

THE CORPORATION OF THE TOWN OF AMHERSTBURG

BY-LAW NO. 2021 – 074

By-law to provide for the 3rd Concession Drain North – Bridge for Blais based on the Drainage Report by Rood Engineering Inc.

WHEREAS a request for improvement of the 3rd Concession Drain North was received under section 78 of the Drainage Act;

WHEREAS Council of the Corporation of the Town of Amherstburg appointed an engineer for the purpose of preparation of an engineer's report for the improvements of the 3rd Concession Drain North under section 78 of the Drainage Act;

WHEREAS Council of the Corporation of the Town of Amherstburg has authorized Gerard Rood, P. Eng., to prepare a report and said engineer's report dated November 5, 2021, can be referenced as Schedule A, as attached hereto;

WHEREAS \$29,500.00 is the estimated cost of improving the drainage works;

AND WHEREAS the report was considered by the Amherstburg Drainage Board at the meeting held on December 7, 2021.

NOW THEREFORE the Council of the Corporation of the Town of Amherstburg hereby enacts as follows:

1. AUTHORIZATION

The attached report is adopted and the drainage works is authorized and shall be completed as specified in the report

2. BORROWING

The Corporation of the Town of Amherstburg may borrow on the credit of the Corporation the amount of \$29,500.00 being the amount necessary for the improvements of the drainage works.

3. DEBENTURE(S)

The Corporation may issue debenture(s) for the amount borrowed less the total amount of:

- (a) Grants received under section 85 of the Drainage Act;
- (b) Monies paid as allowances;
- (c) Commuted payments made in respect of lands and roads assessed with the municipality;
- (d) Money paid under subsection 61(3) of the Drainage Act; and
- (e) Money assessed in and payable by another municipality.

4. PAYMENT


Such debenture(s) shall be made payable within 5 years from the date of the debenture(s) and shall bear interest at a rate not higher than 1% more than the municipal lending rates as posted by The Town of Amherstburg's Bank's Prime Lending Rate on the date of sale of such debenture(s).


(1) A special equal annual rate sufficient to redeem the principal and interest on the debenture(s) shall be levied upon the lands and roads and shall be collected in the same manner and at the same as other taxes are collected in each year for 5 years after the passing of this by-law.

(2) All assessments of \$1000.00 or less are payable in the first year in which the

assessments are imposed.


Read a first and second time and provisionally adopted this 13th day of December, 2021.

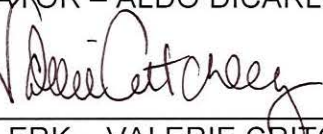


MAYOR – ALDO DICARLO


CLERK – VALERIE CRITCHLEY

Read a third time and finally passed this 4th day of ~~February~~, ²⁰²² 2024.



MAYOR – ALDO DICARLO


CLERK – VALERIE CRITCHLEY

3RD CONCESSION DRAIN NORTH

New Bridge for Blais

(Geographic Township of Anderdon)

(E09-2021-018)



Town of Amherstburg

271 Sandwich Street South
Amherstburg, Ontario N9V 2A5
519-736-0012

Rood Engineering Inc.

Consulting Engineers

*9 Nelson Street
Leamington, Ontario N8H 1G6
519-322-1621*

*Project REI2021D010
2021-11-05*

November 5th, 2021

Mayor and Town Council
Corporation of the Town of Amherstburg
271 Sandwich Street South
Amherstburg, Ontario
N9V 2A5

Mayor DiCarlo and Members of Council:

3RD CONCESSION DRAIN NORTH
Bridge for Blais (E09-2021-018)
(Geographic Twp. of Anderdon)
Project REI2021D010
Town of Amherstburg, County of Essex

I. INTRODUCTION

In accordance with the instructions received from you at your July 6th, 2021 meeting and confirmed by letter dated July 7th, 2021, from your Drainage Superintendent and Engineering Coordinator, Shane McVitty, P.Eng., we have prepared the following report that provides for the construction of a new bridge culvert in the 3rd Concession Drain North. The 3rd Concession Drain North is an open drain with a number of access bridges and enclosures. The drain extends from its outlet in the Dupuis Drain, at the southeast corner of the County Road 8 (North Townline Road) and Concession Road 3 North intersection, in a southerly direction along the east side of Concession Road 3 North. It continues southerly along the east side of the roadway to the upper end of the open drain approximately 1384 metres from County Road 8 to its head near the midpoint of Lot 12, Concession 3. A plan showing the 3rd Concession Drain North, its approximate watershed, as well as the general location of the bridges along the drain, is included herein as part of the report.

Our appointment and the works relative to the new culvert bridge in the 3rd Concession Drain North, 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 bridge enclosure and drain improvements, and we report thereon as follows.

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:

Report – 3rd Concession Drain North
Bridge for Blais (E09-2021-018)
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- | | | | |
|----|--------------------|---|--------------------------|
| 1) | January 20th, 1970 | Repair and improve 3rd Concession Drain and bridges | C.G.R. Armstrong, P.Eng. |
| 2) | October 14th, 1980 | Repair and improvement of the Dupuis Drain | E.P. Sullo, P.Eng. |
| 3) | November 1st, 1989 | 3rd Concession Drain culvert for Gosselin | Nick Peralta, P.Eng. |
| 4) | June 30th, 1992 | 3rd Concession Drain Beneteau enclosure | Lou Zarlenga, P.Eng. |
| 5) | May 30th, 1997 | Repair and improvement of the Dolphis Meloche Drain | E.O. LaFontaine, P.Eng. |
| 6) | April 24th, 2015 | Repair and improve drain and bridges | Gerard Rood, P.Eng. |

The 2015 Report by Gerard Rood, P.Eng. provided for many of the culverts to be improved along the length of the drain and the latest profile for the grading of the drain. The recent report on the drain also provided an updated Maintenance Schedule of Assessment pursuant to Section 76 of the Drainage Act. We arranged with the Town to provide us with the updated assessment roll information for the affected parcels.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the drainage information provided by the Town, we arranged with the Drainage Superintendent, Shane McVitty, to schedule an online on-site meeting for August 26th, 2021. The following people were in attendance at said meeting: Richard Bastien, Robert Blais, John Wladarski, Shane McVitty (Drainage Superintendent), Gerard Rood (Rood Engineering), and Kayla Daguette (Rood Engineering). Mr. McVitty provided an introduction. He noted that the Town had received a request from Mr. Blais for a new bridge culvert to complete a severance of his property. Mr. Rood told the owners that the processing of the report could take 4-5 months and the construction timing window would be after November 1st.

Mr. McVitty explained that cost sharing is typically provided for a standard access bridge installation. Mr. Rood advised that the extra cost of any top width beyond the standard 6.1m (20 ft.) is borne by the owner.

Mr. McVitty asked the owners if there was a need to clean the drain immediately as this could be done under maintenance provisions of the Drainage Act. Maintenance on a Municipal drain can be initiated by any assessed owner at any time by putting in a notice to the Town. There is a

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billing done to the affected owners each time that maintenance work is done. The owners indicated that there was no urgency to clean the drain.

It was noted that agricultural lands are expected to be eligible for a 1/3 grant on their total assessment if they are qualified under the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) Agricultural Drainage Infrastructure Program (A.D.I.P.) policies as Farm Property Tax Class.

Mr. Rood outlined that a standard bridge top width is 6.1 metres (20 feet) for a residential or agricultural access. Bridges can be done with stacked concrete filled jute bag, sloped quarried limestone on filter cloth ends, or precast concrete blocks, with the owner usually selecting the cheapest option. All pipes will be embedded in the drain bottom for 10% of their diameter in accordance with current Essex Region Conservation Authority (E.R.C.A.) and Department of Fisheries and Oceans (D.F.O.) requirements.

To complete the severance the owner expressed interest in having the new access bridge pipe connect to the existing C.S.P. serving the immediate upstream property, thereby extending the existing enclosure. In addition to agreeing on the standard 6.1m top width, Robert Blais agreed that rip rap sloped end wall treatment would be sufficient on the downstream end.

John Wladarski asked about the project timeline and when they can expect to hear more. Gerard stated that he will try to get the report out by September. Shane added that the Town will try for the October agenda, advising Planning about the bridge and getting a clearance to proceed. He doesn't expect any concerns and it should be processed quickly.

John asked more questions regarding the engineering costs, tender information and choosing a contractor. Gerard answered that the approximate report cost is \$6000.00 and that the Tenderer is appointed through the Town for legal protection. Shane continued and added that since 100% of the cost is upon the owner, the owner can choose a contractor that is qualified. Shane has a list of contractors for their review, or he can send out requests to qualified contractors.

Richard asked about the upfront cost to the owner and any new costs. Gerard explained the upfront costs associated with the new bridge installation and the life expectancy of the new pipe. He added that the older connecting pipe will be inspected and maintained prior to connecting the new portion. He then went on to outline the aspects of cost sharing for any future maintenance with values following the sharing set out in the 2015 drainage report.

IV. FIELD SURVEY AND INVESTIGATIONS

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

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A number of bench marks were established from the April 24th, 2015 Gerard Rood, P.Eng. report, being, the top northwest corner of the box culvert at Concession Road 3 North and County Road 8. Other benchmarks included top of hydrant at St. Josephs school yard on Concession Road 3 North and top of hydrant at M.N. 3944 Concession Road 3 North. These said benchmarks were utilized in establishing a correlation between the old report and new survey for the bridge. We also surveyed the drain both upstream and downstream of the proposed access bridge/enclosure extension and picked up the existing culvert elevations in order to establish a design grade profile for the installation of the new bridge. Cross sections were taken of the 3rd Concession Drain North at the general location of the proposed new bridge, as necessary for us to complete 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. requirements for work that would be proposed to be carried out on the section of the 3rd Concession Drain North. A response from the Conservation Authority was received via email on July 7th, 2021. E.R.C.A. stated that the portion of the 3rd Concession Drain North is located within a regulated area administered by E.R.C.A. Accordingly, a permit or approval will be required by E.R.C.A. for any works to the affected portion of the 3rd Concession Drain North.

Former Ministry of Natural Resources & Forestry (M.N.R.F.) 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 by the Town and their contractor. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

For the purposes of establishing the watershed area upstream of the proposed bridge, and determining the pipe size required, we investigated and reviewed the 2015 Engineer's Report of Gerard Rood, P.Eng. on the 3rd Concession Drain North and the Schedule of Assessment.

V. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the April 24th, 2015 report plans provides a good fit to the majority of the bridges in the drain. Said report provided for improvements to many of the bridges and we have used the grades and other drain parameters to establish the design and work included for in this report.

The drain survey provided the necessary information to establish that the existing culvert to the south is in good working condition to connect the proposed new bridge pipe and extending the enclosure. In order for the connection to be made this would require the same pipe sizes at the point of connection. The existing C.S.P. size of 900mm diameter proved to be a smaller size than

what the proposed C.S.P. size is intended to be in order to accommodate flows; in addition, the requirement of having the pipe embedded 10% of its opening diameter would have the proposed pipe much deeper than existing thus eliminating the potential to connect directly to the existing pipe. It was determined that a catch basin would be incorporated into the design to ensure that the new pipe would meet embedment requirements but still establish a connection with the existing pipe enclosure to the south. It was also determined that the use of an Ultra Flo pipe would provide for better sizing connection at the catch basin and for overhead coverage purposes.

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

We have inspected the site of the new bridge/enclosure extension to be constructed in the 3rd Concession Drain North. Once the bridge extension has been constructed, we recommend that the Town keep up and maintain this bridge as part of the drainage works in the future. We recommend that standard maintenance works such as flushing and cleaning and endwall repair be carried out in accordance with the provisions of this report and the standard practice requirements and regulations at the time of the work.

We further recommend that all future maintenance work to the access bridge be carried out as provided for in this report and that the costs shall be assessed to the affected owners and upstream lands and roads in the proportions as established in this report.

Existing unpolluted connections to the drain will be extended to outlet to the proposed catch basin or the open drain beyond the new culvert pipe. The Town will work with the Owner, the Health Unit, and the Ministry of the Environment and Climate Change (M.O.E.C.C.) to address any sanitary system problems. The Owners are advised that septic flows cannot be allowed to the storm drainage system pursuant to applicable legislation.

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

- a) The new bridge culvert pipe to be installed will be set so that 10% of its diameter is below the drain design bottom in accordance with the current practice and requirements of the Conservation Authority and the Department of Fisheries and Oceans.

- b) The bridge pipe is to be provided with quarried limestone rip rap on filter cloth sloped end on the downstream side and connected to the existing upstream pipe through use of a catch basin.
- c) As this is an existing Municipal drain, the repair and improvement can be carried out based on the provisions included within the former Agreement that the Town had with M.N.R.F. and the mitigation measures included within same. A copy of said 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 **Schedule “C” Mitigation Plan** of the agreement as included in **Appendix “REI-B”** for reference by the Owners and the Contractor who will be conducting the works.

We further find and recommend as follows:

- a) **Bridge No. 11A (Robert Blais)**

We recommend that a new pipe enclosure be installed at this time in accordance with the details provided on the plans and as further set out in the Specifications forming part of this report. We recommend that this access bridge be kept up and maintained in the future by the Town as part of the Municipal drain.

We recommend that the new bridge culvert in the 3rd Concession Drain North be constructed as outlined, 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”. Based on the design being in conformance with the works in the previous drainage report for the drain repair and improvements, and in accordance with the O.M.A.F.R.A. Design Guidelines, the installation of this new bridge/enclosure will not have any adverse impacts to the level of service of the drain and there will be no negative impacts to the upstream and downstream areas of the drain.

VI. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **TWENTY-NINE THOUSAND AND FIVE HUNDRED DOLLARS (\$29,500.00)**, made up as follows:

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Bridge for Blais (E09-2021-018)
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CONSTRUCTION

| | | | | |
|-------------------------------|---|----------|-----------|------------------|
| Item 1) | Bridge No. 11A; prepare drain at new bridge location including all brushing, grubbing and topsoil and rock removal, provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of <u>10.0</u> metres (32.8 ft.) of 900mm diameter, 2.0mm thick, aluminized steel type II corrugated Ultra Flo pipe with annular ends and 191mm x 19mm corrugations, including hugger band bolted coupler; 305mm thick sloped quarried limestone rip rap on filter cloth north end protection; connection to catch basin; granular backfill including 300mm thick Granular "A" travel surface; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Robert Blais) | Lump Sum | \$ | 13,800.00 |
| Item 2) | Catch Basin No. 1; Supply and install 600mm x 1200mm precast concrete catch basin unit, with galvanized steel honeycomb grate per O.P.S.D. 403.010, including adjustment units, excavation, disposal, bedding, connections, 450mm sump, backfill, compaction and restoration, complete. | Lump Sum | \$ | 2,288.00 |
| Item 3) | Estimated net Harmonized Sales Tax (1.76% H.S.T.) on construction items above. | Lump Sum | \$ | 284.00 |
| Item 4) | Contingency Amount for Construction. | | \$ | 1,128.00 |
| TOTAL FOR CONSTRUCTION | | | \$ | 17,500.00 |

INCIDENTALS

| | | | | |
|----|--|--|----|----------|
| 1) | Report, Estimate, & Specifications | | \$ | 3,400.00 |
| 2) | Survey, Assistants, Expenses, and Drawings, Duplication Cost of Report and Drawings, Consideration Meeting, etcetera | | \$ | 3,100.00 |

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| | | |
|---|-----------|------------------|
| 3) Estimated Cost of Preparing Tender Documents | \$ | 1,000.00 |
| 4) Estimated Cost of Full-Time Supervision and Inspection During Construction (based on 2 days) | \$ | 2,000.00 |
| 5) Estimated Net H.S.T. on Items Above (1.76 %) | \$ | 168.00 |
| 6) Estimated Cost of E.R.C.A. Permit | \$ | 500.00 |
| 7) Contingency Allowance | \$ | 1,832.00 |
| | | <hr/> |
| TOTAL FOR INCIDENTALS | \$ | 12,000.00 |
| TOTAL FOR CONSTRUCTION (brought forward) | \$ | 17,500.00 |
| | | <hr/> |
| TOTAL ESTIMATE | \$ | 29,500.00 |
| | | <hr/> |

VII. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the access bridge/enclosure. The design drawings show the subject bridge location and the details of the access bridge installation, as well as the approximate location within the watershed area. The design drawings are attached to the back of this report and are labelled **Appendix "REI-E"**.

Also attached, we have prepared Specifications which set out the required construction details for the proposed access bridge/enclosure extension, which also include Standard Specifications labelled therein as **Appendix "REI-C"**.

VIII. SCHEDULE OF ASSESSMENT

We would recommend that the Total Cost for construction of this project, including incidental costs, be charged against the lands affected in accordance with the attached Construction 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

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Bridge for Blais (E09-2021-018)
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it very clear that grants are provided at the discretion of the Minister. Based on the current A.D.I.P. policies, “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 Clerk 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 the O.M.A.F.R.A. A.D.I.P. policies, we expect that this project will not be qualified for the grant normally available for agricultural lands due to the severance being after 2014. 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.

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 as provided for in the cost sharing set out in the attached Schedule of Assessment.

IX. FUTURE MAINTENANCE

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

When the maintenance costs of the individual access bridges and enclosures are being shared with upstream lands and roads, it should be noted that the percentages to be shared with the upstream lands and roads shall be assessed as an Outlet Liability against the affected lands and roads lying upstream of the access bridge or enclosure in question, including the proportion of the abutting lands located upstream of the bridge or enclosure being maintained. The cost sharing for upstream lands shall be prorated in the same proportions as the Outlet Liability values shown in the 2015 drainage report “Maintenance Schedule of Assessment” or any subsequent update to it pursuant to the Drainage Act. The share to the abutting owner(s) shall be assessed as a Benefit to the owner(s) of the parcel abutting the access bridge. Based on the 2015 drainage report table of bridge cost sharing, we recommend that the owner(s) served by the

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bridge/enclosure and catch basin installed under this report be assessed 62.5% of the cost as a Benefit, and the balance of 37.5% be assessed to the upstream lands and roads as Outlet Liability on a pro-rata basis when future maintenance work is required to this installation.

The 2015 Maintenance Assessment Schedule referenced is based on a future estimated cost of \$10,000.00; however, 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 and as noted above. We further recommend that the maintenance cost sharing as set out above shall remain as aforesaid until otherwise determined and re-established under the provisions of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

All of which is respectfully submitted.

Rood Engineering Inc.

Gerard Rood

Gerard Rood, P.Eng.



tm

att.

ROOD ENGINEERING INC.

Consulting Engineers

9 Nelson Street

LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
3RD CONCESSION DRAIN NORTH
(Blais Bridge MN 3953)
Town of Amherstburg

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

| Parcel ID | Plan No. | Lot or Part of Lot | Acres Owned | Acres Afft'd | Hectares Afft'd | Owner's Name | Value of Benefit | Value of Outlet | Value of Special Benefit | TOTAL VALUE |
|---|----------|--------------------|-------------|--------------|-----------------|--------------|---------------------|---------------------|--------------------------|---------------------|
| 17 | 3 | 14 | 1.66 | 1.66 | 0.672 | Robert Blais | \$ 18,438.00 | \$ 11,062.00 | \$ - | \$ 29,500.00 |
| Total on Privately Owned - Non-Agricultural Lands..... | | | | | | | \$ 18,438.00 | \$ 11,062.00 | \$ - | \$ 29,500.00 |
| TOTAL ASSESSMENT | | | | 1.66 | 0.67 | | \$ 18,438.00 | \$ 11,062.00 | \$ - | \$ 29,500.00 |

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1 Hectare = 2.471 Acres
 Project No. REI2021D010
 November 5th, 2021

SPECIFICATIONS

3RD CONCESSION DRAIN NORTH

Bridge for Blais (E09-2021-018)

(Former Geographic Township of Anderdon)

TOWN OF AMHERSTBURG

I. GENERAL SCOPE OF WORK

The 3rd Concession Drain North extends from its outlet in the Dupuis Drain, at the southeast corner of the intersection of County Road 8 (North Townline Road) and Concession Road 3 North, in a southerly direction along the east side of Concession Road 3 North. It continues southerly along the east side of the roadway to the upper end of the open drain approximately 1384 metres south of County Road 8 to its head near the midpoint of Lot 12, Concession 3. The work under this project generally comprises of construction of a new access bridge/enclosure serving the Blais lands in unison with a planned lot severance. The work on the bridge/enclosure being constructed includes the installation of a new catch basin for both existing and new pipe connections near Station 0+692.9; new culvert installation near Station 0+692.3; new culvert end treatment located on the north pipe end comprising of sloped quarried limestone on filter cloth end protection; granular approaches and backfill; and granular transition areas.

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

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

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 Canard River. It is intended that work on this project be carried out during relatively dry weather to ensure proper site and drain conditions and to avoid conflicts with sediment being deposited into the outlet drainage system. All disturbed areas shall be restored as quickly as possible with grass seeding and mulching installed to ensure a protective cover and to minimize any erosion from the work sites subsequent to construction. The Contractor may be

Specifications - 3rd Concession Drain North
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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 area that is classified as sensitive to impacts on aquatic life and habitat by E.R.C.A. and D.F.O.

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

- a) As per standard requirements, work will not be conducted at times when flows in the drain are elevated due to local rain events, storms, or seasonal floods. Work will be done in the dry.
- 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 Contractor is to note that the Ministry of Natural Resources and Forestry (M.N.R.F.) and Ministry of Environment Conservation and Parks (M.E.C.P.) screening process by way of a Species at Risk (S.A.R.) review of the "Endangered Species Act, 2007" (E.S.A.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. prior to construction. This Section

allows the Town to conduct eligible works of repair, maintenance and improvement to existing municipal drains under the Drainage Act, and exemptions from Sections 9 and 10 of the E.S.A., provided that the requirements are followed in accordance with Ontario Regulation 242/08. The results of the review will be provided to the Contractor and copies of the mitigation measures, habitat protection and identification sheets will be included within **Appendix "REI-B"**. Snake species including Butler's Garter Snake and Eastern Foxsnake are indicated to be threatened and endangered respectively on the agreement plans for this site. In addition, turtles along with the snakes are considered sensitive to the area and are mobile. Schedule 'C' of the agreement has provisions to protect them and mitigate any impacts. A copy of the Town review and copies of the agreement mitigation are included within **Appendix "REI-B"**.

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

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the east side of Concession 3 North. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the driveways as necessary to carry out the construction of the new access bridge, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridge to carry out the required construction of the new structure installation and ancillary work.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close Concession 3 North for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the County of Essex and Amherstburg Works Department.

Throughout the course of the work it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the lawn areas of residential properties. Due to the extent of the work and the

area for carrying out the work, the Contractor will be required to carry out all of the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

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

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

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

The Contractor shall remove all deleterious materials and rubbish along the course of the open drain in the location of the work areas and any such materials located in the bridge culvert while

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

VI. FENCING

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

VII. DETAILS OF BRIDGE WORK

When completed, the new access bridge/enclosure along the centreline of the new culvert shall have a total top width, including the top width of the quarried limestone sloped end wall on the north end, of approximately 10.0 metres (32.80 ft.) and a travelled driveway width of 6.12 metres (20.0 ft.). The adjacent quarried limestone on filter cloth bank protection shall be installed on a slope no steeper than 1.5 horizontal to 1.0 vertical and shall extend from the end of the new corrugated aluminized steel pipe structure to the top elevation of the east and west banks. A 600mmX1200mm precast concrete catch basin shall be provided to connect the south end of the new pipe to the north end of the existing pipe. The catch basin shall include a galvanized honeycomb steel grating in accordance with O.P.S.D. 403.010 and have a 450mm deep sump. The invert elevation of the pipes is approximately 175.869m and the top elevation is approximately 177.370m. The proposed pipe inverts are set approximately 90mm below the drain design grade. The Ultra Flo aluminized Type II smooth steel pipe to be provided for this project is to be supplied as no more than two (2) approximately equal lengths of pipe for the bridge and joined together with a hugger band aluminized bolted coupler with non-woven geotextile filter cloth wrapped around it, secured in accordance with the manufacturer's recommendations. The aluminized smooth steel pipe to be utilized for this bridge/enclosure installation must be a minimum of 2.0mm thick with 191mm by 19mm corrugations and shall be approved by the Town Drainage Superintendent or Engineer, prior to its placement in the drain. The Town Drainage Superintendent or the Consulting Engineer may make minor changes to the bridge alignment as they deem necessary to suit the site conditions. All work shall be carried out in general accordance with the items in the **"STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"** attached to this report and labelled **Appendix "REI-C"**.

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

The Contractor shall also note that the placement of the new access bridge culvert is to be performed totally in the dry, and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the bridge pipe and for a distance of 3.0 metres (10.0ft.) both upstream and downstream of said pipe. The design parameters of the 3rd Concession Drain North at the location of this new access bridge installation consists of a 0.90m (2.95 ft.) bottom width, 0.10% grade, and 1.5 horizontal to 1.0 vertical sideslopes. The Contractor shall be required to cut any brush and strip the existing drain sideslopes of any vegetation as part of the grubbing operation. The Contractor shall also dispose of all excavated and deleterious materials, as well as any grubbed out materials, to a site to be obtained by it at its own expense. Rip rap material at the bridge location may be salvaged and re-used if cleaned up and able to be placed as outlined further in these specifications. The Contractor shall note that the survey indicates that the existing drain bottom is slightly above the design grade. The Contractor shall be required to provide any and all labour, material and equipment to set the pipe to the required design grades. The Contractor shall also be required to supply, if necessary, for a solid base, a minimum thickness of 100mm (4") of 20mm (3/4") clear stone bedding underneath the culvert pipe, extending from the bottom of the excavation to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

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

Once the aluminized smooth steel pipe has been satisfactorily set in place at the site, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. (Ontario Provincial Standard Specification) Form 1010, with the exception of the top 305mm (12") of the backfill material for the full top width of the drain and the access bridge, which shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010.

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The Contractor shall also perform the necessary excavation to extend the driveway westerly from the east top bank of the drain to the west limit of the roadway pavement. This driveway approach from the existing edge of paved shoulder to approximately 1.0 metres east of the east top of bank shall consist of a minimum of 305mm (12") of granular material M.T.O. Type "A" satisfactorily compacted in place. The granular shall extend for the full width of the access culvert top with a 5.0m turning radius to the edge of the roadway granular, as shown on the plans. The gravel backfill shall also extend across the full access pipe width to approximately 1.0m beyond the east top of bank as shown on the plans. The pipe shall have a minimum of 685mm of cover and be uniformly graded down to the existing driveway level from the existing road edge level.

Once the aluminized smooth steel Ultra Flo pipe has been set in place at the required location, the Contractor shall completely backfill same with granular material, and install the precast concrete block headwalls and quarried limestone on filter cloth protection on both ends of the bridge. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 1, 2, 3, and 4 of the "**Standard Specifications for Access Bridge Construction**" attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in Item 4 of said Appendix. The Contractor, in all cases, shall comply with these specifications and upon completion of the precast blocks end protection installation shall restore the adjacent areas to their original conditions. All rock protection shall be 305mm (12") thick, installed on non-woven filter cloth, and shall be installed in accordance with Item 2 of the "**Standard Specifications for Access Bridge Construction**". The synthetic filter fabric to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products through Underground Specialties - Wolseley in Windsor, Ontario, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Industries Amherst Quarry, in Amherstburg, Ontario, or equal.

The aluminized smooth steel pipe for this installation shall be provided with a depth of cover measured from the top of the aluminized steel pipe to the top of the granular backfill of approximately 0.685m (26.96 in.) for the new bridge and if the culvert is placed at its proper elevations, this should be easily achieved. If the Contractor finds that the specified cover is not being met, they shall notify the Drainage Superintendent and the Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The cover requirement is **critical** and must be attained. In order for this new access bridge culvert to properly fit the channel parameters, all of the design grade elevations provided below must be strictly adhered to.

Also, for use by the Contractor, we have established a Benchmark near the site. This Benchmark is the "*top of Hydrant at M.N. 3944 Concession Road 3 North*", with same being **Elevation 178.278 metres**. The new pipe culvert and the backfilling are to be placed on the following basis:

- i) The **South (upstream) invert** of the proposed bridge culvert is to be set at Elevation **175.869 metres**.

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- ii) The **North (downstream) invert** of the proposed bridge culvert is to be set at Elevation **175.859** metres.
- iii) The centreline of driveway for this bridge installation shall be set to approximately Elevation **177.990** metres at the existing gravel shoulder edge, Elevation **177.524** metres at the culvert pipe centreline, and Elevation **177.293** metres at approximately 1.0 metre east of the east top of bank and then graded to match the existing ground elevation at each end of the granular and asphalt approaches. The access bridge driveway, in all cases, shall be graded with a cross-fall from the centreline of the driveway to the outer edges of the driveway at an approximate grade of 1.50%.

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

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

As part of the work provided for the construction of the access bridge, the Contractor shall be required to protect or extend any existing lateral tile ends, pipes and swales which conflict with the bridge installation. All existing lateral tile drains, pipes and swales, where required, shall be diverted and connected to the proposed catch basin or extended to the end of the new access bridge culvert to discharge into the sloped rock protection and shall be extended and installed in accordance with the "Standard Lateral Tile Detail" as shown in **Appendix "REI-C"**, unless otherwise noted. Connections shall be made using manufacturer's couplers wherever possible. All other connections shall be completely sealed with concrete grout around the full exterior perimeter of each joint. Grouted mortar joints shall be composed of three (3) parts of clean, sharp sand to one (1) part of Portland cement and the mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Engineer. The mortar joint shall be of a sufficient mass around the full circumference of the joint to ensure a tight, solid seal.

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

All of the granular backfill and the compaction levels for same shall be provided to the full satisfaction of the Town Drainage Superintendent or the Engineer. The Contractor shall also note that any sediment being removed from the drain bottom as previously specified herein, shall not be

utilized for the construction of the driveway, and shall be disposed of by the Contractor to a site to be obtained by it at its own expense. The Contractor shall be required to restore any and all drain sideslopes damaged by the access bridge installation and removal of vegetation and rock protection, utilizing the available scavenged topsoil, and shall seed and mulch over all of said topsoil areas, and restore any disturbed rock protection using new filter fabric where needed.

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

VIII. ULTRA FLO STEEL PIPE INSTALLATION

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

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

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

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

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

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

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

The Contractor shall also note that the placing of the new access bridge culvert shall be completed so that it totally complies with the parameters established and noted in the Bridge Details and Tables for the culvert installation. The culvert shall be set on an even grade and the

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

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

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

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the drawings provided by the Town and as noted in the Standard Specifications in **Appendix "REI-C"**. In all cases, the concrete filled jute bag headwalls shall be topped with a minimum 100mm (4") thick continuous concrete cap comprising 30mPa concrete with 6% ±1% air entrainment for the entire length of the headwalls. The headwalls shall be installed on an inward batter to be not less than 1 horizontal to 5 vertical, and under no circumstances shall this batter, which is measured from the top of the headwall to the projection of the end of the pipe, be less than 305mm (12"). From the midpoint of the pipe height down to the concrete footing, the wall shall be a double concrete filled jute bag installation. On the side by the road the walls shall be deflected as shown to provide daylighting and a better approach across the new bridge.

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

The Contractor shall install interlocking precast concrete blocks with filter cloth backing for walls on both ends of the bridges requiring same. The blocks shall be minimum 600X600X1200mm in size as available from Underground Specialties - Wolseley, Windsor, Ontario, or equal, and

installed as set out in **Appendix "REI-C"**. Vertical joints shall be staggered by use of half blocks where needed and wingwall deflections when required shall employ 45-degree angled blocks. Voids between the blocks and the pipe shall be grouted with 30MPa concrete having 6% ±1% air entrainment and extend for the full thickness of the wall and have a smooth uniform finish on the face that blends with the precast blocks. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 1), 3), and 4) of the "Standard Specifications for Access Bridge Construction" attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in said Appendix. The Contractor shall submit shop drawings for approval of the wall installation that includes details for a minimum 300mm thick concrete footing that extends from the pipe invert downward. The footing shall extend into the drain banks each side for the required embedment of the blocks and be constructed to ensure that the completed wall will be completely vertical or tipped slightly back towards the driveway. Where the block walls extend more than 1.8 metres in height, the supplier shall provide the Contractor with uni-axial geogrid (SG350 or equivalent) reinforcement for installation to tie the wall back into the granular backfill. The Contractor, in all cases, shall comply with these specifications and upon completion of the stacked precast concrete end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone on filter cloth rock protection adjacent to the headwalls at each corner of the bridge. All rock protection shall be 1.0 metres wide and 305mm (12") thick, installed on non-woven filter cloth, and shall be installed in accordance with Item 2) of the "Standard Specifications for Access Bridge Construction". The synthetic filter mat to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtex Construction Products through Underground Specialties - Wolsley in Windsor, Ontario or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Industries Amherst Quarries, in Amherstburg, Ontario, or equal.

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

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

General Conditions included in Item 4 and the **“Typical Quarried Limestone End Protection Detail”** also in **Appendix “REI-C”**.

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

Also, for use by the Contractor, we have established a Benchmark at the site of the work and especially at the location where the new bridge is being constructed.

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

XI. ANCILLARY WORK

During the course of any work to the bridge along the length of the project, the Contractor will be required to protect or extend any existing tile ends or swales and connect them to the drainage works to maintain the drainage from the adjacent lands. All existing tiles shall be

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

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

The Contractor will be responsible to restore any damage caused to driveways used for access, at its cost. All damaged hard surface driveway and 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 new Ultra Flo aluminized steel type II pipe for this installation is 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 this new access bridge culvert to properly fit the channel parameters, **all of the design grade elevations must be strictly adhered to.**

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

Although it is anticipated that the culvert installation 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 the 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. All costs associated with the supply and installation of this straw bale or silt curtain check dam shall be included in the cost bid for the bridge construction.

XII. TOPSOIL, SEED AND MULCH

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

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

XIII. GENERAL CONDITIONS

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

- Contractor shall indemnify and save harmless the Town of Amherstburg and the Consulting Engineer and their representatives for any damages which it may cause or sustain during the progress of the work. It shall not hold the Town of Amherstburg or the Consulting Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.
- c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Consulting Engineer can review same and check that the work will generally conform to the design and project intent.
 - d) The Contractor will be responsible for any damage caused by it to any portion of the Town road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its' employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, 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 Town, the Drainage Superintendent, and the Consulting Engineer so that steps can be taken by the Town to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Town in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.
 - g) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.

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- 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) During the course of the project the Contractor shall deal with any excess soil management from the project in accordance with Ontario Reg 406/19 pursuant to the Environmental Protection Act, R.S.O. 1990, c. E.19 and any subsequent amendments to same.
- j) All driveways, laneways and access bridges, or any other means of access onto 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.
- k) The Contractor will be required to submit to the Town, a Certificate of Good Standing from the "Workplace Safety and Insurance Board" prior to the commencement of the work and the Contractor will be required to submit to the Town, a Certificate of Clearance for the project from the "Workplace Safety and Insurance Board" before Final Payment is made to the Contractor.
- l) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Town. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Town in every way and shall guarantee faithful performance of the contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

The Tenderer shall include the cost of bonds in the unit price of the Tender items as no additional payment will be made in this regard.
- m) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than \$5,000,000.00 on this project; and shall name the Town of Amherstburg and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.
- n) 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

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work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:

- i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board
- ii) proof of advertising
- iii) a Statutory Declaration, in a form satisfactory to the Engineer and the Town, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-Contracts thereunder have expired or have been satisfied, discharged, or provided for by payment into Court.

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

- o) 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.
- p) Should extra work be required by the Town Drainage Superintendent or Consulting Engineer and it is done on a time and material basis, the actual cost of the work will be paid to the Contractor with a 15% markup on the total actual cost of labour, equipment and materials needed to complete the extra work.

APPENDIX “REI-A”

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

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

- Work will not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods. In-water works will not be undertaken between March 15th and June 30th.
- New culverts are to be installed with a minimum 10 % embedment below the existing bottom or design bottom of the drain (whichever is lower).
- All new culverts must provide for fish passage. Typically, culvert lengths that do not exceed 15.0 metres do not create an obstruction to fish passage. Depending on the proposed culvert diameter, however, longer lengths may be allowed. Concerns with longer culverts relate to velocity, loss of riparian habitat, etc. (Note: IF longer culvert lengths are proposed, we recommend that they be reviewed with this office prior to finalizing the engineer's report. Ultimately, it is the proponent's responsibility to undertake the necessary studies to confirm that the proposed length will not be a barrier to fish passage.)
- All disturbed soils on both 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 spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.
- 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 his/her contractors to ensure that sediment and erosion control measures are functioning properly and are maintained/upgraded as required.
- Silt or sand accumulated in the barriers/traps must be removed and stabilized on land once the site is stabilized.
- 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 refueling and maintenance should be conducted away from the water.

SECTION II
SPECIFICATIONS
FOR FISH SALVAGE

GENERAL
SECTION 201

The Work shall include the capture, salvage and release of fish that are trapped or stranded as the result of the Contractor's operations, at locations identified in the Fish Salvage Plan, and in co-operation with the Essex Region Conservation Authority (E.R.C.A.).

Fish capture shall be performed prior to dewatering, and in such manner that will minimize the injury to the fish.

MATERIALS
SECTION 202

All materials required for fish capture, salvage and release shall be supplied by the Contractor.

CONSTRUCTION
SECTION 203

The Contractor shall not commence any fish capture, salvage and release work until the Fish Salvage Plan has been accepted by the Consultant and the Conservation Authority. All work shall be performed in accordance with the Fish Salvage Plan unless otherwise determined by the Consultant or the Conservation Authority.

The Contractor shall ensure an ice-free pool is maintained throughout all fish capture and release operations.

All fish shall be captured within the area specified, and released at an acceptable location in the downstream water body. Fish shall be captured by electro fishing, netting, seining, trapping, or other method acceptable to the Consultant and/or the Conservation Authority.

MEASUREMENT AND PAYMENT
SECTION 204

Payment for this Work will be made at the lump sum price bid for "Fish Capture and Release". The lump sum price will be considered full compensation for all labour, materials, equipment, tools and incidentals necessary to complete the Work to the satisfaction of the Consultant.

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.

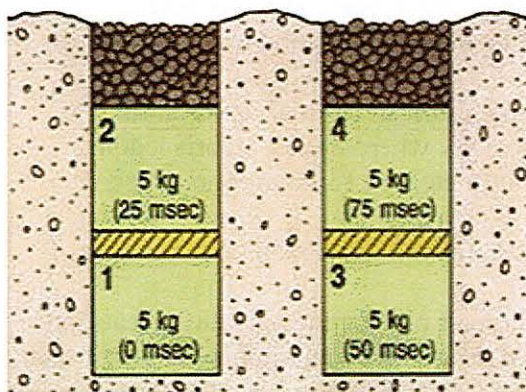
- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has 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

Species summary

COSEWIC scientific name

Notropis anogenus

Taxonomic group

Fishes (freshwater)

Range

Ontario



Legal list

Legal common name

Pugnose Shiner

Date added

January 12, 2005

Status on Schedule 1

Threatened (since August 8, 2019)

SARA status history

This species was initially listed on Schedule 3 as Special Concern. In November 2002, the species was assessed as "Endangered" by COSEWIC. In January 2005, the species was add...

GIC decision

Downlist

COSEWIC assessment

COSEWIC common name

Pugnose Shiner

COSEWIC scientific name

Notropis anogenus

Last assessment date and status change

May 2013 (in a lower risk category)

COSEWIC status

Threatened

Status criteria [Footnote 1](#)

Does not meet any criteria, but designated Threatened because of a small area of occupancy, declining habitat quality, and concerns that many subpopulations may not be viable.

COSEWIC status history

Designated Special Concern in April 1985. Status re-examined and designated Endangered in November 2002. Status re-examined and designated Threatened in May 2013.

COSEWIC reason for designation

The species has a small area of occupancy and consists of numerous small populations, many of which may not be viable. At least two populations have been extirpated. Habitat d...

Last minister's receipt date

September 24, 2013

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

The Pugnose Shiner (*Notropis anogenus*) is a member of the minnow family (Cyprinidae) and has the following characteristics: Body is fragile, slender and small, somewhat compressed laterally; extremely small upturned mouth; distinct black lateral band extends around snout and chin, through the eye to the caudal peduncle, ending with a small dark wedge-shaped caudal spot; overall colouration is silver with pale yellow and olive tints above the lateral black band; males become brightly golden in colour during spawning; all fins are transparent; eight dorsal rays; and total length is approximately 50 millimeters for males and 60 millimeters for females.

Distribution and population

The range of the Pugnose Shiner extends from Ontario, south to Illinois and west to North Dakota. The species has a disjunct distribution and it is often absent from theoretically suitable habitat within its range. In Canada, this species has only been found in four main areas of Ontario: 1) southern Lake Huron drainage; 2) Lake St. Clair; 3) Lake Erie; and 4) eastern Lake Ontario/upper St. Lawrence River drainage. It is assumed to be extirpated from Point Pelee and Rondeau Bay.

Habitat

The Pugnose Shiner is usually found over sand and mud in slow-moving, clear, vegetated streams and lakes. It is found in sheltered ponds, wetlands, stagnant channels and protected bays adjacent to larger waterbodies.

Biology

Spawning is thought to occur in late spring to early summer, and takes place in shallow, heavily vegetated waters. It does not guard its eggs, but rather distributes them widely over the aquatic plants and substrates.

Threats

The Pugnose Shiner requires clear water with abundant aquatic vegetation. Habitat degradation and loss is the principal threat. Activities that contribute to these threats include agricultural, industrial and urban development, removal of aquatic vegetation, and changes in water quality/quantity. As many habitat areas are fragmented, there is limited connection between populations. Aquatic invasive species are also a growing threat, particularly Common Carp and Eurasian watermilfoil, due to their negative effects on native aquatic vegetation.

Protection

SARA contains provisions that allow for the protection of certain listed species at risk individuals, their residences as well as their critical habitat. The responsibility for conservation of species at risk is shared by all jurisdictions in Canada. The Act recognizes this joint responsibility and that all Canadians have a role to play in the protection of wildlife. More information about SARA, including how it protects individual species, is available in [A guide to your responsibilities under the Species at Risk Act](#). For information on how provincial or territorial laws protect the species, consult the provinces' and territories' websites.

Species summary

COSEWIC scientific name

Opsopoeodus emiliae

Taxonomic group

Fishes (freshwater)

Range

Ontario



Legal list

Legal common name

Pugnose Minnow

Date added

June 5, 2003

Status on Schedule 1

Threatened (since August 8, 2019)

SARA status history

This species was initially assessed as "Special Concern". In 2003, the species was added to Schedule 1 with the same status. In 2012, the species was reassessed as "Threatened" by COSEWIC. In August 2019, the species' status on Schedule 1 was updated to "Threatened".

GIC decision

Uplist

COSEWIC assessment

COSEWIC common name

Pugnose Minnow

COSEWIC scientific name

Opsopoeodus emiliae

Last assessment date and status change

May 2012 (in a higher risk category)

COSEWIC status

Threatened

Status criteria [Footnote 1](#)

B1ab(i,ii,iii)+2ab(i,ii,iii)

COSEWIC status history

Designated Special Concern in April 1985. Status re-examined and confirmed in May 2000. Status re-examined and designated Threatened in May 2012.

COSEWIC reason for designation

This fish is a small-bodied species with a restricted and declining distribution that inhabits river, stream and lake habitats. The species is threatened by habitat loss, habi...

Last minister's receipt date

October 5, 2012

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

The Pugnose Minnow is a small fish (35 to 57 mm long) with a forked tail and short pectoral fins. It has a rounded snout and a small upturned mouth. It is silver in color, with a black midlateral band which extends from the tail to the snout. The dorsal fin of adult males is dusky or black with a white bar in the middle. This colour pattern (used for identifying the species) intensifies during the spawning season. Breeding males have a dark silver-blue body and white tips on their anal and pelvic fins. They develop small white knobs on the first three dorsal fin rays and patches of small tubercles on the snout and chin.

Distribution and population

Most of the range of the Pugnose Minnow is in the eastern United States, from Florida west to Texas and north to Wisconsin. In Canada, it is at the northern edge of its range and is restricted to a small area in southwestern Ontario. The size of the Canadian population is unknown, and existing information is insufficient to determine any population trend, however, data suggest that numbers are relatively low but the species is maintaining itself in most of its Canadian range.

Habitat

In Canada, Pugnose Minnows prefer clear, slow-moving rivers, lakes and stream with abundant aquatic vegetation, but are not necessarily excluded from more turbid waters. Some minnows have been recorded in water bodies with moderately clear to very silty water with substrates of clay, silt or mud, moderate to abundant vegetation, and little or no current. One specimen was even found in turbid water devoid of vegetation.

Biology

Little is known about the biology of the Pugnose Minnow. Adults are generally 35 to 57 mm long, with a maximum length of 64 mm. The fish have a lifespan of about three years. They probably spawn in late spring or early summer and have a complex spawning behaviour. Males select a flat surface, such as the underside of a rock, for their spawning site and defend a small territory. Males go through elaborate behavioural displays to attract females to their nests. Females are led to the spawning site by the males. The female repeatedly touches the spawning surface with her mouth and snout. The male follows and nudges her. The small white knobs that develop on the dorsal fins of breeding males may act as egg mimics to stimulate the female to spawn. The spawning pair aligns laterally and repeatedly invert for a brief moment at a time. Eggs (about 1.3 mm diameter) are laid singly or in strings of 2 to 5 in a single layer on the underside of a flat surface. Up to 120 eggs can be laid during a spawning session, and sessions are repeated over 6 to 7 days. Males defend the nest and eggs from potential predators. Eggs hatch in about 6 days, but the time depends on water temperature. Newly hatched fry are 5.0 to 5.5 mm long. Pugnose Minnows feed mainly on insects, but they also eat some algae (likely by accident), aquatic crustaceans (like copepods), fish eggs and fish fry.

Threats

Pugnose Minnow may be limited by siltation or water turbidity and removal of aquatic plants, conditions which are prevalent throughout its Canadian range. Although the species can occur in turbid environments, these are believed to be marginal habitats. The siltation of rivers and streams, caused by urbanization and agricultural practices, is believed to be the main reason for the small size of Pugnose Minnow populations in Canada. Wetlands that provide ideal habitat for Pugnose Minnows have been steadily declining in the species' range.

Protection

SARA contains provisions that allow for the protection of certain listed species at risk individuals, their residences as well as their critical habitat. The responsibility for conservation of species at risk is shared by all jurisdictions in Canada. The Act recognizes this joint responsibility and that all Canadians have a role to play in the protection of wildlife. More information about SARA, including how it protects individual species, is available in [A guide to your responsibilities under the Species at Risk Act](#). For information on how provincial or territorial laws protect the species, consult the provinces' and territories' websites.

Species summary

COSEWIC scientific name
Minytrema melanops
Taxonomic group
Fishes (freshwater)
Range
Ontario



Legal list

Legal common name
Spotted Sucker
Date added
June 5, 2003
Status on Schedule 1
Special Concern

SARA status history

This species was initially assessed as "special concern". In 2003, the species was added to Schedule 1 with the same status. No changes has been made to the status since the species was listed on Schedule 1.

COSEWIC assessment

COSEWIC common name
Spotted Sucker
COSEWIC scientific name
Minytrema melanops
Last assessment date and status change
November 2014 (no change)
COSEWIC status

Special Concern

COSEWIC status history

Designated Special Concern in April 1983. Status re-examined and confirmed in April 1994, November 2001, May 2005, and November 2014.

COSEWIC reason for designation

This species is a relatively rare fish that inhabits lakes and rivers in southwestern Ontario. Its spatial distribution has remained relatively constant in these environments ...

Last minister's receipt date

October 6, 2015

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

The Spotted Sucker is a medium-sized fish, measuring 23 to 38 cm in length. The young are torpedo-shaped and become deep-bodied and narrow in breadth as they mature. The fish's back is dark green to brown in colour, while its sides are bronze to silver. The belly is silvery and white. It is named for the eight to 10 horizontal rows of black or brown spots, one per scale, over the length of its body from behind its head.

Distribution and population

The Spotted Sucker is restricted to the freshwaters of central and eastern North America. It is found in rivers along the Atlantic Coast of the United States and in the southern and central states. The Canadian distribution is limited to southwestern Ontario, where it occurs in Lake St. Clair, in the western basin of Lake Erie, and in the Thames and East Sydenham rivers. The spotted sucker has been collected from six Ontario locations since the 1994 status report, three of which are new locations. The population structure in Canada is not known. The first recorded capture occurred in Lake St. Clair in 1963. The specimen was thought to be a stray from the western U.S. side of the lake, but recent collections suggest that the population has spread. There is also indication that a reproducing population may occur in the Canadian waters of Lake St. Clair. Nine specimens were recorded from Canadian waters in 1980. At least 10 additional specimens have been obtained from the tributaries of lakes Erie and St. Clair since then. The lake St. Clair population may be larger than that of Lake Erie. The species was common in Lake Erie during the mid to late 1800s. The population began to decline prior to 1920 and has since dropped considerably. In fact, there have been no recent records for spotted sucker from Lake Erie, the last record dating from 1976.

Habitat

The fish inhabits all types of slow-flowing bodies of water. It favours slow-moving streams and prefers clear water with a minimum of suspended solids, but has been found in the East

Sydenham River, where turbidity is moderate to heavy. It may be more tolerant of siltation than some other sucker species, especially if siltation is only periodically heavy.

Biology

Spawning takes place in the late spring or early summer and occurs in shallow rapids over coarse limestone rubble. Depressions behind large rocks are often used as spawning sites. A spawning group consists of two males and one female. Breeding males have distinctive colouration: two dark bands separated by a pinkish band along the side. Both sexes may spawn more than once. An estimated 38,000 eggs were found in one mature female caught in the Thames River. Eggs are semi-buoyant and hatch within seven to 12 days of fertilization. The fish matures at about three years old. Distinct changes in diet occur throughout various life stages. Larvae feed on microscopic animals and diatoms in mid and surface waters. Juveniles begin feeding over patches of sand. Once they reach a length of 5 cm, they start eating bottom-dwelling organisms. Adults feed on planktonic crustaceans, water fleas, midges, diatoms and molluscs over clean sand bars in quiet waters. Several fish-eating birds and other fish inhabiting the same areas probably prey upon the young. Species are only captured incidentally in the Great Lakes basin, usually by hook and line or in trap nets. It is captured for human consumption in the southern limits of its range.

Threats

Inadequate information makes the limiting factors difficult to define for the Spotted Sucker. Canadian populations are at the northern fringe of the species' range. Suitable habitat is necessary for the species' survival in Ontario and the United States. Habitat degradation from siltation is known to have caused some U.S. populations to decline. Populations may also be threatened by deteriorating water quality.

Protection

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Species summary

COSEWIC scientific name

Ichthyomyzon unicuspis

Taxonomic group

Fishes (freshwater)

Range

Ontario, Quebec



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Legal list

Legal common name

Silver Lamprey, Great Lakes - Upper St. Lawrence populations

Date added

August 8, 2019

Status on Schedule 1

Special Concern

SARA status history

This species was assessed for the first time in May 2011 as "Special Concern". In August 2019, the species was added to Schedule 1 with the same status.

GIC decision

Add

COSEWIC assessment

COSEWIC common name

Silver Lamprey, Great Lakes - Upper St. Lawrence populations

COSEWIC scientific name

Ichthyomyzon unicuspis

Previous common names

Silver Lamprey (Great Lakes - Western St. Lawrence populations)

Previous scientific names

Ichthyomyzon unicuspis (Great Lakes - Western St. Lawrence populations),
Ichthyomyzon unicuspis (Populations des Grands Lacs - Ouest du Saint-Laurent)

Last assessment date and status change

November 2020 (no change)

COSEWIC status

Special Concern

COSEWIC status history

Designated Special Concern in May 2011. Status re-examined and confirmed in November 2020.

COSEWIC reason for designation

This small parasitic lamprey is distributed in streams and lakes throughout the Laurentian Great Lakes basin and in southern Québec. In the Great Lakes basin, a major p...

Last minister's receipt date
October 12, 2021

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

The Silver Lamprey is one of eleven species of lamprey in Canada. There are two separately recognized populations of Silver Lamprey in Canada: i) the Great Lakes - Upper St. Lawrence populations; and ii) the Saskatchewan - Nelson River populations. The Silver Lamprey has the following characteristics: Jawless, eel-shaped fish with a sucking disc mouth and lack of paired fins; Seven pairs of gill openings; Newly metamorphosed juveniles may be as small as 9 centimeters; while spawning-sized adults range between 31 and 39 centimeters in length; Prior to spawning, adults exhibit a light yellow-tan colour on the ventral side (under side), that darkens into blue or blue-gray towards the dorsal side (back side); Larvae appear wormlike, and do not have eyes or teeth. Rather than a disc mouth, they have an oral hood; and, Lifespan ranges from six to eight years, with most of its life spent as larvae; adults die shortly after spawning.

Habitat

Silver Lamprey are found in fresh waters in eastern North America, with a range extending from Manitoba to Tennessee in the west, and from Quebec and Vermont in the east. In Canada, it is separated into two populations: the Great Lakes and Upper St. Lawrence populations; and the Saskatchewan-Nelson River populations. Silver Lamprey from the Great Lakes and Upper St. Lawrence population have been documented in 41 streams and nine lakes including Lake Ontario, Lake Huron, Lake Superior, Lake Erie, Lake St. Clair, Lake Nipissing, Lake Champlain, Lac St. Pierre and Lac St. Louis. Silver Lamprey spawn in rivers and streams and require unrestricted migration to spawning habitat. Spawning habitat includes gravel and sand for building nests, clean fast-flowing water, and a small amount of silt-free sand or other materials on which the eggs can adhere. Spawning occurs only once in a lifetime and the adults die shortly afterward. Silver Lamprey eggs hatch after two to three weeks following fertilization and enter a larval stage. During this life stage, the worm-like larvae (called ammocoetes) drift downstream and burrow into soft sediments made of sand, silt and organic debris where they remain for four to seven years. At the end of this period, larvae undergo metamorphosis into their juvenile form, characterized by enlargement of the tail and dorsal fins, and development of eyes and a sucker disc lined with sharp teeth. The newly transformed juveniles migrate downstream into lakes or rivers in order to locate fish hosts on which to feed for one to two years before returning to streams to spawn.

Threats

Threats to the Silver Lamprey include methods used to control the invasive Sea Lamprey in the Great Lakes (for example, the application of lampricides and the construction of low head barriers to block spawning migrations), pollution, habitat alteration, dam construction, siltation, water fluctuations, and competition from other species. While most of these threats occur broadly across the Silver Lamprey's range, Sea Lamprey control impacts are limited to Silver Lamprey nursery streams in the Great Lakes that receive lampricide treatments or have Sea Lamprey barriers. Lampricide treatments are not conducted in the Huron-Erie corridor or outside the Great Lakes Basin (such as Quebec and St. Lawrence River).

Protection

SARA contains provisions that allow for the protection of certain listed species at risk individuals, their residences as well as their critical habitat. The responsibility for conservation of species at risk is shared by all jurisdictions in Canada. The Act recognizes this joint responsibility and that all Canadians have a role to play in the protection of wildlife. More information about SARA, including how it protects individual species, is available in [A guide to your responsibilities under the Species at Risk Act](#). For information on how provincial or territorial laws protect the species, consult the provinces' and territories' websites.

Species summary

COSEWIC scientific name

Quadrula quadrula

Taxonomic group

Molluscs

Range

Ontario

Legal list

Legal common name

Mapleleaf, Great Lakes - Upper St. Lawrence population

Date added

March 8, 2013

Status on Schedule 1

Special Concern (since August 8, 2019)

SARA status history

This species was initially assessed as "threatened" in 2006. In 2013, the species was added to Schedule 1 with the same status. No changes has been made to the status since the species was added to Schedule 1. In November 2016, the species was reassessed as "Special Concern" by COSEWIC. In August 2019, the species' status on Schedule 1 was updated to "Special Concern".

GIC decision

Downlist

COSEWIC assessment

COSEWIC common name

Mapleleaf , Great Lakes - Upper St. Lawrence population

COSEWIC scientific name

Quadrula quadrula

Previous common names

Mapleleaf (Great Lakes - Upper St. Lawrence populations), Mapleleaf (Great Lakes - Western St. Lawrence population), Mapleleaf Mussel (Great Lakes - Western St. Lawrence population)

Previous scientific names

Quadrula quadrula (Great Lakes - Upper St. Lawrence populations), *Quadrula quadrula* (Great Lakes - Western St. Lawrence population), *Quadrula quadrula* (Population des Grands Lacs - Ouest du Saint-Laurent), *Quadrula quadrula* (Populations des Grands Lacs et du haut Saint-Laurent)

Last assessment date and status change

November 2016 (in a lower risk category)

COSEWIC status

Special Concern

COSEWIC status history

Designated Threatened in April 2006. Status re-examined and designated Special Concern in November 2016.

COSEWIC reason for designation

This heavy-shelled mussel, shaped like a maple leaf, has a limited distribution in southern Ontario. There is evidence of an ongoing, but slight, decline in the range over the last three generations. Low-impact threats, including those from Zebra and Quagga mussels, habitat alteration, and pollution continue. Despite these threats, this population is estimated to be large (millions of animals) and apparently stable at a number of locations in Lake St. Clair, Lake Erie, and western Lake Ontario watersheds. The change in status since the original report is a result of increased sampling effort across the region, newly discovered locations, and evidence for recent gene flow across Lake Erie, which suggests the potential for rescue.

Last minister's receipt date
October 24, 2017

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

Mapleleaf, *Quadrula quadrula*, is a freshwater mussel. The shell is thick, squarish in outline and ranges in colour from yellowish green through light brown to dark brown. Typically, the species can be recognized by two rows of raised bumps or knots extending in a v-shape from the umbo (the beak that protrudes above the hinge of each valve) to the ventral edge of the shell. There are occasional deviations from this nodule pattern. Canadian specimens reach 130 mm in length, 100 mm in height and 50 mm in width. The interior of the shell is white with heavy hinge teeth.

[Updated 22/01/2018]

Distribution and population

In the United States, this species occurs throughout the Ohio-Mississippi drainages ranging from Texas to Alabama in the south to Minnesota and Pennsylvania in the north. Its distribution extends into the Great Lakes drainage in Minnesota and Wisconsin to New York and into the Red River drainage in Minnesota and North Dakota. In Canada, this species is limited in southern Ontario to the coastal areas and medium to large rivers of the Lake Huron, Lake St. Clair, Lake Erie, and Lake Ontario watersheds. In Manitoba, the species is found in the Red River and some tributaries, the Assiniboine River, and Lake Winnipeg and some tributaries. In Ontario, *Q. quadrula* is restricted to a few coastal areas and rivers draining into Lake Huron, Lake Erie, Lake St. Clair, and Lake Ontario. A rough estimate for total population size in Ontario is at least 6 million individuals. The mussel community in this region is in decline with many species considered extirpated from areas they once occupied. Comparison with historical records indicates some reduction in the distribution of this species in Ontario. Recent studies indicate that *Q. quadrula* is abundant in some areas where it does occur and may be increasing its distribution within the Sydenham River, lower Thames River, and lower Grand River, but with

current threats the overall trend may be a slow continuing decline over the next 3 generations. In Manitoba, although the population size is estimated to range between roughly 1 million and 4 million, densities are generally low and appear to be in decline in some areas. The species occurs in the Red River and in the lower reaches of some of its tributaries, the Assiniboine River, and the lower reaches of some tributaries draining into Lake Winnipeg. Comparison with historical records of distribution indicates that the freshwater mussel community in Manitoba is in decline. Where *Q. quadrula* does occur in Manitoba it is never abundant with many fresh empty valves indicating high levels of recent mortality. [Updated 22/01/2018]

Habitat

Quadrula quadrula occurs in a variety of habitats ranging from medium to large rivers with slow to moderate current, to lakes and reservoirs in mud, sand, or gravel bottoms. In Ontario and Manitoba, *Q. quadrula* is most typically recovered from medium to large rivers in firmly packed coarse gravel and sand to firmly packed clay/mud bottom. [Updated 22/01/2018]

Biology

Quadrula quadrula is dioecious (separate sexes) but sexes cannot be distinguished based on shell morphology. Larvae, called glochidia, are brooded in the gills by the female and are parasitic on catfishes. Known fish hosts are the Flathead Catfish, which does not occur in Canada, and the Channel Catfish, which does occur in Canada. Development on the fish host requires approximately 50-60 days. During this time, the larval mussel transforms to a juvenile, then drops off the fish host and grows to adult size and maturity. Like other freshwater mussels, *Q. quadrula* feeds on algae and bacteria filtered from the water column and bottom. *Quadrula quadrula* is a long-lived species with individuals from Manitoba living up to 64 years and averaging 22 years of age, with a generation time of roughly 20 years. [Updated 22/01/2018]

Threats

Like almost all North American freshwater mussels, this species is threatened by habitat loss and degradation and the effects of invasive species, particularly Zebra and Quagga mussels in Ontario. Zebra Mussels now threaten *Q. quadrula* in Manitoba, with Zebra Mussel populations becoming established in the Red River, Lake Winnipeg, and in reservoirs in the Red River watershed in North Dakota and Minnesota. Habitat changes associated with Zebra Mussels and modifications to the banks of the Red and Assiniboine rivers (e.g., rip-rap and dikes) that alter the flow hydrology of these rivers are threats. In both Ontario and Manitoba, *Q. quadrula* occurs in areas affected by industrial and municipal pollution and agricultural runoff. [Updated 22/01/2018]

Protection

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information about SARA, including how it protects individual species, is available in [A guide to your responsibilities under the Species at Risk Act](#). For information on how provincial or territorial laws protect the species, consult the provinces' and territories' websites.

Mapleleaf Mussel

(*Quadrula quadrata*)

Threatened



Description

- » A medium-sized freshwater mussel reaching about 12 cm in length
- » Shell is thick and square-shaped; inside of the shell is silvery white while the outside varies from yellow-green to dark brown
- » There are two rows of raised nodules (bumps) forming a 'V' on the shell surface

Life Cycle

- » Filter feeders whose diets include bacteria, algae, and particles
- » During spawning, males release sperm into the water that is filtered by females, with fertilization occurring in a specialized region of the female's gill
- » Immature mussels develop in the gills and are released into the water column, where they attach themselves to a host fish
- » Juvenile mussels feed on the host until breaking free and falling to the sediment, where they develop into adults, moving very little throughout the rest of their lives
- » Host fish species include Channel Catfish and potentially Brown Bullhead

Habitat and Distribution

- » In Ontario, found in the Sydenham, Ausable, Grand and Thames Rivers; historically known from Lake Erie and Lake St. Clair
- » Habitat consists of medium-large rivers with relatively slow currents and sand, gravel or clay/mud bottoms

Factors Affecting Population

- » Habitat loss and degradation from poor water quality and siltation associated with agricultural and urban runoff
- » Zebra Mussels are believed to be a major threat as populations have declined in Canada by 50 per cent since the invasion of Zebra Mussels

Mapleleaf Mussel
(Quadrala quadrala)



Photo : Photo Field Guide to the Freshwater Mussels of Ontario

Species summary

COSEWIC scientific name

Toxolasma parvum

Taxonomic group

Molluscs

Range

Ontario



Legal list

Legal common name

Lilliput

Date added

August 8, 2019

Status on Schedule 1

Endangered

SARA status history

This species was assessed for the first time in May 2013, as "Endangered". In August 2019, the species was added to Schedule 1 with the same status.

GIC decision

Add

COSEWIC assessment

COSEWIC common name

Lilliput

COSEWIC scientific name

Toxolasma parvum

Last assessment date and status change

May 2013 (new)

COSEWIC status

Endangered

Status criteria [Footnote 1](#)

B2ab(iii)

COSEWIC status history

Designated Endangered in May 2013.

COSEWIC reason for designation

This species has a fairly restricted range in Canada, confined to tributaries of Lake St. Clair, Lake Erie, and Lake Ontario. Populations once found in the open Canadian waters of Lake St. Clair, Lake Erie and the Detroit River have disappeared. Overall, the species has lost 40% of its former range in Canada. The invasion of freshwater habitat by the exotic Zebra and Quagga mussels, combined with pollution from urban development and sedimentation are the main cause of populations disappearing and the range shrinking.

Last minister's receipt date
September 24, 2013

Species details

On this page, you will learn about the life cycle of this wildlife species. You can access different types of information about this species and how it relates to the [Species at Risk Act](#).

Description

The Lilliput (*Toxolasma parvum*) is one of Canada's 54 freshwater mussel species. It is a rare and small mussel, typically less than 4 centimeters and occasionally reaching sizes of 5.5 centimeters in length. It is the only mussel of the genus *Toxolasma* found in Canada and can be recognized by the following features: Thick shell that is elliptical to oval in shape; dull, smooth and cloth-like outer shell; front (anterior) end is rounded and the back (posterior) end is rounded on males, squared on females; shell colour is brown to brownish-black and may have green rays on the dorsal slope; inside of shell (nacre) is shiny and silvery-white or bluish-white; raised part at the top of the shell (beak) is sculptured with 4–6 heavy concentric ridges, and is slightly raised above the hinge line; and hinge teeth are fully developed, but compressed (thin serrated pseudocardinal teeth and long, thin and straight lateral teeth).

Distribution and population

Lilliput is only found in North America, where it is widely distributed from the Gulf of Mexico to the Great Lakes basin. In Canada, Lilliput was historically found in southern Ontario in the drainages of lakes St. Clair, Erie and Ontario. No longer found in over 40 percent of its historical range, Lilliput is now restricted to the Sydenham River, lower Thames River (Baptiste Creek), Ruscom River, Belle River, Grand River, Welland River, Jordan Harbour and Hamilton Harbour (Sunfish Pond, Cootes Paradise and Grindstone Creek). In the United States, Lilliput can still be found in 22 states, but is considered possibly extirpated from Georgia and New York, critically imperiled in Pennsylvania, endangered in Michigan, and vulnerable in Indiana and Wisconsin.

Habitat

Lilliput is found in a variety of habitats, from small to large rivers to wetlands and the shallows of lakes, ponds and reservoirs. It prefers to burrow in soft substrates (river and lake bottoms) made of mud, sand, silt or fine gravel.

Biology

Lilliput has a short lifespan, living to a maximum age of 12 years. It can be hermaphroditic (each mussel features both male and female gonads). Spawning occurs from June to August and glochidia (mussel larvae) are released in July of the following year. Like most other freshwater mussels, the glochidia are parasitic on fishes. In this case, adult mussels lure in a fish with worm-like filaments on their shells and release mucous packages of glochidia disguised as food. When the fish takes a bite, the package ruptures, releasing the glochidia to attach to their host as they flow through its gills. Here they will remain until they reach their juvenile, free-living stage and drop off to burrow in the substrate below. Adult Lilliput essentially stays in one location (i.e., sessile), and may move only a few metres along the substrate the entire rest of its life. The likely host fishes for this mussel in Canada are the Johnny Darter (*Etheostoma nigrum*), Green Sunfish (*Lepomis cyanellus*) and Bluegill (*Lepomis macrochirus*). Like all species of freshwater mussels, Lilliput filters its food from the water. Bacteria and algae are its primary food sources.

Threats

Serious threats facing remaining Lilliput include habitat loss and the increasing pollution of the waters where they live and feed. Municipal, agricultural and industrial activities can result in higher levels of sediment, nutrients and contaminants that clog mussel gills, disrupt breathing, movement and reproduction, and degrade habitat quality. Other possible threats include habitat destruction, and even mussel removal, by riverbed dredging for transportation and shipping purposes, as well as continued residential and commercial development and dam construction along Lilliput habitat. Invasive Zebra and Quagga mussels can colonize on the Lilliput in large numbers, restricting their feeding, breathing, moving and reproduction. The invasive Round Goby may also out-compete the Lilliput for prey, as well as competing with its host fishes.

Protection

SARA contains provisions that allow for the protection of certain listed species at risk individuals, their residences as well as their critical habitat. The responsibility for conservation of species at risk is shared by all jurisdictions in Canada. The Act recognizes this joint responsibility and that all Canadians have a role to play in the protection of wildlife. More information about SARA, including how it protects individual species, is available in [A guide to your responsibilities under the Species at Risk Act](#). For information on how provincial or territorial laws protect the species, consult the provinces' and territories' websites.

APPENDIX “REI-B”



TOWN OF AMHERSTBURG

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

16. Training and Required On Site Materials for Snakes

16.1. The Municipality will ensure any person:

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

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

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

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

- (a) erect effective temporary snake barriers approved by the MNR that will not pose a risk of entanglement for snakes and that shall be secured so that individual snakes may not pass over or under the barrier or between any openings to enter or re-enter the Work Zone;
- (b) inspect the temporary snake barriers daily during periods when snakes are active, capture any individuals incidentally encountered within the area bounded by the snake barrier and release the captured individuals in accordance with section 21.1; and
- (c) remove the temporary snake barriers immediately upon completion of the Activity.

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

18. Measures for Encounters with Snakes During a Sensitive Period

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

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

19. Measures for Encounters with Snake Nests

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

- (a) collect any displaced or damaged eggs and transfer them to a Holding Tub;
- (b) capture and transfer all injured dispersing juveniles of that Species into a light coloured drawstring cotton sack;
- (c) place all cotton sacks with the captured injured individuals into a Holding Tub;
- (d) ensure that the Holding Tub with the captured injured individuals is stored out of direct sunlight;
- (e) immediately Contact the MNR to seek direction and to arrange for the transfer of the injured individuals;
- (f) immediately stop any disturbance to the nest site and loosely cover exposed portions with soil or organic material to protect the integrity of the remaining individuals;
- (g) not drive any equipment over the nest site or conduct any Activities within 5 metres of the nest site;
- (h) not place any dredged materials removed from the Drainage Works on top of the nest site;
- (i) mark out the physical location of the nest site but not by any means that might increase the susceptibility of the nest to predation or poaching; and
- (j) where there are no collected eggs or captured individuals, Contact the MNR within 72 hours to provide information on the location of the nest site.

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

20.1. Where one or more individuals belonging to a snake Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:

- (a) follow the requirements in section 16;
- (b) briefly stop the Activity for a reasonable period of time to allow any uninjured individual snakes of that Species to leave the Work Zone;
- (c) if the individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (b) above, capture all uninjured individuals and release them in accordance with section 21.1;
- (d) where circumstances do not allow for the immediate release of captured uninjured individuals, they may be transferred into individual, light-coloured, drawstring cotton sacks before placing them in a Holding Tub which shall be stored out of direct sunlight for a maximum of 24 hours before releasing them in accordance with section 21.1;
- (e) capture and transfer any individuals injured as a result of conducting the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals; and
- (f) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

21. Release of Captured Individuals Outside of a Sensitive Period

21.1. Where uninjured individuals are captured under section 20.1, they shall be released:

- (a) within 24 hours of capture;
- (b) in an area immediately adjacent to the Drainage Works where there is natural vegetation cover;
- (c) in an area that will not be further impacted by the undertaking of any Activity; and
- (d) not more than 250 metres from the capture site.

21.2. Following a release under section 21.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

22. Measures for Dead Snakes

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

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



TOWN OF AMHERSTBURG

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

9. Training and Required On Site Materials for Turtles

9.1. The Municipality will ensure any person:

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

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

10.1. Subject to section 10.2, where a proposed Activity will occur in a Sensitive Area for any Turtle Species and during a Sensitive Period for that Species, the Municipality shall:

- (a) not undertake any Activities that include the excavation of sediment or disturbance to banks during the applicable Sensitive Period unless otherwise authorized;
- (b) undertake Activities in accordance with any additional site-specific measures provided in writing by the MNR Designated Representative;
- (c) avoid draw-down and de-watering of the Sensitive Area during the applicable Sensitive Period; and
- (d) if authorized by the MNR Designated Representative under (a) above to undertake Activities that include excavation of sediment or disturbance of banks, in addition to any other measures required under (b) above, ensure any person undertaking an Activity has at least two Holding Tubs on site at all times.

10.2. Section 10.1 does not apply where the applicable Drainage Works are:

- (a) in a naturally dry condition;
- (b) classified as a Class F drain in DFO's *Class Authorization System for the Maintenance of Agricultural Municipal Drains in Ontario* (ISBN 0-662-72748-7); or
- (c) a closed drain.

11. Measures for Encounters with Turtles During a Sensitive Period

11.1. Where one or more individuals belonging to a turtle Species is encountered in the undertaking of an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:

- (a) capture and transfer all uninjured individuals of that Species into a Holding Tub;
- (b) capture and transfer all individuals injured as a result of the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals;
- (c) ensure that the Holding Tubs with the captured individuals are stored at a cool temperature to prevent freezing until the individuals can be transferred; and
- (d) immediately Contact the MNR to seek direction and to arrange for the transfer of the individual turtles.

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

12.1. Where one or more individuals belonging to a turtle Species laying eggs, or an active nest site of any turtle Species, is encountered in undertaking an Activity in a Work Zone, the Municipality shall:

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

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

13.1. Where one or more individuals belonging to a turtle Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:

- (a) briefly stop the Activity for a reasonable period of time to allow any uninjured individual turtles of that Species to leave the Work Zone;
- (b) where individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (a) above, capture all uninjured individuals and release them in accordance with section 14.1;
- (c) where circumstances do not allow for their immediate release, transfer captured uninjured individuals for a maximum of 24 hours into a Holding Tub which shall be stored out of direct sunlight and then release them in accordance with section 14.1;
- (d) capture and transfer any individuals that have been injured into a Holding Tub separate from any Holding Tub containing uninjured individuals; and
- (e) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

14. Release of Captured Individuals Outside of a Sensitive Period

14.1. Where uninjured individuals are captured under section 13.1, they shall be released:

- (a) within 24 hours of capture;
- (b) in an area immediately adjacent to the Drainage Works;
- (c) in an area that will not be further impacted by the undertaking of any Activity;
- and
- (d) not more than 250 metres from the capture site.

14.2. Following a release under section 14.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

15. Measures for Dead Turtles

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

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

SNAKES OF ONTARIO IDENTIFIER



toronto
ZOO

An identification guide to the Massasauga Rattlesnake and other Ontario snakes.

Recovery through education and conservation.

This guide will help you identify the Massasauga Rattlesnake and other snakes in Ontario. The Massasauga is one of five Ontario snakes with blotches. Snakes on this Identifier are grouped by appearance (blotched, striped and no pattern). When you see a snake, look at its size and pattern. Does it have blotches, stripes, or no pattern?

Snakes are illustrated at quarter-life size. These snakes are not found in all Ontario regions. Consult a field guide for maps of snakes in your area. The size of snakes includes U.S. populations as listed in 'Conant, Roger and Joseph T. Collins. 1991 *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*. 3rd edition. Houghton Mifflin Co. Boston'

For information on the Toronto Zoo's Rattlesnake Workshop write to:

Toronto Zoo - Rattlesnakes
361-A Old Finch Ave.
Scarborough, ON, CANADA M1B 5K7
email: alentini@torontozoo.ca
Visit the Massasauga Rattlesnake Recovery Team website: www.massasauga.ca

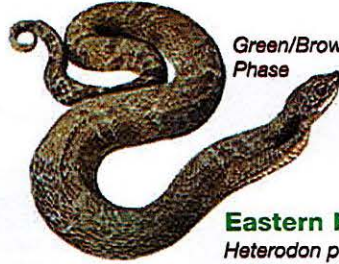
Milk

Lampropeltis triangulum

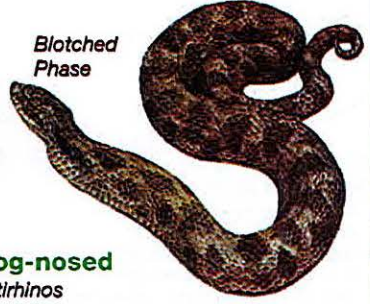
- 61-90 cm; record 132.1 cm
- Cream, tan, or light grey with red or dark brown black-bordered blotches or rings on back alternating with blotches along each side
- Young have red blotches bordered in black
- Blotch on neck may appear Y or V shaped
- Belly whitish with black checkerboard pattern
- Scales smooth; anal scale single
- Lays eggs
- SPECIAL CONCERN (COSEWIC); SPECIAL CONCERN (OMNR)



Green/Brown Phase



Blotched Phase



Eastern Hog-nosed

Heterodon platirhinos

- 51-84 cm; record 115.6 cm
- Large dark blotches down back alternating with smaller blotches along sides
- When threatened, spreads neck to display darker neck pattern and will roll over to play dead
- Can be blotched phase, plain grey, green-brown or even black
- Heavy-bodied
- Flat head with upturned snout
- Belly yellow-grey with greenish grey pattern
- Underside of tail lighter colour than body
- Scales keeled; anal scale divided
- Lays eggs
- THREATENED (COSEWIC); THREATENED (OMNR)



Northern Water

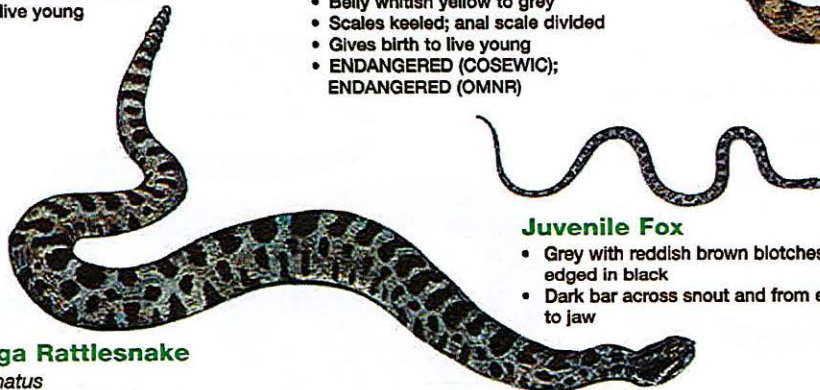
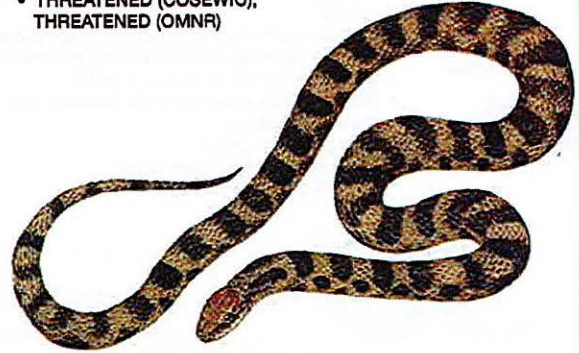
Nerodia sipedon sipedon

- 61-106.7 cm; record 140.5 cm
- Well patterned individuals have reddish brown squarish blotches down back with row of alternating blotches along each side
- At front of body, some blotches extend as saddles over back and on to sides
- Pattern on older individuals may be obscured and they appear black or brown
- Usually found in or near water
- Belly cream with irregular rows of reddish half moon crescents
- Scales keeled; anal scale divided
- Gives birth to live young

Lake Erie Water

Nerodia sipedon insularum

- 61-106.7 cm; record 140.5 cm
- A sub-species of the more wide spread Northern Water snake
- Range from uniformly grey with no markings to dark grey-brown with some banding
- Only found at western end of Lake Erie and on Pelee and surrounding islands
- Belly whitish yellow to grey
- Scales keeled; anal scale divided
- Gives birth to live young
- ENDANGERED (COSEWIC); ENDANGERED (OMNR)



Juvenile Fox

- Grey with reddish brown blotches edged in black
- Dark bar across snout and from eye to jaw

Eastern Fox

Elaphe gloydi

- 91-137 cm; record 179.1 cm (large snake)
- Yellow-brown with large brown or black blotches on back that alternate with smaller blotches along sides
- May have red-brown head
- Belly yellow with black checkerboard pattern
- Scales weakly keeled; anal scale divided
- Lays eggs
- THREATENED (COSEWIC); THREATENED (OMNR)

Massasauga Rattlesnake

Sistrurus catenatus

- Ontario's only venomous snake
- 47.2-76 cm; record 100.3 cm
- Grey to brownish grey with darker blotches along back and several rows of alternating blotches along sides; blotches edged in white
- Black snakes with no pattern, very rare
- Pit on each side of head between eye and nostril
- Distinct segmented rattle
- Tall thick, squarish; does not taper to a point like all others
- Does not always rattle a warning; relies on pattern and remaining motionless to go undetected
- Heavy bodied; often found coiled
- Belly black
- Scales keeled; anal scale single
- Gives birth to live young
- THREATENED (COSEWIC); THREATENED (OMNR)



DeKay's Brown

Storeria dekayi

- 23-33 cm; record 49.2 cm (small snake)
- Light grey-brown to red-brown
- Two rows of spots along light coloured stripe on back
- Rows of spots may be joined by narrow lines
- Dark downward bar on side of head
- Juveniles have three yellowish spots on neck
- Belly cream or pinkish
- Scales keeled; anal scale divided
- Gives birth to live young

Northern Red-bellied

Storeria occipitomaculata occipitomaculata

- 20.3-25.4 cm; record 40.6 cm (small snake)
- Reddish brown to grey-brown in colour
- Three light brown or yellow spots on neck
- Orange-red belly; few dark spots may be present
- Scales keeled; anal scale divided
- Gives birth to live young

Smooth Green

Ophedryx vernalis

- 30.3-51 cm; record 66 cm
- Bright green and shiny
- Belly white or yellow
- Scales smooth; anal scale divided
- Lays eggs

Ring-necked

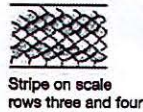
Diadophis punctatus

- 25.4-38 cm; record 70.6 cm
- Shiny steel blue, slate or brown in colour
- Neck ring and belly orange-yellow
- Scales adjacent to neck ring darker
- Belly has interrupted row of small black spots
- Scales smooth; anal scale divided
- Lays eggs

Eastern Ribbon

Thamnophis sauritus

- 45.7-66 cm; record 96.5 cm
- Black with 3 yellow stripes
- Lateral stripes on scale rows 3 and 4
- Distinct white half-moon spot in front of eye
- May have brown colour along each side of belly
- Belly yellow-green
- Scales keeled; anal scale single
- Gives birth to live young
- SPECIAL CONCERN (COSEWIC); SPECIAL CONCERN (OMNR)



Queen

Regina septemvittata

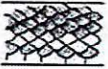
- 36-61 cm; record 92.1 cm
- Yellow-brown with yellow stripe along lower flank
- 3-5 dark stripes may be found on back
- Belly cream-yellow; brown stripes may be visible
- Usually found near rivers and marshes
- Scales keeled; anal scale divided
- Gives birth to live young
- THREATENED (COSEWIC); THREATENED (OMNR)

Eastern Garter

Thamnophis sirtalis sirtalis

- 45.7-66 cm; record 123.8 cm
- Black, green or brown with three yellow or yellow-green stripes
- Stripes may be orange or reddish in some parts of range
- Some snakes may be all black with no stripes (melanistic)
- Lateral stripes on scale rows 2 and 3
- May have dark scales or spots between stripes giving it a checkered pattern
- Belly yellowish green
- Scales keeled; anal scale single
- Gives birth to live young

Stripe on scale rows two and three



Blue Racer

Coluber constrictor foxii

- 90-152 cm; record 182.90 cm (large snake)
- Grey to greenish blue
- Head dark, throat white
- Belly light blue
- Only found on Pelee Island
- Scales smooth; anal scale divided
- Lays eggs
- ENDANGERED (COSEWIC); ENDANGERED (OMNR)

Red-sided Garter

Thamnophis sirtalis parietalis

- 41-66 cm; record 124.1 cm
- Black-brown with 3 yellow stripes
- Red bars between stripes and reddish wash on sides between scales
- Lateral stripes on scale rows 2 and 3
- Belly green-black
- In Ontario, only found along the Manitoba border
- Scales keeled; anal scale single
- Gives birth to live young

Juvenile Blue Racer

- Grey with central row of dark grey-brown blotches
- Few or no blotches on brown or grey tail
- Side of head speckled white and black

Butler's Garter

Thamnophis butleri

- 38-51 cm; record 69.2 cm
- Black or brown-green with 3 yellow stripes
- Stripes may be orange
- Lateral stripes on scale row 3 extending onto row 2 below and 4 above
- Towards back of body lateral stripe on scale rows 2 and 3
- Smallish head
- Belly green-yellow
- Only found in SW Ontario
- Scales keeled; anal scale single
- Gives birth to live young
- THREATENED (COSEWIC); THREATENED (OMNR)

Eastern Rat

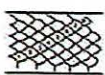
Elaphe obsoleta

- 106.7-183 cm; record 256.5 cm (large snake)
- In some, faint blotched pattern may be seen
- Throat white
- Belly grey-brown wash
- Scales weakly keeled; anal scale divided
- Lays eggs
- THREATENED (COSEWIC); THREATENED (OMNR)

Juvenile Eastern Rat

- Light grey with grey-brown blotches on body and tail
- Dark bar across snout and from eye to jaw

How to count scale rows on a snake



Smooth Scales



Keeled Scales



Divided Anal Scale



Single Anal Scale



TURTLES OF ONTARIO IDENTIFIER

Illustrations are half life size.



www.torontozoo.com/adoptapond

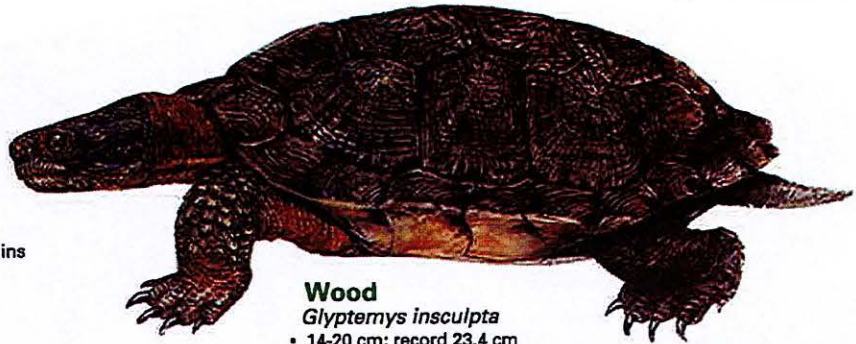


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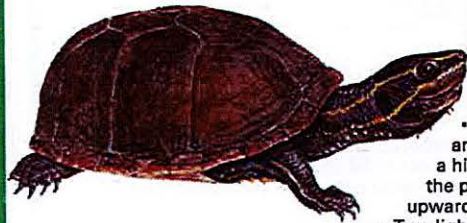
Midland painted
Chrysemys picta marginata

- 11.5-14 cm; record 19.5 cm
- Females larger than males
- Smooth, olive to brownish-grey carapace with orange-red margins
- Yellow plastron with dark central blotch
- Neck, legs and tail striped with red and yellow; yellow blotch behind each eye
- Males have very long nails on front feet
- Often seen basking on logs
- Lays 3-14 oval, white, smooth-shelled eggs



Wood
Glyptemys insculpta

- 14-20 cm; record 23.4 cm
- Brown or greyish-brown, rough, heavily sculptured carapace, often with a central keel or ridge and raised concentric growth rings on each scute
- Rear margin of carapace serrated
- Plastron is yellow with black squares
- Head black; skin brown; adults with orange or yellow on neck and legs
- Found on land (the most terrestrial turtle in Ontario) and in or near streams and wet meadows
- Lays 4-12 oval, white, thin-shelled eggs
- THREATENED (COSEWIC); ENDANGERED (OMNR)



Stinkpot
Sternotherus odoratus

- 5.1-11.5 cm; record 13.7 cm
- Small turtle with smooth, light olive to black, high-domed, narrow carapace
- Plastron is small, yellow-brown and gives little protection to legs; a hinge runs across the front of the plastron allowing it to close upward to protect the head
- Two light stripes on each side of the head
- Barbels (fleshy projections) on chin and throat
- Named for musky odour produced when handled (also known as musk turtle)
- Lays 2-5 oval, white, hard-shelled eggs
- THREATENED (COSEWIC); THREATENED (OMNR)



Western painted
Chrysemys picta bellii

- 9-18 cm; record 25.1 cm
- Light, irregular lines on olive to brownish-grey carapace
- Yellow plastron with large, dark, irregular shaped central blotch
- Often seen basking on logs
- Lays 3-20 oval, white, smooth-shelled eggs

Map

Graptemys geographica

- Male 9-15.9 cm; Female 18-27.3 cm
- Males much smaller than females
- Numerous fine yellow lines on olive green to brownish carapace, resembling a map; may be less obvious in older turtles
- Rear margin of carapace serrated
- Carapace has a slight raised area (or keel) down centre of shell
- Yellow plastron
- Yellow spot, variable in size and shape, behind each eye
- Head and limbs may have light and dark stripes
- Lays 10-16 oblong, parchment-shelled eggs
- SPECIAL CONCERN (COSEWIC); SPECIAL CONCERN (OMNR)



Blanding's
Emydoidea blandingii

- 12.5-18 cm; record 27.4 cm
- Carapace black to greyish-brown with numerous yellowish spots or streaks
- Plastron has a flexible grooved hinge that allows lower shell to close upward to protect head and legs
- Bright yellow on chin and throat
- Protruding eyes
- Domed shell obvious while basking on logs, rocks, or clumps of vegetation
- Lays 6-11 oval, dull white, hard-shelled eggs
- THREATENED (COSEWIC); THREATENED (OMNR)

Spotted

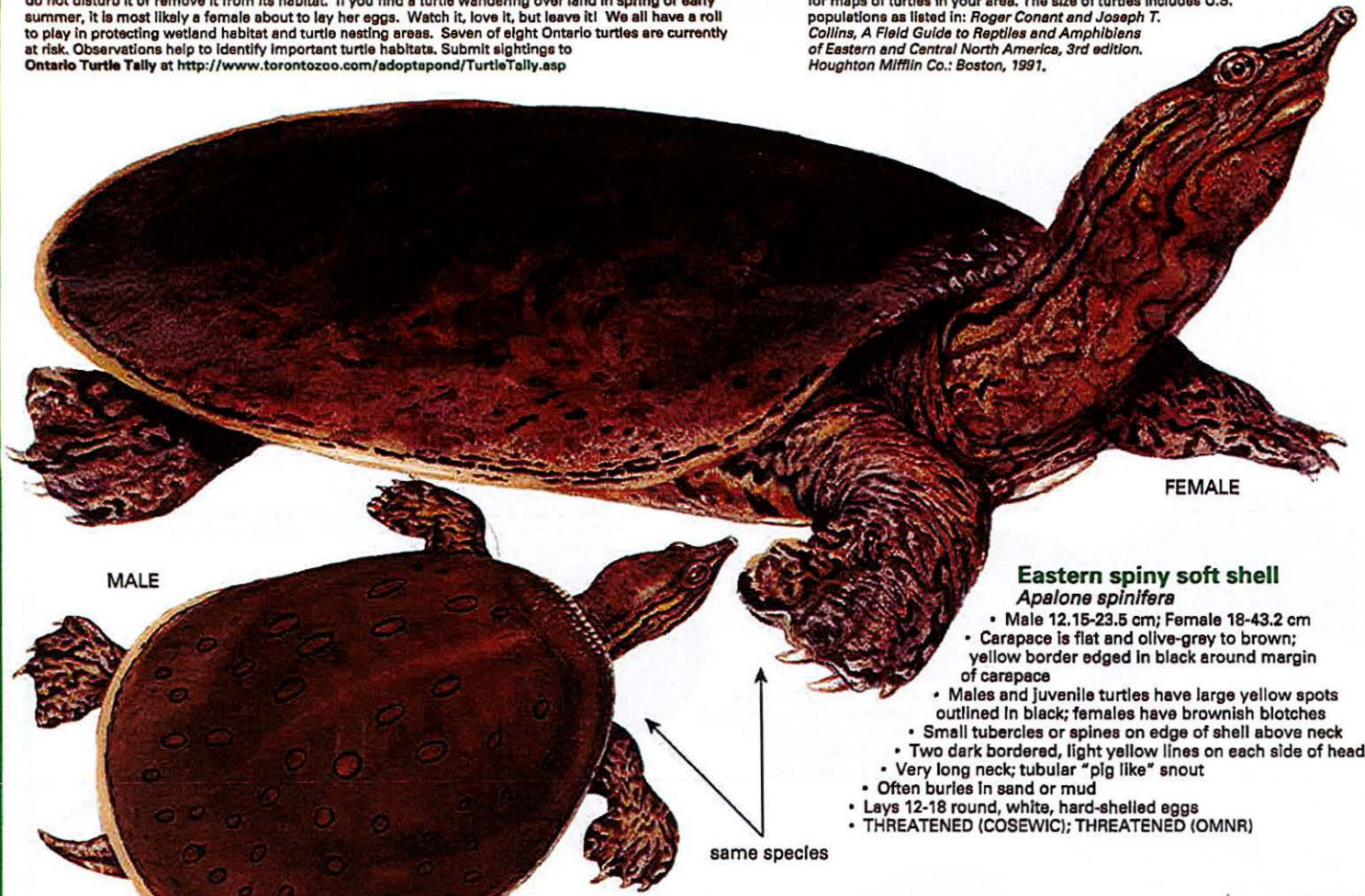
Clemmys guttata

- 9-11.5 cm; record 12.7 cm
- Smooth black carapace with bright yellow or orange spots; spots fade in older turtles
- Plastron yellow-orange with large black blotch on each scute
- Males have tan chin and brown eyes; females have yellow chin and orange eyes
- Head, neck, limbs and tail are grey to black with yellow spots; inside of legs washed with orange
- Lays 3-8 oval, leathery textured eggs
- ENDANGERED (COSEWIC); ENDANGERED (OMNR)



Turtles in Ontario are protected under the Fish and Wildlife Conservation Act. If you find a turtle please do not disturb it or remove it from its habitat. If you find a turtle wandering over land in spring or early summer, it is most likely a female about to lay her eggs. Watch it, love it, but leave it! We all have a roll to play in protecting wetland habitat and turtle nesting areas. Seven of eight Ontario turtles are currently at risk. Observations help to identify important turtle habitats. Submit sightings to Ontario Turtle Tally at <http://www.torontozoo.com/adoptapond/TurtleTally.asp>

These turtles are not found in all Ontario regions. Consult a field guide for maps of turtles in your area. The size of turtles includes U.S. populations as listed in: Roger Conant and Joseph T. Collins, *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*, 3rd edition, Houghton Mifflin Co.: Boston, 1991.



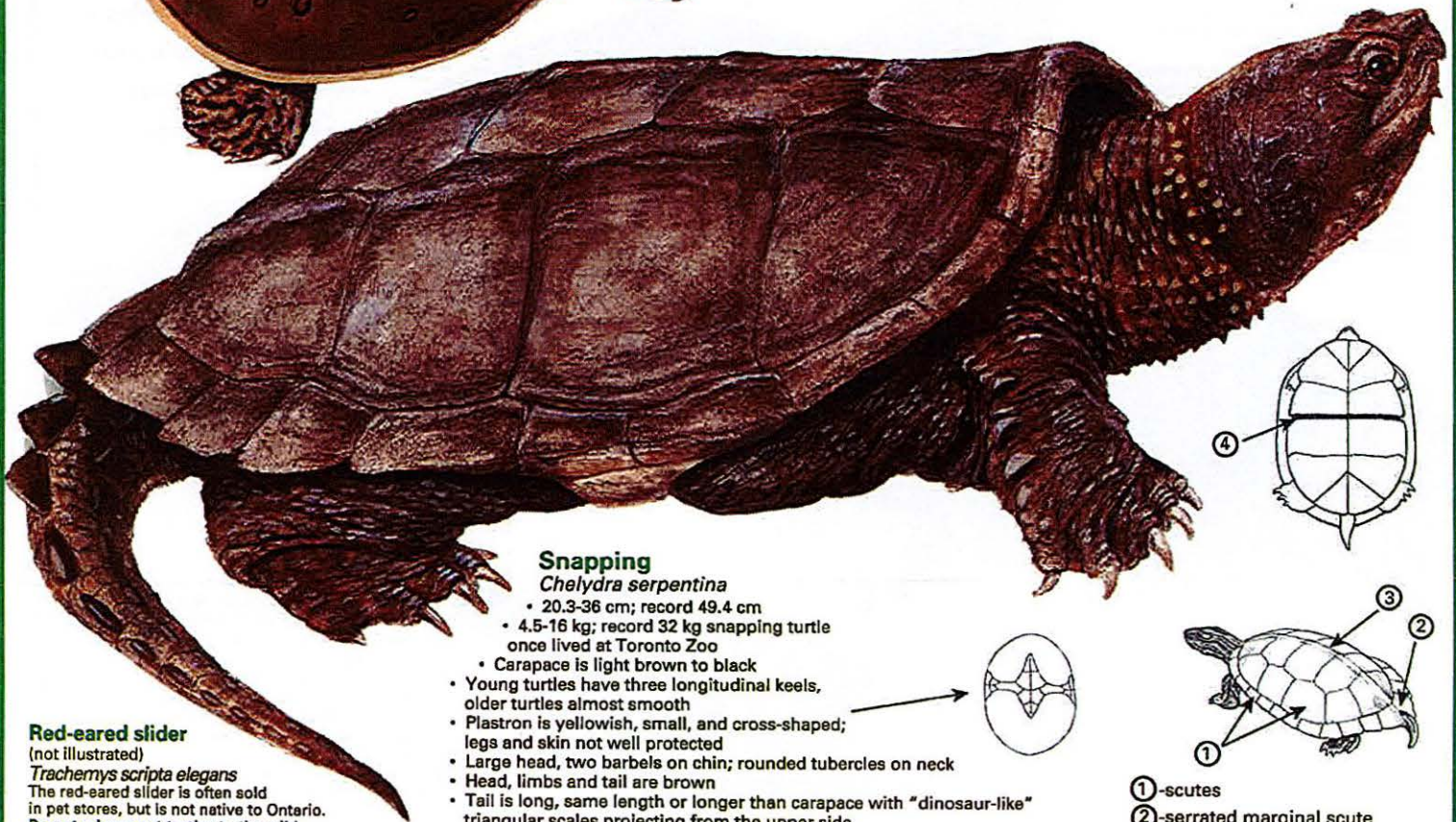
FEMALE

MALE

Eastern spiny soft shell
Apalone spinifera

- Male 12.15-23.5 cm; Female 18-43.2 cm
- Carapace is flat and olive-grey to brown; yellow border edged in black around margin of carapace
- Males and juvenile turtles have large yellow spots outlined in black; females have brownish blotches
- Small tubercles or spines on edge of shell above neck
- Two dark bordered, light yellow lines on each side of head
- Very long neck; tubular "pig like" snout
- Often buries in sand or mud
- Lays 12-18 round, white, hard-shelled eggs
- THREATENED (COSEWIC); THREATENED (OMNR)

same species



Snapping
Chelydra serpentina

- 20.3-36 cm; record 49.4 cm
- 4.5-16 kg; record 32 kg snapping turtle once lived at Toronto Zoo
- Carapace is light brown to black
- Young turtles have three longitudinal keels, older turtles almost smooth
- Plastron is yellowish, small, and cross-shaped; legs and skin not well protected
- Large head, two barbels on chin; rounded tubercles on neck
- Head, limbs and tail are brown
- Tail is long, same length or longer than carapace with "dinosaur-like" triangular scales projecting from the upper side
- Lays 20-40 round, ping-pong ball-like eggs
- SPECIAL CONCERN (COSEWIC)

Red-eared slider
(not illustrated)

Trachemys scripta elegans
The red-eared slider is often sold in pet stores, but is not native to Ontario. Do not release pet turtles to the wild. They may carry diseases that threaten our native turtles, and are not likely to survive.

- ① -scutes
- ② -serrated marginal scute
- ③ -longitudinal keel
- ④ -hinge on plastron

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 (¾") 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.

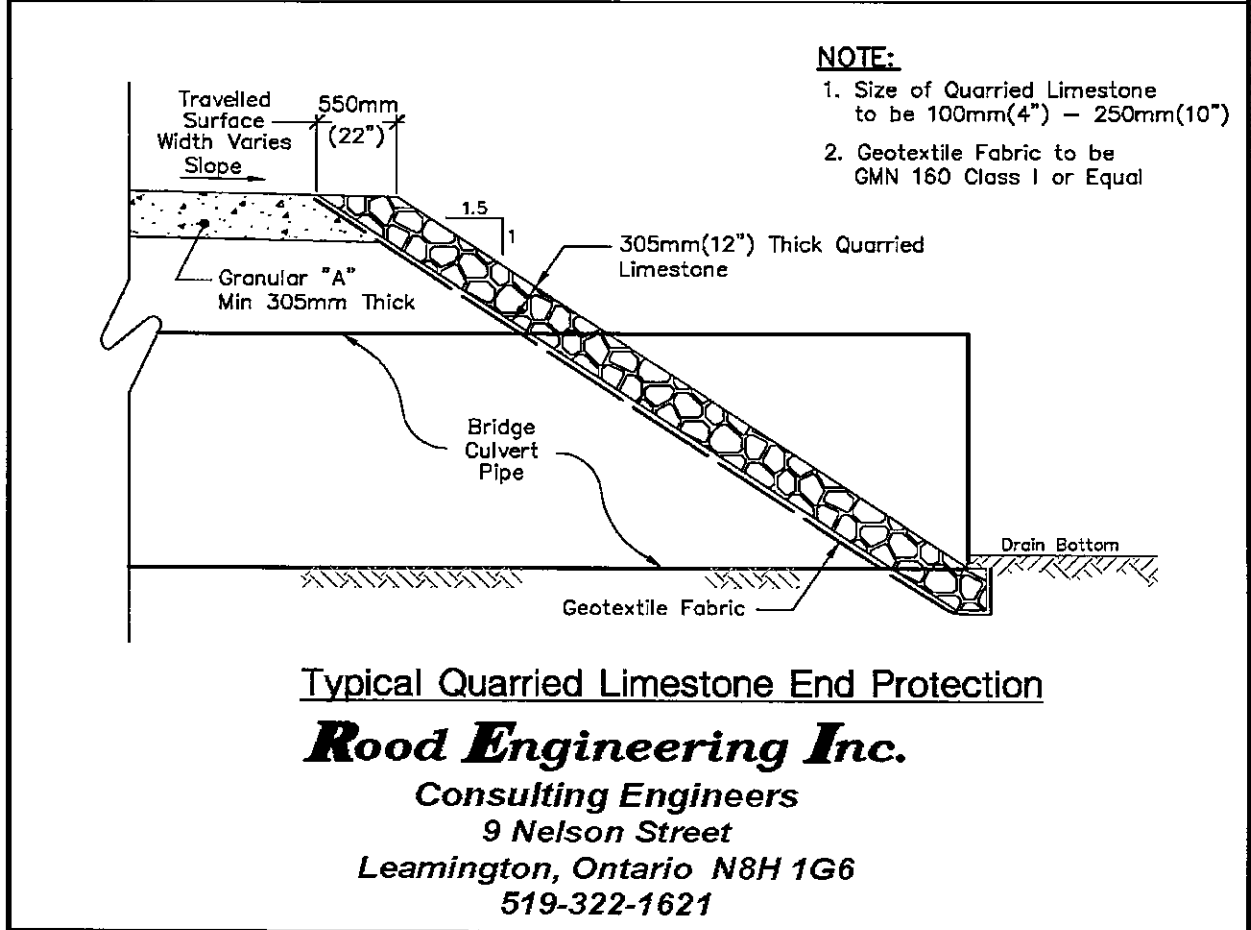
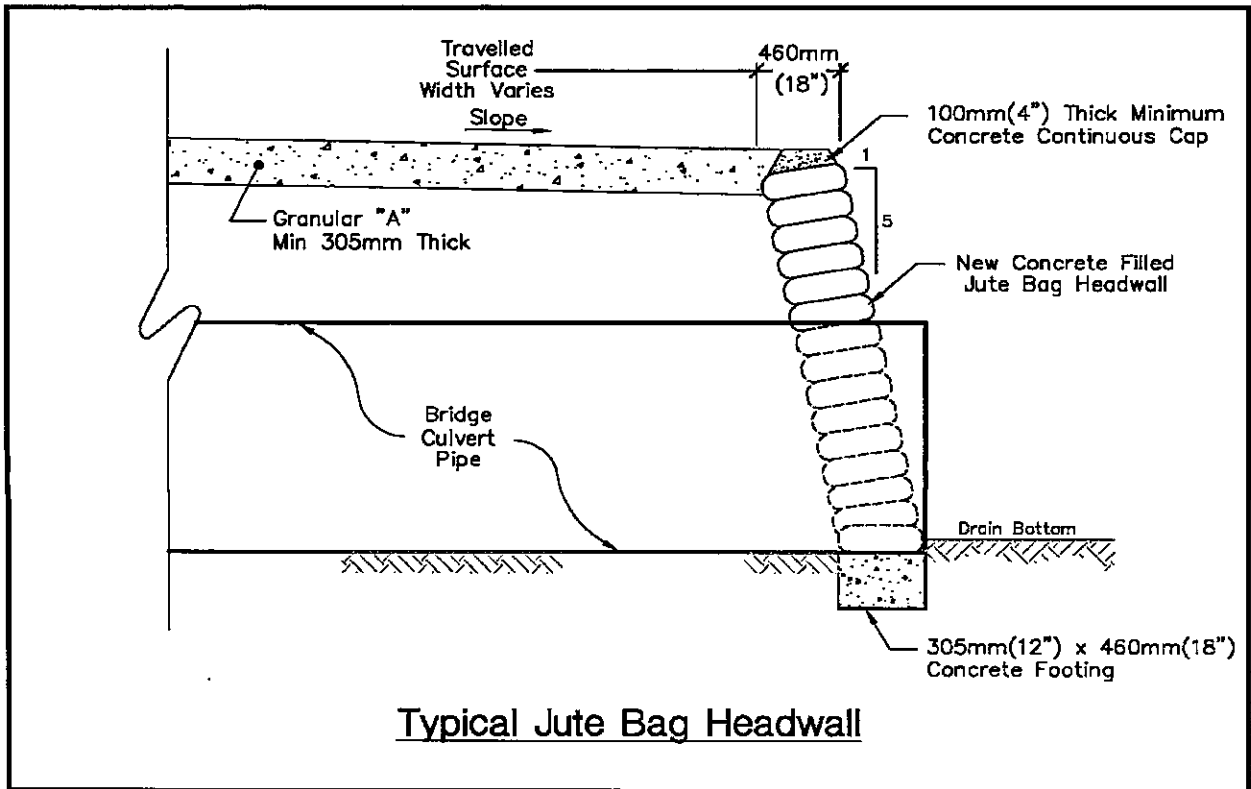
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

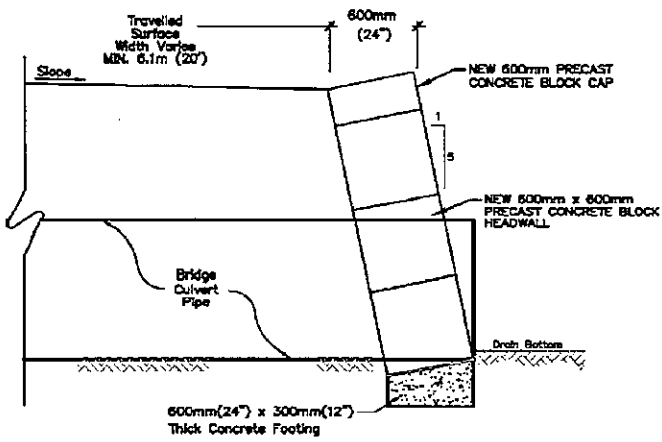
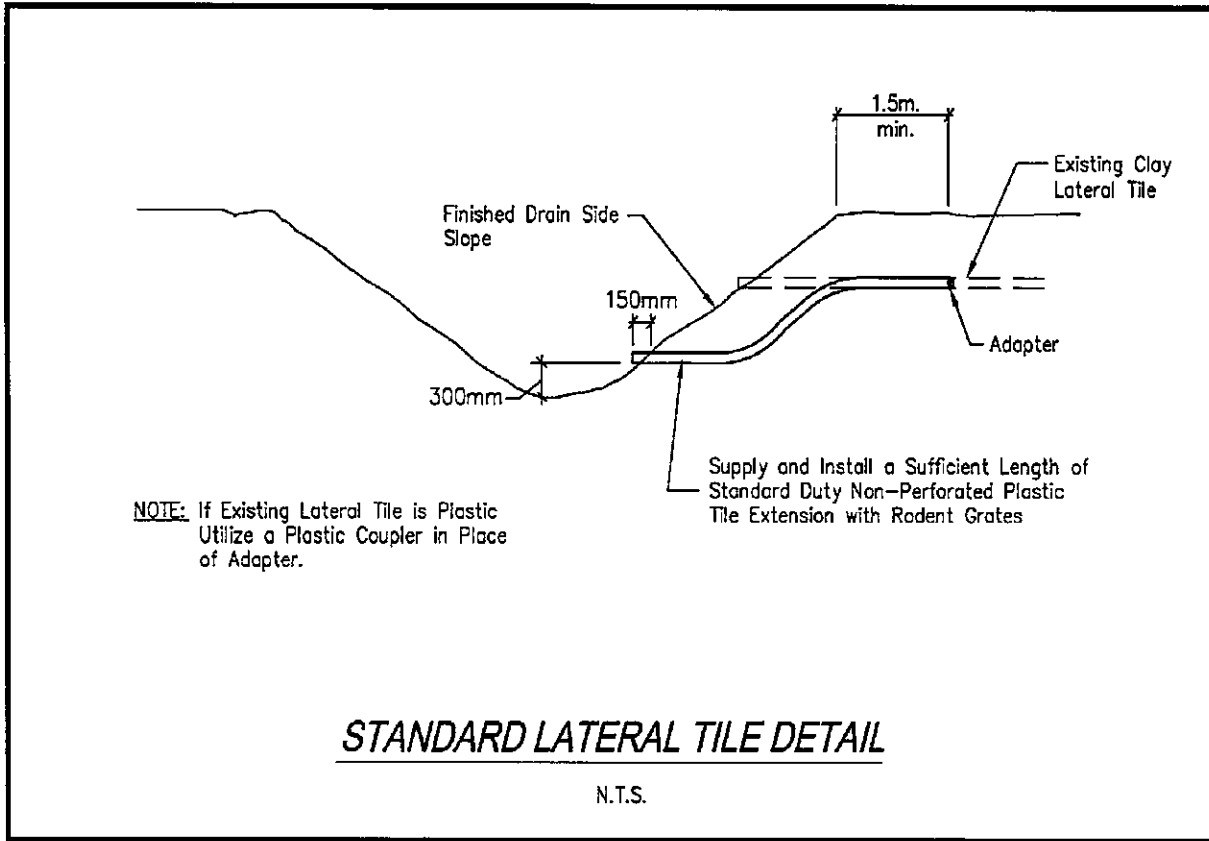
When working along a municipal roadway, the Contractor shall provide all necessary lights, signs, barricades and flagpersons as required to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If 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.

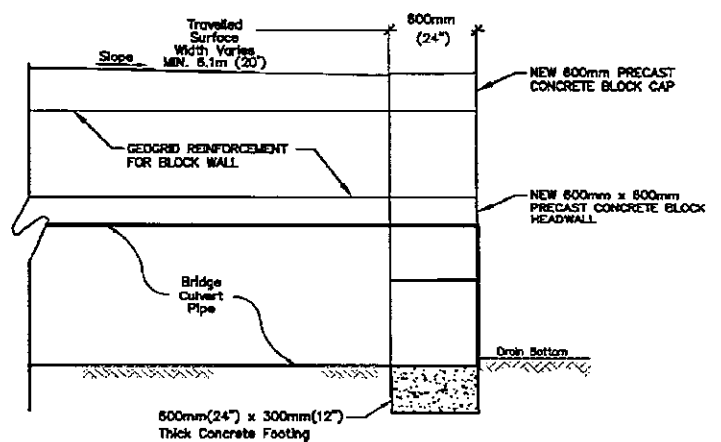
All of the work required towards the installation of the bridge shall be performed in a neat and workmanlike manner. The general site shall be restored to its' original condition, and the general area shall be cleaned of all debris and junk, etc. caused by the work

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.



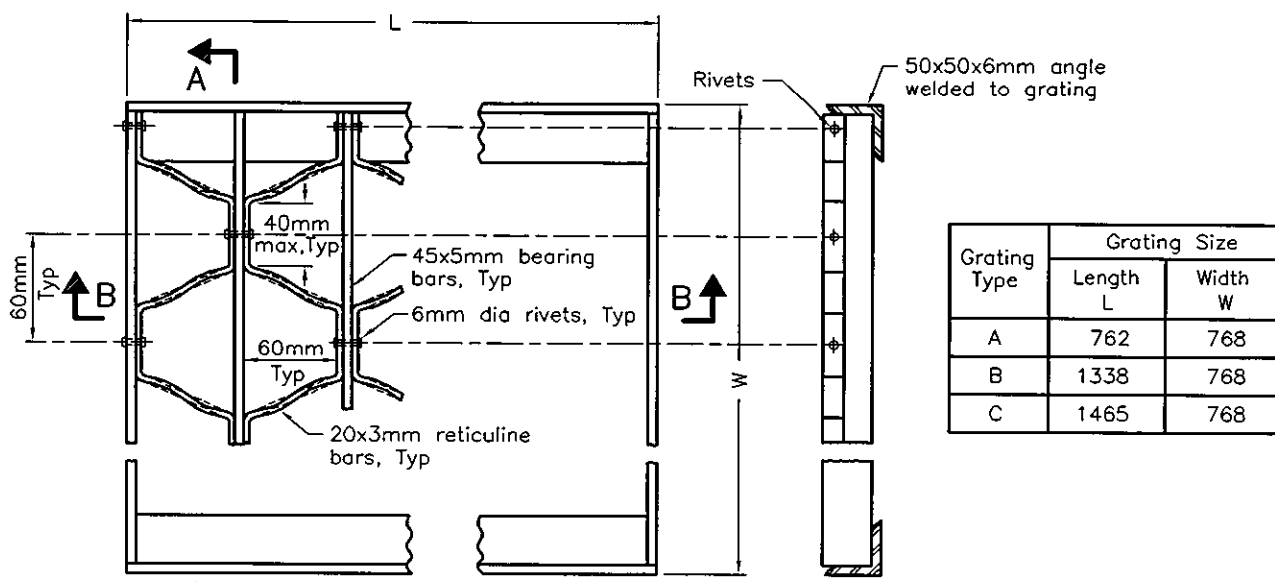


TYPICAL PRECAST CONCRETE BLOCK END PROTECTION
Scale = N.T.S.



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

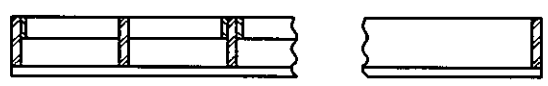
APPENDIX “REI-D”



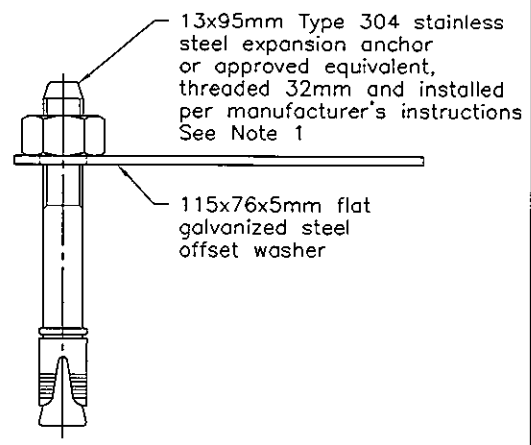
| Grating Type | Grating Size | |
|--------------|--------------|---------|
| | Length L | Width W |
| A | 762 | 768 |
| B | 1338 | 768 |
| C | 1465 | 768 |

PLAN OF GRATE

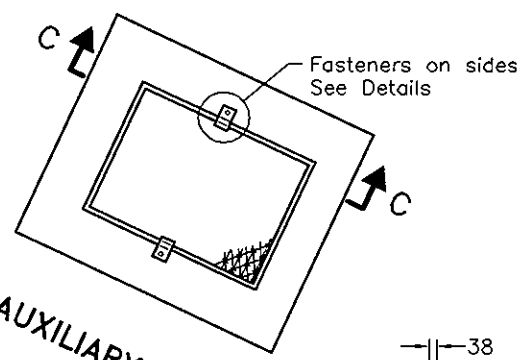
SECTION A-A



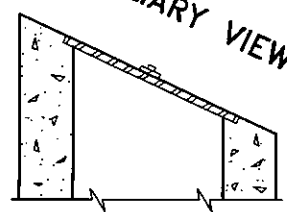
SECTION B-B



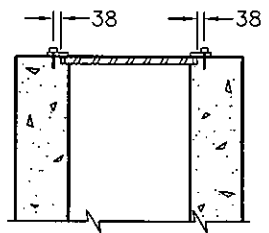
FASTENER DETAIL



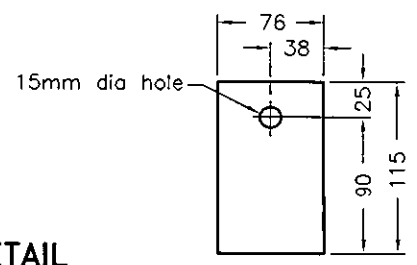
AUXILIARY VIEW



SECTION C-C



FASTENER EMBEDMENT DETAIL



OFFSET WASHER DETAIL

NOTES:

- 1 Equivalent (13x100mm Galvanized J-Bolt) cast-in-place anchor may be used.
- A Fastener shall be inserted to maintain minimum concrete cover requirements.
- B All steel components and rivets shall be galvanized.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2017 Rev 3

GALVANIZED STEEL
HONEYCOMB GRATING
FOR DITCH INLETS

OPSD 403.010



APPENDIX “REI-E”

WATERSHED PLAN SHOWING THE

3RD CONCESSION DRAIN NORTH

(Geographic Township of Anderdon)

IN THE TOWN OF AMHERSTBURG

IN THE COUNTY OF ESSEX • ONTARIO

TOWN OF AMHERSTBURG

MAJOR ADMINISTRATOR: Arie Deane
DRAINAGE SUPERINTENDENT: Shona McVitty, P.Eng.

Shawn Rood
GERARD ROOD, P.ENG.



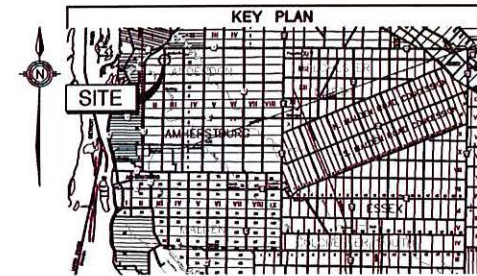
ROOD ENGINEERING INC.

CHARTERED PROFESSIONAL ENGINEERS
LAWSONVILLE, ONTARIO
518-322-1821

DATE: November 5th, 2021

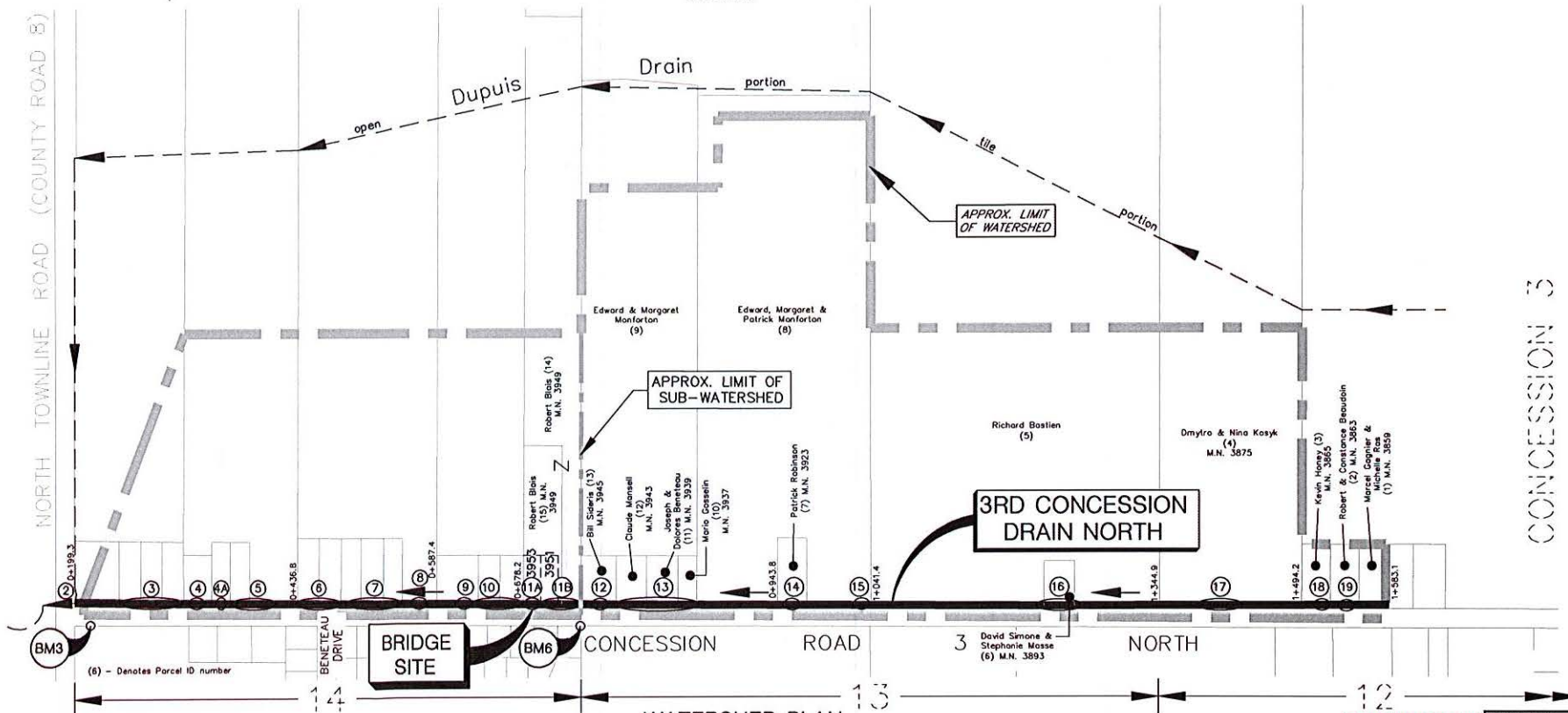
BENCHMARKS:

- TOP NORTH WEST CORNER BOX CULVERT AT CONCESSION ROAD 3 NORTH AND COUNTY ROAD 8
ELEV. = 177.480m
- TOP OF HYDRANT IN FRONT OF ST. JOSEPH SCHOOL AT 981 COUNTY ROAD 8
ELEV. = 178.200m
- TOP OF HYDRANT AT ST. JOSEPH SCHOOL YARD ON CONCESSION ROAD 3 NORTH
ELEV. = 178.022m
- TOP OF HYDRANT AT 3866 BENETEAU DRIVE
ELEV. = 178.430m
- TOP OF HYDRANT AT 3856 CONCESSION ROAD 3 NORTH
ELEV. = 178.588m
- TOP OF HYDRANT AT 3844 CONCESSION ROAD 3 NORTH
ELEV. = 178.428m
- NAIL IN POLE (No. 11403) AT 3808 CONCESSION 3 NORTH
ELEV. = 178.281m
- TOP OF HYDRANT APPROXIMATELY 130m NORTH OF 3862 CONCESSION ROAD 3 NORTH
ELEV. = 178.828m
- TOP OF HYDRANT WEST SIDE OF CONCESSION ROAD 3 NORTH ROAD APPROXIMATELY 155m SOUTH OF DOLPES MELOCHE DRAIN
ELEV. = 178.665m



KEY PLAN

SCALE = 1:150,000



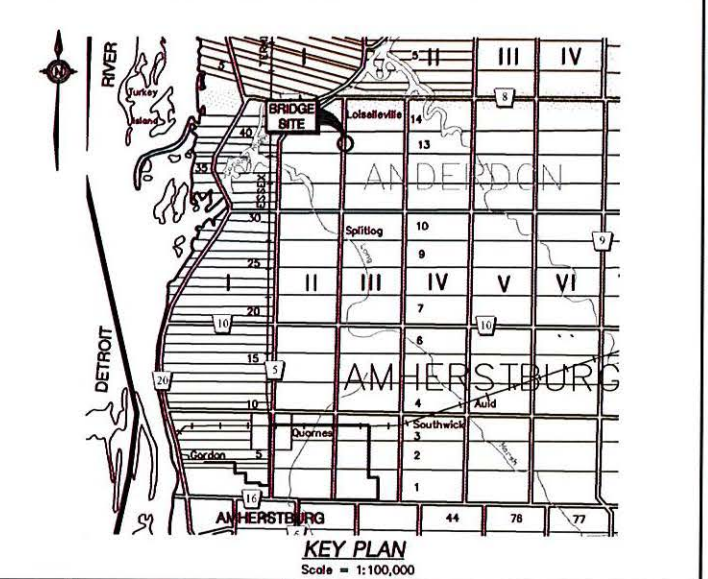
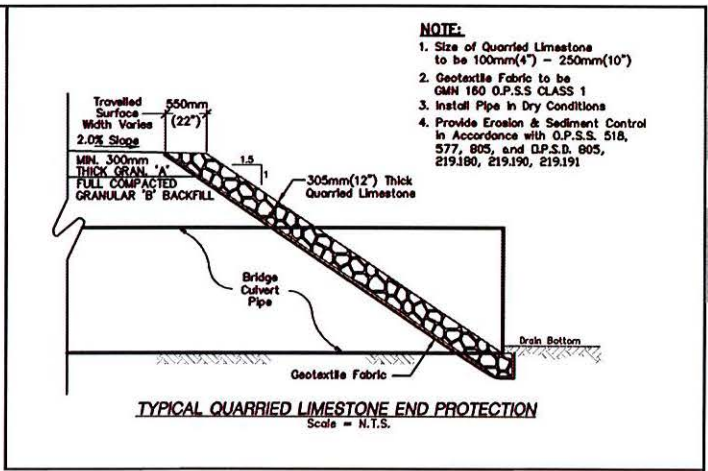
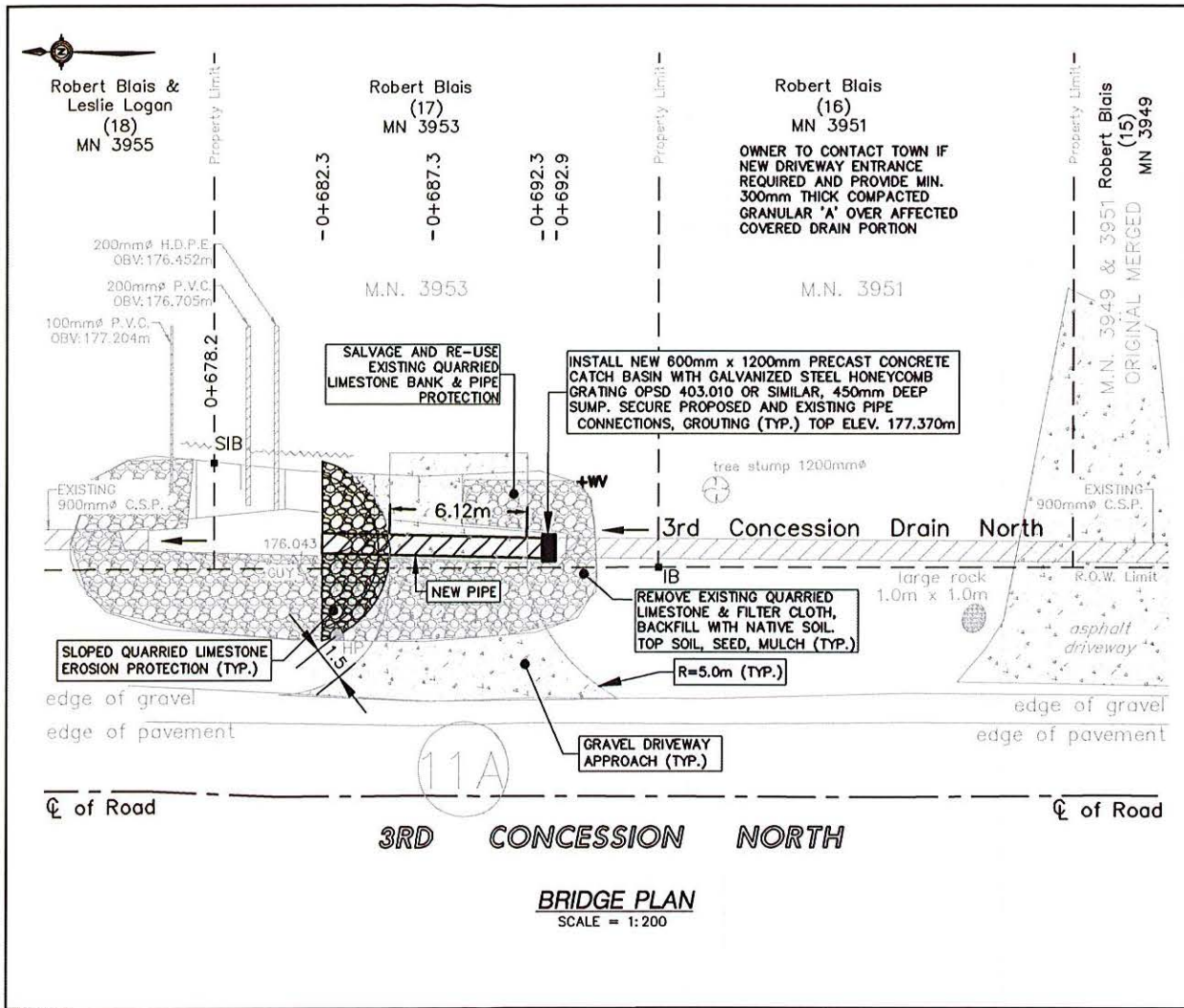
WATERSHED PLAN

SCALE = 1:2,000

(6) - Denotes Parcel ID number
① - Denotes bridge number

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

DRAWN BY: G.S. & K.D.
PLOT CODE: L11
COMPUTER FILE: RE2021010.DWG
FILE No.: RE20210100
SHEET No.: 1 OF 2



BENCHMARK:
6. TOP OF HYDRANT AT M.N. 3944 CONCESSION ROAD 3 NORTH

ELEV. = 178.278m

| PIPE SIZE | PIPE LENGTH | PIPE GAUGE | CORRUGATIONS | TYPE OF PIPE | DESIGN ELEVATIONS |
|-----------|----------------------|--------------------|----------------------------|--|---|
| 900mm | 10.0m (32.10 FT.) | 2.0 mm (14 GA.) | 19x191 mm (0.75"x7.52") | ALUMINIZED TYPE II ULTRA-FLO C.S.P. | UPSTREAM INV. (S) =175.869m DOWNSTREAM INV. (N) =175.859m CL TOP OF DRIVEWAY =177.524m DRAIN GRADE = 0.10% |

3RD CONCESSION DRAIN NORTH
New Bridge For Robert Blais, (17) M.N. 3953
(GEOGRAPHIC TOWNSHIP OF ANDERDON)
IN THE
TOWN OF AMHERSTBURG
IN THE
COUNTY OF ESSEX • ONTARIO



ROAD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
919-322-1921

FILE No: 2021D10
DRAWN BY: K.D.
PLOT CODE: 1:1
FILE: RD2021D10.DWG

DATE: 2021-11-05
APPENDIX 'E'
2 OF 2