*Project REI2016D013
November 20th, 2019*

November 20th, 2019

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

Mayor McNamara and Members of Council:

**HURLEY RELIEF BRANCH DRAIN & UPPER PART OF THE HURLEY RELIEF DRAIN
E09HU(44) - Geographic Twp. of Sandwich South
Project REI2016D013
Town of Tecumseh, County of Essex**

I. INTRODUCTION

In accordance with the instructions provided at your June 28th, 2016 meeting and received from the Town by email dated July 20th, 2016, from Sam Paglia, P.Eng. Town Drainage Superintendent, we have prepared the following report that provides for repair and improvements of the open and enclosed drain segments, along with bridge and enclosure repairs and improvements along the drain, together with ancillary work. The Hurley Relief Branch Drain and upper part of the Hurley Relief Drain comprises of open and enclosed drain portions. The Hurley Relief Drain extends from its outlet in the Little River Drain westerly across the 9th Concession Road where the drain then travels in a southerly direction from just north of Kings Highway 401 in the centre of Concession 8 to a point just north of County Road 46 (former King's Highway 98). The Hurley Relief Drain then travels westerly until intersecting with the Hurley Relief Branch Drain. The Hurley Relief Drain the travels generally in a southerly direction and crosses County Road 46 to the north limit of the former Canadian National Railway, now owned by Canada Southern Railway Co. The Hurley Relief Branch Drain travels from the Hurley Relief Drain in a generally southwest direction across County Road 46 and along the north side of the former Canadian National Railway until it reaches the east limit of the 8th Concession Road. The drain then extends southerly under the former Railroad to its junction with the Extension of the Hurley Relief Branch Drain, including a pipe westerly under the 8th Concession Road. The Hurley Relief Drain, Branch, and Extension is located in the geographic township of Sandwich South, Town of Tecumseh. A plan showing the Hurley Relief Branch Drain and the upper part of the Hurley Relief Drain, as well as the general location of the enclosures and bridges along the drain, is included herein as part of the report.

Our appointment and the works relative to the repair and improvements to the Hurley Relief Branch Drain and upper part of the Hurley Relief Drain, proposed under this report, is in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010". We have performed all of the necessary survey, investigations, etcetera, for the proposed repairs and improvements to the bridges, enclosures and drains, and we report thereon as follows.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

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:

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| 1) | July 8th, 1991 | Extension of the Hurley Relief Branch Drain - Report, Plan & Profile | Lou Zarlenga, P.Eng. |
| 2) | July 29th, 1966 | Hurley Relief Drain & Branch - Report, Plan & Profile | C.G.R. Armstrong, P.Eng. |
| 3) | May 5th, 1981 | Hurley Relief & Branch & Extension Drain - Plan & Profile | Maurice Armstrong, P.Eng. |
| 4) | January 25th, 1950 | Hurley Relief Drain & Branch - Report, Plan & Profile | C.G.R. Armstrong, P.Eng. |

The 1991 report prepared by Lou Zarlenga, P.Eng. provided for the Extension of the Hurley Relief Branch Drain. This report incorporated the existing 900mm corrugated steel pipe (C.S.P.) along the east side of the 8th Concession Road south of the former Railway, and extended it southerly and then westerly under the 8th Concession Road and continued to the west side of Ure Street with C.S.P. covered drain and precast concrete and C.S.P. manholes and catch basins for the Extension of the Hurley Relief Branch Drain. Furthermore, this report enclosed the existing roadside ditch, which all provided for a sufficient outlet for the lands east and west of Ure Street on the west side of the 8th Concession Road.

The 1966 report by C.G.R. Armstrong, P.Eng. and the 1981 report by Maurice Armstrong, P.Eng. provided for general repairs and improvements to the entire length of the Hurley Relief Branch Drain and Hurley Relief Drain with the 1981 plan and profile being the latest plan and profile for the drain. Similar to the said reports, the 1950 report by C.G.R. Armstrong, P.Eng. provided for general repairs and improvements to the entire length of the Hurley Relief Branch Drain and Hurley Relief Drain.

We have utilized the plan and profile within the 1981 Armstrong report to establish the size parameters for the drain and the details to be used in completing the enclosure installation. We have also used this Engineer's plan and profile to establish the drain profile grades, and to assist us in establishing the design grade for the repairs and improvements to the drains and subject enclosure pipe. The 1991 Zarlenga report, 1950 and 1966 Armstrong reports all assisted us in determining the watershed limits for the Hurley Relief Drain and Branch.

We arranged with the Town to provide us with the updated assessment roll information for the affected parcels. We also reviewed reports for the abutting drains and spoke to the owners to help in establishing the current watershed limit for the Hurley Relief Drain, Branch, & Extension.

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 8th, 2017.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

The following people were in attendance at said meeting: Frank Portelli, Trevor Dinn, Curtis Turner, David and Brian Thibert, David Johnson, Ravinder Singh, Dilbag Singh, Gino Peretti, Lorne Strong, Sam Paglia (Town Drainage Superintendent), and Gerard Rood (Rood Engineering).

Mr. Paglia completed introductions for the purpose of the meeting. The Town has received a request for an enclosure to the upper part of the Hurley Relief Drain. Further to this, there was an additional request submitted to the Town for examination for overall improvements to the Hurley Relief Drain and its Branch to provide a sufficient outlet to the Extension of the Hurley Relief Branch Drain. It was discussed that this meeting is to inform everyone about the proposed work which will all be completed under a drainage report in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010".

Details of the Hurley Relief Drain and Hurley Relief Branch Drain were discussed. The primary concern was that there is serious sediment accumulation in the drain with some bank erosion which has caused restrictions to a sufficient outlet for the Extension of the Hurley Relief Branch Drain. It was discussed that the Branch Drain immediately south of County Road 46 has been diverted around 2 buildings by going south to the former railroad and then continuing westerly to its original alignment adjacent to the north side of the former railroad and westerly over to the 8th Concession Road. Following the survey and investigations regarding the diversion of the Branch Drain, the report will set out to make this diversion a legal part of the drain. Mr. Rood confirmed there were no existing plans, agreements, or any other information to the changes completed which would have already made this diversion a legal part of the drain.

Mr. Rood addressed with the owner of Parcel 540-01050 that the Essex Region Conservation Authority (E.R.C.A.) may have concerns that need to be considered with respect to enclosing the upper part of the Hurley Relief Drain which travels through their property. He also mentioned that overland conveyance flows and storage requirements may need to be investigated.

It was discussed that the bridges and enclosures along the Branch Drain and upper part of the Hurley Relief Drain would be inspected and owners of them would be contacted if there were concerns with any of the structures. Once the work scope is confirmed, a draft report is prepared for a Public Information Centre (P.I.C.) meeting and then a final report is 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. It was discussed that all trees within the drain cross section from top of bank to top of bank will be removed to prevent obstruction of drainage. One side of the drain will be basically cleared for access to carry out the work and dispose of material; however, some mature trees may be able to be saved if the Contractor can work around them. Material excavated along lawn areas will be accessed from the road side and will be trucked away. It was explained that owners pay a portion of the cost if adjacent to the work area or upstream of the work. The Town wants to restore the drain to an adequate capacity and wants to maintain an accurate and fair assessment schedule for drain maintenance with an updated watershed plan.

Some owners within the watershed but off of the drain voiced concerns of flooding and ponding on their lands. Gerard Rood explained how once the Hurley Relief Branch Drain is repaired and improved the owners can contact the Road Authority to have some ditch work completed to improve the drainage for their lands and the roadway.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

The overall drainage report procedure pursuant to the Drainage Act, tendering process, and future maintenance processes were generally reviewed with the owners. Owners were invited to contact the Town or Engineer if they had any questions or wanted to participate in the works. Mr. Paglia discussed the general process of the drainage report once submitted. Assessment costs were generally reviewed with the owners explaining the Benefit, Outlet, and Special Benefit costs associated with the Schedule of Assessment.

The owners were also advised that the works will be subject to the approval of the Department of Fisheries and Oceans (D.F.O.), the Ministry of Natural Resources and Forestry (M.N.R.F.), and the Essex Region Conservation Authority (E.R.C.A.). We further discussed details of the work including reconnection of any existing pipes to the covered portions of the drain system.

IV. FIELD SURVEY AND INVESTIGATIONS

Following the on-site meeting we arranged for our survey crew to attend at the site and perform a topographic survey of the Hurley Relief Branch Drain and the upper part of the Hurley Relief Drain, including taking the necessary levels and details to establish the design parameters for the enclosure installation, and made bridge inspections. 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.

A bench mark was looped from previous work carried out on the 8th Concession Road Infrastructure Works by Dillion Consulting and was utilized in establishing a correlation between the old report and new survey for the enclosure and drainage works. We surveyed the entire length of the Hurley Relief Branch Drain for the repair and improvement works to provide a sufficient outlet to the Extension of the Hurley Relief Branch Drain. We also surveyed the upper part of the Hurley Relief Drain for the proposed enclosure and bridge structure and swale, and picked up the existing bench mark and pipe elevations in order to establish a design grade profile for the installation of the enclosure. All of the said survey works were completed as necessary for us to prepare our design calculations, estimates and specifications.

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 Hurley Relief & Branch & Extension Drain. A response from the Conservation Authority was received by email on May 13th, 2016 and indicated that the Town must apply for a permit and follow standard mitigation requirements. We also reviewed the Town maps for fish and mussel species at risk and find that this is a Class "F" drain. Additionally, the plans show there are no species indicated in the vicinity of this project. A copy of the 2011 Town of Tecumseh Natural Heritage Inventory was provided to us from E.R.C.A. which confirms there are no endangered or threatened Species at Risk (S.A.R.) within the area of proposed drainage works. 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 (E.S.A.), 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. 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 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. PIPES AND BRIDGES REVIEW

As part of our investigations, we made detailed inspections of all of the enclosure pipes and bridges along the open drain. Their condition and proposed work, if any, is summarized as follows:

Bridge Summary

1. This new enclosure will serve parcel 540-01050 at MN4795. The enclosure will eliminate the open drain that severs the parcel and will allow the entire parcel to be used effectively for the business located there. Work will include a conveyance swale along the east limit of the parcel for larger storm events.
2. This bridge enclosure serves County Road 46 owned by the County of Essex to go over the Hurley Relief Drain. The 900mm C.S.P. portion under the road appears to be in good condition as it was most likely replaced during the recent reconstruction of County Road 46. Since the bridge is serving the road authority and therefore would not be needed if the road was taken out of service, we recommend that 98% of all future maintenance costs for works to the bridge enclosure be borne by the road authority pursuant to Section 26 of the Drainage Act. The report and plans will provide the Town with the details needed for future work on the bridge enclosure pursuant to the maintenance provisions of the Drainage Act.
3. This enclosure serves parcel 540-01900 at MN5094. The enclosed 900mm diameter corrugated steel pipe located within the parcel was found to be in poor condition with no erosion protection present on the endwalls. The report and plans will provide the Town with the details needed for construction of the enclosure replacement pursuant to the provisions of the Drainage Act.
4. This enclosure serves parcel 540-02000 at MN5072. The enclosure is in fair condition with rust approximately up to the spring line. There is no end wall protection on both ends of the pipe; however, significant vegetative growth is present protecting the banks from erosion. The report and plans will provide the Town with the details needed for future work on the pipe enclosure pursuant to the maintenance provisions of the Drainage Act.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

5. This bridge serves County Road 46 owned by the County of Essex to go over the Hurley Relief Branch Drain. Since the bridge is serving the road authority and therefore would not be needed if the road was taken out of service, we recommend that 98% of all future maintenance costs for works to the bridge be borne by the road authority pursuant to Section 26 of the Drainage Act. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
6. This bridge enclosure that serves parcel 540-01040 was installed for the diversion of the Hurley Relief Branch Drain. The structure comprises C.S.P. and is in fair condition. The report and plans will make the structure part of the Drain and provide the Town with the details needed for future work on the bridge enclosure pursuant to the maintenance provisions of the Drainage Act.
7. This bridge enclosure serves the former railway and is located just east of the 8th Concession Road being parcel 540-01000. The bridge pipe is in good condition and comprises 900mm diameter concrete pipe. During the inspection of the bridge severe sediment accumulation was present at the outlet. During the reconstruction on the 8th Concession Road flushing and cleaning of the pipe was completed. Our survey still shows significant sediment accumulation at the bridge outlet in the Hurley Relief Branch Drain. Since the bridge is serving the public utility former railroad crossing and the services installed in this corridor. and would not be needed if the former railroad was taken out of service and the utilities were relocated, we recommend that 100% of all future maintenance costs for works to the bridge be borne by the owners of the parcel pursuant to Section 26 of the Drainage Act. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
8. This pipe enclosure extends along the east side and crosses under the 8th Concession Road just south of the former railway crossing of the roadway. The concrete pipe is in good condition and was flushed and cleaned during the reconstruction of the 8th Concession Road, and includes manholes for deflections of the drain sections. The report and plans will provide the Town with the details needed for future work on the pipe enclosure pursuant to the maintenance provisions of the Drainage Act.

VI. PUBLIC INFORMATION CENTRE AND THE DRAINAGE ACT

Arrangements were made to meet at the Fire Hall on Walker Road on April 10th, 2019 with the Drainage Superintendent and interested owners to discuss the Draft P.I.C. drainage report dated February 8th, 2019 for this project. The meeting was well attended with the following people present: Trevor Dinn, Mark Fishleigh (County of Essex), Frank Portelli, Rob Schaafsma, Ravinder Singh, Cam Hedges (Town Asst. Drainage Superintendent), Sam Paglia (Town Drainage Superintendent), Kory Snelgrove (Rood Engineering) and Gerard Rood (Rood Engineering).

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.) meeting 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. There were discussions regarding debenture options for assessments that were greater than \$5,000.00 to a

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

parcel. Owners were reminded that the costs in the drainage report are just estimates and the final costs will be based on the tender prices and overall costs of the project once completed.

At the meeting, the former owner of Parcel 540-01900, Trevor Dinn, expressed concerns with the cost for replacement of the covered drain alongside his home. The history of the drain and the covered drain installation at the cost of the previous owner were reviewed. It was established that alternative options for the enclosure replacement with estimated costs would be prepared and reviewed with Trevor Dinn and Sam Paglia. A site meeting was held with Trevor Dinn and Sam Paglia and the alternatives reviewed. Hard copies of the information were provided to the owner and there were subsequent follow-ups with no resolution reached. Eventually we were advised that the parcel was sold to new owners who were made aware of the proposed drainage improvements. Contact with the new owner Ehsan Rostami confirmed that he was acceptable with the original design proposal to simply replace the enclosure with a new pipe to minimize the impacts to the parcel. The original P.I.C. plans and report have been updated to reflect the latest information as included in this final report.

Owners are 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 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. As an

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

example, when work is carried out on the Hurley Relief Drain downstream of the Hurley Relief Branch Drain, the owners in the Hurley Relief Branch Drain sub-watershed that are outletting to the Hurley Relief Drain will be responsible for a portion of the cost, along with the other owners in the Hurley Relief 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 (cobble) 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 1966 report plans by C.G.R. Armstrong, P.Eng. and 1981 report plans by Maurice Armstrong, P.Eng. provides a good fit to the existing profile for the upper part of the Hurley Relief Drain and the Hurley Relief Branch Drain. Said reports provided for improvements to the open drain that still appear to suit the current conditions of the watershed.

The 1966 and 1981 plans show the Hurley Relief Branch Drain travelling southwesterly through parcels 540-01040 and 540-01000. Since then the drain has been diverted to allow for the development of buildings. The Hurley Relief Branch Drain has been diverted southeasterly until it reaches the former railroad where it then travels upstream in a northwesterly direction. We recommend that the original drain alignment on this section be abandoned pursuant to Section 19 of the Drainage Act, and that the new drain alignment and enclosure bridge pipe form part of the Hurley Relief Drain Branch for current and future maintenance works.

Based on our detailed survey, investigations, examinations, and discussions with the affected Owners and governing Authorities, we would recommend that drain repair and improvement works be carried out as follows:

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

- a) We recommend that all drain improvements, 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, and natural conditions have not changed and there is no information to indicate any new species concerns, the repair and improvement can be carried out based on the mitigation measures and new legislation provisions under the Endangered Species Act (E.S.A.), Ontario Regulation 242/08 Section 23.9, which allows repairs, maintenance and improvements to be conducted by the Town within existing municipal drains. These works are exempt from Sections 9 and 10 of the Endangered Species Act provided that the rules in the regulations are followed. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system. A copy of the new Town E.S.A. mitigation measures is included in **Appendix "REI-B"** within this report. We recommend that any work being completed shall be carried out in accordance with details 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) We find that portions of the open drains have significant accumulation of silt and debris and we recommend that these be cleaned out as set out further in this report. We also recommend that the entire length of the upper part of the Hurley Relief Drain and the Hurley Relief Branch Drain include brushing and grubbing works within the design cross section and working easement on the working side of the drain as further set out in this report.
- d) As provided for by Section 18 of the Drainage Act we recommend that the bridges and enclosures along the drain be constructed, repaired, and improved as outlined further in this report including the specifications and the plans that form part of the report. We further recommend that the diversion of the Hurley Relief Branch Drain for bridge enclosure number 5 be adopted as part of the drain. Also, when future maintenance is done on any bridges or enclosures, we recommend that the inverts be set to provide the standard 10% of pipe diameter embedment below the drain profile grade.
- e) The existing drain has some grass areas along the Municipal drain that reduce the amount of erosion and sediment entering the drain, and that enhance water quality. We recommend that the existing grass areas be protected as part of this project and recommend that new buffer strips be constructed by the owners in all areas where no current grass buffer exists.

We recommend that the upper portion of the Hurley Relief Drain and the complete length of the Hurley Relief Branch Drain be repaired and improved, 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".

IX. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **ONE HUNDRED SEVENTY FOUR THOUSAND FIVE HUNDRED DOLLARS (\$174,500.00)**, made up as follows:

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

CONSTRUCTION

HURLEY RELIEF BRANCH DRAIN

Item 1)	<u>Station 0+000 to Station 0+642.2;</u> Carry out excavation of the drain to remove accumulated sediment and restore the drain to the profile grade shown on the plans, including all disposal, hauling and leveling of material, approximately <u>642.2</u> metres (approximately 824 cubic metres), complete.	Lump Sum	\$	9,900.00
Item 2)	<u>Station 0+000 to 0+642.2;</u> Spread scavenged topsoil; carry out seeding and mulching on all newly excavated side slopes including all harrowing, raking, preparation and clean up, complete.	Lump Sum	\$	2,600.00
Item 3)	<u>Station 0+000 to 0+642.2;</u> Provide all labour, material, and equipment for brushing and grubbing works including all hauling, disposal and clean up (approximately <u>642.2</u> lineal metres), complete.	Lump Sum	\$	6,500.00
Item 4)	<u>Station 0+000.0 to Station 0+642.2;</u> carry out cleaning of the drain bridges and enclosures to remove accumulated sediment and restore the drain to the profile grade on the plans, including removal of any deleterious materials, all loading, hauling and disposal of material, complete:			
	a) Enclosure No. 4: <u>41.8</u> metres at <u>\$70.00</u> per lineal metre		\$	2,930.00
	b) Bridge No. 5: <u>29.3</u> metres at <u>\$70.00</u> per lineal metre		\$	2,050.00
	c) Bridge No. 6: <u>36.3</u> metres at <u>\$70.00</u> per lineal metre		\$	2,540.00
Item 5)	<u>Station 0+000.0 to Station 0+642.2;</u> provide quarried limestone rip rap on filter cloth general erosion protection on drain banks at surface water inlets, eroded main tile outlets, slumped bank areas and for rock chute inlets, including excavation, removal of any deleterious materials, all loading, hauling and disposal of material, supply and place rock on filter cloth, complete:			
	a) Quarried limestone: approximately <u>50.0</u> tonnes at <u>\$65.00</u> per tonne		\$	3,250.00
	b) Filter cloth: approximately <u>100</u> square metres at <u>\$5.00</u> per square metre		\$	500.00
Item 6)	<u>Station 0+000.0 to Station 3+125.1;</u> supply and install new heavy duty H.D.P.E. plastic tile end extensions, including connections, rodent grate, removal of any deleterious			

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

materials, excavation, backfill, compaction and restoration, complete:

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| a) | 3.0 metres (10') of 100mm (4") diameter pipe for 100mm diameter tiles: <u>5</u> required at <u>\$120.00</u> each | \$ 600.00 |
| b) | 3.0 metres (10') of 150mm (6") diameter pipe for 150mm diameter tiles: <u>2</u> required at <u>\$200.00</u> each | \$ 400.00 |
| c) | 3.0 metres (10') of 200mm (8") diameter pipe for 200mm diameter tiles: <u>1</u> required at <u>\$300.00</u> each | \$ 300.00 |

UPPER PART OF THE HURLEY RELIEF DRAIN

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|----------|--|-----------------------|
| Item 7) | <u>Station 1+060 to Station 1+130;</u> Provide all labour, material, and equipment for brushing and grubbing works including all loading, hauling, disposal and clean up (approximately <u>70.0</u> lineal metres), complete. | Lump Sum \$ 700.00 |
| Item 8) | <u>Enclosure 1 - Station 1+063.4 to 1+128.0;</u> supply and install approximately <u>65.0</u> lineal metres of 900mm diameter 320kPa solid heavy duty polyethylene smoothwall pipe, including wrap coupler connections, excavation, granular bedding and backfill, granular 'A' driveway, quarried limestone rip rap on filter cloth ends, compaction, loading, hauling, disposal, restoration, fence removal and reinstallation, including swale construction along east limit, complete.
(540-01050) | Lump Sum \$ 48,100.00 |
| Item 9) | <u>Enclosure 3 - Station 1+153.5 to 1+204.0;</u> supply and install approximately <u>51.0</u> lineal metres of 900mm diameter 320kPa solid heavy duty polyethylene smoothwall pipe, including wrap coupler connections, concrete collar at road pipe, excavation, remove and dispose of existing C.S.P., bedding, native backfill, quarried limestone rip rap on filter cloth end protection, compaction, brushing and grubbing, loading, hauling, disposal and restoration, complete.
(540-01900) | Lump Sum \$ 28,800.00 |
| Item 10) | <u>Station 1+037.6 to Station 1+204.0;</u> carry out cleaning of the drain pipes to remove accumulated sediment and restore the drain to the profile grade on the plans, including removal of any deleterious materials, all loading, hauling and disposal of material, complete: | |
| | a) Bridge No. 2: <u>24.0</u> metres at <u>\$70.00</u> per lineal metre | \$ 1,680.00 |
| Item 11) | Final cleanup and restoration. | Lump Sum \$ 2,000.00 |

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

Item 12)	Contingency Allowance.	Lump Sum	\$	6,650.00
	SUBTOTAL FOR CONSTRUCTION		\$	119,500.00
	Net H.S.T. (1.76%) on Construction		\$	2,103.00
	TOTAL FOR CONSTRUCTION		\$	121,603.00

INCIDENTALS

1)	Report, Estimate, & Specifications	\$	12,000.00
2)	Survey, Assistants, Expenses, and Drawings	\$	28,000.00
3)	Duplication Cost of Report and Drawings	\$	1,500.00
4)	Estimated Cost of Letting Contract	\$	1,500.00
5)	Estimated Cost of Layout and Staking	\$	1,000.00
6)	Estimated Cost of Part-Time Supervision and Inspection During Construction (based on 3 day duration)	\$	2,600.00
7)	Net H.S.T. on Incidental Items Above (1.76%)	\$	820.00
8)	Estimated Cost of Interim Financing	\$	1,000.00
9)	Contingency Allowance	\$	4,477.00
	TOTAL FOR INCIDENTALS	\$	52,897.00
	TOTAL FOR CONSTRUCTION (brought forward)	\$	121,603.00
	TOTAL ESTIMATE	\$	174,500.00

X. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the drain repairs and improvements. The design drawings show the subject repair and improvement locations and the details of the work, as well as the approximate location within the watershed area. The drain design drawings are attached to the back of this report and are labelled **Appendix "REI-E"**.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

Also attached, we have prepared Specifications which set out the required construction details for the drain repair and improvements, which also include Standard Specifications labelled therein as **Appendix "REI-C"**.

XI. SCHEDULE OF ASSESSMENT

We would recommend that the Total Cost for construction of this project, including incidental costs, be charged against the lands and roads affected in accordance with the attached Schedule of Assessment. On September 22nd, 2005, the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) issued Administrative Policies for the Agricultural Drainage Infrastructure Program (A.D.I.P.). This program has re-instated financial assistance for eligible costs and assessed lands pursuant to the Drainage Act. Sections 85 to 90 of the Drainage Act allow the Minister to provide grants for various activities under said Act. Sections 85 and 87 make it very clear that grants are provided at the discretion of the Minister. Based on the current A.D.I.P., "lands used for agricultural purposes" may be eligible for a grant in the amount of 1/3 of their total assessment. The new policies define "lands used for agricultural purposes" as those lands eligible for the "Farm Property Class Tax Rate". The Town provides this information to the Engineer from the current property tax roll. Properties that do not meet the criteria are not eligible for grants. In accordance with same we expect that this project will be qualified for the grant normally available for agricultural lands. The Ministry however, is continually reviewing their policy for grants, and we recommend that the Town monitor the policies, and make application to the Ministry for any grant should same become available through the A.D.I.P. program or other available funds.

Pursuant to Section 26 of the Drainage Act, the Public Utility or Road Authority is responsible for all increase in cost to the drainage works due to the existence of their railway, roadways or services. This requirement has been reflected in the following **Bridge/Enclosure Cost Sharing** table related to sharing of future maintenance costs for the access bridges and enclosures. This provision shall apply to the County Road 46 (Bridge 2 & Bridge 5), and Canada Southern Railway Co. bridge crossing (Bridge 7) and 8th Concession Road (Bridge 8) for Road Authorities and Public Utilities.

Where a bridge structure has increased top width beyond the standard 6.10 metre (20.0 ft.) top width, all of the increased costs resulting from same are assessed 100% to the Owner of the lands served by the bridge.

XII. FUTURE MAINTENANCE

When maintenance work is carried out in the future on the open drain portion, the cost for said future maintenance shall be assessed in accordance with the attached Schedule of Assessment excluding any Special Benefit. When future maintenance work is carried out, the assessment to the affected Owners shall be based on the actual future maintenance cost shared on a pro-rata basis with the values shown in this assessment schedule.

When maintenance work is carried out on any public road and lands owned by the County of Essex or the Town in the future, we recommend that the cost be assessed 98.0% to the County of Essex or the Town, and the remainder of 2.0% shall be assessed to the upstream lands and roads based on their affected area and outlet assessments as set out in the attached Schedule of

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

Assessment. When maintenance work is carried out on any primary private bridges or enclosures in the future, we recommend that part of the cost be assessed as a Benefit to the abutting parcel served by the access bridge or enclosure, and the remainder shall be assessed to the upstream lands and roads based on their affected area and outlet assessments as set out in the attached Schedule of Assessment. The share for Benefit and Outlet Liability shall be as set out in the Bridge/Enclosure Cost Sharing table below. Since Enclosures 3 and 4 are an enclosure where no legal access is needed for crossing, we recommend that 100% of the cost of future maintenance to the enclosures be assessed as a Benefit to the abutting parcel served by the bridge enclosure.

UPPER PART OF THE HURLEY RELIEF DRAIN BRIDGE/ENCLOSURE COST SHARING

<u>Bridge / Enclosure</u>	<u>Owners</u>	<u>Benefit to Owner</u>	<u>Outlet Upstream</u>
1	(540-01050),	96.1%	3.9%
2	County of Essex,	98.0%	2.0%
3	(540-01900),	94.0%	6.0%

HURLEY RELIEF BRANCH DRAIN BRIDGE/ENCLOSURE COST SHARING

<u>Bridge / Enclosure</u>	<u>Owners</u>	<u>Benefit to Owner</u>	<u>Outlet Upstream</u>
4	(540-02000),	94.0%	6.0%
5	County of Essex,	98.0%	2.0%
6	(540-01040),	86.2%	13.8%
7	(590-01000),	98.0%	2.0%
8	Town of Tecumseh,	98.0%	2.0%

We recommend that the bridge and enclosure structures as identified herein, be maintained in the future as part of the drainage works. We would also recommend that the access bridges and enclosures in the drain, for which the future maintenance costs are to be borne by the abutting affected landowners and upstream lands and roads, be maintained by the Town and that said maintenance would include works to the bridge enclosure culvert, bedding, backfill and end treatment. Where concrete, asphalt or other decorative driveway surfaces over the bridge enclosure culverts require removal as part of the maintenance works, these surfaces should also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guard rails or other special features exist that will be impacted by the maintenance work, they are also to be removed and restored or replaced as part of the bridge enclosure maintenance work. However, the cost of the supply and installation of any surface material other than Granular "A" material, and the cost of removal and restoration or replacement, if necessary, of any special features, shall be totally assessed to the benefiting adjoining parcel served by said access bridge or enclosure.

Report - Hurley Relief Branch Drain &
Upper part of the Hurley Relief Drain E09HU(44)
(Geographic Township of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

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, P.Eng.



att.

Rood Engineering Inc.

Consulting Engineers

9 Nelson Street

LEAMINGTON, Ontario N8H 1G6

HURLEY RELIEF BRANCH DRAIN
TOWN OF TECUMSEH

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
County Road 46			5.39	2.181	County of Essex	\$ 2,194.00	\$ 2,076.00	\$ -	\$ 4,270.00
8th Concession Road			2.99	1.210	Town of Tecumseh	\$ 614.00	\$ 2,057.00	\$ -	\$ 2,671.00
Del Duca Drive			2.47	1.000	Town of Tecumseh	\$ 508.00	\$ 1,701.00	\$ -	\$ 2,209.00
Ure Street			2.73	1.104	Town of Tecumseh	\$ 560.00	\$ 1,878.00	\$ -	\$ 2,438.00
North Talbot Road			1.24	0.500	Town of Tecumseh	\$ 254.00	\$ 850.00	\$ -	\$ 1,104.00
590-01200	7 & 8	11 & 12	0.85	0.344	Town of Tecumseh	\$ 290.00	\$ 172.00	\$ -	\$ 462.00
Total on Municipal Lands.....						\$ 4,420.00	\$ 8,734.00	\$ -	\$ 13,154.00

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-00905	8	11	0.69	0.279	Gurpreet Dhillon	\$ 235.00	\$ 139.00	\$ -	\$ 374.00
540-00920	8	11 & 12	10.47	4.238	Union Gas Ltd.	\$ 1,301.00	\$ 1,646.00	\$ -	\$ 2,947.00
540-00930	8	12	2.33	0.943	Davemarc Developments	\$ 734.00	\$ 347.00	\$ -	\$ 1,081.00
540-00940	8	12	1.80	0.728	Vic Mur Enterprises	\$ 567.00	\$ 268.00	\$ -	\$ 835.00
540-00950	8	12	0.49	0.198	Super Lighting and Decor Inc.	\$ 154.00	\$ 73.00	\$ -	\$ 227.00
540-00960	8	12	1.12	0.453	1818670 Ontario Limited	\$ 353.00	\$ 167.00	\$ -	\$ 520.00
540-01000	8	11 & 12	0.62	0.251	Voltuara Investments Inc.	\$ 195.00	\$ 92.00	\$ -	\$ 287.00
540-01040	8	11 & 12	0.50	0.202	Robert Weir & Dorothy Suzor	\$ 157.00	\$ 75.00	\$ -	\$ 232.00

Hurley Relief Branch Drain E09HU(44)
Town of Tecumseh

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-02000	8	11	0.49	0.198	Frank Portelli & Tammy Ouellette	\$ 167.00	\$ 73.00	\$ -	\$ 240.00
550-18901	7	12	0.45	0.182	1339596 Ontario Limited	\$ 77.00	\$ 91.00	\$ -	\$ 168.00
550-18902	7	12	0.45	0.182	Donald Bastien, Frank Monaco & Thomas Masiarek	\$ 77.00	\$ 91.00	\$ -	\$ 168.00
550-18903	7	12	0.45	0.182	Ironworkers Local 700	\$ 77.00	\$ 91.00	\$ -	\$ 168.00
550-19000	7	12	0.45	0.182	Ironworkers Local 700	\$ 77.00	\$ 91.00	\$ -	\$ 168.00
550-19001	7	12	1.81	0.732	2158058 Ontario Inc.	\$ 309.00	\$ 365.00	\$ -	\$ 674.00
550-19200	7	12	3.80	1.538	401 Diesel Centre Ltd.	\$ 648.00	\$ 767.00	\$ -	\$ 1,415.00
550-19400	7	12	3.25	1.315	Prodart Enterprises Inc.	\$ 554.00	\$ 656.00	\$ -	\$ 1,210.00
550-19500	7	12	1.00	0.405	Giuseppe Delicata	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-19502	7	11	5.58	2.258	West Industries Inc.	\$ 952.00	\$ 1,126.00	\$ -	\$ 2,078.00
550-19600	7	11	2.06	0.834	Pangeo Holdings Ltd.	\$ 351.00	\$ 416.00	\$ -	\$ 767.00
550-19606	7	RP 5 & 22	1.03	0.417	Riz-Cona Inc.	\$ 176.00	\$ 208.00	\$ -	\$ 384.00
550-19606	7	RP 4 & 23	1.84	0.745	Riz-Cona Inc.	\$ 314.00	\$ 371.00	\$ -	\$ 685.00
550-19610	7	11	1.29	0.522	2361269 Ontario Inc.	\$ 220.00	\$ 260.00	\$ -	\$ 480.00
550-19800	7	11	1.45	0.587	2198043 Ontario Inc.	\$ 247.00	\$ 293.00	\$ -	\$ 540.00
550-19820	7	11	2.09	0.846	Jin Hu Holdings Inc.	\$ 357.00	\$ 422.00	\$ -	\$ 779.00
550-19822	7	11	1.26	0.510	Computool Investments Inc.	\$ 215.00	\$ 254.00	\$ -	\$ 469.00
550-19824	7	11	1.26	0.510	1068420 Ontario Inc	\$ 215.00	\$ 254.00	\$ -	\$ 469.00
550-19826	7	11	1.08	0.437	Blue Line Mold Inc.	\$ 184.00	\$ 218.00	\$ -	\$ 402.00
550-19828	7	11	1.08	0.437	2449620 Ontario Inc.	\$ 184.00	\$ 218.00	\$ -	\$ 402.00
550-19830	7	11	1.08	0.437	2355406 Ontario Limited	\$ 184.00	\$ 218.00	\$ -	\$ 402.00
550-19900	7	11	1.93	0.781	905293 Ontario Limited	\$ 329.00	\$ 389.00	\$ -	\$ 718.00
550-20000	7	11	1.39	0.563	1849658 Ontario Inc.	\$ 237.00	\$ 281.00	\$ -	\$ 518.00
550-20001	7	12	1.06	0.429	Rom-Ex Investment Ltd.	\$ 181.00	\$ 214.00	\$ -	\$ 395.00
550-20002	7	12	0.92	0.372	Carolcox Management Limited	\$ 157.00	\$ 186.00	\$ -	\$ 343.00
550-20003	7	12	1.12	0.453	Filippo Liburdi Construction Limited	\$ 191.00	\$ 226.00	\$ -	\$ 417.00
550-20004	7	12	1.03	0.417	2446126 Ontario Inc.	\$ 176.00	\$ 208.00	\$ -	\$ 384.00

Hurley Relief Branch Drain E09HU(44)
Town of Tecumseh

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
550-20005	7	12	1.05	0.425	2446126 Ontario Ltd.	\$ 179.00	\$ 212.00	\$ -	\$ 391.00
550-20006	7	12	1.20	0.486	Eagle Heating & Cooling Inc.	\$ 205.00	\$ 242.00	\$ -	\$ 447.00
550-20007	7	12	1.48	0.599	2030185 Ontario Ltd.	\$ 252.00	\$ 299.00	\$ -	\$ 551.00
550-20008	7	11	1.09	0.441	N. Talbot Holdings Ltd.	\$ 186.00	\$ 220.00	\$ -	\$ 406.00
550-20009	7	12	1.03	0.417	2030185 Ontario Ltd.	\$ 176.00	\$ 208.00	\$ -	\$ 384.00
550-20010	7	12	1.26	0.510	Filippo Liburdi Construction Limited	\$ 215.00	\$ 254.00	\$ -	\$ 469.00
550-20011	7	12	1.29	0.522	2189165 Ontario Limited	\$ 220.00	\$ 260.00	\$ -	\$ 480.00
550-20012	7	12	1.00	0.405	Calframax Holdings Inc.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20014	7	12	3.00	1.214	2446126 Ontario Ltd.	\$ 512.00	\$ 605.00	\$ -	\$ 1,117.00
550-20018	7	RP 19 & 20	2.00	0.809	2612491 Ontario Ltd.	\$ 341.00	\$ 404.00	\$ -	\$ 745.00
550-20018	7	RP 18	1.00	0.405	2612491 Ontario Ltd.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20019	7	12	1.00	0.405	Matward Holdings Ltd.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20020	7	12	1.00	0.405	Calframax Holdings Inc.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20030	7	12 & 13	4.18	1.690	Detroit River Tunnel Company	\$ 2,137.00	\$ 624.00	\$ -	\$ 2,761.00
550-20189	7	12	0.84	0.340	2088307 Ontario Limited	\$ 143.00	\$ 170.00	\$ -	\$ 313.00
550-20190	7	12	1.00	0.405	Rycroft Capital Corporation	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20191	7	12	1.00	0.405	Del Duca Industrial Park Ltd.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20192	7	12	1.00	0.405	Del Duca Industrial Park Ltd.	\$ 171.00	\$ 202.00	\$ -	\$ 373.00
550-20194	7	12	2.00	0.809	Del Duca Industrial Park Ltd.	\$ 341.00	\$ 404.00	\$ -	\$ 745.00
550-20195	7	12	0.84	0.340	2076493 Ontario Ltd.	\$ 143.00	\$ 170.00	\$ -	\$ 313.00
550-20196	7	12	0.93	0.376	Sigma Engineering (Windsor) Inc.	\$ 159.00	\$ 188.00	\$ -	\$ 347.00
550-20197	7	12	0.81	0.328	Sigma Engineering (Windsor) Inc.	\$ 138.00	\$ 163.00	\$ -	\$ 301.00
550-20198	7	12	1.79	0.724	1307649 Ontario Limited	\$ 305.00	\$ 361.00	\$ -	\$ 666.00
550-20200	7	11	2.15	0.870	Carolcox Management Limited	\$ 367.00	\$ 434.00	\$ -	\$ 801.00
550-20230	7	11	1.17	0.473	2391472 Ontario Ltd.	\$ 200.00	\$ 236.00	\$ -	\$ 436.00
550-20240	7	RP 3	3.36	1.360	West Industries Inc.	\$ 573.00	\$ 678.00	\$ -	\$ 1,251.00
550-20240	7	RP 2	2.18	0.882	West Industries Inc.	\$ 372.00	\$ 440.00	\$ -	\$ 812.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
550-20260	7	11	0.91	0.368	Mamatas Real Estate Holdings Ltd.	\$ 155.00	\$ 184.00	\$ -	\$ 339.00
550-20300	7	11	2.82	1.141	Mamatas Real Estate Holdings Ltd.	\$ 481.00	\$ 569.00	\$ -	\$ 1,050.00
590-01000	7	10 to 12	2.83	1.144	Canada Southern Railway Co.	\$ 1,447.00	\$ 422.00	\$ -	\$ 1,869.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 21,167.00	\$ 20,157.00	\$ -	\$ 41,324.00

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-02100	8	12	11.35	4.592	1061166 Ontario Inc.	\$1,206.00	\$1,550.00	\$ -	\$ 2,756.00
Total on Privately Owned - Agricultural Lands (grantable).....						\$ 1,206.00	\$ 1,550.00	\$ -	\$ 2,756.00

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

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-00900	8	11	13.30	5.382	Del Duca Industrial Park Ltd.	\$ 1,499.00	\$ 1,872.00	\$ -	\$ 3,371.00
540-00910	8	12	2.45	0.991	Ecotemp Investments Inc.	\$ 418.00	\$ 494.00	\$ -	\$ 912.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						\$ 1,917.00	\$ 2,366.00	\$ -	\$ 4,283.00
TOTAL ASSESSMENT			148.69	60.171		\$ 28,710.00	\$ 32,807.00	\$ -	\$ 61,517.00

1 Hectare = 2.471 Acres
Project No. REI2016D013
November 20th, 2019

CONSTRUCTION SCHEDULE OF ASSESSMENT
UPPER PART OF THE HURLEY RELIEF DRAIN
TOWN OF TECUMSEH

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
County Road 46			2.31	0.935	County of Essex	\$ 1,281.00	\$ 928.00	\$ -	\$ 2,209.00
590-01200	7 & 8	11 & 12	0.67	0.271	Town of Tecumseh	\$ 163.00	\$ 141.00	\$ -	\$ 304.00
Total on Municipal Lands.....						\$ 1,444.00	\$ 1,069.00	\$ -	\$ 2,513.00

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-00920	8	11 & 12	4.73	1.913	Union Gas Ltd.	\$ 419.00	\$ 775.00	\$ -	\$ 1,194.00
540-01050	8	11	2.79	1.129	8707570 Canada Corp.	\$ 627.00	\$ 434.00	\$ 61,104.00	\$ 62,165.00
540-01100	8	11	3.25	1.315	Ioan Mihali	\$ 731.00	\$ 505.00	\$ -	\$ 1,236.00
540-01900	8	11	0.33	0.134	Ehsan Rostami & Mojgan Padash	\$ 80.00	\$ 51.00	\$ 36,271.00	\$ 36,402.00
590-01000	7	10 to 12	3.49	1.412	Canada Southern Railway Co.	\$ 1,275.00	\$ 544.00	\$ -	\$ 1,819.00
Total on Privately Owned - Non-Agricultural Lands.....						\$ 3,132.00	\$ 2,309.00	\$ 97,375.00	\$ 102,816.00

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

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
540-00900	8	11	30.16	12.205	Del Duca Industrial Park Ltd.	\$ 2,709.00	\$ 4,945.00	\$ -	\$ 7,654.00
Total on Privately Owned - Agricultural Lands (non-grantable).....						\$ 2,709.00	\$ 4,945.00	\$ -	\$ 7,654.00
TOTAL ASSESSMENT			47.73	19.314		\$ 7,285.00	\$ 8,323.00	\$ 97,375.00	\$ 112,983.00

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1 Hectare = 2.471 Acres
Project No. REI2016D013
November 20th, 2019

SPECIFICATIONS

HURLEY RELIEF BRANCH DRAIN & UPPER PART OF THE HURLEY RELIEF DRAIN E09HU(44) (Geographic Township of Sandwich South)

TOWN OF TECUMSEH

I. GENERAL SCOPE OF WORK

The Hurley Relief Branch Drain & upper part of the Hurley Relief Drain comprises of open and enclosed drain portions. The drain extends from its outlet in the Little River Drain westerly across the 9th Concession Road where the drain then travels in a southerly direction from just north of King's Highway 401 in the centre of Concession 8, and then continues southerly to a point just north of County Road 46 (former King's Highway 98). The Hurley Relief Drain then travels westerly until intersecting with the Hurley Relief Branch Drain. The Hurley Relief Drain then travels generally in a southerly direction to the south limit of the retired Canadian National Railway lands now owned by Canada Southern Railway Co. The Hurley Relief Branch Drain travels generally in a southwest direction from its junction with the Hurley Relief Drain, across County Road 46 and along the northerly side of the former railway until it reaches the east limit of the 8th Concession Road, then south along the east side of the roadway and westerly under the roadway to the west side.

The work on the Hurley Relief Branch Drain will extend from its outlet, as noted on the plans, and proceed southwesterly to the upstream end of the open drain. The work on the upper part of Hurley Relief Drain will extend from the Branch outlet, as noted on the plans, and proceed southerly to the upstream end of the open drain at the north limit of parcel 590-01000. The work under this project generally comprises of improvements to the open Hurley Relief Branch Drain to provide a suitable cross section for conveyance of flows, flushing and cleaning of existing bridges and enclosures; along with the addition and replacement of an enclosure along the course of the upper part of the Hurley Relief Drain. Work on the drain includes tile end improvements, supply and installation of quarried limestone on filter cloth general erosion protection and rock chute inlets along with a swale. The proposed work is intended to address the repair and improvement of the open drains, bridges and enclosures, tile end improvements, and erosion protection in accordance with current standards. The Contractor is advised that Enbridge Union Gas has some high pressure large diameter gas mains including east-west along the north side of County Road 46, east-west along the south side of the former railway corridor and north-south along the east side of 8th Concession Road. Third party inspection by an Enbridge Union Gas representative will be required when digging within 1.5m of these pipelines and the Contractor shall coordinate this with Union Gas while completing its works.

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"**. All work carried out under this project shall be completed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

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

The Contractor will be required to implement stringent erosion and sedimentation controls during the course of the work to help minimize the amount of silt and sediment being carried downstream into the Little River Drain. It is intended that work on this project be carried out during relatively dry weather to ensure proper site and drain conditions and to avoid conflicts with sediment being deposited into the outlet drainage systems. 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.

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

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

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

III. M.N.R.F. & M.E.C.P. CONSIDERATIONS

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

The Contractor is to note that this project is subject to 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 (E.S.A.), 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

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

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, 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. Based on this information we find that the Contractor 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 the Contractor follows the rules within Ontario Regulation 242/08 and the Mitigation Measures in the Town S.A.R. Mitigation Plan. To address these requirements the Town has established comprehensive mitigation measures as well as species identification guides for reference. A copy of the relevant information that was provided by them is included herein as part of **Appendix “REI-B”**.

The Contractor is to review **Appendix “REI-B”** in detail and is required to comply, in all regards, with the contents of said M.N.R.F.-M.E.C.P. and Town information, or any future requirements, and follow the special requirements therein included, during construction. 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 necessary 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 the Hurley Relief Branch Drain extends overtop and along the south side of the covered drain north of County Road 46, and overtop and along the southeast side of the drain on the south side of County Road 46 and along the former railroad corridor. Likewise, for the upper part of the Hurley Relief Drain, the majority of the work to be carried out extends along the east side of the drain to the east property limit on the portion south of County Road 46, and overtop and on the west side of the drain north of County Road 46. The Contractor shall have access for a minimum width of 6.0 metres (20 feet) overtop and abutting the proposed drainage works. The Contractor may utilize the work area as necessary, to permit the completion of all of the work required to be carried out for this project along with an area sufficient to spread the excavated material to a maximum depth of 100mm on the adjacent lands beyond any grass buffer, gravel lot or driveway access. The Contractor shall also have access along the roadway boulevard at grass areas and through the driveways from County Road 46 and the 8th Concession Road adjacent to the Hurley Relief Branch Drain and upper part of the Hurley Relief Drain as necessary to access the open drains and carry out the work on the existing drains, access bridges, and enclosures as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridges and enclosures to carry out the removal of the sediment, installation of the replacement pipes, any pipe removals 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 any affected roadways for the proposed works, it shall obtain the permission of the County of Essex and the Town of Tecumseh Public Works Departments, the Town of Tecumseh Drainage Superintendent, and the 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 the Town of Tecumseh Public Works Departments.

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the grass buffer and driveway areas abutting the drain. 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 placement, 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 from top of bank to top of bank, 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 cut as close to the ground as practicable and within the drain banks parallel to the side slopes. Except as noted herein, stumps shall be left in place and shall be sprayed with a single application of stump killer (Diphenoprop BK700 or approved equal). Dead trees on the top of the east bank and any trees or tree branches that overhang the drain shall be removed and trimmed. All removed materials shall be put into piles by the Contractor in locations adjacent to the drain and within the working corridors, 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. In all cases, trees and brush shall be stockpiled on the property on which they were cut. 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 and the requirements of the Town burning by-laws as set out **Appendix “REI-D”** are followed. The Contractor shall assume all responsibility for control of the burn, obtaining all utility locates in the area of each burn site, all responsibility for liabilities related to the burning of the brush and smoke generated, and 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 on private lands adjacent to the drain and within the working corridors, especially mature trees beyond the drain sideslopes. The landowners will be requested to mark trees that they wish to save if possible and the Contractor shall review the removal of trees with the Town Drainage Superintendent or Consulting Engineer.

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

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

The Contractor shall remove all deleterious materials and rubbish along the course of the open drain and any such materials located in the bridge culverts and enclosures while carrying out its

cleaning of same. All such deleterious materials and rubbish shall be loaded up and hauled away by the Contractor to a site to be obtained by it at its cost.

VI. FENCING

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

VII. DETAILS OF OPEN DRAIN WORK

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

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

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

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

Where there is any brush or rubbish in the course of the drains, including both side slopes of the drain, all such brush or rubbish shall be close cut and grubbed out. Where there is any brush or

rubbish where the earth is to be spread, or on that strip of land between where the earth is to be spread and the edge of the drains, all such brush or rubbish shall be close cut and grubbed out. The whole is to be burned, chipped or otherwise satisfactorily disposed of by the Contractor.

VII. DETAILS OF BRIDGE & ENCLOSURE WORK

The Contractor shall provide all material, labour and equipment to repair and improve the existing access bridges and enclosures in the Hurley Relief Branch Drain and upper part of the Hurley Relief Drain requiring work, along with endwall repairs and other improvements as noted.

All existing corrugated steel pipes slated to be removed shall be replaced with new aluminized steel Type II corrugated Hel-Cor pipe, or Boss 2000 320 kPa H.D.P.E. smooth wall plastic pipe, or equal. All steel piping sections shall be connected by the use of 9 corrugation (9-C) or hugger band bolted couplers installed around the complete circumference of the pipe in accordance with the manufacturer's recommendations. Plastic piping shall be connected together with wrap couplers installed in accordance with the manufacturer's recommendations. Each coupler shall be wrapped in filter cloth material around the complete circumference to ensure that there will be no soil migration through the joints and into the pipe through said connections. Where pipes are in close proximity of trees or shrubs, the Contractor shall employ bell and gasket joints.

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

VIII. ACCESS BRIDGE & ENCLOSURE PIPE INSTALLATION

The new corrugated steel pipes (C.S.P.) to be installed on this project shall be aluminized steel type II with the corrugation profile specified on the plans or in the schedule of items and prices. Pipes are required to be provided in the longest lengths that are available. Where the overall access pipe length exceeds the standard pipe lengths, the Contractor shall connect the pipe sections together by use of a manufactured 9-C or hugger band bolted coupler installed in accordance with the manufacturer's recommendations. All coupler joints shall be wrapped with a layer of filter cloth around the complete circumference that extends a minimum of 100mm beyond the coupler on each end, to ensure a positive seal against soil migration through the joints.

The new heavy duty smooth wall High Density Poly Ethylene (H.D.P.E.) plastic pipes to be installed on this project are required to be provided in the longest lengths that are available, and shall be no less than 2.0 metres long when shorter sections are needed to meet the overall pipe length. All plastic pipe shall be 320 kPa strength and have a C.S.A. stamp. Where the overall access pipe length exceeds the standard pipe lengths, the Contractor shall connect the pipe sections together by use of a manufactured wrap coupler installed in accordance with the manufacturer's recommendations. All coupler joints shall be wrapped with a layer of filter cloth around the complete circumference that extends a minimum of 100mm beyond the coupler on each end, to ensure a positive seal against soil migration through the joints. Plastic pipe ends shall be secured

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

against flotation. Where pipes are immediately adjacent to trees or shrubs the Contractor shall employ bell and gasket joints for the plastic pipes.

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

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

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

For hard surface driveway crossings, the top 305mm (12") of the backfill over the pipe below the hard surface treatment shall comprise granular material M.T.O. Type "A" O.P.S.S. Form 1010 compacted to a minimum of 100% Standard Proctor Density. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the pipe. To ensure that no damage is caused to the proposed pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Consulting Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work. The Contractor shall restore any asphalt surface by placing a minimum of the existing thickness or a 90mm minimum thickness of Type HL-4 hot mix asphalt. The asphalt shall be supplied and placed in two (2) approximately equal lifts compacted to a value ranging from 92% to 96% of maximum relative density as per O.P.S.S. 310. On roadways, the Contractor shall provide a stepped asphalt repair to minimize differential movement between the trench area and adjacent roadway. For existing concrete driveways the Contractor shall carefully remove the concrete to the nearest expansion joint. The concrete driveway shall be restored to the original length and width that

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

was removed and include 150mm thick, 30mPa concrete, with 6% ±1% air entrainment and 6x6-6/6 welded wire fabric reinforcing installed at the midpoint of the slab. All slab surfaces shall be finished to provide an appearance approximating the finish on the existing concrete driveway abutting the replacement.

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

The Contractor shall protect existing concrete headwalls wherever possible. The Contractor shall carefully extract the existing pipe from the wall, cautiously enlarge the opening as required, and install the new replacement pipe through the salvaged wall. The new pipe shall be thoroughly grouted in place for the full thickness of each headwall, with the surface finish of the grout blended to match to the existing concrete headwall finish, as closely as possible. Grout used for the wall repair shall be in pre-mixed bags or shall comprise of three (3) parts of clean, sharp sand to one (1) part of Portland cement with just sufficient water added to provide a stiff plastic mix and the grouted mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor is to note that any intercepted pipes along the length of the existing culverts or enclosures are to be extended and connected at its cost to the new pipe unless otherwise noted in the accompanying drawings.

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

IX. REMOVALS

Where existing access bridges and enclosures are to be completely removed and replaced, the Contractor shall be required to excavate and completely extract the existing culvert pipe or concrete structure and the existing endwalls in their entirety, excluding poured concrete headwalls that are to be re-used, as well as any other deleterious materials that may be encountered in removing same. The Contractor shall neatly saw cut any concrete or asphalt surfaces over the pipes for a sufficient width to allow for the safe removal of same or go to the

nearest expansion joint panel of the concrete driveways. The Contractor shall also be required to completely dispose of all removed materials to a site to be obtained by it at its own expense. The Contractor shall note that if some headwalls are shown to remain in place, the Contractor shall protect same and carry out its work for the pipe replacement as noted above and dispose of any debris resulting from the work.

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

X. PRECAST CONCRETE HEADWALL AND SLOPED END PROTECTION

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

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

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

Where shown on the plans, the Contractor shall install precast concrete block on filter cloth walls on the ends of the bridge or enclosure. The blocks shall be a minimum of 600X600X1200mm in size as available from Wolseley Underground Specialties, Windsor Ontario, or equal, and installed as set out in **Appendix "REI-C"**. Vertical joints shall be staggered by use of half blocks where needed and wingwall deflections shall employ 45 degree angled blocks where shown. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 1), 3), and 4) of the **"Standard Specifications for Access Bridge Construction"** attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in Item 4) of said Appendix. The Contractor, in all cases, shall comply with these specifications and upon completion of the stacked precast concrete end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply 1.0 metre wide quarried limestone on filter cloth rock protection adjacent to the headwalls at each end of the pipe. All rock protection shall be 305mm (12") thick, installed on non-woven filter cloth, and

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

shall be installed in accordance with Item 2) of the "**Standard Specifications for Access Bridge Construction**".

IX. GENERAL QUARRIED LIMESTONE EROSION PROTECTION

At all of the swale and furrow locations entering the drain, it is required that general quarried limestone erosion protection and rock chutes be provided on the drain slopes, at the locations indicated, and to the widths generally shown within the details and notes included in the accompanying drawings. The rock chutes shall be v-shaped and constructed to direct all flows through the centre portion of the rock chute. Where the drain banks are showing erosion or slumping and distress, the Contractor shall provide quarried limestone on filter cloth general erosion protection as outlined below. Protection locations shall be as established in consultation with the Town Drainage Superintendent and Consulting Engineer and shall include the areas noted on the profiles.

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

X. BENCH MARKS

Also, for use by the Contractor, we have established a number of Bench Marks along the course of the work for the Hurley Relief Branch Drain and upper part of the Hurley Relief Drain, as shown on the plans. The Contractor shall work with the Town Drainage Superintendent or Consulting Engineer to transfer the bench mark as necessary to be used in setting the drain and pipe design grades.

In all cases, the Contractor is to utilize the specified bench mark and drain grades to control its work. The Contractor shall ensure that it takes note of the direction of flow and sets all grades to assure that all flows go southeasterly to easterly for the Hurley Relief Branch Drain and northerly for the upper part of the Hurley Relief Drain to match the direction of flow within the drain. The Contractor's attention is drawn to the fact that the pipe invert grades established herein provide for the pipes to be set approximately 10% of their diameter or rise below the existing drain bottom or the design grade of the drain, whichever is lower.

XI. ANCILLARY WORK

During the course of any work to the bridges or enclosures along the course of the work, the Contractor will be required to protect or extend any existing tile ends or swales and connect them to the drainage works to maintain the drainage from the adjacent lands. All existing pipes and tiles shall be extended utilizing solid Big 'O' "standard tile ends" or equal plastic pipe of the same

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

2019-11-20

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

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

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

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

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

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

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

Specifications - Hurley Relief Branch Drain &
Upper Part of the Hurley Relief Drain – E09HU(44)
(Geographic Twp. of Sandwich South)
Town of Tecumseh - REI2016D013

costs associated with the supply and installation of this straw bale or silt curtain check dam shall be included in the cost bid for the bridge or enclosure replacements.

XII. TOPSOIL, SEED AND MULCH

The Contractor will be required to protect grass buffers and driveway accesses along the top of the drain bank where they currently exist. Where any of these are damaged, they shall be fully restored including placement of topsoil. The topsoil shall be prepared for seeding as noted further in these specifications. Should the existing topsoil be treated to prevent grass growth, the Contractor shall strip the existing topsoil material back and spread it on the adjacent field and supply 50mm thick imported topsoil, or topsoil material scavenged from the drain banks at rock protection locations, that is suitable for growing grass.

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

XIII. SPECIAL PROVISIONS FOR BRIDGES & ENCLOSURES, REPAIR & IMPROVEMENTS

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

HURLEY RELIEF BRANCH DRAIN

Station 0+000.0 to Station 0+642.2

The Contractor shall carry out cleaning of the drain pipes as set out in the report and plans to remove accumulated sediment and restore the drain to the profile grade on the plans, including removal of any deleterious materials, all loading, hauling and disposal of material. All work shall be carried out in accordance with the plans, these specifications and the requirements in **Appendix “REI-C”**.

Timing of work on the enclosures shall be established in consultation with the property owners.

UPPER PART OF THE HURLEY RELIEF DRAIN

Timing of work on the enclosures shall be established in consultation with the property owners. The Contractor shall provide for the construction and improvements to the access bridges and enclosures along the upper part of the Hurley Relief Drain, for the structures noted, as follows:

Enclosure 1 – Parcel 540-01050

The Contractor shall provide all material, labour, and equipment to construct a new enclosure for a future parking lot servicing parcel 540-01050, consisting of 65.0 metres (213.3 ft.) of 900mm diameter, 320 kPa smooth wall heavy duty High Density Polyethylene (H.D.P.E.) plastic pipe and wrap couplers, granular backfill, granular 'A' driveway, with quarried limestone on filter cloth protection on both ends of the enclosure in the upper part of the Hurley Relief Drain. The new enclosure shall be constructed within the existing open drain on parcel 540-01050 south of County Road 46 as seen on the attached plans in **Appendix "REI-E"**. This location shall be the exact designated location of this access bridge enclosure 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 enclosure must be approved in writing by the Engineer.

The Contractor shall provide all labour, material and equipment to perform brushing and grubbing works for an approximate 6.0m working easement, cut and shape the open swale alignment along east property limit including excavation, spreading excess fill on adjacent lands to the west, compaction, grading swale where shown on cross sections with maximum 3.0 to 1.0 (H:V) side slopes to allow for maintenance, fine grading, hydro-seeding and mulch to restore newly formed swale banks, clean up and restoration, approximately 64.5 lineal metres (approximately 150 cubic metres) complete.

Enclosure 3 – Parcel 540-01900

The Contractor shall provide all material, labour, and equipment to construct a replacement enclosure for parcel 540-01900, consisting of 51.0 metres (167.3 ft.) of 900mm diameter, 320 kPa smooth wall heavy duty High Density Polyethylene (H.D.P.E.) plastic pipe and wrap couplers or bell and gasket joints adjacent trees and shrubs with quarried limestone on filter cloth protection on the north end of the enclosure in the upper part of the Hurley Relief Drain, and a concrete collar connection to the pipe under the road. The new pipe shall be constructed in place of the existing enclosed drain north of County Road 46 as seen on the attached plans in **Appendix "REI-E"**. This location shall be the exact designated location of this enclosure 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 enclosure must be approved in writing by the Engineer.

XIV. GENERAL CONDITIONS

- a) The Town Drainage Superintendent or Consulting Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.
- b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility or other object which it may encounter during the course of the work. The

- Contractor shall indemnify and save harmless the County of Essex, the Town of 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, the 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 Municipal road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Municipality shall have the right to have the necessary repair work done by its employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Municipality. The Contractor, upon completing the works, shall clean all debris and junk, etcetera, from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.
 - e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.
 - f) During the course of the work the Contractor shall be required to connect existing drainage pipes to the Municipal Drain. In the event that polluted flows are discovered, the Contractor shall delay the connection of the pipe and leave the end exposed and alert the Municipality, the Drainage Superintendent and the Consulting Engineer so that steps can be taken by the Municipality to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Municipality in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.
 - g) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.
 - h) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.
 - i) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Consulting Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses, the Consulting Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.
 - j) The Contractor will be required to submit to the Municipality a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work. The Contractor will also be required to submit to the Municipality a Certificate of Clearance

for the project from the Workplace Safety and Insurance Board before Final Payment is made to the Contractor.

- k) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Owner. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Owner in every way and shall guarantee faithful performance of the contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

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

- l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project, and shall name the County of Essex and the Town of Tecumseh and their officials and staff, and the Consulting Engineer and its staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Municipal Clerk and the Consulting Engineer prior to the commencement of work.
- m) Monthly progress orders for payment shall be furnished the Contractor by the 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 Municipality that there are no liens or claims against the work and that all of the requirements as per the Construction Act, 2018 and its subsequent amendments have been adhered to by the Contractor.

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

APPENDIX “REI-A”

STANDARD 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 may 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.

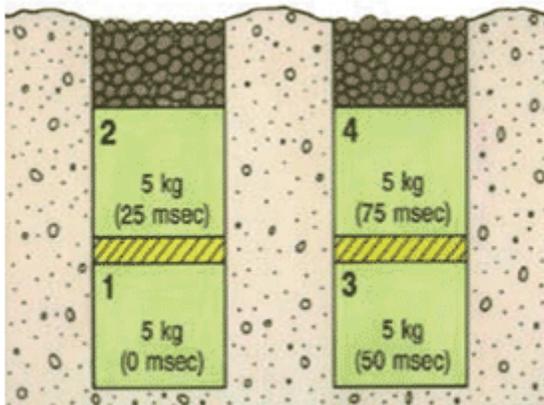
- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious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

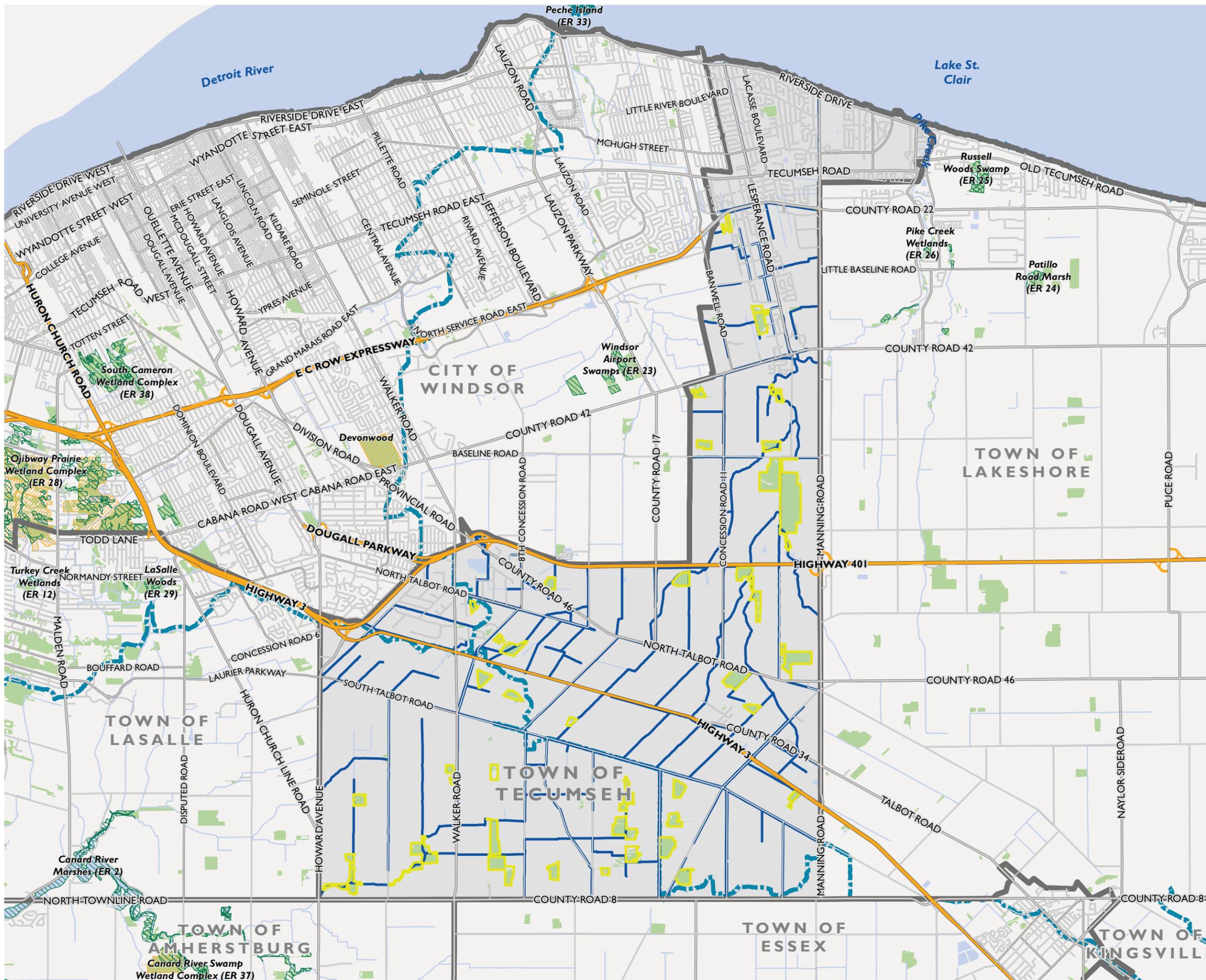
- Forest

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 MNR 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 cross 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)

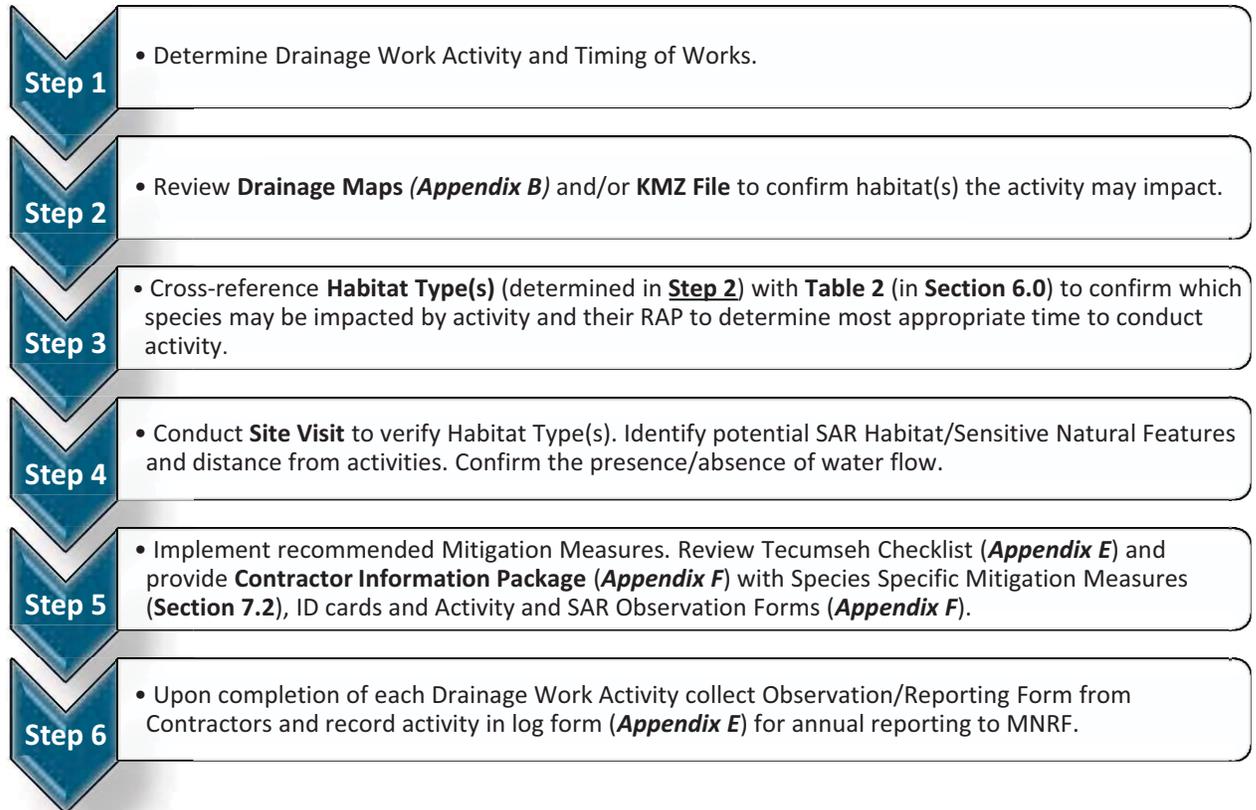
Scientific Name	Common Name	ESA ¹	Preferred Habitat Type ²	Restricted Activity Period
Snakes (2 species)				
<i>Pantherophis gloydi</i>	Eastern Foxsnake (Carolinian population)	END	All ³	September 20 to May 31
<i>Thamnophis butleri</i>	Butler's Gartersnake	END	All ³	
Fishes (2 species)				
<i>Notropis 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.



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	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 MNR 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	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.



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).
Eastern Meadowlark	<ul style="list-style-type: none"> • Limit construction footprint where possible. • Conduct work outside of the RAP for birds where possible. • 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.

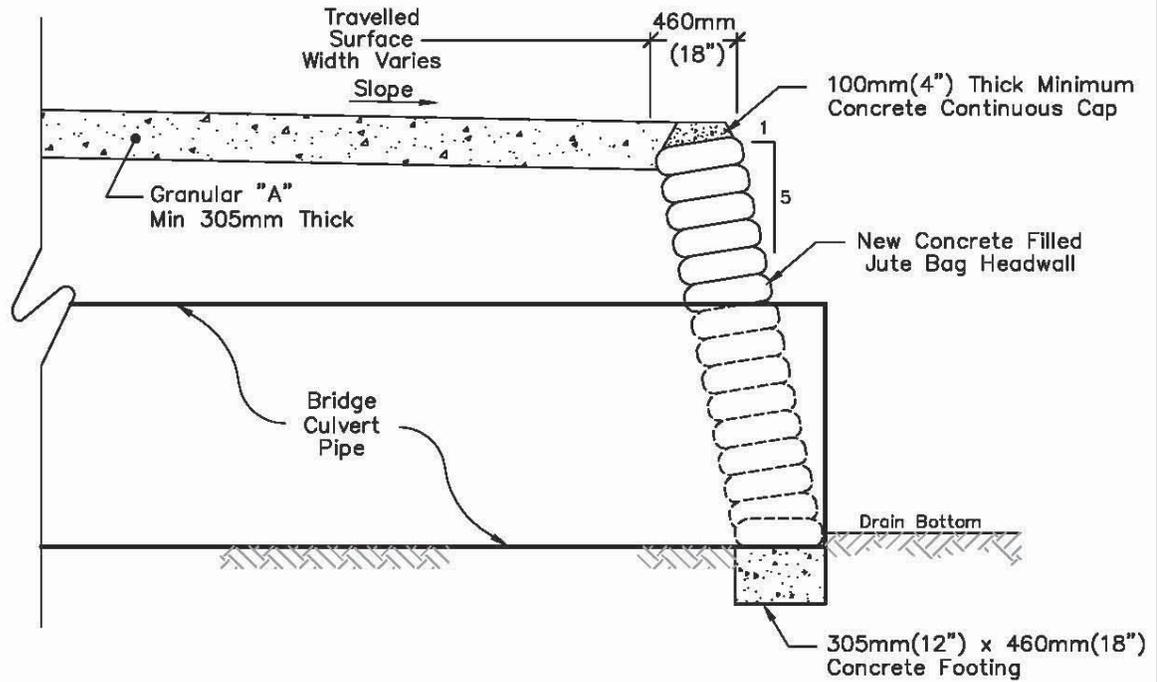
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

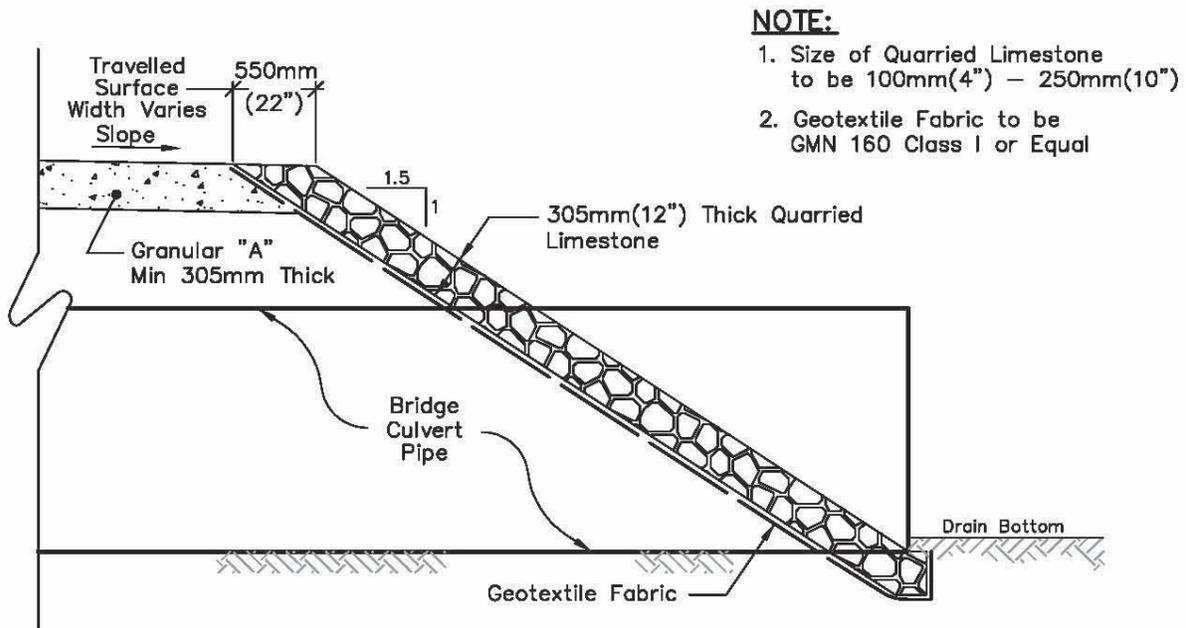
Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

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

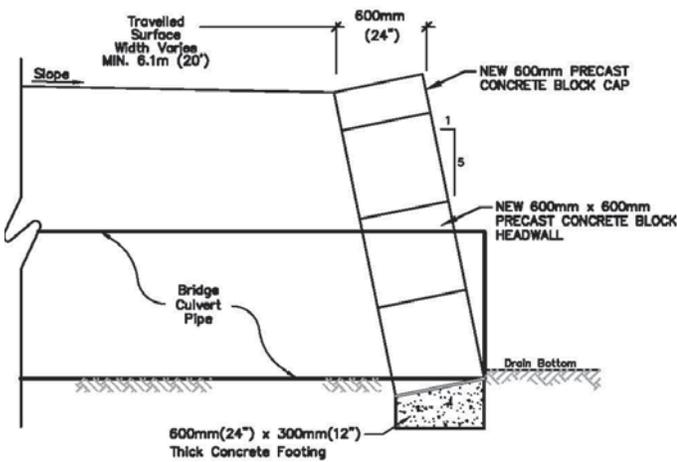
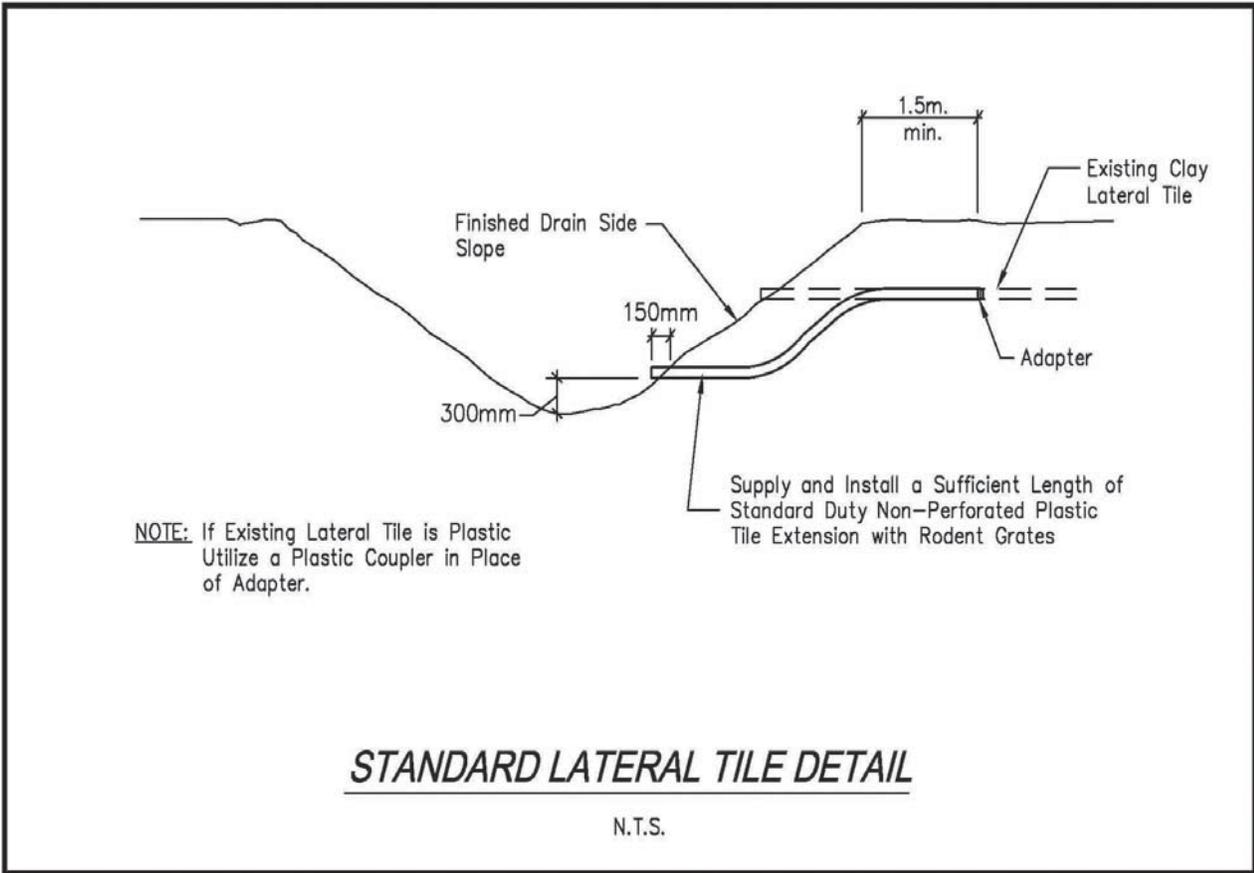
Rood Engineering Inc.

Consulting Engineers

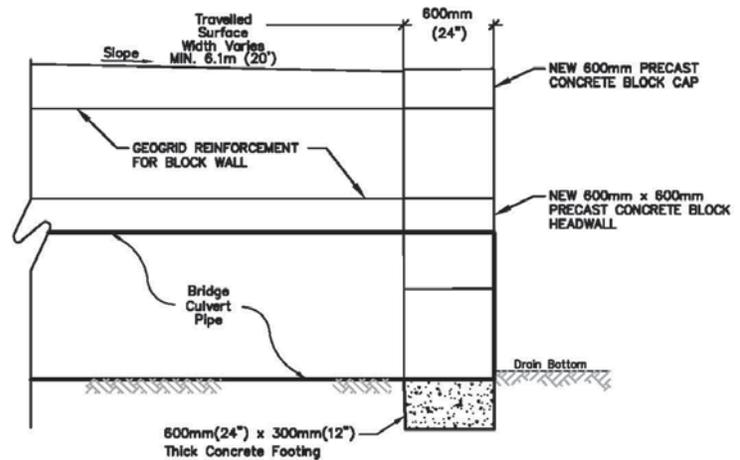
9 Nelson Street

Leamington, Ontario N8H 1G6

519-322-1621



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



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



Block Headwall Installation Instructions for Culverts

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

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.

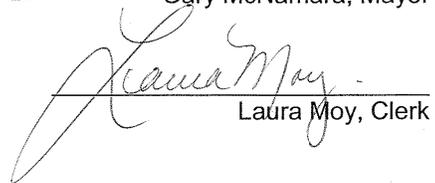
3. **That** paragraph 5.3 be deleted and replaced with the following paragraph:

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.

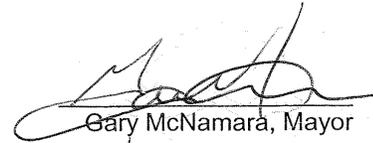
10. **EFFECTIVE DATE**

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

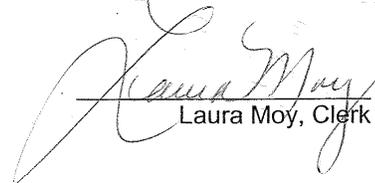
11. **REPEAL**

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, PROFILES, PLANS, AND SECTIONS

FOR THE

HURLEY RELIEF BRANCH DRAIN AND UPPER PART OF THE HURLEY RELIEF DRAIN

(Geographic Township of Sandwich South)

IN THE

TOWN OF TECUMSEH

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Road
GERARD ROAD, P.ENG.



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

DATE: November 20th, 2019

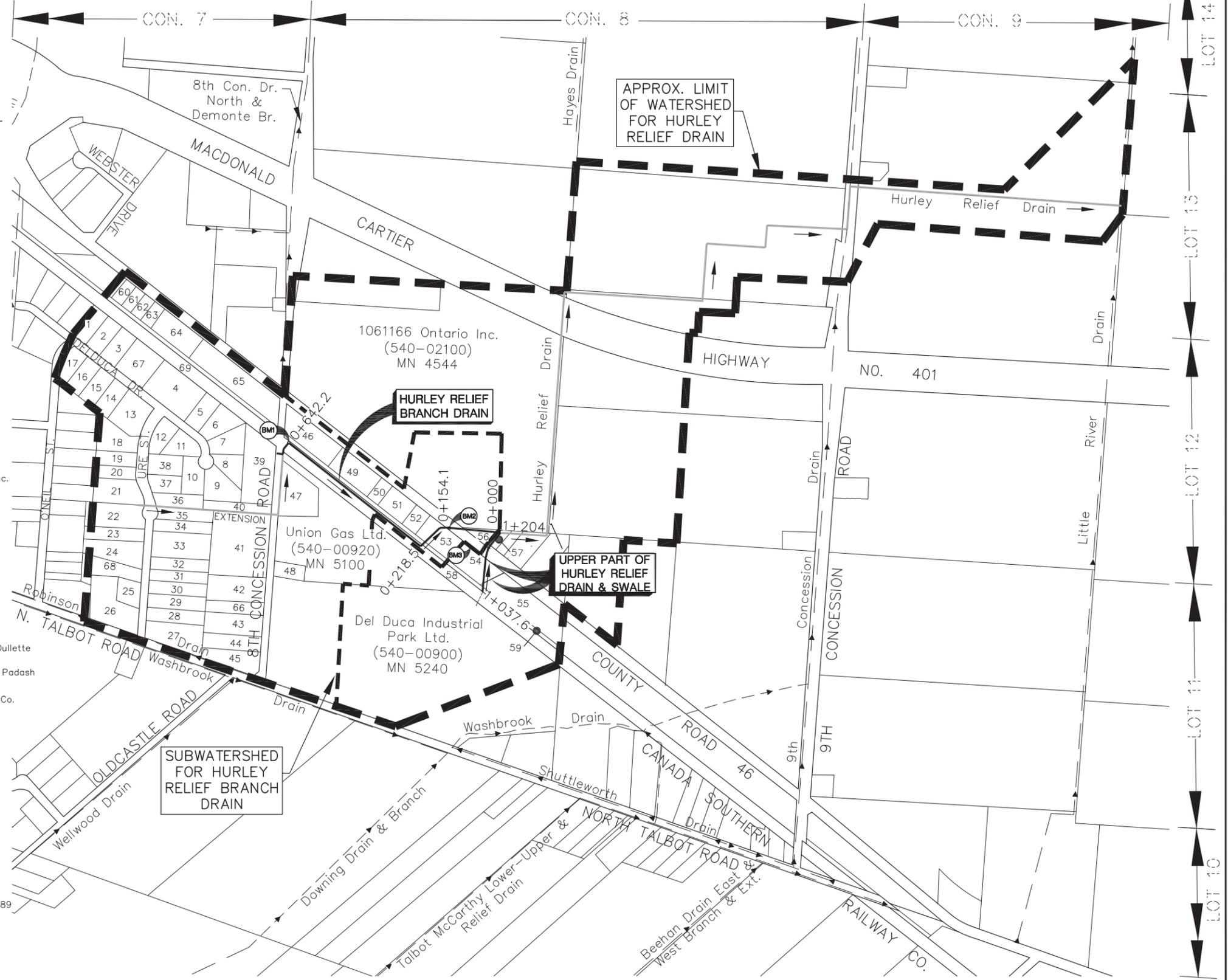
TOWN OF TECUMSEH

MAYOR: GARY McNAMARA
CLERK: LAURA MOY
DRAINAGE SUPERINTENDENT: SAM PAGLIA, P.ENG.

BENCHMARKS:

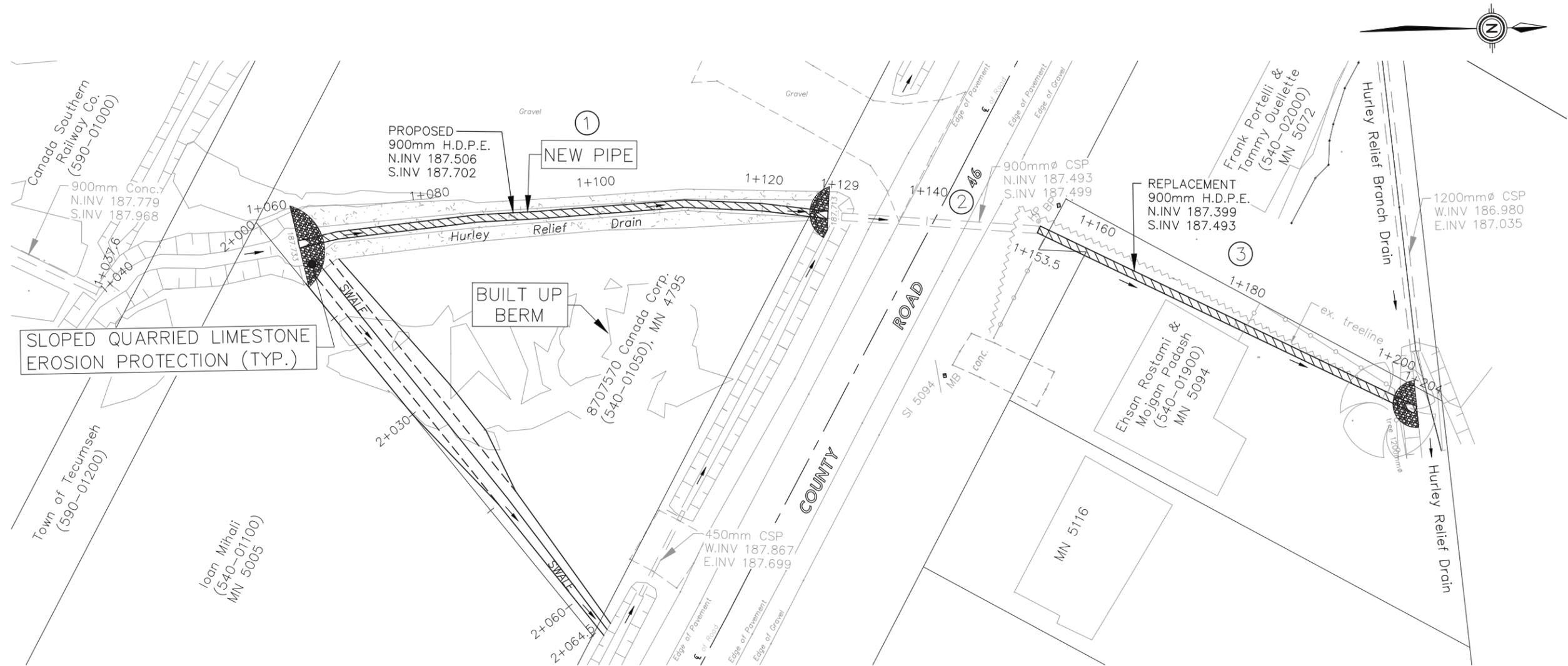
- 1) TOP NORTH OBVERT 900mm# CONC. PIPE UNDER CANADA SOUTHERN RAILWAY CO. AT EAST SIDE 8TH CONCESSION ROAD
ELEV. = 188.289m
- 2) SOUTHEAST CORNER OF CONCRETE CURB FOR BRIDGE NO. 5 ON SOUTH SIDE OF COUNTY ROAD 46
ELEV. = 189.352m

- | | | |
|---|--|---|
| 1. Calframax Holdings Inc. (550-20020), MN 3700 | 24. West Industries Inc. (550-20240), MN 5155 | 47. Ecotemp Investments Inc. (540-00910), MN 5140 |
| 2. Matward Holdings Ltd. (550-20019), MN 3750 | 25. Mamatas Real Estate Holdings Ltd. (550-20260), MN 5175 | 48. Gurpreet Dhillon (540-00905), MN 5180 |
| 3. 2612491 Ontario Ltd. (550-20018), MN 3800 | 26. Mamatas Real Estate Holdings Ltd. (550-20300), MN 3920 | 49. Vic Mur Enterprises (540-00940), MN 4565 |
| 4. 2446126 Ontario Ltd. (550-20014), MN 4000 | 27. Jin Hu Holdings Inc. (550-19820), MN 4000 | 50. Super Lighting & Decor Inc. (540-00950), MN 4585 |
| 5. Calframax Holdings Inc. (550-20012), MN 4100 | 28. Computool Investments Inc. (550-19822), MN 5180 | 51. 1818670 Ontario Ltd. (540-00960), MN 4587 |
| 6. 2189165 Ontario Ltd. (550-20011), MN 4150 | 29. 1068420 Ontario Inc. (550-19824), MN 5170 | 52. Voltuara Investments Ltd. (540-01000), MN 4591 |
| 7. Filippo Liburdi Construction Ltd. (550-20010), MN 4200 | 30. Blue Line Mold Inc. (550-19826), MN 5160 | 53. Robert Weir & Dorothy Suzor (550-01040), MN 4595 |
| 8. 2030185 Ontario Ltd. (550-20009), MN 4250 | 31. 2449620 Ontario Inc. (550-19828), MN 5156 | 54. 8707570 Canada Corp. (540-01050), MN 4795 |
| 9. 2030185 Ontario Ltd. (550-20007), MN 4300 | 32. 2355406 Ontario Ltd. (550-19830), MN 5150 | 55. Ioan Mihali (540-01100), MN 5005 |
| 10. Eagle Heating & Cooling Inc. (550-20006), MN 4201 | 33. 905293 Ontario Ltd. (550-19900), MN 5140 | 56. Frank Portelli & Tammy Oullette (540-02000), MN 5072 |
| 11. 2446126 Ontario Ltd. (550-20005), MN 4125 | 34. 1849658 Ontario Ltd. (550-20000), MN 5136 | 57. Ehsan Rostami & Mojgan Padash (540-01900), MN 5094 |
| 12. 2446126 Ontario Inc. (550-20004), MN 4501 | 35. N. Talbot Holdings Ltd. (550-20008), MN 5130 | 58. Canada Southern Railway Co. (590-01000) |
| 13. Del Duca Industrial Park Ltd. (550-20194), MN 3955 | 36. Rom-Ex Investment Ltd. (550-20001), MN 5100 | 59. Town of Tecumseh (590-01200) |
| 14. Del Duca Industrial Park Ltd. (550-20192), MN 3875 | 37. Carolcox Management Ltd. (550-20002), MN 5080 | 60. 1339596 Ontario Limited (550-18901), MN 4009 |
| 15. Del Duca Industrial Park Ltd. (550-20191), MN 3825 | 38. Filippo Liburdi Construction Ltd. (550-20003), MN 5060 | 61. Donald Bastien, Frank Monaco, & Thomas Masiarek, (550-18902), MN 4013 |
| 16. Rycroft Capital Corporation (550-20190), MN 3775 | 39. Prodart Enterprises Inc. (550-19400), MN 5041 | 62. Ironworkers Local 700 (550-18903), MN 4041 |
| 17. 2088307 Ontario Ltd. (550-20189), MN 3725 | 40. Giuseppe Delicata (550-19500), MN 5105 | 63. Ironworkers Local 700 (550-19000), MN 4069 |
| 18. 2076493 Ontario Ltd. (550-20195), MN 5041 | 41. West Industries Inc. (550-19502), MN 5175 | 64. 2158058 Ontario Inc. (550-19001), MN 4155 |
| 19. Sigma Engineering (Windsor) Inc. (550-20196), MN 5061 | 42. Pangeo Holdings Ltd. (550-19600), MN 5185 | 65. 401 Diesel Centre Ltd. (550-19200), MN 4293 & 4489 |
| 20. Sigma Engineering (Windsor) Inc. (550-20197), MN 5051 | 43. Riza-Cona Inc. (550-19606), MN 5205 | 66. Riza-Cona Inc. (550-19606) |
| 21. 1307649 Ontario Ltd. (550-20198), MN 5101 | 44. 2361269 Ontario Inc. (550-19610), MN 5255 | 67. 2612491 Ontario Ltd. (550-20018), MN 3900 |
| 22. Carolcox Management Ltd. (550-20200), MN 5135 | 45. 2198043 Ontario Inc. (550-19800), MN 4500 | 68. West Industries Inc. (550-20240), MN 5155 |
| 23. 2391472 Ontario Ltd. (550-20230), MN 5145 | 46. Davemarc Developments (540-00930), MN 4535 | 69. Detroit River Tunnel Company (550-20030) |

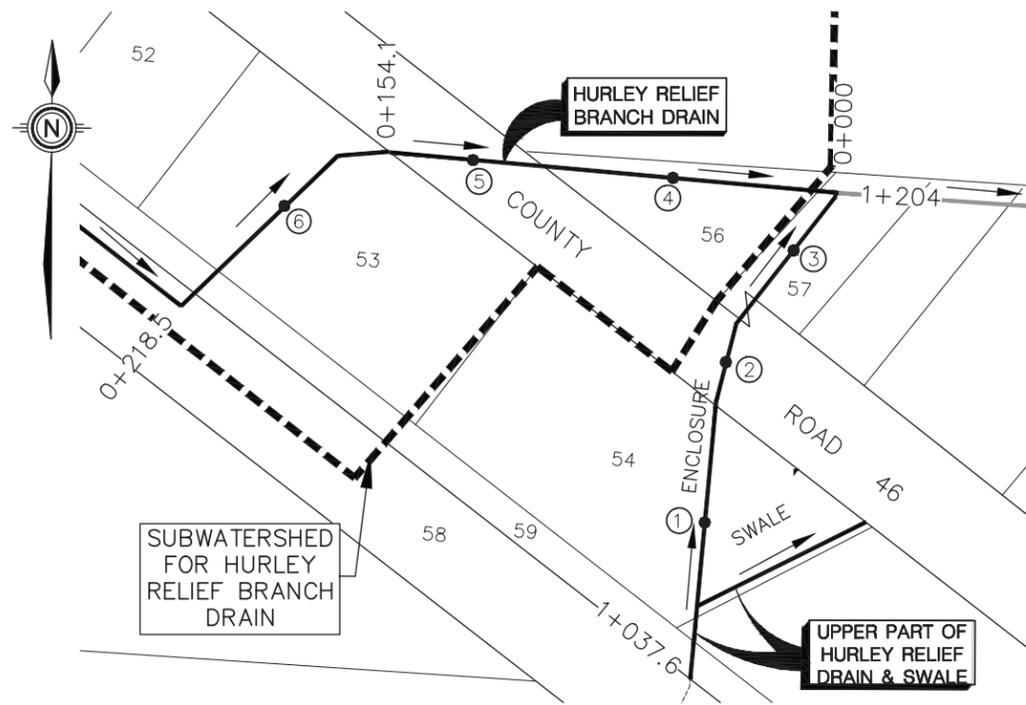


THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

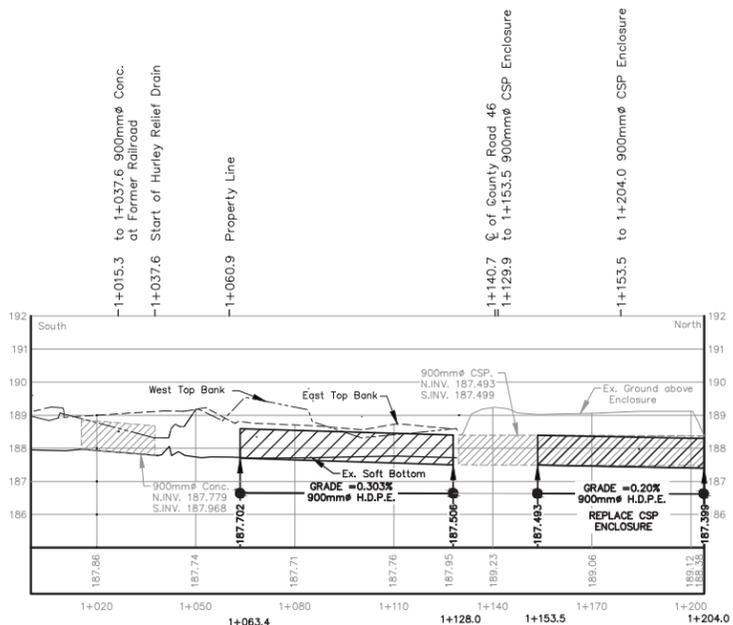
HURLEY RELIEF BRANCH DRAIN & UPPER PART OF HURLEY RELIEF DRAIN WATERSHED PLAN
Scale = 1:5,000
NOTE 1: REFER TO SHEET NO. 2
DETAIL 'A' FOR BRIDGE/ENCLOSURE
NUMBER SCHEMATIC



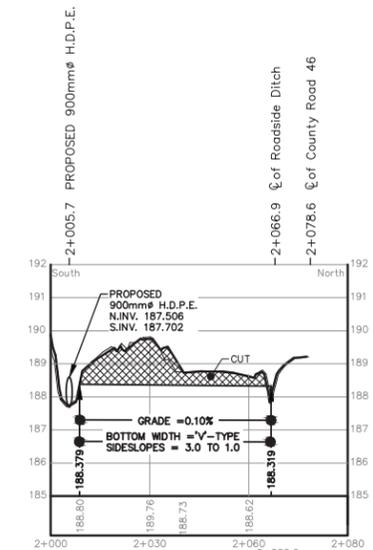
PLAN - UPPER PART OF HURLEY RELIEF DRAIN ENCLOSURES & SWALE
Scale = 1:250



DETAIL A - BRIDGE & ENCLOSURE LOCATIONS
Scale = 1:1,000

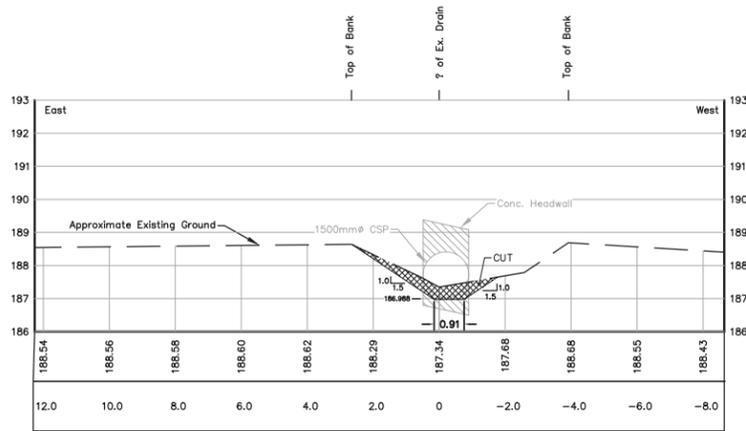


PROFILE - UPPER PART OF HURLEY RELIEF DRAIN
Scale = 1:1,000 Hor.
1:100 Vert.

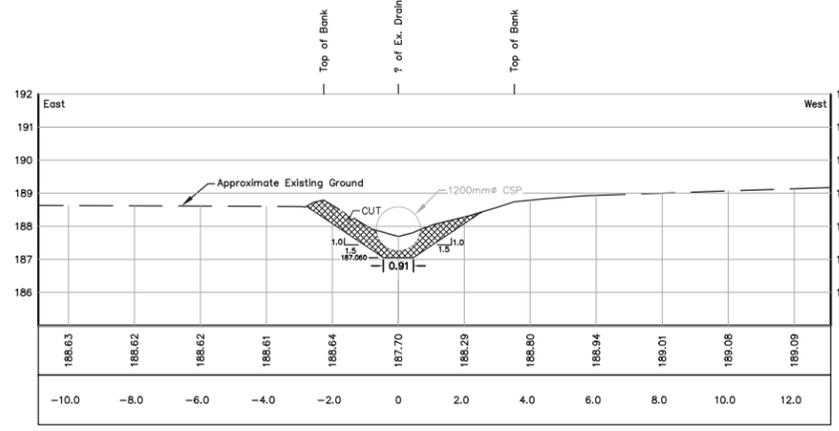


SWALE PROFILE - UPPER PART OF HURLEY RELIEF DRAIN
Scale = 1:1,000 Hor.
1:100 Vert.

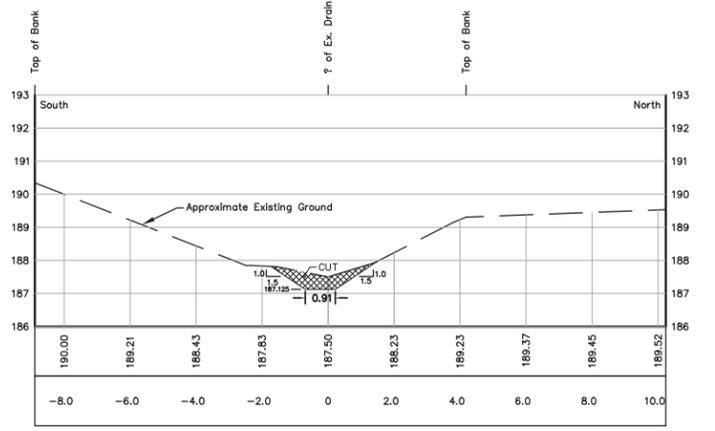
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.



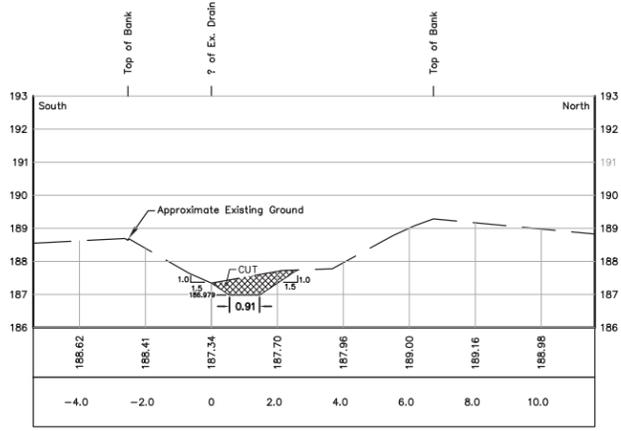
STA 0+104.2
Scale = 1:100



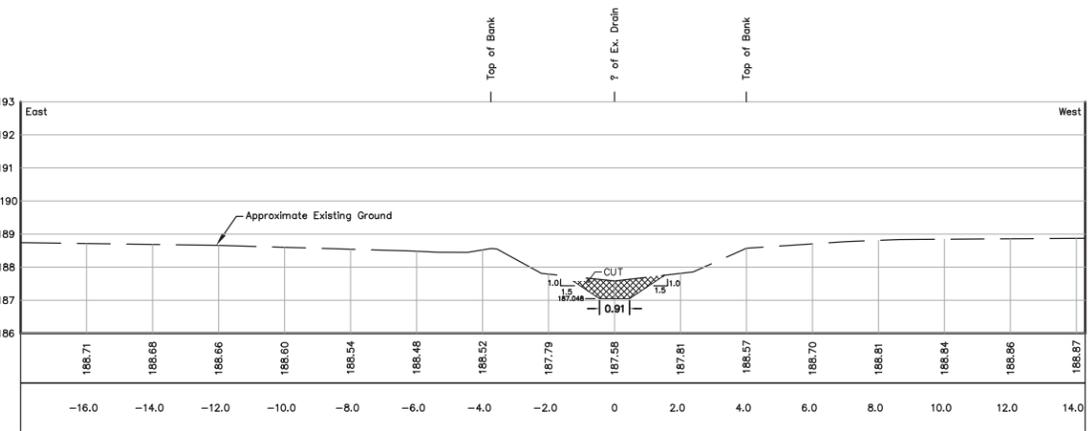
STA 0+164.7
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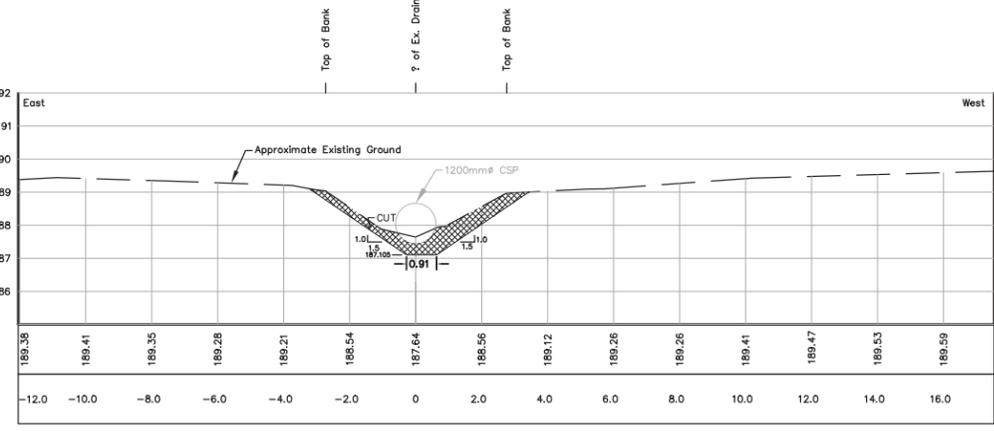
STA 0+218.5
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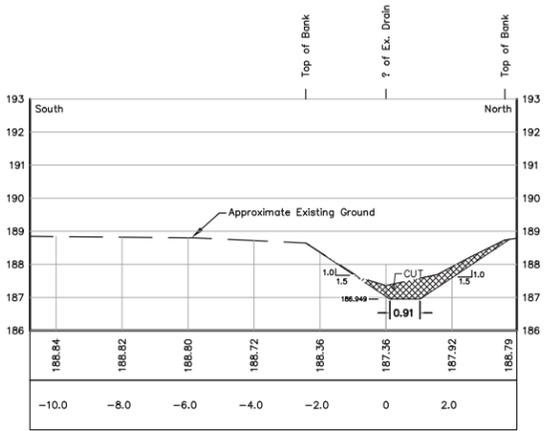
STA 0+096.9
Scale = 1:100



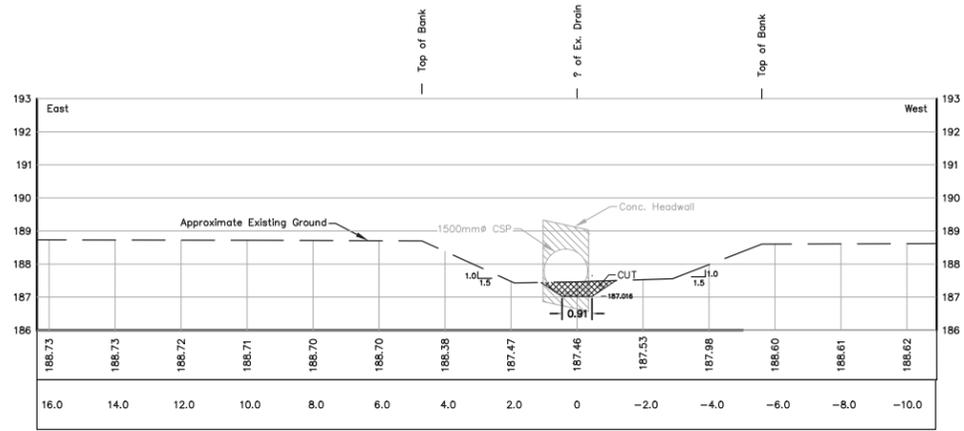
STA 0+164.1
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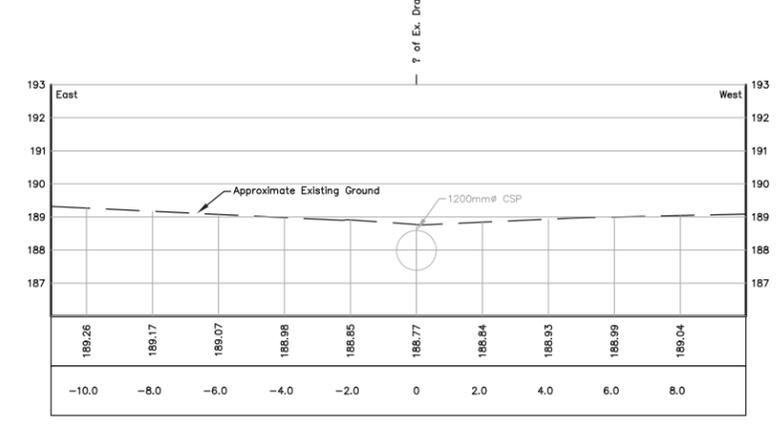
STA 0+201.4
Scale = 1:100



STA 0+071.0
Scale = 1:100



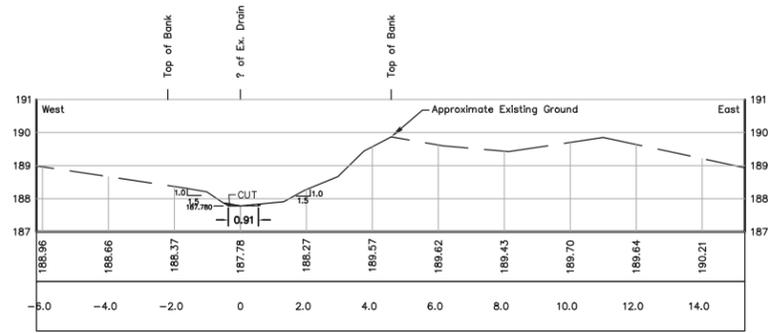
STA 0+131.6
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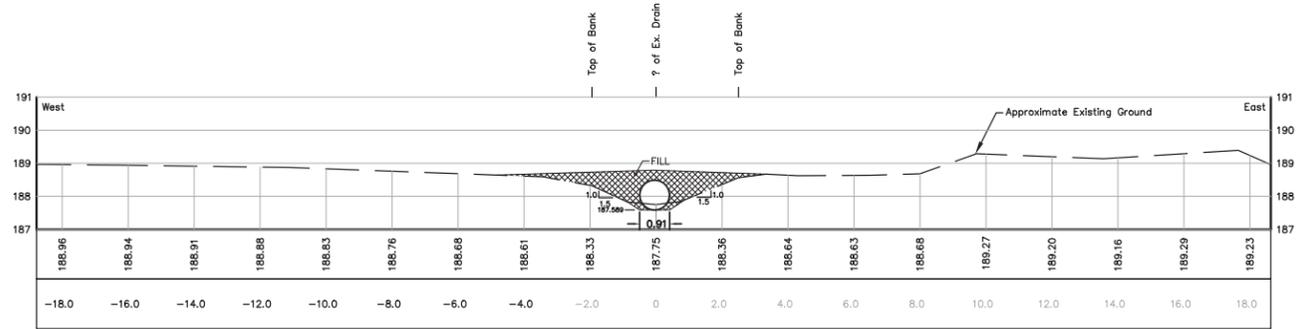
STA 0+190.0
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THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

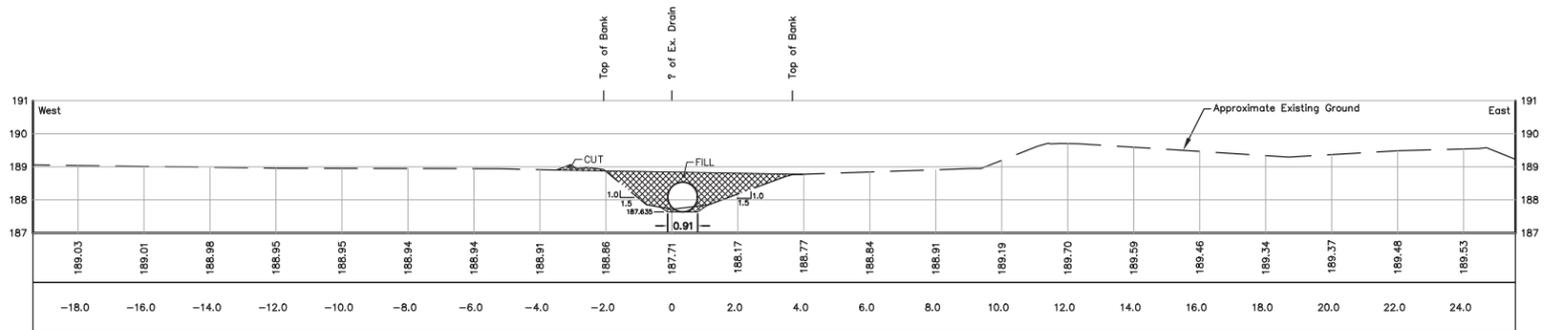
E09HU(44)



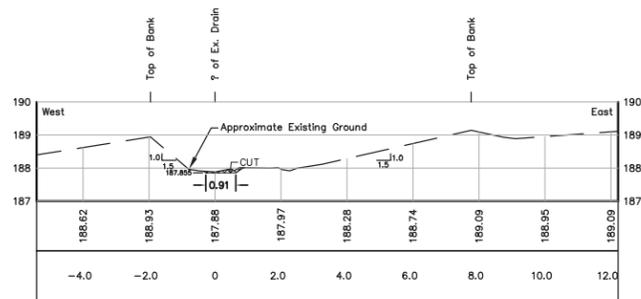
STA 1+038.3
Scale = 1:100



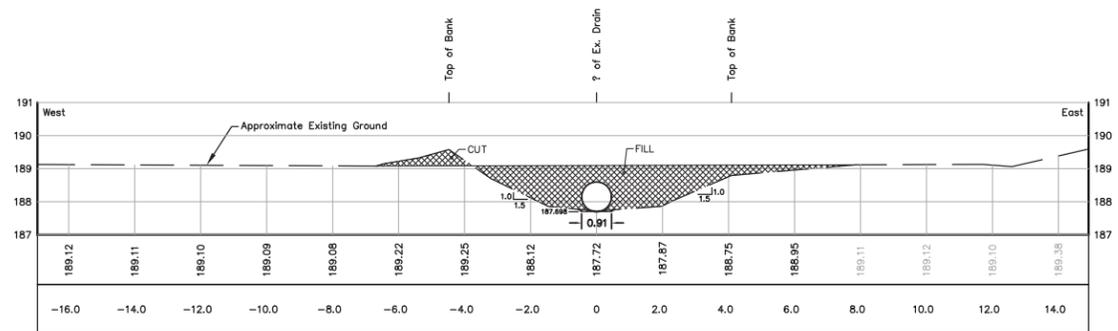
STA 1+100.1
Scale = 1:100



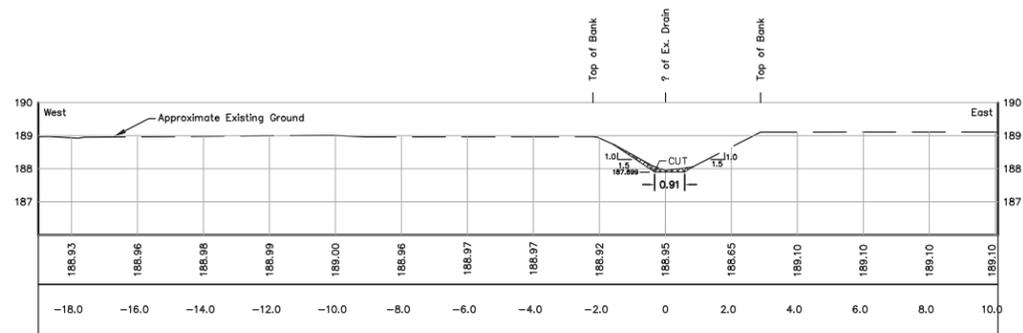
STA 1+085.2
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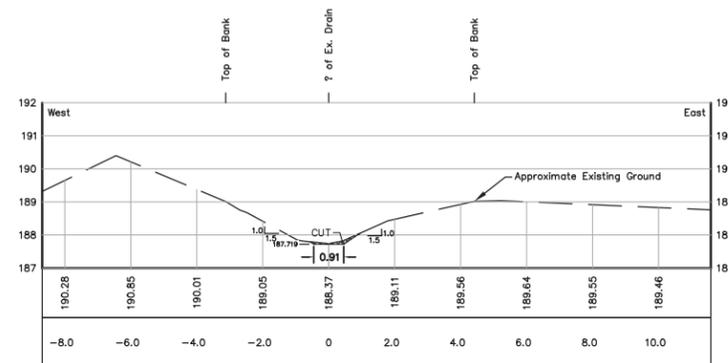
STA 1+014.4
Scale = 1:100



STA 1+064.9
Scale = 1:100



STA 1+000.0
Scale = 1:100



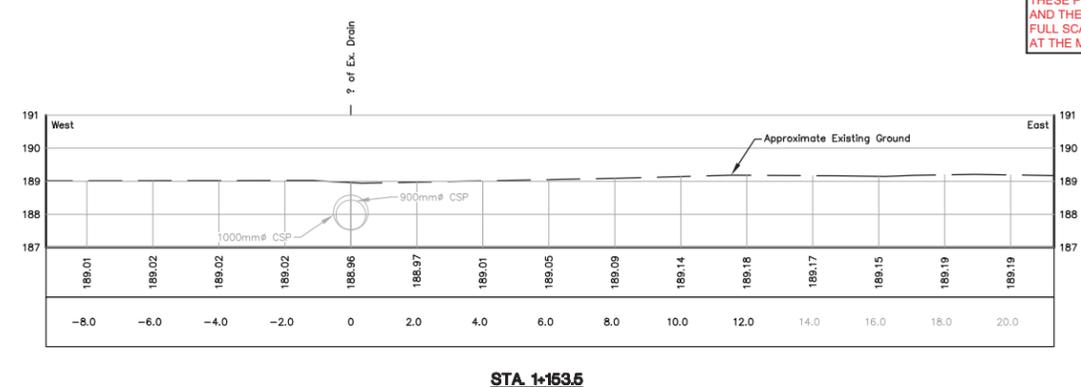
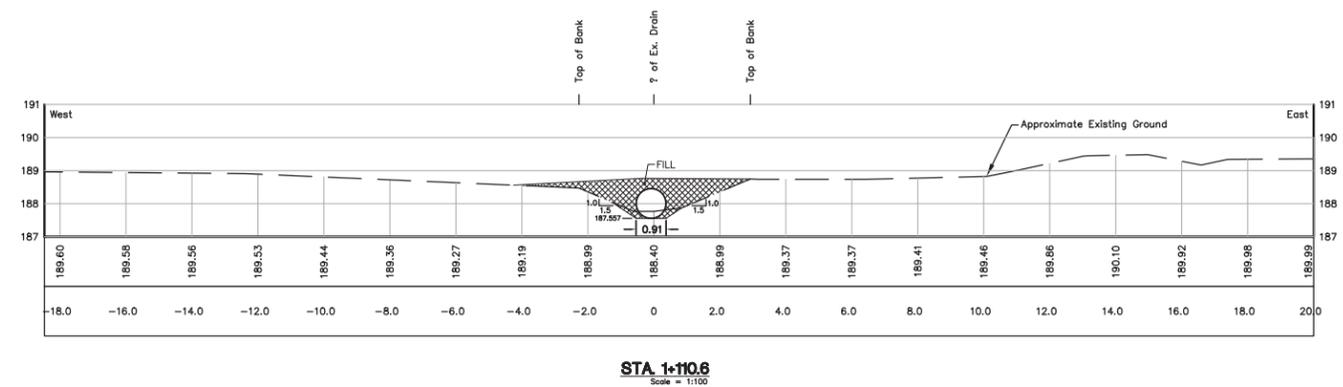
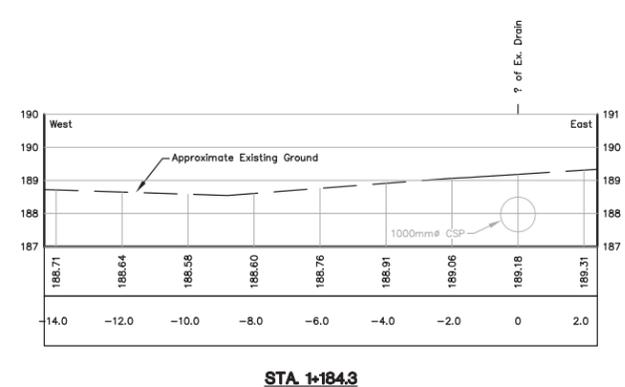
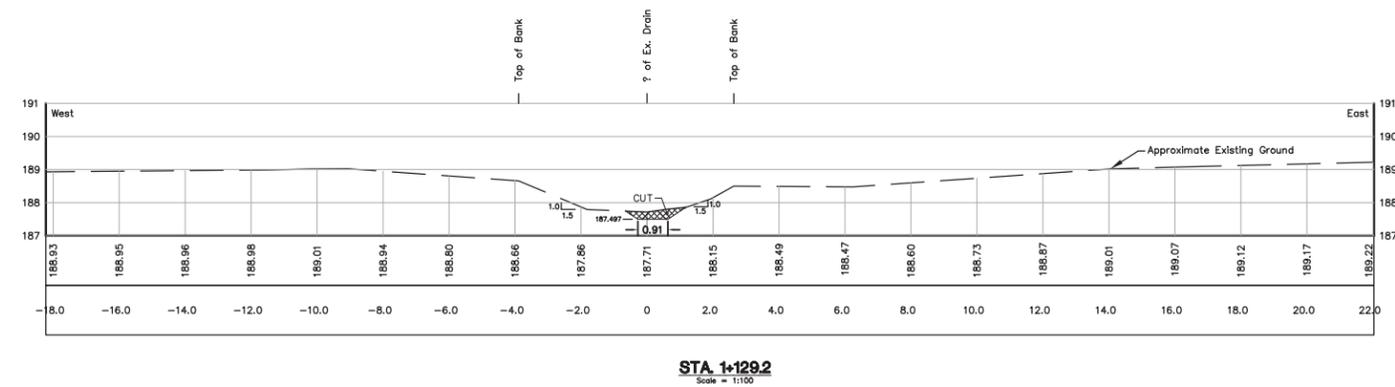
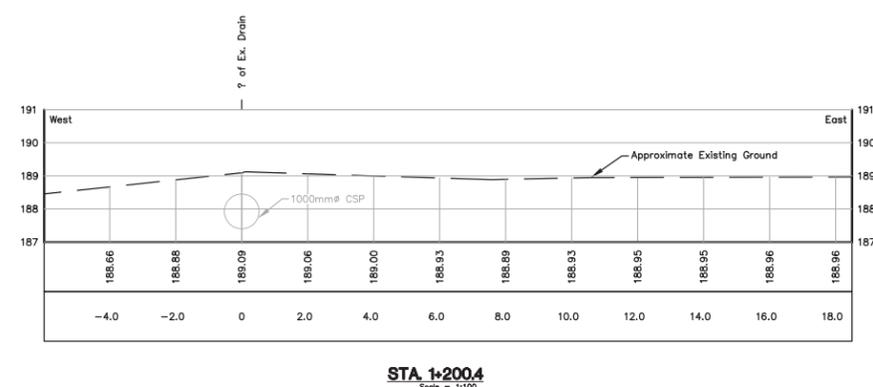
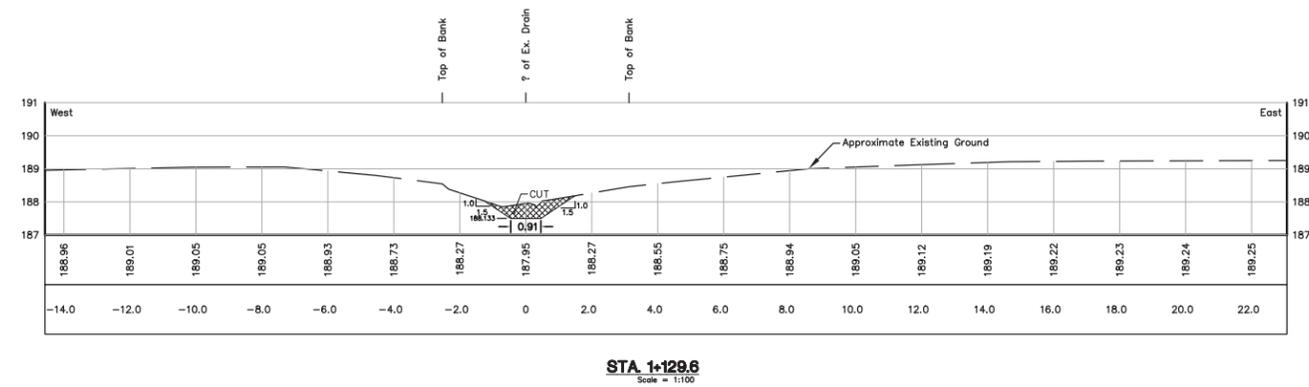
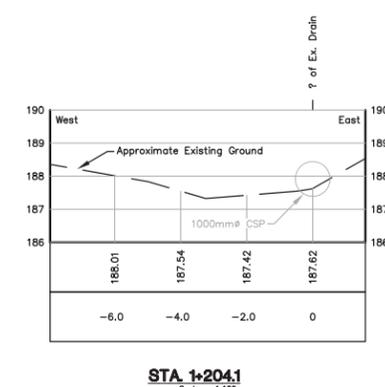
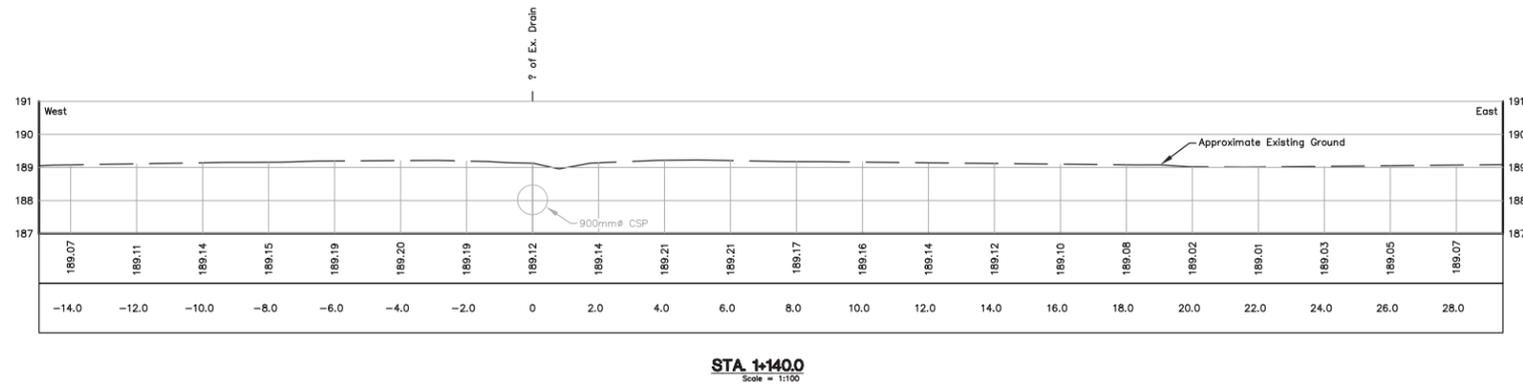
STA 1+058.1
Scale = 1:100

UPPER PART OF THE HURLEY RELIEF DRAIN (UPPER PT. ENCLOSURE & BRANCH SWALE)

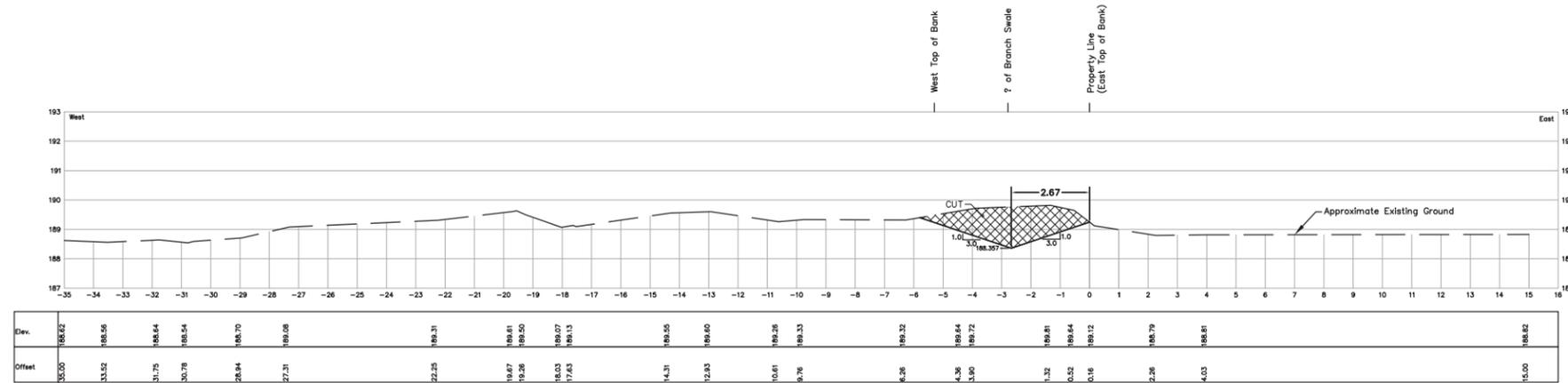
THESE PLANS HAVE BEEN REDUCED
AND THE SCALE THEREFORE VARIES.
FULL SCALE PLANS MAY BE VIEWED
AT THE MUNICIPAL OFFICE.

E09HU(44)

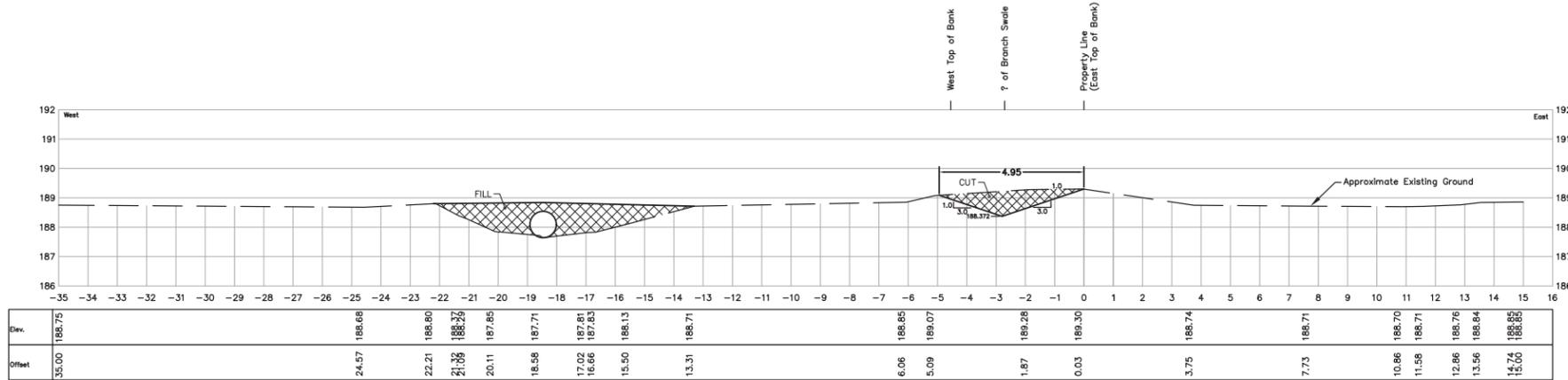
DRAWN BY: G.S. & K.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2016D013.DWG
FILE No.: REI2016D013
SHEET No.: 7 of 10



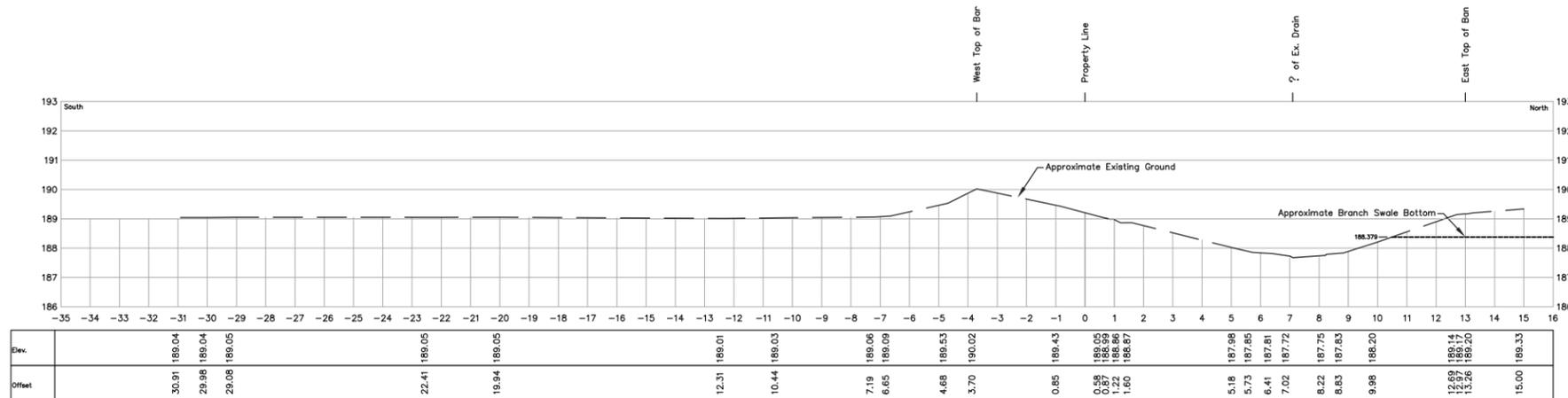
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.



SWALE BRANCH SECTION 0+030.0
Scale = 1:100



SWALE BRANCH SECTION 0+015.0
Scale = 1:100



SWALE BRANCH SECTION 0+000.0
Scale = 1:100

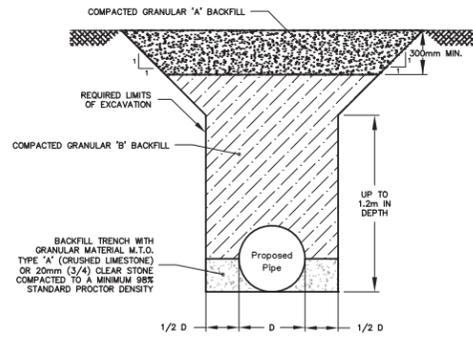
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

UPPER PT. OF HURLEY RELIEF DRAIN - SWALE BRANCH

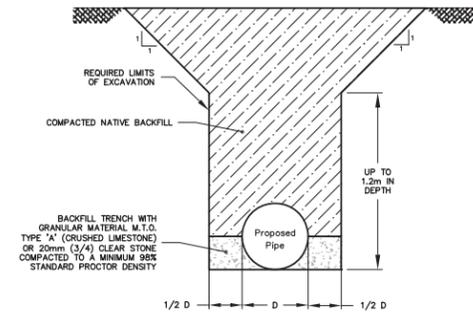
DRAWN BY: K.S.
PLOT CODE: 1:1
COMPUTER FILE: REI2016D013.DWG
FILE No.: REI2016D013
SHEET No.: 9 of 10

E09HU(44)

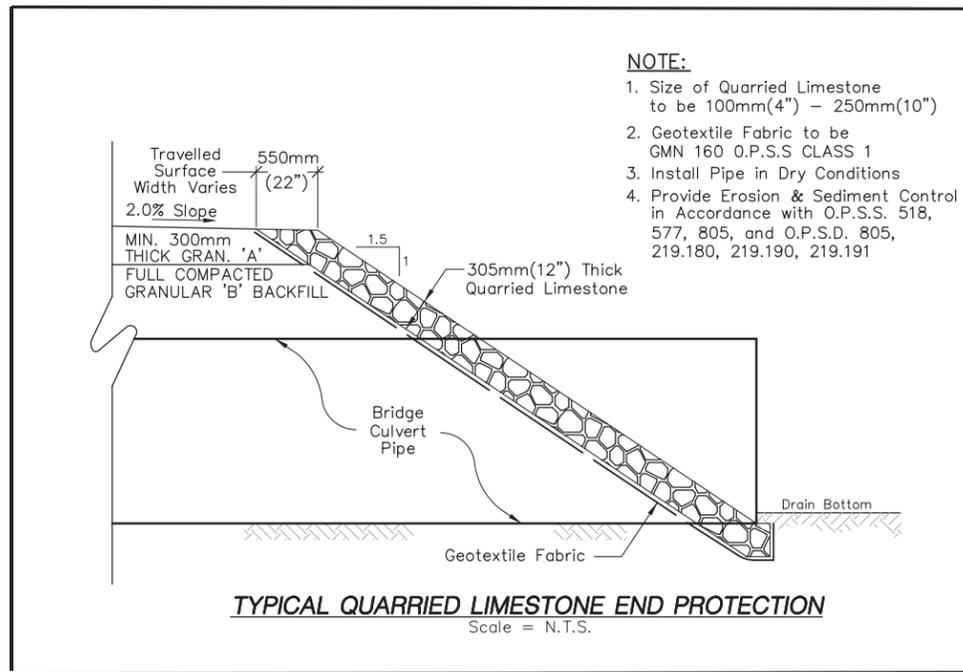
C:\Users\k.s.\Desktop\REI2016D013\Drawings\016D013 - Hurley Relief Drain - Swale Branch.dwg 2016-05-11



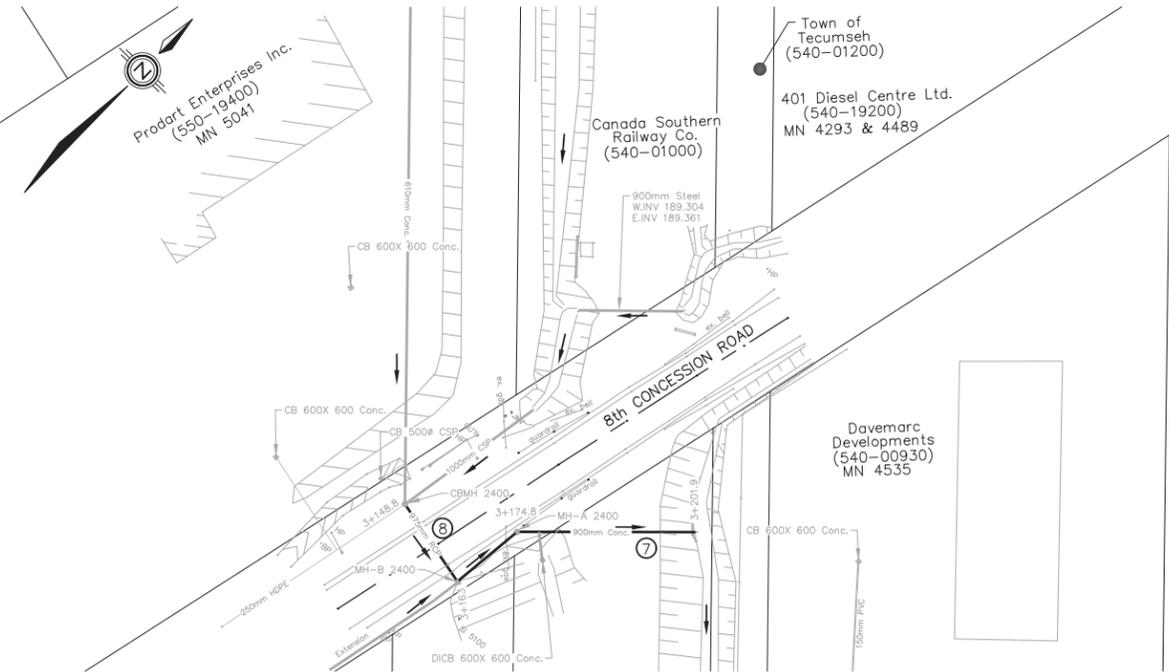
TYPICAL DRIVEWAY BACKFILL DETAIL
N.T.S.



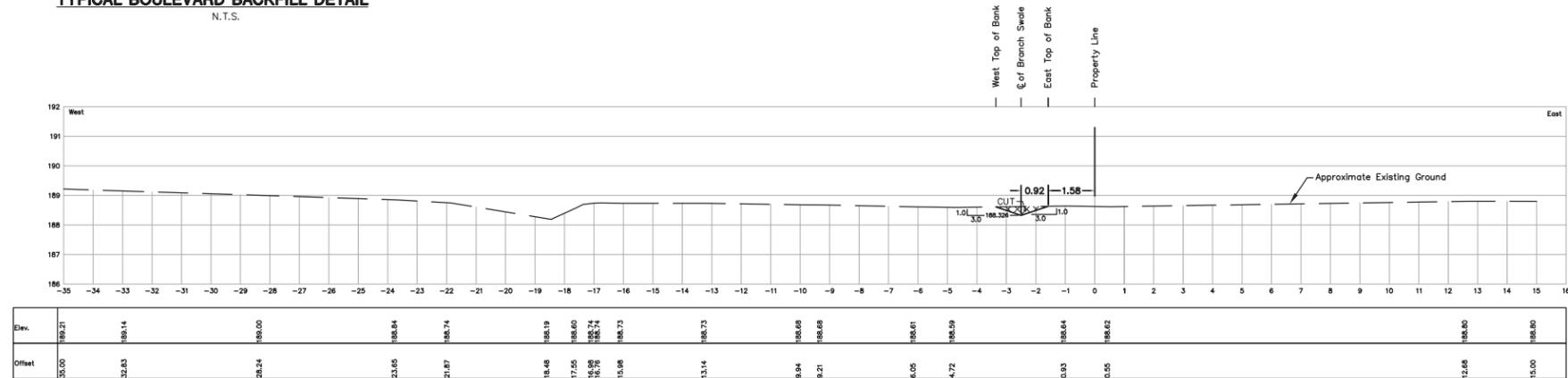
TYPICAL BOULEVARD BACKFILL DETAIL
N.T.S.



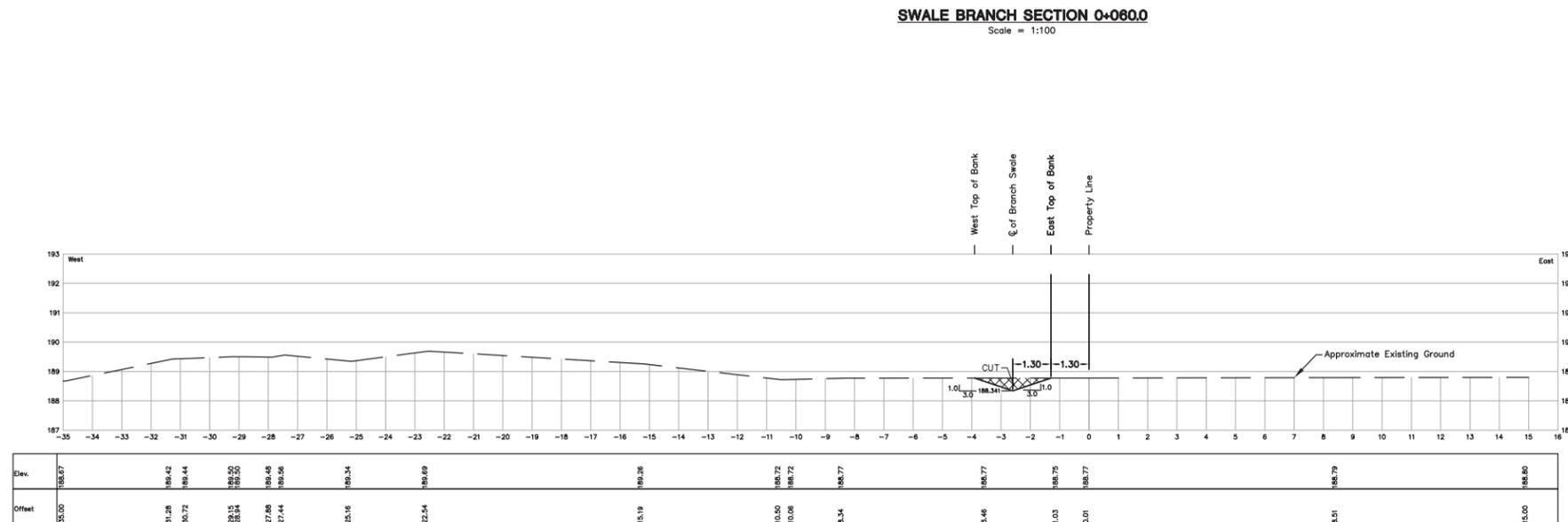
- NOTE:**
1. Size of Quarried Limestone to be 100mm(4") - 250mm(10")
 2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
 3. Install Pipe in Dry Conditions
 4. Provide Erosion & Sediment Control in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191



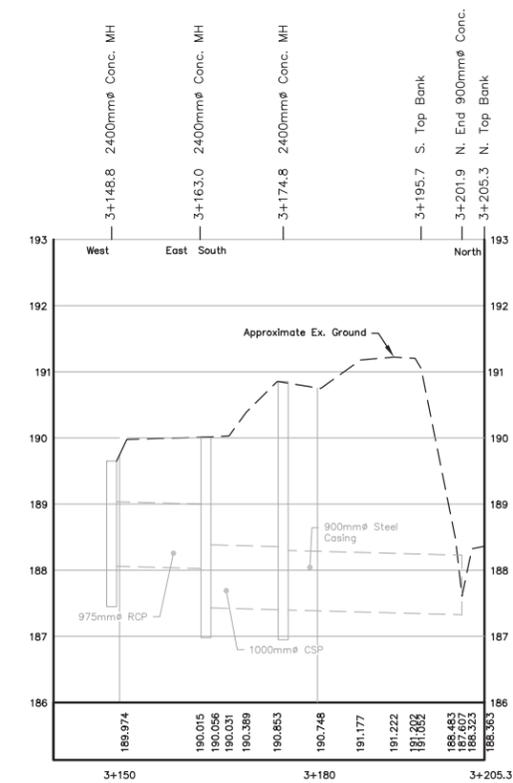
PLAN - HURLEY RELIEF BRANCH DRAIN
Scale = 1:500



SWALE BRANCH SECTION 0+060.0
Scale = 1:100



SWALE BRANCH SECTION 0+045.0
Scale = 1:100



PROFILE - HURLEY RELIEF BRANCH DRAIN
Scale = 1:500 Hor.
1:50 Vert.

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