THE CORPORATION OF THE TOWN OF AMHERSTBURG

BY-LAW NO. 2016 - 76

By-law to provide for the Repair and Improvement of the 8th Concession Drain South based on the Drainage Report by Rood Engineering Inc.

WHEREAS as request for repair and improvement of the 8th Concession Drain South was received under section 78 of the Drainage Act;

WHEREAS Council of the Corporation of the Town of Amherstburg felt it necessary to appoint an engineer for the purpose of preparation of an engineer's report for the repair and improvement under section 78 of the Drainage Act;

WHEREAS Council of the Corporation of the Town of Amherstburg has authorized Gerard Rood, P. Eng., Rood Engineering Inc. to prepare a report and said report dated July 12th, 2016;

WHEREAS the report was reconsidered and adopted by the Amherstburg Drainage Board at the meeting held on Tuesday, October 4, 2016 and is attached hereto and forms part of this by-law;

WHEREAS $17,159.00 is the amount to be contributed by the Town of Amherstburg of the total $397,000.00 for the drainage works;

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 $397,000.00 being the amount necessary for the improvements of the drainage works.

   This project being the 8th Concession Drain South.

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) 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 as shown in the schedule 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) For paying the amount $ 17,159.00 being the amount assessed upon the lands and roads belonging to or controlled by the municipality a special rate sufficient to pay the amount assessed plus interest thereon shall be levied upon the whole rateable property in the Town of Amherstburg in each year for 5 years after the passing of this by-law to be collected in the same manner and at the same time as other taxes collected.

(3) All assessments of $1,000.00 or less are payable in the first year in which the assessments are imposed.

5. SCHEDULE OF ASSESSMENTS OF LANDS AND ROADS

Property Description				Estimated Assessment as per Report	Estimated Grants 33 1/3%	Equal Bi-Annual Rate to be Imposed
Lot or Part Lot No.	Concession	Geographic Township	Parcel Roll No.			
Part Lot 87	8	Malden	560-00210	$1,425.00		$317.28
Part Lot 82	7	Malden	570-04950	$21,090.00		$4,695.76
Part Lot 83	7	Malden	570-05000	$1,359.00		$302.58
Part Lot 90	8	Malden	610-00590	$1,196.00		$266.30
Part Lot 90	8	Malden	610-00600	$1,180.00		$262.74
Part Lot 79	7	Malden	620-02850	$2,085.00		$464.24
Part Lot 80	7	Malden	620-05890	$1,045.00		$232.68
Part Lot 80	7	Malden	620-05900	$10,206.00		$2,272.40
Part Lot 80	7	Malden	620-06000	$8,918.00		$1,985.62
Part Lot 80	7	Malden	620-06150	$27,763.00		$6,181.52
Part Lot 87	8	Malden	560-00200	$10,270.00	$3,458.11	$1,516.68
Part Lot 88	8	Malden	560-00400	$2,063.00	$687.67	$306.22
Part Lot 88	8	Malden	560-00500	$1,467.00	$489.00	$217.76
Part Lot 83 & 84	7	Malden	570-04300	$6,906.00	$2,436.33	$995.18
Part Lot 83	7	Malden	570-04400	$11,011.00	$3,769.67	$1,612.30
Part Lot 83	7	Malden	570-04410	$2,052.00	$684.00	$304.58
Part Lot 83	7	Malden	570-04500	$13,228.00	$4,604.67	$1,920.02
Part Lot 82	7	Malden	570-04800	$7,710.00	$2,858.67	$1,080.16

Part Lot 82	7	Malden	570-04900	$18,299.00	$6,278.33	$2,676.44
Part Lot 83	7	Malden	570-04980	$2,264.00	$754.67	$336.06
Part Lot 84	7	Malden	570-05100	$7,791.00	$2,597.00	$1,156.46
Part Lot 90	8	Malden	610-00500	$2,620.00	$873.33	$388.90
Part Lot 90	8	Malden	610-00601	$5,133.00	$1,711.00	$761.92
Part Lot 91	8	Malden	610-01000	$1,395.00	$465.00	$207.06
Part Lot 81	7	Malden	620-00100	$14,891.00	$5,488.67	$2,093.46
Part Lot 79	7	Malden	620-02900	$13,998.00	$5,419.00	$1,910.14
Part Lot 80	7	Malden	620-06100	$7,163.00	$2,746.67	$983.30
Part Lot 81	7	Malden	620-06200	$9,719.00	$3,519.33	$1,380.38
			Total	**$214,247.00**	**$48,841.12**	**$36,828.14**

Read a first and second time and provisionally adopted this 11th day of October, 2016.

MAYOR – ALDO DICARLO

CLERK – PAULA PARKER

Read a third time and finally passed this 12 day of DEC., 2016.

MAYOR – ALDO DICARLO

CLERK – PAULA PARKER

8TH CONCESSION ROAD DRAIN SOUTH
Reconsidered Report

(Geographic Township of Malden)

(PWD-MD-2012-017)

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

REI Project 2012D017
September 12th, 2016

September 12th, 2016

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

Mayor DiCarlo and Members of Council:

8TH CONCESSION ROAD DRAIN SOUTH
Reconsidered Report
(Geographic Twp. of Malden)
REI Project 2012D017
Town of Amherstburg, County of Essex

I. INTRODUCTION

In accordance with instructions received at the Drainage Board meeting on September 6th, 2016, we have reconsidered our July 12th, 2016 report to incorporate relocation of Bridge 2 and Bridge 10 when reconstructed. In accordance with the original instructions received from you at your June 25th, 2012 meeting and confirmed by letter dated July 23rd, 2012, from your former Director of Engineering and Infrastructure, Lou Zarlenga, P.Eng., we have prepared the following report that provides for improvement to several of the bridges located along the drain, along with cleaning and improvements of the open drain and the access pipes not being replaced at this time. The 8th Concession Road Drain South extends from its outlet in the Long Marsh Drain, near the southeast corner of County Road 9 (Howard Avenue) and County Road 18 (Pike Road), in a westerly direction to the west side of Road 9. It then extends southerly along the west side of the roadway to the upper end of the open drain approximately 16.5 metres south of the north limit of Lot 84, Concession 7. A plan showing the 8th Concession Road Drain South, 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 repair and improvement of the 8th Concession Road Drain South, 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 and drain improvements, and we report thereon as follows.

II. BACKGROUND

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

1)	July 8th, 1976	Repair and improve drain and bridges including relocate drain off County Road 9 onto private lands south of South Sideroad	Wm. J. Setterington, P.Eng.

2)	May 29th, 1985	Updated maintenance schedule report	Nick Peralta, P.Eng.

The 1976 Report by Wm. Setterington, 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 most recent report on the drain by Nick Peralta, P.Eng. provided for an updated Maintenance Schedule of Assessment pursuant to Section 76 of the Drainage Act.

We arranged with the Municipality to provide us with the updated assessment roll information for the affected parcels. At the request of the County, we also investigated with them, the Town and Union Gas the requirements for relocating the drain outlet southerly to make the road intersection at Howard Avenue (County Road 9) and Pike Road (County Road 18) safer.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the drainage information provided by the Municipality, we arranged with the former Drainage Superintendent, Eric Chamberlain, to schedule an on-site meeting for September 4th, 2012. The following people were in attendance at said meeting: Brent Marchant, Helen Sellars, Allan Serran, Brad Martin, Alan Quesnel, Jon Parks, Joe & Harry Grondin, Brian Renaud, Eric Chamberlain (Drainage Superintendent) and Gerard Rood (Rood Engineering). Mr. Chamberlain provided an introduction. He noted that the Town had received a request from Mr. Waters for drain maintenance. There is a concern with the culvert failing at Municipal Number (MN) 8352 and the north headwall is severely tipped. Most of the bridges are from the early 1970's. The drain has been deepened and improved in the past. Mr. Rood told the owners that the processing of the report could take 6-7 months and the construction timing window would be after July 1st.

Mr. Marchant advised that the bridge enclosure serving his property at MN 8540 has concerns. Mr. Chamberlain explained that cost sharing is typically provided for a standard access bridge installation and the cost of enclosure piping is borne by the land owner or in some cases the road authority where they requested relocation of the drain off the roadway onto private lands and paid for the original enclosure. Mr. Rood advised that the access bridge portion and the lawn enclosure portion are evaluated separately. The extra cost of any top width beyond the standard 6.1m (20 ft.) is borne by the owner.

An owner mentioned that the last maintenance work on the drain was done in 1985. Mr. Parks commented that the drain worked well after the last maintenance. Mr. Chamberlain 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 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.

Mr. Renaud noted that their farm drains mostly to the Long Marsh Drain to the east and questioned why they were assessed to this drain. He was advised that the past reports would be reviewed to ensure that the correct affected area was being assessed. It was noted that some of the lands on the east side direct some drainage to the road ditch and the County has pipes under the road that direct these flows to the 8th Concession Road Drain South.

Spraying of the drain was discussed to help control growth of weeds including phragmites so the drain will better maintain its capacity. Mr. Chamberlain noted that there are costs involved

with this and it was established that the owners would be okay with a 3-year cycle for spraying if possible. The engineer was asked to look at rock protection around main tile ends to reduce the risk of erosion.

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 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 either stacked concrete filled jute bag or sloped quarried limestone on filter cloth ends, 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.

After the meeting, Mr. Rood and Mr. Chamberlain met with Brent Marchant and inspected the enclosure culvert at MN 8540. It was observed that the pipe appears to be in poor condition and there are sinkholes along the length of the pipe indicating that the pipe is likely rotted out and will need to be replaced.

IV. FIELD SURVEY AND INVESTIGATIONS

Subsequent to the on-site meeting we arranged for a topographic survey of the drain and bridges to be completed. We further arranged to get updated roll information from the Municipality, including information on the tax class of each of the properties affected by the Municipal Drain. After completing a visual inspection of the access culvert under County Road 9 revealed that the pipe was rotted out, we contacted the County of Essex to consult on how they wanted to proceed with the repair. The County requested that the access bridge and drain outlet be shifted south to allow for a safer road intersection. We carried out some additional survey work and prepared sketches of the proposed relocation of the outlet and initially contacted Union Gas to determine if it were possible to cut across their parcel just south of County Road 18. We established that they had too much underground plant that would be affected by the proposed outlet relocation. In consultation with the County of Essex and the Town, we established that a new outlet just south of the Union Gas parcel would be the most suitable.

We also made initial submissions to the Essex Region Conservation Authority regarding their requirements or any D.F.O. requirements for work that would be proposed to be carried out on the drain and access bridges within the 8th Concession Road Drain South. A response from the Conservation Authority was received on September 21st, 2012. A copy of their concerns and requirements is included in **Appendix "REI-A"** of this report.

We also arranged for the Town to review the Ministry of Natural Resources and Forestry (M.N.R.F.) Species at Risk (S.A.R.) former agreement made with the Town pursuant to the Endangered Species Act, 2007. The former Agreement plans indicate that turtle and snake species are a concern for this work area as outlined in the letter from the Town dated January 18th, 2013. The former Agreement includes mitigation measures to be followed as outlined in "Schedule C Mitigation Measures" of the document and a copy of same as it relates to turtles and snakes is included herein in **Appendix "REI-B"**.

V. BRIDGES REVIEW

As part of our investigations, we made detailed inspections of each of the bridges along the open drain. We prepared preliminary designs and estimates for improvement of those bridges that require work at this time. We contacted the majority of the bridge owners to discuss their bridges with them and to determine if there were any concerns that the owner was aware of that should be addressed as part of the report. Preliminary details of the proposed work and cost estimates for work on the bridges was discussed with each owner that we were able to contact, along with cost sharing. Owners were reminded that they would also share in the cost of the work along the downstream portions of the drain.

VI. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the July 8th, 1976 report plans by Wm. Setterington, P.Eng. 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.

There are several bridges that are expected to last for a few years before requiring work. These structures are not considered to be adversely impacting the drain. We have inspected each of these bridges and find that they conform to the general requirements of access bridges for Municipal drains. We recommend that the Municipality keep up and maintain these bridges 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 bridges 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 bridge pipes and enclosures will be connected to the new replacement bridge and enclosure, or diverted and extended to outlet to the open drain. The Municipality 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 drain improvement works be carried out as follows:

a) Badly deteriorated bridges are to be replaced with new pipes that will be set so that 10% of their diameter is below the drain bottom in accordance with the current practice and requirements of the Conservation Authority and the Department of Fisheries and Oceans.

b) All replacement bridge pipes are to be provided with either quarried limestone rip rap on filter cloth sloped ends, concrete filled jute bag endwalls, or precast concrete block endwalls, unless the existing concrete headwall can be re-used.

c) Where necessary, all driveways will be transitioned from the minimum 6.10 metre (20.0 ft.) top width over the pipe to the width of the existing driveways as shown and detailed on the plans.

d) We recommend that all bridges not being improved directly under this report, shall be kept up and maintained in the future in accordance with the details and provisions included within this report, the plans and the specifications, subject to any further requirements established by the approval Authorities including E.R.C.A., D.F.O. and M.N.R.F.

e) We recommend that all drain improvements, including those to access bridges, be carried out in accordance with the requirements established by E.R.C.A. and D.F.O. as set out in the documents within **Appendix "REI-A"** attached to this report.

f) 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.

g) We find that portions of the open drain along the west side of County Road 9 (Howard Avenue) and some of the pipes have significant accumulation of silt and debris and we recommend that these be cleaned out as set out further in this report.

h) The County of Essex and the Town are in agreement on relocation of the drain outlet just south of its present location to outlet to the same Municipal drain, being the Long Marsh Drain, and we recommend proceeding with same and further recommend that the owners be compensated for the use of the lands for the relocated outlet as set out below.

We further find and recommend as follows:

a) **Bridge No. 1** (County of Essex, County Road 9 – Howard Avenue)

This road access was found to be rotted out. To improve the intersection of County Road 9 (Howard Avenue) and County Road 18 (Pike Road), the drain outlet shall be relocated south of its present position with a new access culvert under the roadway and an open channel extending easterly to the Long Marsh Drain, along with ancillary work as shown on the plans and provided for in the specifications. We recommend that this new access bridge and outlet be kept up and maintained in the future by the Town as part of the Municipal drain. We further recommend that the existing access bridge, open drain and stub into the Long Marsh Drain access culvert along the south side of County Road 18 be abandoned pursuant to Section 19 of the Drainage Act once the work provided for under this report has been completed. We have provided for the removal of the existing bridge and portions of the headwalls, filling of the open channel and creation of road swales to be maintained by the County at their cost in the future, along with blocking off the stub into the Long Marsh Drain. The pipe stub shall be removed from the west side of the Long Marsh Drain access culvert, and the access culvert repaired with galvanized corrugated panels matching the profile and curvature of the existing pipe securely fastened in place to maintain the integrity of the existing structure.

b) **Bridge No. 2** (806574 Ontario Inc., 620-02900)

We find that this existing corrugated steel pipe (C.S.P.) structure is rotted out with deteriorating headwalls comprising concrete filled jute bags. It has a gravel and grass top. We recommend that this access bridge be removed and replaced at a new location near the south limit of the parcel as requested by the owner, and as provided for further in this report, and that it be kept up and maintained in the future by the Town as part of the Municipal drain.

c) **Bridge No. 3** (Susan & Tim Reaume, 620-05890)

We find that this existing corrugated steel pipe access bridge with sloped rip rap ends is a newer structure in fair condition. We recommend that this access bridge be kept up and maintained in the future by the Town as part of the Municipal drain.

d) **Bridge No. 4** (Alan Quesnel, 620-05900)

This existing bridge is a C.S.P. structure that appears to be nearing its life end. The pipe ends are protected with concrete headwalls with the north wall collapsing into the drain. We recommend that this access bridge be repaired with a precast concrete block headwall on the north end as provided for further in this report and be kept up and maintained in the future by the Town as part of the Municipal drain.

e) **Bridge No. 5** (Alan Quesnel, 620-06000)

We find that this existing C.S.P. bridge is in fair condition, and has a field stone and rock sloped end on the south and concrete filled jute bag endwall on the north. We recommend that this access bridge be kept up and maintained in the future by the Town as part of the Municipal drain.

f) **Bridge No. 6** (Dennis Hallatt, 620-06150)

We find this bridge is badly rusted and bulging inside the length of the pipe. The existing concrete headwalls on each end appear to be in fair condition. We recommend that this access bridge be replaced using the existing headwalls and be kept up and maintained in the future by the Town as part of the Municipal drain.

g) **Bridge No. 7** (Ruby Martin, 620-06200)

This existing bridge is badly rusted and has open joints that result in sinkholes. The existing concrete headwalls on each end appear to be in fair condition. We recommend that this access bridge be replaced using the existing headwalls and be kept up and maintained in the future by the Town as part of the Municipal drain.

h) **Bridge No. 8** (Town of Amherstburg, South Sideroad)

We find that this existing C.S.P. bridge with sloped rip rap endwalls is in fair condition. We recommend that this access bridge be kept up and maintained in the future by the Town as part of the Municipal drain.

i) **Bridge No. 9** (Kerri Montgomery, 570-04950)

We find this C.S.P. access bridge and enclosure with sloped rip rap ends is in very poor condition with sinkholes occurring along its length. We recommend that the pipe be

replaced 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.

j) **Bridge No. 10** (Jon Parks, 570-04400)

We find this C.S.P. access bridge to be rotted out at the pipe haunches. We recommend that this access bridge with sloped rip rap end protection be removed and replaced at this time with the replacement structure shifted north as requested by the owner and provided for in this report, and that it be kept up and maintained in the future by the Town as part of the Municipal drain.

k) **Bridge No. 11** (Stanley & Suzanne Langlois, 570-05000)

This existing C.S.P. access bridge with sloped rip rap protection on the south end and dirt and gravel sloped end on the north is rusting but appears to be solid and in fair condition. We recommend that this access bridge be kept up and maintained in the future by the Town as part of the Municipal drain.

l) **Bridge No. 12** (Allan, Connie, Michael, Anna & Donald Serran, 570-04300)

We find this existing C.S.P. access bridge with sloped rip rap end protection is badly rusted but in fair condition structurally. 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 8th Concession Road Drain South be repaired and improved, including the bridges 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".

VII. ALLOWANCES

We find that the work on the drain will impact some of the lands, particularly at the new outlet, and these agricultural lands require payment for the land taken by same. We therefore recommend that the following owners be compensated for the land taken for drain widening and relocation as follows, namely:

1)	806574 Ontario Inc., (620-02900)	Owner,	Part of Lot 79, Concession 7,	$	461.00
2)	806574 Ontario Inc., (610-01200)	Owner,	Part of Lot 92, Concession 8,	$	4,273.00
	TOTAL FOR LAND TAKEN			**$**	**4,734.00**

We have provided for this land taken compensation in our estimate, as is provided for under Section 29 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010".

This compensation shall allow for all of the land necessary to construct the new Municipal drain outlet, as well as access along the lands for the future maintenance and upkeep of the drainage system. We have allowed for some slight drain widening along the west bank of the drain as shown on the cross sections, and for the complete area of the new drain outlet and the lands that are cut off to the north of the new drain outlet. A value of $8,546.00 per acre ($21,117.00 per hectare) for the drain widening and new outlet construction has been provided. The allowances provided shall establish the legal right for the Municipal drainage system outlet in its proposed location and establish the right to access along the north side of the drain for future maintenance. We recommend that the area north of the new drain outlet be cut and maintained by the Town as part of the drainage works.

We find that all of the bridge work will generally be completed within the confines of the existing drain limits and road right-of-way and have provided for full restoration works to be carried out at all disturbed areas. We recommend that any materials removed from the open drain, or existing bridges and enclosures along lawn areas, be loaded up and hauled away for disposal by the Contractor.

Based on the above we find that no allowances for damages are necessary pursuant to Section 30 of the Drainage Act for those portions of the parcels having lawn areas.

We find that the disposal of excavated material along the west bank of the drain abutting cultivated agricultural lands requires payment for the land affected by same. We therefore recommend that the following owners be compensated for the damages to land and crops, if any, as follows, namely:

1)	806574 Ontario Inc. (620-02900),	Owners,	Part of Lot 79, Concession 7,	$	2,259.00
2)	Alan Quesnel (620-06000),	Owner,	Part of Lot 80, Concession 7,	$	746.00
3)	Bradley & Laurie Martin (620-06100),	Owners,	Part of Lot 80, Concession 7	$	1,077.00
4)	Ruby Martin (620-06200),	Owner,	Part of Lot 81, Concession 7,	$	839.00
5)	Alan & Pauline Waters (620-00100),	Owners,	Part of Lot 81, Concession 7,	$	1,575.00
6)	Russell Wood (570-04800),	Owner,	Part of Lot 82, Concession 7,	$	866.00
7)	Jon & Kathleen Parks (570-04900),	Owners,	Part of Lot 82, Concession 7,	$	536.00
8)	Jon Parks (570-04500),	Owner,	Part of Lot 83, Concession 7	$	586.00
9)	Jon Parks (570-04400),	Owner,	Part of Lot 83, Concession 7	$	298.00

10)	Allan, Connie, Michael, Anna & Donald Serran (570-04300),	Owners,	Part of Lot 83, Concession 7,	$	403.00
	TOTAL FOR DAMAGES			**$**	**9,185.00**

These values for damages are based on a strip of land parallel to and immediately adjacent to the drain, wide enough to spread the excavated material to a maximum thickness of 100mm. These allowances are based on a value of $1,227.00 per acre ($3,032.00 per hectare) for damage to the affected lands and crops, if any.

We have provided for this in our estimate as is provided for under Section 30 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010".

VIII. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **THREE HUNDRED NINETY-SEVEN THOUSAND DOLLARS ($397,000.00),** made up as follows:

CONSTRUCTION

Item 1)	**Existing Bridge No. 1**; Carefully remove existing concrete endwalls each end, completely remove and dispose of existing C.S.P. arch and all materials that are unsuitable, including any deleterious material encountered; place granular backfill including compaction; restore gravel shoulder and paved travel surface; extend existing 600mm diameter C.S.P. at southwest corner with approximately 3.0m of 2.0mm thick aluminized C.S.P. including bolted coupler; supply and place 300mm thick rock on filter cloth protection on drain bank adjacent the southwest corner of existing bridge; remove and plug existing pipe stub opening at Long Marsh Drain bridge under County Road 18 with galvanized corrugated steel plates formed to the culvert and bolted in place; salvage existing rip rap; brush and fill existing open drain from Long Marsh Drain west to County Road 9 and brush and grade roadside swale to direct flows west and south; relay existing road ditch pipes; provide topsoil placement, seeding and mulching, and restoration and clean up, complete. (County of Essex)	Lump Sum	$	15,000.00
Item 2)	**Relocated Bridge No. 1**; Excavate open drain from Long Marsh Drain westerly, completely remove and dispose of any deleterious material encountered; provide pipe bedding, supply and install a new road access bridge at the location shown on the plans consisting of 27.0 metres (88.6 ft.) of 2800 span X 1950mm rise corrugated steel pipe arch, 3.5mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugations,			

	including 9 corrugation bolted couplers; sloped quarried limestone on filter cloth end protection; one 3.0m long and one 9.0m long 450mm diameter 2.8mm thick aluminized C.S.P. stubs at east side of road to connect road ditches to the north and south; granular backfill including 300mm thick Granular "A" travel surface; 150mm thick asphalt surface; 300mm thick rock on filter cloth protection on drain bank at Long Marsh Drain; coordinate lowering of utilities with each affected party; topsoil placement, seeding and mulching, and restoration and clean up, complete. (County of Essex)	Lump Sum	$	45,500.00
Item 3)	**Bridge No. 2**; Completely remove and dispose of the existing structure and endwall materials that are unsuitable, including any other deleterious material encountered; restore drain cross section; prepare drain at new location including all brushing, grubbing and topsoil removal, provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of 16.0 metres (52.5 ft.) of 1600mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugations, including 9 corrugation bolted coupler; 305mm thick sloped quarried limestone rip rap on filter cloth end protection; granular backfill including 300mm thick Granular "A" travel surface; topsoil placement, seeding and mulching, and restoration and clean up, complete. (806574 Ontario Inc.)	Lump Sum	$	14,200.00
Item 4)	**Bridge No. 4;** Excavate drain, completely remove and dispose of the existing north concrete headwall materials that are unsuitable, including any other deleterious material encountered; fix up pipe end including shortening pipe if needed, supply and install a new precast concrete block headwall on north end; granular backfill including compaction, topsoil placement, seeding and mulching, and restoration and clean up, complete. (Alan Quesnel)	Lump Sum	$	10,000.00
Item 5)	**Bridge No. 6**; Excavate drain, completely remove and dispose of the existing structure and endwall materials that are unsuitable, including any other deleterious material encountered; provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of 37.0 metres (121.4 ft.) of 1400mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugations, including 9 corrugation bolted coupler; enlarge concrete headwall openings and grout in new pipe; granular backfill including 300mm thick Granular "A" travel surface; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Dennis Hallatt)	Lump Sum	$	28,700.00

Item 6)	**Bridge No. 7**; Excavate drain, completely remove and dispose of the existing structure and materials that are unsuitable, including any other deleterious material encountered; provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of 7.0 metres (23.0 ft.) of 1400mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125mm x 25mm corrugations, including 9 corrugation bolted couplers; enlarge existing headwall openings and grout in new pipe; granular backfill including 300mm thick Granular "A" top course; protect existing tiles and pipes; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Ruby Martin)	Lump Sum	$	8,900.00
Item 7)	**Bridge No. 9**; Excavate drain, completely remove and dispose of the existing structure and endwall materials that are unsuitable, including any other deleterious material encountered; provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of 98.0 metres (321.5 ft.) of 1200mm diameter, 2.0mm thick, aluminized steel type II corrugated Hel-Cor pipe with annular ends and 125 x 25mm corrugations, including 9 corrugation bolted coupler; sloped quarried limestone on filter cloth end protection; granular backfill including 300mm thick Granular "A" travel surface at driveways; topsoil placement, seeding and mulching, temporary fencing, restoration and clean up, complete. (Kerri Montgomery)	Lump Sum	$	52,100.00
Item 8)	**Bridge No. 10**; Completely remove and dispose of the existing structure and endwall materials that are unsuitable, including any other deleterious material encountered; restore drain cross section; prepare drain at new location including brushing, grubbing and topsoil removal, provide pipe bedding, supply and install a new access bridge at the location shown on the plans consisting of 25.0 metres (82.0 ft.) of 900mm diameter, smooth wall Boss 2000 H.D.P.E. pipe, including wrap couplers; sloped quarried limestone on filter cloth end protection; granular backfill including 300mm thick Granular "A" travel surface; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Jon Parks)	Lump Sum	$	14,200.00
Item 9)	**Station 0+004.5 to Station 3+265.5;** Carry out bottom dipping and excavation of the drain to remove accumulated sediment and restore the drain to the profile grade and sections shown on the plans, including all leveling, hauling and disposal of material where specified, approximately 3,261 metres (3,210 cubic metres) at $10.00 per lineal metre.		$	32,610.00

Item 10)	**Station 0+000.0 to Station 3+265.5;** Carry out cleaning of the drain pipes to remove accumulated sediment and restore the drain to the profile grade on the plans, including removal of any deleterious materials, all hauling and disposal of material, complete:		
	a) Bridge No. 3: 14.5 metres at $70.00 per lineal metre	$	1,015.00
	b) Bridge No. 5: 12.2 metres at $70.00 per lineal metre	$	854.00
	c) Bridge No. 8: 6.2 metres at $80.00 per lineal metre	$	496.00
	d) Bridge No. 11: 59.4 metres at $60.00 per lineal metre	$	3,564.00
	e) Bridge No. 12: 12.3 metres at $70.00 per lineal metre	$	861.00
Item 11)	**Station 0+000.0 to Station 3+261.7;** Provide quarried limestone rip rap on filter cloth general erosion protection on drain banks at surface water inlets, eroded main tile outlets, slumped bank areas and for rock chute inlets, including excavation, removal of any deleterious materials, all hauling and disposal of material, supply and place rock on filter cloth, complete:		
	a) Quarried limestone: approximately 150.0 tonnes at $65.00 per tonne	$	9,750.00
	b) Filter cloth: approximately 300 square metres at $5.00 per square metre	$	1,500.00
Item 12)	**Relocated Bridge No. 1**; Lower 150mm watermain near east end of road crossing including all excavation, fittings, restraints, assembly, installation, disinfection, backfill, compaction and restoration, to the full satisfaction of the Town Water Department, complete. Lump Sum	$	10,000.00
Item 13)	**Station 0+000.0 to Station 3+261.7;** Supply and install approximately 75 standard lateral tile drain "ditch end" extensions to the outlet end of existing damaged 100mm diameter lateral tiles entering the drain, including excavation, rodent grate, backfill, compaction, topsoil placement and seed and mulch, complete at $120.00 each.	$	9,000.00
Item 14)	**Station 0+000.0 to Station 3+261.7;** Supply and install new heavy duty H.D.P.E. plastic tile main extensions, including connections, rodent grate, removal of any deleterious materials, excavation, backfill, compaction and restoration, complete:		

	a) 3.0 metres (10') of 150mm (6") diameter pipe for 150mm diameter tiles: 5 required at $200.00 each	$	1,000.00
	b) 3.0 metres (10') of 200mm (8") diameter pipe for 200mm diameter tiles: 5 required at $300.00 each	$	1,500.00
Item 15)	Contingency Amount for Construction	$	33,700.00
	SUBTOTAL FOR CONSTRUCTION	**$**	**294,450.00**
	Net H.S.T. (1.76%) on Construction	**$**	**5,182.00**
	TOTAL FOR CONSTRUCTION	**$**	**299,632.00**

INCIDENTALS

1)	Report, Estimate, & Specifications	$	16,000.00
2)	Survey, Assistants, Expenses, and Drawings	$	37,000.00
3)	Duplication Cost of Report and Drawings	$	2,000.00
3)	Reconsider Report and Duplication Costs	$	3,000.00
4)	Estimated Cost of Letting Contract	$	1,500.00
5)	Estimated Cost of Layout and Staking	$	1,800.00
6)	Estimated Cost of Full-Time Supervision and Inspection During Construction (based on 3 week duration)	$	20,160.00
7)	Net H.S.T. on Items Above (1.76 %)	$	1,381.00
8)	Estimated Cost of E.R.C.A. Permit	$	115.00
9)	Contingency Allowance	$	493.00
	TOTAL FOR INCIDENTALS	**$**	**83,449.00**
	TOTAL FOR ALLOWANCES (brought forward)	**$**	**13,919.00**

TOTAL FOR CONSTRUCTION (brought forward)	**$**	**299,632.00**
TOTAL ESTIMATE	**$**	**397,000.00**

IX. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the access bridge and drain repairs and improvements. The design drawings show the subject bridges and improvement locations and the details of the replacement access bridge installations, 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 and drain repairs and improvements, which also include Standard Specifications labelled therein as **Appendix "REI-C"**.

X. SCHEDULE OF ASSESSMENT

We would recommend that the Total Cost for construction of this project, including incidental costs, be charged against the lands and roads affected in accordance with the attached Construction Schedule of Assessment. On September 22nd, 2005, the Ontario Ministry of Agriculture and Food (O.M.A.F.) issued Administrative Policies for the Agricultural Drainage Infrastructure Program (A.D.I.P.). This program has re-instated financial assistance for eligible costs and assessed lands pursuant to the Drainage Act. Sections 85 to 90 of the Drainage Act allow the Minister to provide grants for various activities under said Act. Sections 85 and 87 make it very clear that grants are provided at the discretion of the Minister. Based on the current A.D.I.P. 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 Municipal 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 same we expect that this project will be qualified for the grant normally available for agricultural lands. The Ministry however, is continually reviewing their policy for grants, and we recommend that the Municipality 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. When maintenance work is carried out in the future on the open drain portion, the cost for said future maintenance shall be assessed in accordance with the "Maintenance Schedule of Assessment" included in **Appendix "REI-D"**. This Schedule shall be used for all drain work not related to bridge repair and improvement.

Pursuant to Section 26 of the Drainage Act, the Road Authority is responsible for all increase in cost to the drainage works due to the existence of their roadway. This requirement has been reflected in the following **Table A** related to sharing of future maintenance costs for the access bridges. This provision shall apply to the South Sideroad crossing for the Town of Amherstburg, and the County Road 9 crossing for the County of Essex.

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. We have also established for parcels that have lawn enclosures as the result of the County requesting

relocation of the drain off the road allowance, the cost sharing between the affected parcels and the County of Essex.

XI. FUTURE MAINTENANCE

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

After the completion of all of the works included within this report, all existing access bridges and the roadway crossings within the 8th Concession Road Drain South shall be maintained in the future by the Town of Amherstburg and should any maintenance works be required to any of same, all costs are to be shared by the abutting landowner, and upstream affected lands and roads in accordance with the percentages shown in the table which follows herein. We have also noted in the table whether a parcel is eligible for grant (G) or is non grantable (NG).

TABLE A
MAINTENANCE SHARING
FOR ACCESS BRIDGES

BRIDGE NO.	ROLL NUMBER	OWNERS	CLASS	% TO ABUTTING OWNER	% TO UPSTREAM OWNERS
1	County Road 9	County of Essex	(NG)	98.0%	2.0%
2	620-02900	806574 Ontario Inc.	(G)	42.0%	58.0%
3	620-05890	Susan & Tim Reaume	(NG)	50.0%	50.0%
4	620-05900	Alan Quesnel	(NG)	74.6%	25.4%
5	620-06000	Alan Quesnel	(NG)	50.6%	49.4%
6	620-06150	Dennis Hallatt	(NG)	73.4%	26.6%
7	620-06200	Ruby Martin	(G)	50.5%	49.5%
8	South Sideroad	Town of Amherstburg	(NG)	98.0%	2.0%
9	570-04950	Kerri Montgomery	(NG)	30.1%	7.5%

		County of Essex	(NG)	62.4%	
10	570-04400	Jon Parks	(G)	41.9%	18.0%
		County of Essex	(NG)	40.1%	
11	570-05000	Stanley & Suzanne Langlois	(NG)	23.3%	9.1%
		County of Essex	(NG)	67.6%	
12	570-04300	Allan, Connie, Michael, Anna & Donald Serran	(G)	75.0%	25.0%

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 attached "Maintenance Schedule of Assessment", included in **Appendix "REI-D"** at the end of this report. The share to the abutting owner(s) shall be assessed as a Benefit to the owner(s) of the parcel abutting the access bridge.

The "Maintenance Schedule of Assessment" values in **Appendix "REI-D"** are strictly for the purposes of properly allocating future maintenance costs on the open drain. The Assessment Schedule in Appendix "REI-D" is based on a future estimated cost of $20,000.00; 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. 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.

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2016-09-10
PROVINCE OF ONTARIO

tr

att.

ROOD ENGINEERING INC.
Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT

8TH CONCESSION ROAD DRAIN SOUTH RECONSIDERED

(Geographic Township of Malden) (PWD-MD-2012-017)

TOWN OF AMHERSTBURG

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Howard Avenue			6.53	16.13	County of Essex	$ 125,324.00	$ 21,907.00	$ -	$ 147,231.00
South Sideroad			0.56	1.38	Town of Amherstburg	$ 1,335.00	$ 3,039.00	$ -	$ 4,374.00
Water Department			0.00	0.00	Town of Amherstburg	$ -	$ -	$ 12,785.00	$ 12,785.00
Total on Municipal Lands						**$ 126,659.00**	**$ 24,946.00**	**$ 12,785.00**	**$ 164,390.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
560-00210	8	Pt. Lot 87	0.43	1.07	Jon & Kathleen Parks	$ 96.00	$ 1,329.00	$ -	$ 1,425.00
560-00250	8	Pt. Lot 87	0.07	0.18	David Smith	$ 21.00	$ 162.00	$ -	$ 183.00
560-00300	8	S Pt. Lot 88	0.28	0.69	Lawrence Patterson & Tina Nemeth	$ 79.00	$ 586.00	$ -	$ 665.00
560-00490	8	N Pt. Lot 88	0.28	0.69	Jeffrey Serran	$ 84.00	$ 789.00	$ -	$ 873.00
570-04950	7	Pt. Lot 82	0.57	1.41	Kerri Montgomery	$ 20,097.00	$ 993.00	$ -	$ 21,090.00
570-05000	7	S Pt. Lot 83	0.30	0.74	Stanley & Suzanne Langlois	$ 422.00	$ 937.00	$ -	$ 1,359.00
610-00505	8	S Pt. Lot 90	0.22	0.55	Helen Sellars	$ 86.00	$ 434.00	$ -	$ 520.00
610-00510	8	Pt. Lot 90	0.39	0.96	John & Gloria Sellars	$ 150.00	$ 670.00	$ -	$ 820.00
610-00590	8	Pt. Lot 90	0.66	1.62	Matthew & Laura Sellars	$ 254.00	$ 942.00	$ -	$ 1,196.00
610-00600	8	Pt. Lot 90	0.74	1.84	Andrew & Theresa Beetham	$ 288.00	$ 892.00	$ -	$ 1,180.00
610-00750	8	N Pt. Lot 90	0.23	0.57	Brian & Lisa Renaud	$ 89.00	$ 400.00	$ -	$ 489.00
610-00850	8	Pt. Lot 91	0.23	0.56	Frank Fazekas	$ 157.00	$ 294.00	$ -	$ 451.00
610-00900	8	Pt. Lot 91	0.30	0.73	Michael & Kimberlee Kaldeway	$ 210.00	$ 315.00	$ -	$ 525.00
610-01105	8	N Pt. Lot 91	0.49	1.20	Brandon Crawford	$ 345.00	$ 333.00	$ -	$ 678.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
620-02800	7	Pt. Lot 79	0.38	0.95	Jeffrey & Stephanie Beaudoin	$ 420.00	$ 219.00	$ -	$ 639.00
620-02850	7	Pt. Lot 79	1.63	4.02	Lester & Laurella Laur	$ 1,775.00	$ 310.00	$ -	$ 2,085.00
620-02890	7	Pt. Lot 79	0.35	0.86	Ryan Greenwood & Linda Simone	$ 380.00	$ 121.00	$ -	$ 501.00
620-05890	7	Pt. Lot 80	0.61	1.51	Susan & Tim Reaume	$ 693.00	$ 352.00	$ -	$ 1,045.00
620-05895	7	Pt. Lot 80	0.61	1.51	Alan Quesnel	$ 293.00	$ 352.00	$ -	$ 645.00
620-05900	7	Pt. Lot 80	0.80	1.98	Alan Quesnel	$ 9,727.00	$ 479.00	$ -	$ 10,206.00
620-06000	7	Pt. Lot 80	15.45	38.18	Alan Quesnel	$ 5,151.00	$ 4,513.00	$ -	$ 9,664.00
620-06150	7	Pt. Lot 80	0.61	1.50	Dennis Hallatt	$ 27,107.00	$ 656.00	$ -	$ 27,763.00
Total on Privately Owned - Non-Agricultural Lands						**$ 67,924.00**	**$ 16,078.00**	**$ -**	**$ 84,002.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
560-00200	8	Pt. Lot 87	7.49	18.50	Jon Parks	$ 2,334.00	$ 7,936.00	$ -	$ 10,270.00
560-00400	8	S Pt. Lot 88	1.50	3.70	Allan & Connie Serran	$ 551.00	$ 1,512.00	$ -	$ 2,063.00
560-00500	8	N Pt. Lot 88	1.21	3.00	Allan Serran	$ 446.00	$ 1,021.00	$ -	$ 1,467.00
570-04300	7	Pt. Lots 83 & 84	4.86	12.00	Allan, Connie, Michael, Anna & Donald Serran	$ 2,409.00	$ 4,900.00	$ -	$ 7,309.00
570-04400	7	Pt. Lot 83	3.64	9.00	Jon Parks	$ 7,950.00	$ 3,359.00	$ -	$ 11,309.00
570-04410	7	Pt. Lot 83	0.74	1.84	Jon Parks	$ 587.00	$ 1,465.00	$ -	$ 2,052.00
570-04500	7	N Pt. Lot 83	11.74	29.00	Jon Parks	$ 4,090.00	$ 9,724.00	$ -	$ 13,814.00
570-04800	7	N Pt. Lot 82	8.50	21.00	Russell Wood	$ 3,173.00	$ 5,403.00	$ -	$ 8,576.00
570-04900	7	S Pt. Lot 82	18.21	45.00	Jon & Kathleen Parks	$ 5,218.00	$ 13,617.00	$ -	$ 18,835.00
570-04980	7	Pt. Lot 83	0.70	1.72	Jon Parks	$ 548.00	$ 1,716.00	$ -	$ 2,264.00
570-05100	7	N Pt. Lot 84	6.07	15.00	Paul & Joyce Gyori	$ 2,202.00	$ 5,589.00	$ -	$ 7,791.00
610-00500	8	S Pt. Lot 90	2.83	7.00	Joseph Grondin	$ 996.00	$ 1,624.00	$ -	$ 2,620.00
610-00601	8	Pt. Lot 90	6.07	15.00	Gerald Gemus & Sons Limited	$ 1,888.00	$ 3,245.00	$ -	$ 5,133.00
610-00700	8	N Pt. Lot 90	1.39	3.43	Ronald & Brian Renaud	$ 157.00	$ 707.00	$ -	$ 864.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
610-00800	8	S Pt. Lot 91	1.01	2.50	Jeannette Martin	$ 367.00	$ 435.00	$ -	$ 802.00
610-01000	8	Pt. Lot 91	2.02	5.00	Gerald Gemus & Sons Limited	$ 734.00	$ 661.00	$ -	$ 1,395.00
610-01100	8	N Pt. Lot 91	0.81	2.00	Norman & Rose Jobin	$ 315.00	$ 208.00	$ -	$ 523.00
620-00100	7	Pt. Lot 81	19.02	47.00	Alan & Pauline Waters	$ 5,847.00	$ 10,619.00	$ -	$ 16,466.00
620-02900	7	Pt. Lot 79	17.43	43.07	806574 Ontario Inc.	$ 13,002.00	$ 3,255.00	$ -	$ 16,257.00
620-06100	7	Pt. Lot 80	11.13	27.50	Bradley & Laurie Martin	$ 3,907.00	$ 4,333.00	$ -	$ 8,240.00
620-06200	7	Pt. Lot 81	5.87	14.50	Ruby Martin	$ 7,700.00	$ 2,858.00	$ -	$ 10,558.00
Total on Privately Owned - Agricultural Lands (grantable)						**$ 64,421.00**	**$ 84,187.00**	**$ -**	**$ 148,608.00**
TOTAL ASSESSMENT			164.95	407.59		**$ 259,004.00**	**$ 125,211.00**	**$ 12,785.00**	**$ 397,000.00**

1 Hectare = 2.471 Acres
Project No. REI2012D017
September 12th, 2016

SPECIFICATIONS - RECONSIDERED

8TH CONCESSION ROAD DRAIN SOUTH

(Geographic Township of Malden, PWD-MD-2012-017)

TOWN OF AMHERSTBURG

I. GENERAL SCOPE OF WORK

The 8th Concession Road Drain South currently comprises of an open roadside drain generally located along the west side of County Road 9 (Howard Avenue) and extending from the south side of County Road 18 (Pike Road) southerly to its upper end just south of the north limit of Lot 84, Concession 7. The work under this project generally comprises of improvements to the open drain to provide a suitable cross section for conveyance of flows, along with major improvements to seven (7) of the twelve (12) access bridges along the course of the drain. The work on bridges being improved includes the removal of existing pipes and endwalls excluding the poured concrete headwalls where noted; the installation of new culverts; new culvert end treatments comprising of sloped quarried limestone on filter cloth end protection, precast concrete blocks or concrete filled jute bag endwalls; granular approaches and backfill; granular transition areas; hard surface driveway repairs; general quarried limestone erosion protection and rock chute inlets. The proposed work is intended to address the improvement of the open drain along the west side of the road, repairs to some bridges, replacement of seven (7) deteriorated access bridges or their headwalls, and the construction of replacement end protection in accordance with current standards. Work also includes relocation of the outlet portion of the drain from the south side of County Road 18 to a point just south of the Union Gas pressure station. This work involves removal of the old culvert and pipe stub at the Long Marsh Drain, backfilling the drain and restoring the roadway, installation of a new culvert under the roadway with road restoration and constructing a new open channel east to the Long Marsh Drain, along with ancillary work.

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

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

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

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

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

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

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

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

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

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

III. M.N.R.F. CONSIDERATIONS

The Contractor is to note that this project has gone through the Ministry of Natural Resources & Forestry (M.N.R.F.) screening process by way of a Species at Risk (S.A.R.) former Town Agreement review. A copy of the relevant information that was provided by them is included herein as part of **Appendix "REI-B"**.

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

Notwithstanding the above, the Contractor is advised that the Town has a former signed **Agreement** with the Ministry of Natural Resources & Forestry (M.N.R.F.) regarding the maintenance operations on Municipal drains and the Endangered Species Act, 2007 (E.S.A.). The Drainage Superintendent has reviewed the endangered species maps and any concerns will be provided in **Appendix "REI-B"**. Certain species such as turtles and snakes are mobile and may be encountered during construction. Therefore, the "**SCHEDULE C MITIGATION PLAN**" of the former **Agreement** (pages 13 through 23) has been included in **Appendix "REI-B"** in its entirety for further information and use by the Contractor.

The Contractor shall contact the Drainage Superintendent if an endangered species is encountered during construction. The Contractor shall be responsible for providing the necessary equipment and materials outlined in the "**SCHEDULE C MITIGATION PLAN**" to address the handling of any endangered species encountered during the course of the construction work. The Contractor shall cooperate fully and assist the Drainage Superintendent or M.N.R.F. staff in

the proper handling of the endangered species as outlined in the **"MITIGATION PLAN"**, and as may be further directed by the Drainage Superintendent or the M.N.R.F., and shall govern all its operations accordingly.

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the west side of County Road 9 (Howard Avenue). The Contractor shall have access for a minimum width of 6.1 metres (20 feet) along the top of the west bank and new north bank in agricultural fields, along with the full width of the roadways abutting the proposed drainage works. The Contractor may use the entire width of the County Road 9 and County Road 18 right-of-way. 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 replacement of the existing access bridges and lawn enclosure pipes, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridges and enclosures to carry out the required construction of the replacement structures and ancillary work.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close County Road 9 for the proposed works, it shall obtain the permission of the County of Essex, the Town Drainage Superintendent and Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the County of Essex and the Amherstburg Public 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. At the Montgomery parcel the Contractor may be required to provide temporary fencing for protection of the horses. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of the necessary steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

Where there is any brush, trees or rubbish along the course of the drainage works, including the full width of the work access, all such brush, trees or rubbish shall be close cut and grubbed out, and the whole shall be chipped up for recycling, burned or otherwise satisfactorily disposed of by the Contractor. The brush and trees removed along the course of the work are to be put into piles by the Contractor in locations where they can be safely chipped and disposed of, or burned by it, or hauled away and disposed of by the Contractor to a site to be obtained by it at its expense. Prior to and during the course of any burning operations, the Contractor shall comply with the guidelines prepared by the Air Quality Branch of the Ontario Ministry of the Environment, and shall ensure that the Environmental Protection Act is not violated. The

Contractor will be required to notify the local fire authorities to obtain any permits and co-operate with them in the carrying out of any work. The removal of brush and trees shall be carried out in close consultation with the Town Drainage Superintendent or Consulting Engineer to ensure that no decorative trees or shrubs are disturbed by the operations of the Contractor that can be saved. It is the intent of this project to save as many trees and bushes as practical within the roadway allowances and on private lands. Where decorative trees or shrubs are located directly over drainage pipes, the Contractor shall carefully extract same where possible 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 and any such materials located in the bridge culverts and enclosures while carrying out its cleaning of same. All such deleterious materials and rubbish shall be loaded up and hauled away by the Contractor to a site to be obtained by it at its cost.

VI. FENCING

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

VII. DETAILS OF BRIDGE WORK

The Contractor shall provide all material, labour and equipment to repair and improve the existing access bridges in the 8th Concession Road Drain South requiring work, along with endwall repairs and other improvements as noted.

All existing corrugated steel and concrete pipes slated to be removed for the six (6) existing bridges and enclosures shall be replaced with new aluminized steel Type II Hel-Cor pipe or smooth wall plastic Boss 2000 H.D.P.E. pipe. All steel piping sections shall be connected by the use of 9-corrugation (9-C) bolted couplers installed around the complete circumference of the pipe in accordance with the manufacturer's recommendation. All plastic pipe sections shall be

connected by use of wrap couplers installed in accordance with the manufacturer's recommendations. Each coupler shall be wrapped in filter cloth material around the complete circumference to ensure that there will be no soil migration through the joints and into the pipe through said connections.

The culvert pipe replacements on this project shall be set to the grades as shown on the plans or as otherwise established herein and the Town Drainage Superintendent or the Consulting Engineer may make minor changes to the 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"**.

VIII. ACCESS BRIDGE AND ENCLOSURE PIPE INSTALLATION

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

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

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 approximately 10% of the pipe diameter below the drain bottom to provide the embedment required by E.R.C.A. and D.F.O.

The installation of the complete length of the new culvert 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 structures is to be performed during normal working hours of the Town Drainage Superintendent and the Consulting Engineer from Monday to Friday unless written authorization is provided by them to amend said working hours.

For the access bridge replacements, once the new aluminized steel type II corrugated pipe or H.D.P.E. 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 east and transitions to the west shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. All of the driveway approach areas extending from the Municipal roadway to the west 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 then seed and mulch.

For hard surface driveway crossings, the top 305mm (12") of the backfill over the pipe below the hard surface treatment shall comprise granular material M.T.O. Type "A" O.P.S.S. Form 1010 compacted to a minimum of 100% Standard Proctor Density. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the pipe. To ensure that no damage is caused to the proposed pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Consulting Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work. The Contractor shall restore the asphalt surface by placing a minimum of the existing thickness or a 90mm minimum thickness of Type HL-4 hot mix asphalt. The asphalt shall be supplied and placed in two (2) approximately equal lifts no more than 50mm thick and 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% ±1% air entrainment and 6x6-6/6 welded wire fabric reinforcing installed at the midpoint of the slab. All slab surfaces shall be finished to provide an appearance approximating the finish on the existing concrete driveway abutting the replacement.

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

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

The Contractor shall also note that the placing of the new access bridge culverts and enclosures shall be completed so that they totally comply with the parameters established and noted in the Bridge Details and Tables for each culvert replacement. These culverts shall be set on an even grade and the placement shall be performed totally in the dry, and the Contractor should be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the

Town Drainage Superintendent or the Consulting Engineer. The Contractor shall also be required to supply a minimum of 100mm (4") of 20mm (3/4") clear stone bedding underneath the culvert pipe extending from the bottom of the drain to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. Furthermore, if an unsound base is encountered, it must be removed and replaced with 20mm (3/4") clear stone satisfactorily compacted in place to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor is to note that when replacing the access bridge or enclosure 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 pipe installations are to be carried out with approximately 10% of their diameter embedded below the drain design bottom, as shown and noted on the plan and profiles for each of the access bridge installations.

IX. REMOVALS

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

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

X. PRECAST & CONCRETE FILLED JUTE BAG HEADWALL AND SLOPED END PROTECTION

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

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the accompanying drawings and as is 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 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").

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

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

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

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

XI. GENERAL QUARRIED LIMESTONE EROSION PROTECTION

At all of the swale and furrow locations entering the drain from the west side, it is required that general quarried limestone erosion protection and rock chutes be provided on the drain slopes, at the locations indicated, and to the widths generally shown within the details and notes included in the accompanying drawings. The rock chutes shall be v-shaped and constructed to direct all flows through the centre portion of the rock chute. Where bank erosion exists along the face of existing or new headwalls, the Contractor shall install a strip of rock on filter cloth protection 305mm thick along the face of the headwall extending along the full length of the slope and for a width of 1.0 metres from the face of the headwall. Where the drain banks are showing erosion or slumping and distress, including under tile main outlets, the Contractor shall provide quarried limestone on filter cloth general erosion protection as outlined below. Protection locations shall be as established in consultation with the Town Drainage Superintendent and Consulting Engineer.

The quarried limestone erosion protection shall be embedded into the sideslopes of the drain a minimum thickness of 305mm and shall be underlain in all cases with non-woven synthetic filter

mat. The filter mat shall not only be laid along the flat portion of the erosion protection, but also contoured to the exterior limits of the quarried limestone and the unprotected slope. The width of the general erosion protection shall be as established in the accompanying drawings or as otherwise directed by the Town Drainage Superintendent or the Consulting Engineer during construction. In placing the erosion protection, the Contractor shall carefully tamp the quarried limestone pieces into place with the use of an 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 material to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from the Walker Industries Amherst Quarries, in Amherstburg, Ontario, or equal.

XII. BENCH MARKS

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

For each of the bridge and enclosure replacements, the plans include details illustrating the work to be carried out. For each bridge detail a Bench Mark has been indicated and the Elevation has been shown and may be utilized by the Contractor in carrying out its work. The Contractor shall note that in each case a specific design elevation grade has been provided for 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 or west to east to match the direction of flow within the drain. The Contractor's attention is drawn to the fact that the pipe invert grades established herein provide for the pipes to be set approximately 10% of their diameter below the existing drain bottom or the design grade of the drain, whichever is lower.

XIII. ANCILLARY WORK

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

note that any intercepted pipes along the length of the existing culverts and enclosures are to be extended and connected to the new pipe unless otherwise noted in the accompanying drawings.

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

All granular backfill for the bridge and enclosure installations shall be satisfactorily compacted in place to a minimum Standard Proctor Density of 98% by means of mechanical compaction equipment. All other good, clean, native fill material or topsoil to be utilized, where applicable, shall be compacted in place to a minimum Standard Proctor Density of 96%. All of the backfill material, equipment used, and method of compacting the backfill material shall be provided and performed to the full satisfaction of the Town Drainage Superintendent or Consulting Engineer.

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

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

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

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

XIV. TOPSOIL, SEED AND MULCH

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

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

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

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

XV. SPECIAL PROVISIONS FOR REPLACEMENT, REPAIR AND IMPROVEMENTS

The Contractor shall provide for the construction and improvements to the access bridges and enclosures along the 8th Concession Road Drain South, for the structures noted, as follows:

Bridge No. 1 (County of Essex)

The Contractor is advised that the existing pipe located at the intersection of County Road 9 (Howard Avenue) and County Road 18 (Pike Road) is to be completely removed and a new outlet constructed to the south of the Union Gas fenced off station. The drain outlet shall be relocated south of its present position with a new access culvert under the roadway and an open channel extending easterly to the Long Marsh Drain, along with ancillary work as shown on the plans and provided for in the specifications. The plans provide for the removal of the existing bridge and portions of the headwalls, filling of the open channel and creation of road swales to be maintained by the County at their cost in the future, along with blocking off the stub into the Long Marsh Drain. The pipe stub shall be removed from the west side of the Long Marsh Drain access culvert, and the access culvert repaired with galvanized corrugated panels matching the profile and curvature of the existing pipe securely fastened in place to maintain the integrity of the existing structure. All pipe stubs and erosion protection shall be provided as shown on the plans. The existing roadway surface shall be restored as outlined above. New drain banks and all filled areas shall receive topsoil and have grass seed and mulch applied including a buffer strip 3.0 metres wide to the north and south of the new open drain outlet. All excess material from the new channel construction shall be hauled away and disposed of by the Contractor as outlined in these specifications so that no fill is placed along the new drain banks from the roadway to the Long Marsh Drain. All work shall be carried out in accordance with these specifications, the plans and the requirements in **Appendix "REI-C"**.

As part of the work for this new bridge structure, the Contractor shall coordinate the lowering of the utilities that conflict with the new pipe installation including telephone and gas. Cost of these works are to be borne by each utility pursuant to Section 26 of the Drainage Act. The Contractor shall also coordinate with the Town Water Department to carry out the lowering of the existing watermain on the east side of the road. Work shall be completed in accordance with the details shown on the plans and noted in the Schedule of Items and Prices. The Contractor is advised that the Town Water Department may choose to carry out the work on the pipes with the Contractor providing all the excavation and backfill services that are required to complete the watermain lowering, in which case the work item and all cost of same will be deleted from the Contract price. The Contractor shall coordinate its operations for the watermain lowering with the Town Water Department and ensure that all of their requirements are met, including notice to any owners who may be affected by temporary shutdown of the water system. The Contractor may carry out exploratory digs if it deems it necessary for establishing the spool piece for the work. Pipe material shall be Class 150 PVC and all necessary restraints shall be provided by the Contractor as shown in the detail on Sheet 4 of the plans.

Should the Contractor discover any other utility conflicts with existing utilities during the course of the work, that requires the relocation of same as established by the Engineer, the Contractor shall give that utility the opportunity to make any adjustments to their services if required, which work shall be done by them at the expense of the utility pursuant to Section 26 of the Drainage Act. All work shall be carried out in accordance with the Town of Amherstburg Water Department requirements for same and shall be completed to their full satisfaction including utilization of proper materials and disinfection procedures to ensure that no contamination of the existing water system will occur and there shall be no leaks.

Bridge No. 2 (806574 Ontario Inc., 620-02900)

The Contractor shall completely remove the existing corrugated steel pipe and any end protection that currently exists and restore the open drain to the design cross section. The Contractor will then be required to install the new aluminized steel pipe at the new location near the south end of the parcel and as set out in the chart forming part of the details for Bridge No. 2 on the plans. The Contractor shall provide for all brushing, grubbing and topsoil removal to prepare for the replacement pipe installation, and install sloped quarried limestone on filter cloth protection on each end. The Contractor shall protect the tile outlets on the banks at each end of the structure and divert and extend same as necessary to accommodate the replacement culvert. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

Bridge No. 4 (Alan Quesnel, 620-05900)

The Contractor shall completely remove the existing concrete headwall that currently exists on the north end of the structure. The Contractor shall straighten out the existing pipe end if possible or cut the pipe shorter to an undamaged section. The Contractor shall then install a replacement precast concrete block headwall including footing and a 1.0m wide strip of quarried limestone on filter cloth erosion projection adjacent to the new wall. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

Bridge No. 6 (Dennis Hallatt., 620-06150)

The Contractor shall carefully extract the existing pipe from the original concrete headwalls and enlarge the openings as needed. The existing tree overtop of the drain shall be removed and disposed of by the Contractor as provided elsewhere in these specifications. The Contractor shall supply and install the specified replacement pipe and it shall be securely grouted into the existing headwalls with non shrink grout. The Contractor shall provide form work as needed and 30MPa concrete grout to completely fill the gap between the pipe and walls ensuring that no voids are left. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

Bridge No. 7 (Ruby Martin, 620-06200)

The Contractor shall completely remove the existing corrugated steel pipe access bridge and protect the existing concrete headwalls. The Contractor shall then supply and install a new aluminized steel pipe as set out in the chart forming part of the details for Bridge No. 7 on the plans. The Contractor shall enlarge the wall openings as needed and provide concrete grout to

secure the new pipe into place through the walls. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

Bridge Enclosure No. 9 (Kerri Montgomery, 570-04950)

The Contractor shall completely remove the existing corrugated steel pipe and any unsuitable end protection and dispose of same as outlined previously in these specifications. The Contractor shall then supply and install a new pipe as set out in the chart forming part of the details for Bridge No. 9 on the plans. The Contractor shall provide sloped quarried limestone on filter cloth end protection at each end of the new culvert installation and may use suitable salvaged materials from the original access bridge. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

Bridge No. 10 (Jon Parks, 570-04400)

The Contractor shall completely remove the existing corrugated steel pipe access bridge and any end protection and dispose of same as outlined previously in these specifications, and restore the open drain to the design cross section. The Contractor shall then supply and install a new smooth wall plastic H.D.P.E. pipe at the new location north of the existing one and as set out in the chart forming part of the details for Bridge No. 10 on the plans. The Contractor shall provide for all brushing, grubbing and topsoil removal to prepare for the replacement pipe installation, and install sloped quarried limestone on filter cloth end protection at each end of the new access culvert and secure the pipe against floating. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

General Bridge and Drain Work

For all bridges not being replaced, the Contractor shall clean through the existing structures, to remove all sediment and accumulated materials, and provide for the drain cross section as shown on the profiles and plans. All cleaning and flushing work shall be carried out to the complete satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor will be required to remove all material taken out of the access culverts and drains and haul away and dispose of same, at a site to be obtained by it, at its own expense.

XVI. GENERAL CONDITIONS

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

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

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

d) The Contractor will be responsible for any damage caused by it to any portion of the Municipal road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its' employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, etc., from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.

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

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

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

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

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

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

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

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

l) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than $2,000,000.00 on this project, and shall name the Town of Amherstburg and its' officials, and the County of Essex and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.

m) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 45 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:

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

ii) proof of advertising

iii) a Statutory Declaration, in a form satisfactory to the Consulting Engineer and the 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 Lien Act, 1983 and its' subsequent amendments have been adhered to by the Contractor.

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

APPENDIX "REI-A"

Gmail **Gerard Rood <gerard.reinc@gmail.com>**

RE: 8th Concession Road Drain (PWD-MD-2012-017) - Amherstburg - REI2012D017

Cynthia Casagrande <CCasagrande@erca.org> Fri, Sep 21, 2012 at 10:54 AM
To: Gerard Rood <gerard.reinc@gmail.com>, John Henderson <JHenderson@erca.org>
Cc: "Chamberlain, Eric" <echamberlain@amherstburg.ca>, "Zarlenga, Lou" <lzarlenga@amherstburg.ca>, Karen Jacques <kjacques@amherstburg.ca>

Dear Gerard:

As per your e-mail, you have requested information regarding a proposed culvert replacement, and possibly several more culvert replacements, on the 8th Concession Road Drain at Howard Avenue in the Town of Amherstburg. Please be advised that any bridge replacement on this drain is located within an area that is under the jurisdiction of the Essex Region Conservation Authority (ERCA) (Section 28 of the *Conservation Authorities Act*). Prior to undertaking works, a permit is required from this office. For your information, we have included a 2012 application for permit. The application for permit fee is $115.00 per culvert replacement.

Your submission for permit must include the following:

- letter/report describing the rationale behind the proposed design
- design drawings
- level of service of new culvert in comparison to existing culverts within the drain
- provide upstream and downstream culvert sizes
- a proposed sediment and erosion control plan
- a proposed water control plan
- a contingency plan for rain events that exceed the capacity of the proposed water control system
- restoration details
- details of the fish salvage proposal
- details of the standard mitigation measures that are to be followed during construction

As detailed in the ERCA Level III fish habitat agreement with the Department of Fisheries and Oceans (DFO), the ERCA is responsible for the evaluation of proposed works as to their impact on the fish habitat in the Essex Region watershed. The proposed works will be reviewed to determine whether it is likely to result in impacts to fish and fish habitat which are prohibited by the habitat protection provision of the *Fisheries Act*. The draft DFO drain classification for the 8th Concession Road Drain is Type F.

DFO's general guideline for the replacement of legal culverts/bridges is that they be "like or better" than the existing and that fish passage be improved if possible.

Any replacement culvert on this drain must provide for fish passage. In general, incorporation of the following standard mitigation measures into the design will ensure that any potentially adverse effects on fish and fish habitat will be mitigated:

1. Work will not be conducted at times when flows are elevated due to local rain events, storms or seasonal floods. Work will be done in the dry. Works are not to undertaken between March 15th and June 30th. (If works are required to be undertaken between March 15th and June 30th to address public safety issues, a request should be submitted to this office).

2. New culverts and replacement culverts are to be installed with a minimum 10 % embedment below the existing bottom or design bottom of the drain (whichever is lower) and, if possible, should provide a similar bottom width as the existing structure. Please note, open footing structures are preferred where possible. Certain instances, i.e. large road culverts, the minimum embedment would be 10% below the existing bottom or design bottom or 300 mm, whichever is greater. Typically the existing large road culverts contain low water refuge pools. Replacement of these structures should include installation or replacement of existing pooled areas with round river stone in the drain bottom.

3. New culverts and replacement 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/opening, however, longer lengths may be considered. 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 design of same. 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.) In addition, the proposed design may also have to consider fish passage into existing roadside drains at the culvert site.

4. 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.

5. 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.

6. Silt or sand accumulated in the barriers/traps must be removed and stabilized on land once the site is stabilized.

7. 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.

If it is determined that the proposed new structure will result in impacts to fish and fish habitat, the proponent will be required to apply to the DFO for a Federal Authorization for Works or Undertakings Affecting Fish Habitat. As part of the application, the proponent will be required undertake a biological assessment of the drain. This biological assessment would then be used by the proponent to develop a fish habitat compensation plan that replaces the habitat lost by the structure (this may include the footprint of the structure and potentially all upstream habitat). This plan must be prepared by a qualified biologist.

Furthermore, any impacts to fish and fish habitat which result from a failure to implement proposed works as described or from failure to incorporate the mitigation measures included in the approval could lead to corrective action such as enforcement. In addition, under the new *Fisheries Act*, there is a requirement to notify DFO of any harmful alteration or disruption, or any destruction of fish habitat that has not been authorized.

Based on the above information, we suggest that you provide our office with an opportunity to review your preliminary bridge proposal prior to completing the final design.

Please note that we have also screened this project with regard to the federal *Species at Risk Act* for federally listed fish and mussels. Based on the current Department of Fisheries and Oceans (DFO) species at risk (SAR) screening maps (valid until April 2013), this site is not identified as having species at risk fish or mussels. Please note, however, that we do not know if this drain and adjacent lands contain any significant species that may be protected under the provincial *Endangered Species Act*. It is the proponent's responsibility to ensure all issues related to the *Endangered Species Act* are addressed. All inquiries regarding the *Endangered Species Act* should be made with the Aylmer office of the Ontario Ministry of Natural Resources (email address: ESAScreeningRequest.AylmerDistrict@ontario.ca).

If you have any questions, please do not hesitate to contact our office.

Cynthia Casagrande

Regulations Technician

Essex Region Conservation Authority

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.

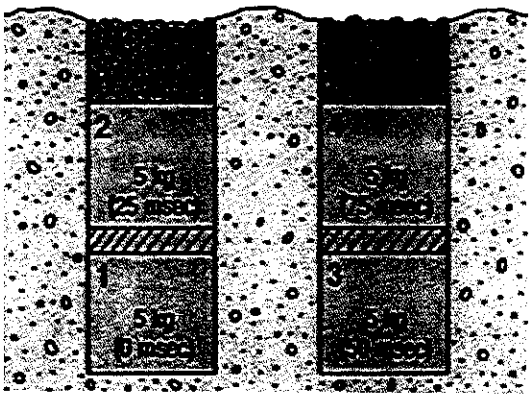
- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has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

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

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

toronto ZOO

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

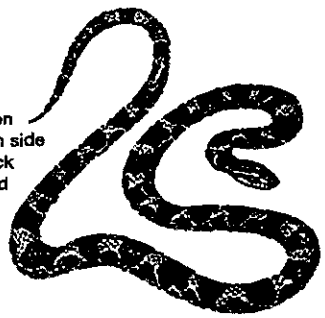
Recovery through education and conservation.
This guide will help you identify the Massasauga Rattlesnake and other snakes in Ontario. The Massasauga is one of five Ontario snakes with blotches. Snakes on this identifier are grouped by appearance (blotched, striped and no pattern). When you see a snake,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

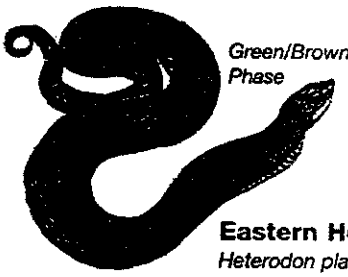
Snakes are illustrated at quarter-life size. These snakes are not found in all Ontario regions. Consult a field guide for maps of snakes in your area. The size of snakes includes U.S. populations as listed in 'Conant, Roger and Joseph T. Collins. 1991 *A Field Guide to Reptiles and Amphibians of Eastern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

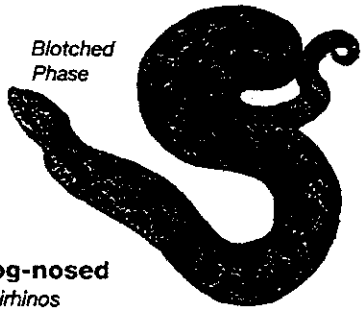
Milk

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)



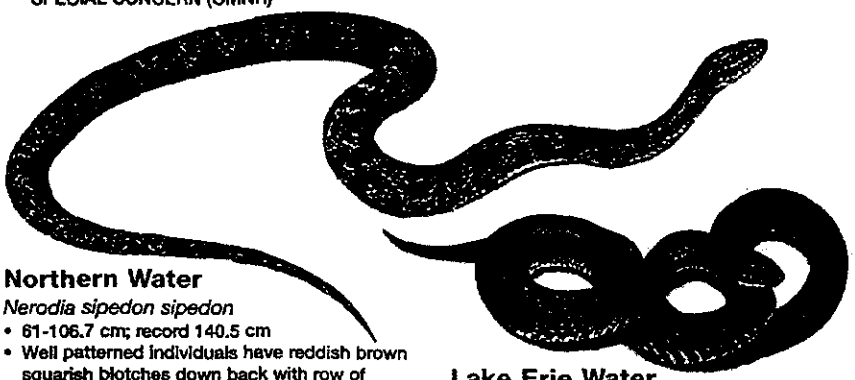




Eastern Hog-nosed

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

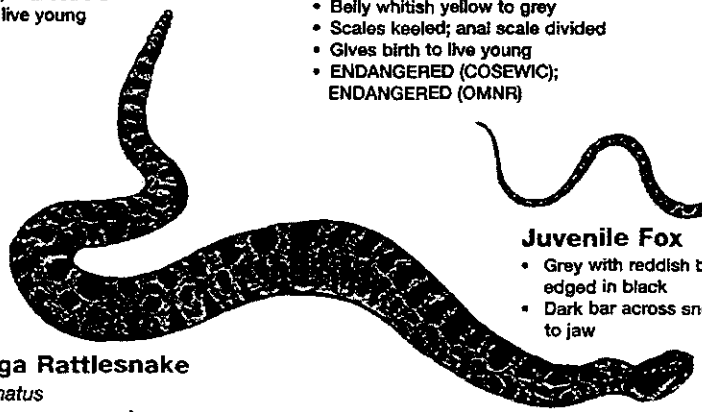
Nerodia sipedon insularum

- 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)

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)



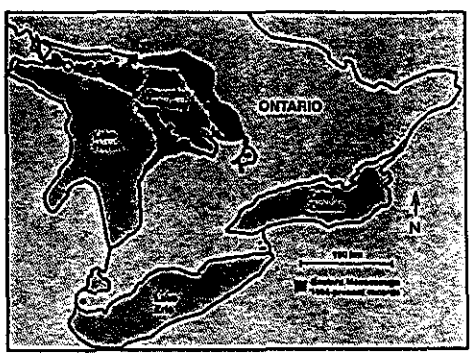
Juvenile Fox

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

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

Opheodrys 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)

Stripe on scale rows three and four

Queen

Regina septemvittata

- 38-61 cm; record 92.1cm
- 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)

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

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

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)

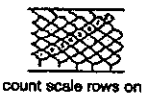
Eastern Rat

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

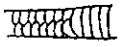
- Light grey with grey-brown blotches on body and tail
- Dark bar across snout and from eye to jaw



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.

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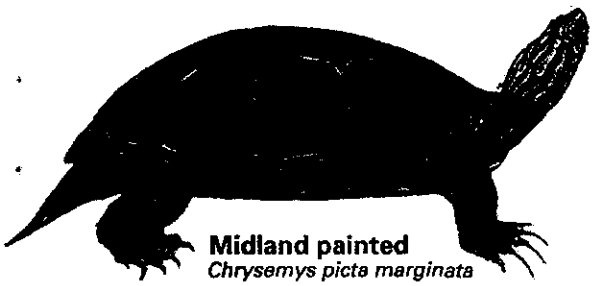
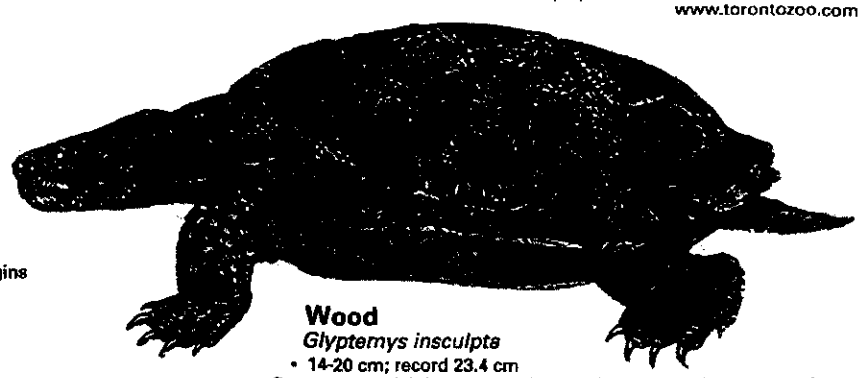


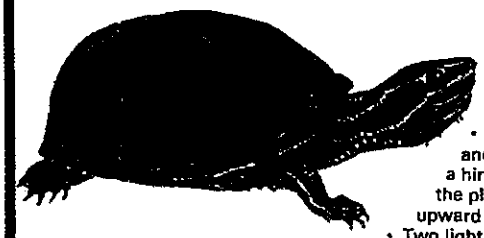
Midland painted
Chrysemys picta marginata

- 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

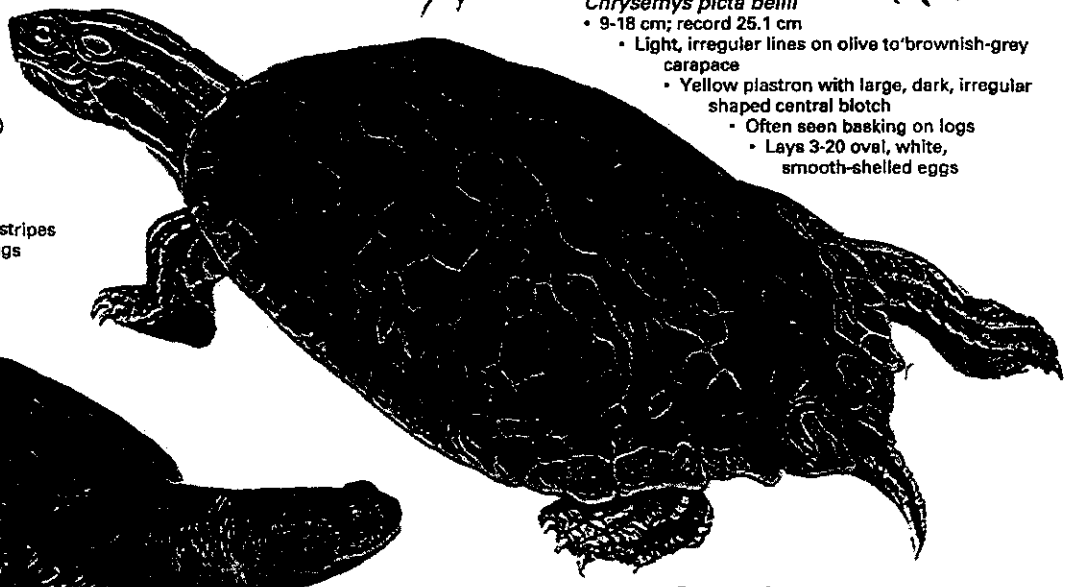
- 5.1-11.5 cm; record 13.7 cm
- Small turtle with smooth, light olive to black, high-domed, narrow carapace
- Plastron is small, yellow-brown and gives little protection to legs; a hinge runs across the front of the plastron allowing it to close upward to protect the head
- Two light stripes on each 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)

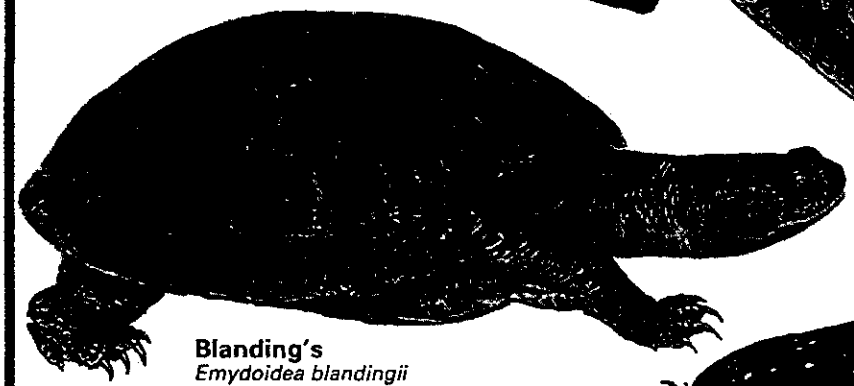
Western painted
Chrysemys picta bellii

- 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

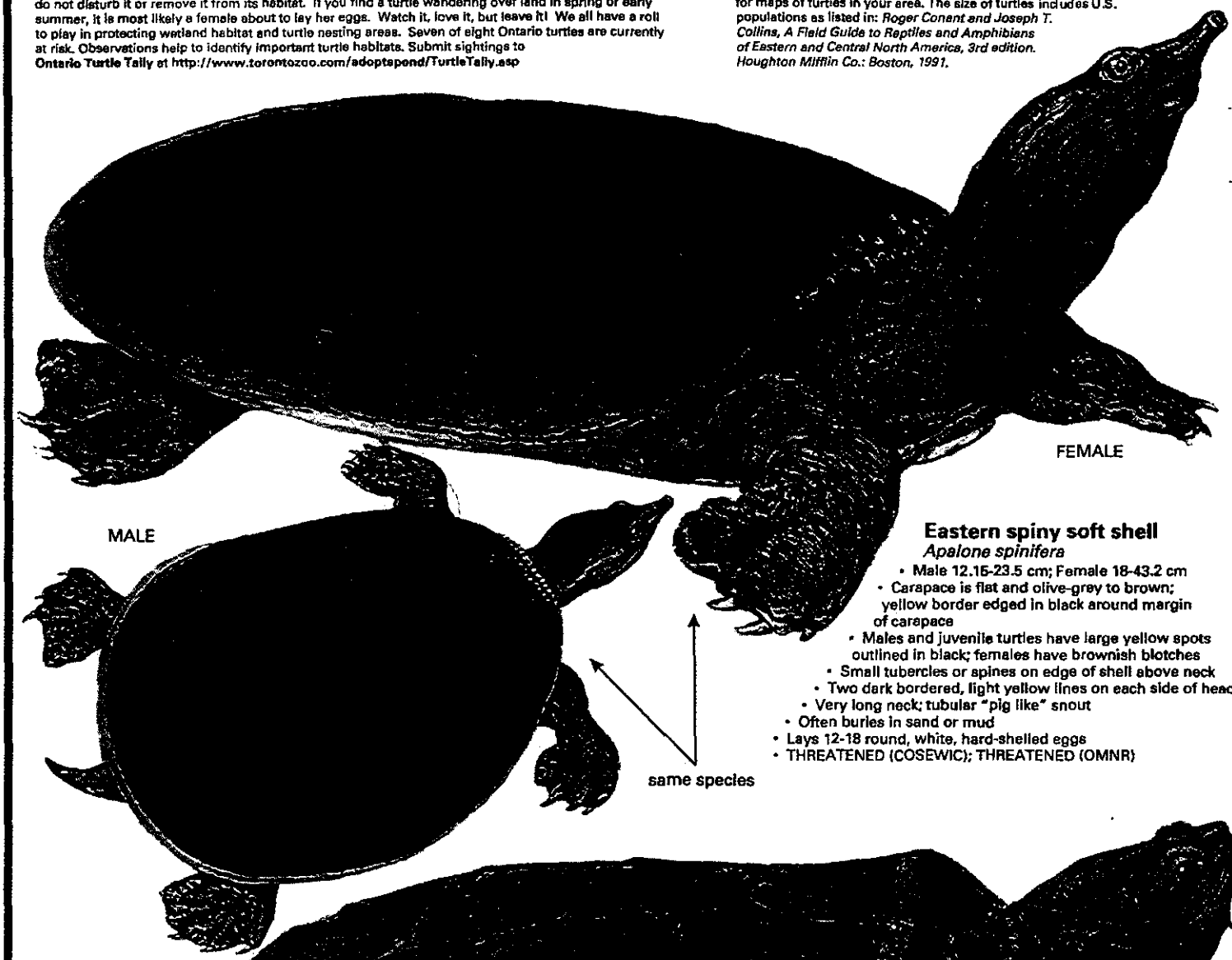
- 12.5-18 cm; record 27.4 cm
- Carapace black to greyish-brown with numerous yellowish spots or streaks
- Plastron has a flexible grooved hinge that allows lower shell to close upward to protect head and legs
- Bright yellow on chin and throat
- Protruding eyes
- Domed shell obvious while basking on 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)

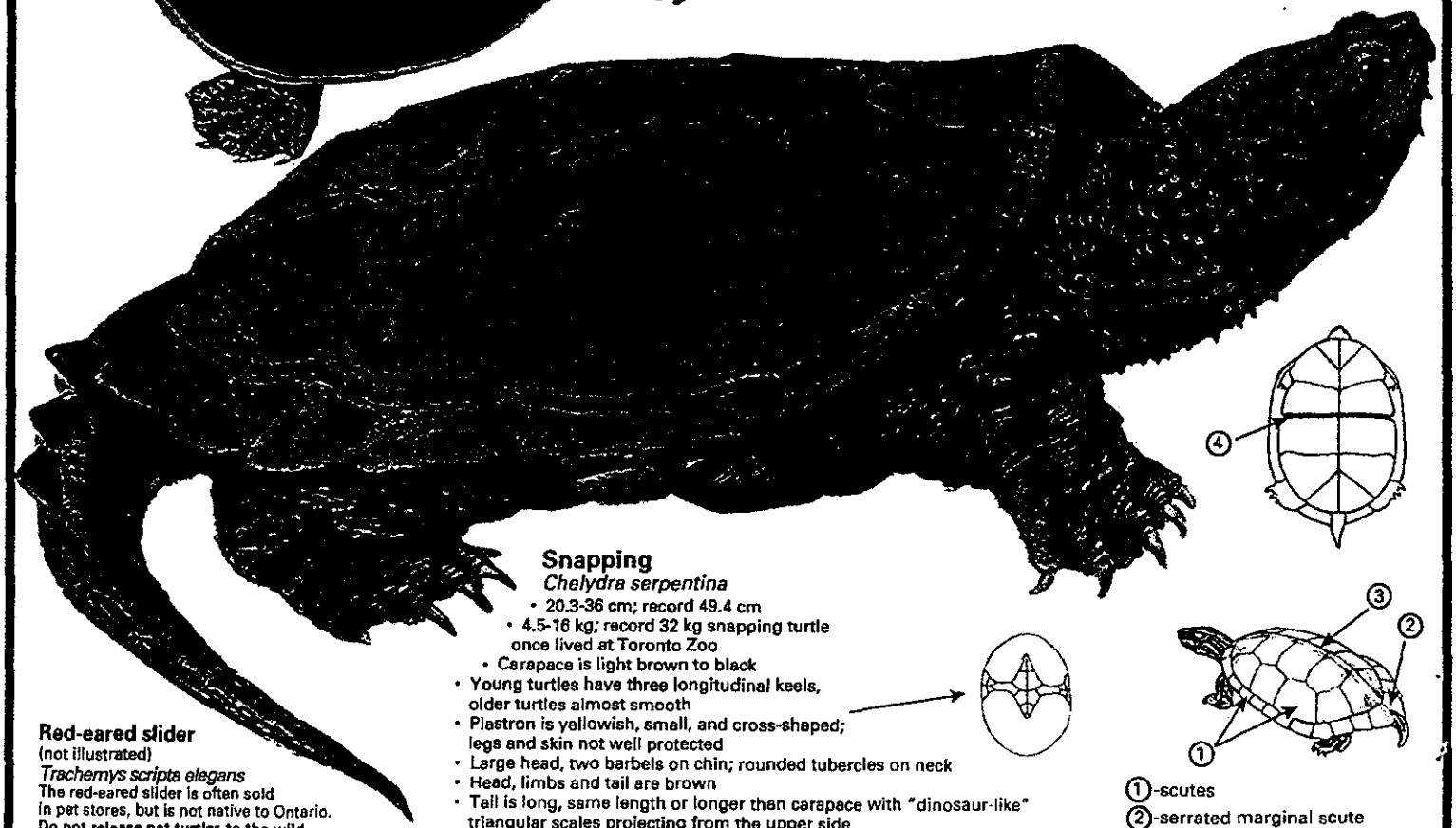
Turtles in Ontario are protected under the Fish and Wildlife Conservation Act. If you find a turtle please do not disturb it or remove it from its habitat. If you find a turtle wandering over land in spring or early summer, it is most likely a female about to lay her eggs. Watch it, love it, but leave 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.*



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)



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)

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

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.

APPENDIX "REI-C"

STANDARD SPECIFICATIONS
FOR ACCESS BRIDGE CONSTRUCTION

1. CONCRETE FILLED JUTE BAG HEADWALLS

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

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

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

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

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

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

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

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

2. QUARRIED LIMESTONE ENDWALLS

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

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

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

3. BRIDGE BACKFILL

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

4. GENERAL

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

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

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

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

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

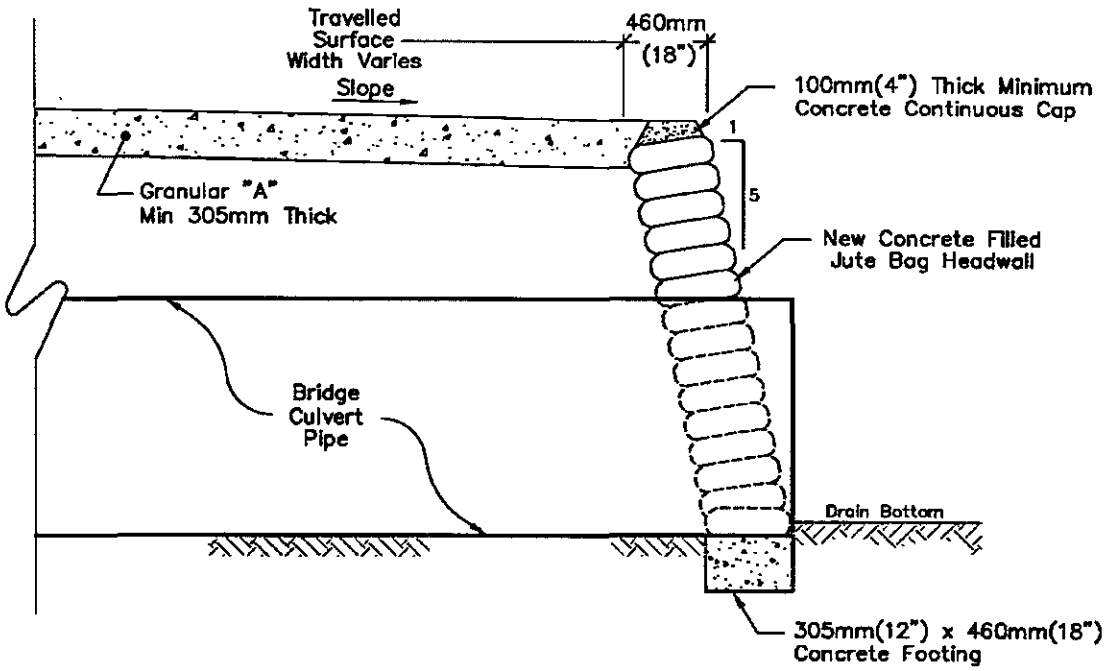
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

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

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

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

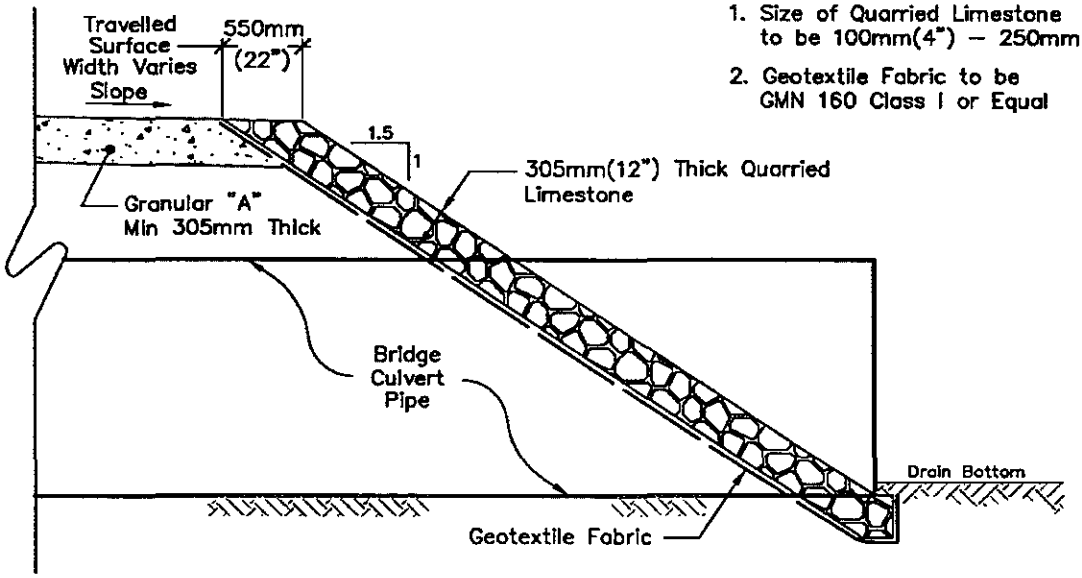
All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Town Drainage Superintendent and Engineer.



Typical Jute Bag Headwall

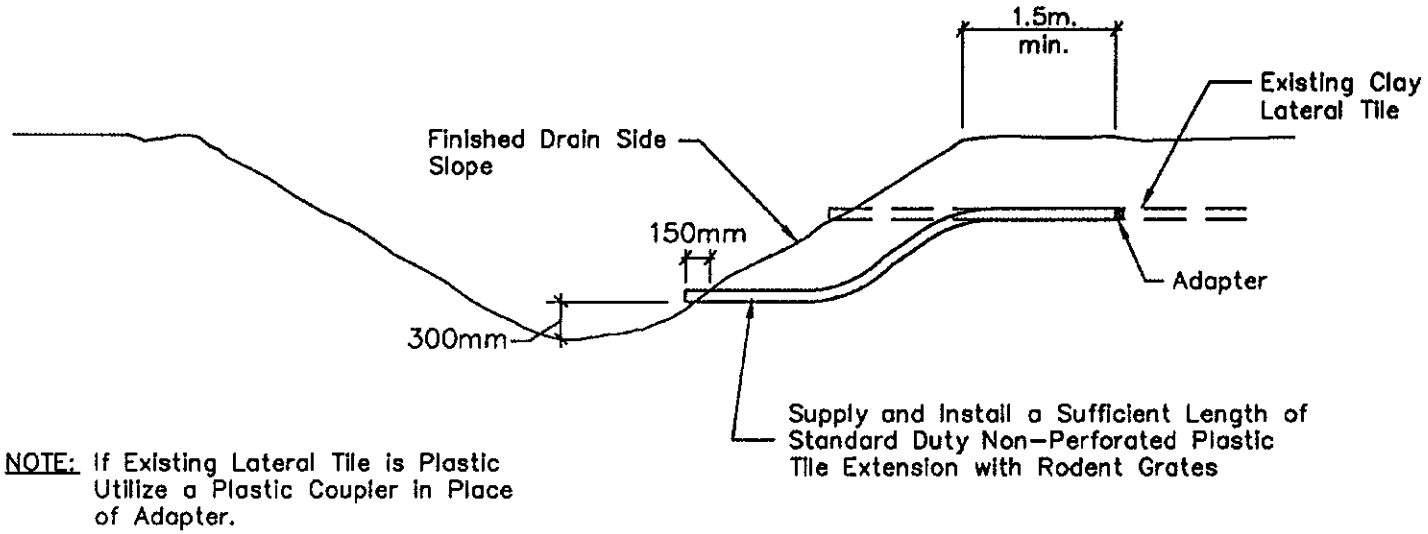
NOTE:

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



Typical Quarried Limestone End Protection

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



NOTE: If Existing Lateral Tile is Plastic Utilize a Plastic Coupler in Place of Adapter.

STANDARD LATERAL TILE DETAIL

N.T.S.

Underground Specialties INC.

Block Headwall Installation Instructions for Culverts

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

APPENDIX "REI-D"

MAINTENANCE SCHEDULE OF ASSESSMENT

8TH CONCESSION ROAD DRAIN SOUTH

(Geographic Township of Malden) (PWD-MD-2012-017)

TOWN OF AMHERSTBURG

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Howard Avenue			6.53	16.13	County of Essex	$ 373.00	$ 2,107.00	$ -	$ 2,480.00
Middle Sideroad			0.56	1.38	Town of Amherstburg	$ 76.00	$ 348.00	$ -	$ 424.00
Total on Municipal Lands						**$ 449.00**	**$ 2,455.00**	**$ -**	**$ 2,904.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
560-00210	8	Pt. Lot 87	0.43	1.07	Jon & Kathleen Parks	$ 13.00	$ 127.00	$ -	$ 140.00
560-00250	8	Pt. Lot 87	0.07	0.18	David Smith	$ 3.00	$ 23.00	$ -	$ 26.00
560-00300	8	S Pt. Lot 88	0.28	0.69	Lawrence Patterson & Tina Nemeth	$ 11.00	$ 33.00	$ -	$ 44.00
560-00490	8	N Pt. Lot 88	0.28	0.69	Jeffrey Serran	$ 12.00	$ 81.00	$ -	$ 93.00
570-04950	7	Pt. Lot 82	0.57	1.41	Kerri Montgomery	$ 63.00	$ 131.00	$ -	$ 194.00
570-05000	7	S Pt. Lot 83	0.30	0.74	Stanley & Suzanne Langlois	$ 33.00	$ 80.00	$ -	$ 113.00
610-00505	8	S Pt. Lot 90	0.22	0.55	Helen Sellars	$ 12.00	$ 57.00	$ -	$ 69.00
610-00510	8	Pt. Lot 90	0.39	0.96	John & Gloria Sellars	$ 21.00	$ 63.00	$ -	$ 84.00
610-00590	8	Pt. Lot 90	0.66	1.62	Matthew & Laura Sellars	$ 35.00	$ 102.00	$ -	$ 137.00
610-00600	8	Pt. Lot 90	0.74	1.84	Andrew & Theresa Beetham	$ 40.00	$ 80.00	$ -	$ 120.00
610-00750	8	N Pt. Lot 90	0.23	0.57	Brian & Lisa Renaud	$ 12.00	$ 33.00	$ -	$ 45.00
610-00850	8	Pt. Lot 91	0.23	0.56	Frank Fazekas	$ 22.00	$ 25.00	$ -	$ 47.00
610-00900	8	Pt. Lot 91	0.30	0.73	Michael & Kimberlee Kaldeway	$ 29.00	$ 33.00	$ -	$ 62.00
610-01105	8	N Pt. Lot 91	0.49	1.20	Brandon Crawford	$ 48.00	$ 30.00	$ -	$ 78.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
620-02800	7	Pt. Lot 79	0.38	0.95	Jeffrey & Stephanie Beaudoin	$ 58.00	$ 29.00	$ -	$ 87.00
620-02850	7	Pt. Lot 79	1.63	4.02	Lester & Laurella Laur	$ 247.00	$ 77.00	$ -	$ 324.00
620-02890	7	Pt. Lot 79	0.35	0.86	Ryan Greenwood & Linda Simone	$ 53.00	$ 15.00	$ -	$ 68.00
620-05890	7	Pt. Lot 80	0.61	1.51	Susan & Tim Reaume	$ 41.00	$ 35.00	$ -	$ 76.00
620-05895	7	Pt. Lot 80	0.61	1.51	Alan Quesnel	$ 41.00	$ 35.00	$ -	$ 76.00
620-05900	7	Pt. Lot 80	0.80	1.98	Alan Quesnel	$ 53.00	$ 46.00	$ -	$ 99.00
620-06000	7	Pt. Lot 80	15.45	38.18	Alan Quesnel	$ 659.00	$ 471.00	$ -	$ 1,130.00
620-06150	7	Pt. Lot 80	0.61	1.50	Dennis Hallatt	$ 40.00	$ 80.00	$ -	$ 120.00
Total on Privately Owned - Non-Agricultural Lands						**$ 1,546.00**	**$ 1,686.00**	**$ -**	**$ 3,232.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
560-00200	8	Pt. Lot 87	7.49	18.50	Jon Parks	$ 324.00	$ 685.00	$ -	$ 1,009.00
560-00400	8	S Pt. Lot 88	1.50	3.70	Allan & Connie Serran	$ 76.00	$ 130.00	$ -	$ 206.00
560-00500	8	N Pt. Lot 88	1.21	3.00	Allan Serran	$ 62.00	$ 98.00	$ -	$ 160.00
570-04300	7	Pt. Lots 83 & 84	4.86	12.00	Allan, Connie, Michael, Anna & Donald Serran	$ 251.00	$ 420.00	$ -	$ 671.00
570-04400	7	Pt. Lot 83	3.64	9.00	Jon Parks	$ 69.00	$ 304.00	$ -	$ 373.00
570-04410	7	Pt. Lot 83	0.74	1.84	Jon Parks	$ 81.00	$ 210.00	$ -	$ 291.00
570-04500	7	N Pt. Lot 83	11.74	29.00	Jon Parks	$ 568.00	$ 927.00	$ -	$ 1,495.00
570-04800	7	N Pt. Lot 82	8.50	21.00	Russell Wood	$ 441.00	$ 529.00	$ -	$ 970.00
570-04900	7	S Pt. Lot 82	18.21	45.00	Jon & Kathleen Parks	$ 725.00	$ 1,297.00	$ -	$ 2,022.00
570-04980	7	Pt. Lot 83	0.70	1.72	Jon Parks	$ 76.00	$ 59.00	$ -	$ 135.00
570-05100	7	N Pt. Lot 84	6.07	15.00	Paul & Joyce Gyori	$ 306.00	$ 554.00	$ -	$ 860.00
610-00500	8	S Pt. Lot 90	2.83	7.00	Joseph Grondin	$ 138.00	$ 152.00	$ -	$ 290.00
610-00601	8	Pt. Lot 90	6.07	15.00	Gerald Gemus & Sons Limited	$ 262.00	$ 293.00	$ -	$ 555.00
610-00700	8	N Pt. Lot 90	1.39	3.43	Ronald & Brian Renaud	$ 22.00	$ 62.00	$ -	$ 84.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Afft'd	Acres Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
610-00800	8	S Pt. Lot 91	1.01	2.50	Jeannette Martin	$ 51.00	$ 40.00	$ -	$ 91.00
610-01000	8	Pt. Lot 91	2.02	5.00	Gerald Gemus & Sons Limited	$ 102.00	$ 69.00	$ -	$ 171.00
610-01100	8	N Pt. Lot 91	0.81	2.00	Norman & Rose Jobin	$ 44.00	$ 22.00	$ -	$ 66.00
620-00100	7	Pt. Lot 81	19.02	47.00	Alan & Pauline Waters	$ 812.00	$ 982.00	$ -	$ 1,794.00
620-02900	7	Pt. Lot 79	17.43	43.07	806574 Ontario Inc.	$ 768.00	$ 344.00	$ -	$ 1,112.00
620-06100	7	Pt. Lot 80	11.13	27.50	Bradley & Laurie Martin	$ 543.00	$ 424.00	$ -	$ 967.00
620-06200	7	Pt. Lot 81	5.87	14.50	Ruby Martin	$ 288.00	$ 254.00	$ -	$ 542.00
Total on Privately Owned - Agricultural Lands (grantable)						**$ 6,009.00**	**$ 7,855.00**	**$ -**	**$ 13,864.00**
TOTAL ASSESSMENT			164.95	407.59		**$ 8,004.00**	**$ 11,996.00**	**$ -**	**$ 20,000.00**

1 Hectare = 2.471 Acres
Project No. REI2012D017
September 12th, 2016

APPENDIX "REI-E"

PLANS, PROFILE & DETAILS

OF THE

8TH CONCESSION ROAD DRAIN SOUTH

(Geographic Township of Malden)

IN THE

TOWN OF AMHERSTBURG

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rood
GERARD ROOD, P.ENG.

REGISTERED PROFESSIONAL ENGINEER G.ROOD 2016-09-12 PROVINCE OF ONTARIO

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

DATE: SEPTEMBER 12th, 2016

TOWN OF AMHERSTBURG

MAYOR: ALDO DICARLO
CLERK: PAULA PARKER
DRAINAGE SUPERINTENDENT: SHANE McVITTY, P.Eng.

BENCHMARKS:

1) Top of concrete headwall at West end of CSP Arch under 8th Concession Road at Pike Sidroad
ELEV. = 188.03m

2) Top of fire hydrant at NW corner of Pike Road & Howard Avenue intersection
ELEV. = 186.30m

3) Nail in West side of hydro pole (0.3m above grade) NE of bridge #2 on East side of Howard Avenue
ELEV. = 185.63m

4) Top of fire hydrant at North property line of M.N. 8341 on East side of Howard Avenue
ELEV. = 186.66m

5) Nail in West side of hydro pole (0.3m above grade) across from M.N. 8352 on East side of Howard Avenue
ELEV. = 186.33m

6) Top of fire hydrant across from M.N. 8400 on East side of Howard Avenue
ELEV. = 187.84m

7) Top of fire hydrant at South end of M.N. 8409 on East side of Howard Avenue
ELEV. = 187.60m

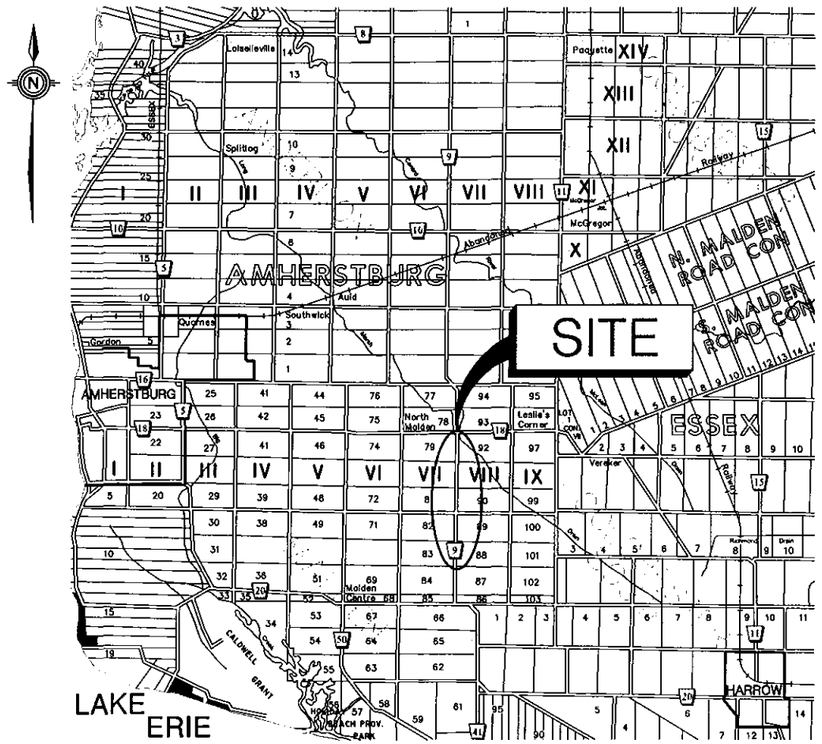
8) Top of fire hydrant at SE corner of Howard Avenue & South Sideroad intersection
ELEV. = 187.56m

9) Nail in East face of hydro pole at front of M.N. 8340 on West side of Howard Avenue
ELEV. = 188.12m

10) Nail in East side of hydro pole (0.3m above grade) at front of M.N. 7631 on West side of Howard Avenue
ELEV. = 189.48m

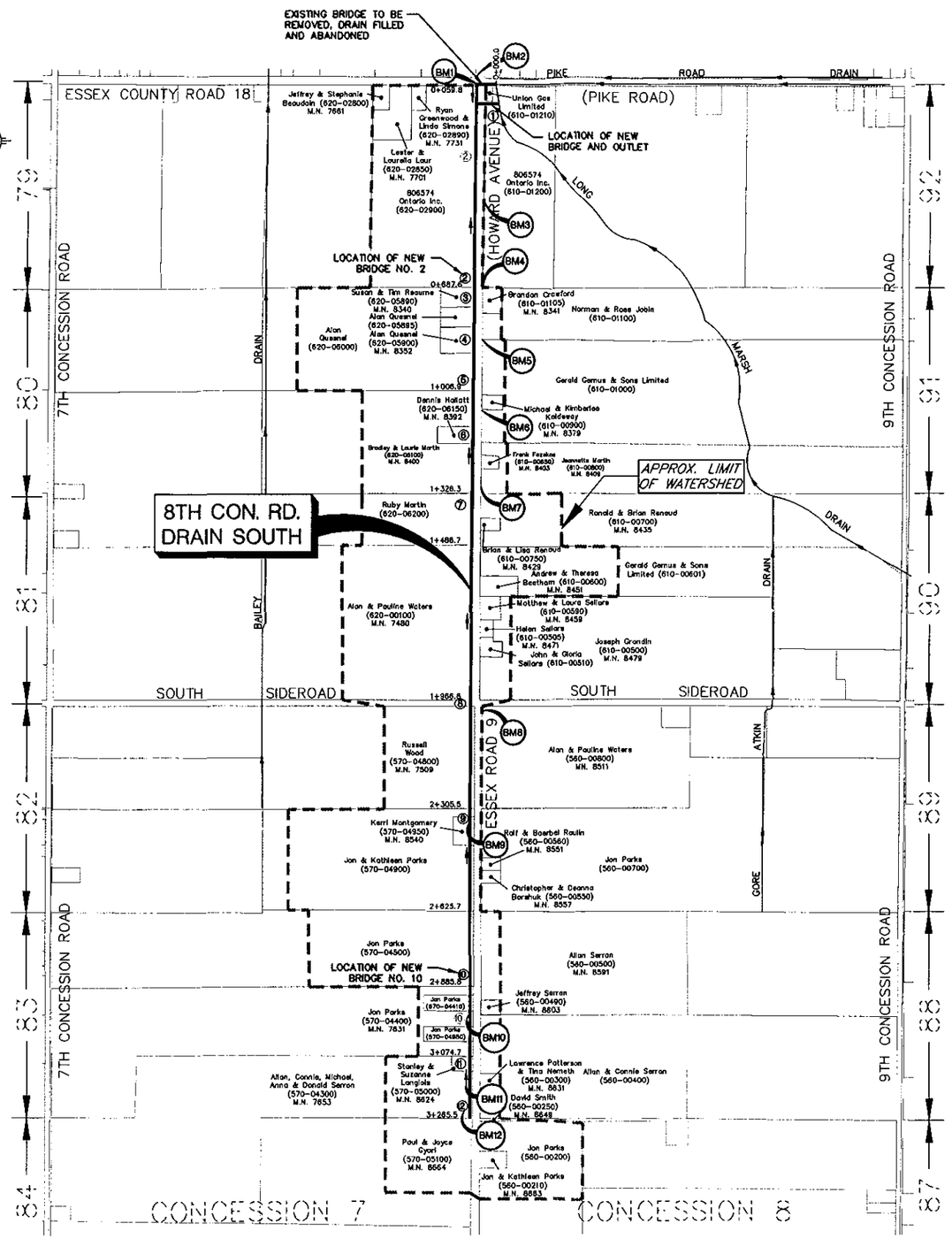
11) Top of fire hydrant at North end of M.N. 7653 on West side of Howard Avenue
ELEV. = 189.89m

12) Nail in East side of hydro pole (0.3m above grade) at South end of M.N. 7853 West side of Howard Avenue
ELEV. = 189.34m



KEY PLAN

SCALE = 1:150,000



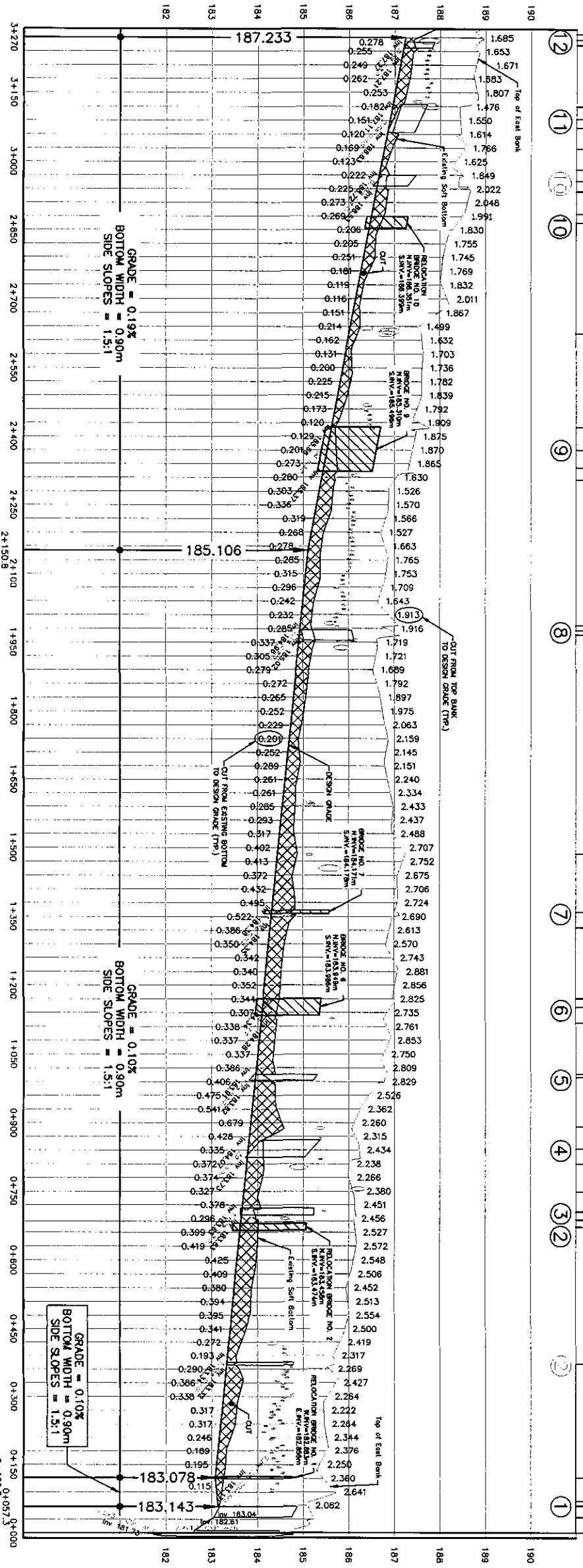
WATERSHED PLAN

SCALE = 1:7,500

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

DRAWN BY: G.R./G.S./K.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

PWD-MD-2012-017 | FILE No.: 2012D017 | SHEET No.: 1 OF 14



	3+282.2	End of Drain
⑫	3+265.5	Property Line West 570-04300 & 570-05100
	3+253.5	to 3+267.5 Existing 600mm Dia. CSP
	3+120.4	Property Line West 570-05000 & 570-04300
⑪	3+063.3	to 3+124.3 Existing 600mm Dia. CSP
	3+074.7	Property Line West 570-04400 & 570-05000
	3+029.0	Property Line West 570-04980 & 570-04400
	2+983.3	Property Line West 570-04400 & 570-04980
⑯	2+945.7	to 2+970.2 Existing 750mm Dia. CSP
	2+934.5	Property Line West 570-04410 & 570-04400
	2+885.8	Property Line West 570-04500 & 570-04410
⑩	2+853.6	**to 2+878.6 PROPOSED 900mm Dia. H.D.P.E.**
	2+625.7	Property Line West 570-04900 & 570-04500
	2+420.1	Property Line West 570-04950 & 570-04900
⑥	2+322.1	**to 2+420.1 PROPOSED 1200mm DIA. CSP**
	2+331.4	Property Line West 570-04900 & 570-04950
	2+305.5	Property Line West 570-04800 & 570-04900
	1+987.0	South R.O.W. Limit of South Sideroad
⑧	1+965.4	to 1+987.7 Existing 1100mm Dia. CSP
	1+966.9	North R.O.W. Limit of South Sideroad
	1+486.7	Property Line West 620-06200 & 620-00100
⑦	1+356.4	**to 1+363.4 PROPOSED 1400mm DIA. CSP**
	1+326.3	Property Line West 620-06100 & 620-06200
	1+171.6	Property Line West 620-06150 & 620-06100
⑥	1+133.8	**to 1+170.8 PROPOSED 1400mm DIA. CSP**
	1+118.7	Property Line West 620-06100 & 620-06150
	1+006.9	Property Line West 620-06000 & 620-06100
⑤	0+993.4	to 1+005.8 Existing 1400mm Dia. CSP
	0+892.0	Property Line West 620-05900 & 620-06000
④	0+824.2	to 0+862.2 Existing 1300mm Dia. CSP
	0+810.6	Property Line West 620-05895 & 620-05900
	0+749.2	Property Line West 620-05890 & 620-05895
③	0+697.6	to 0+712.8 Existing 1600mm Dia. CSP
	0+687.6	Property Line West 620-02900 & 620-05890
②	0+663.9	**to 0+680.0 PROPOSED 1600mm DIA. CSP**
⑫	0+368.7	to 0+374.9 Existing1450mm DIA. CSP
	0+122.3	**CONSTRUCT NEW OULET EAST**
	0+069.4	Union Gas Limited Easment
	0+059.8	South R.O.W. Limit of Essex County Road No. 18
①	0+058.5	Drain Turns South
	0+033.1	to 0+058.5 3.2x1.7 CSP Arch
		REMOVE BRIDGE, FILL DRAIN, RESTORE ASPHALT & GRADE SWALE
	0+000.0	Centreline of Long Marsh Drain

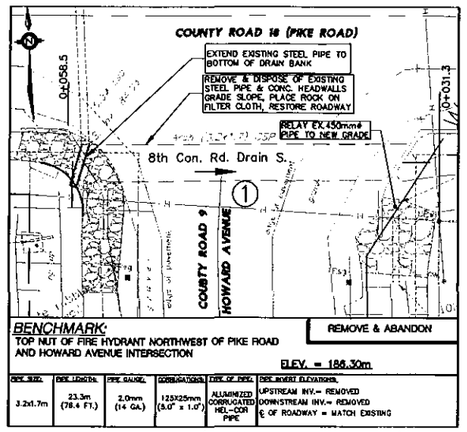
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

PWD-MD-2012-017

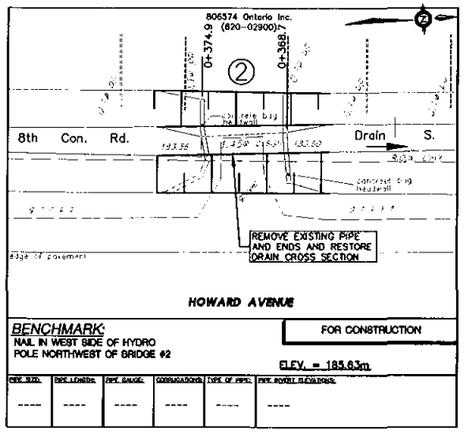
FILE No: 2012D017

SHEET No: 2 OF 14

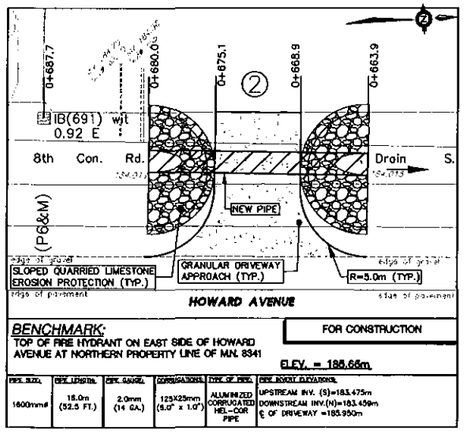
DRAWN BY: H.S./G.S./K.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG



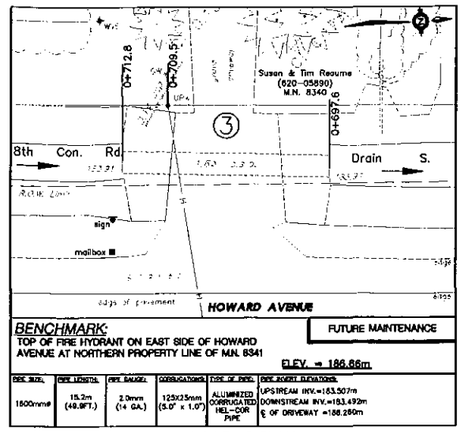
BRIDGE #1 PLAN (See New Outlet Location Plan)
SCALE = 1:200



BRIDGE #2 REMOVAL PLAN
SCALE = 1:200



BRIDGE #2 RELOCATION PLAN
SCALE = 1:200



BRIDGE #3 PLAN
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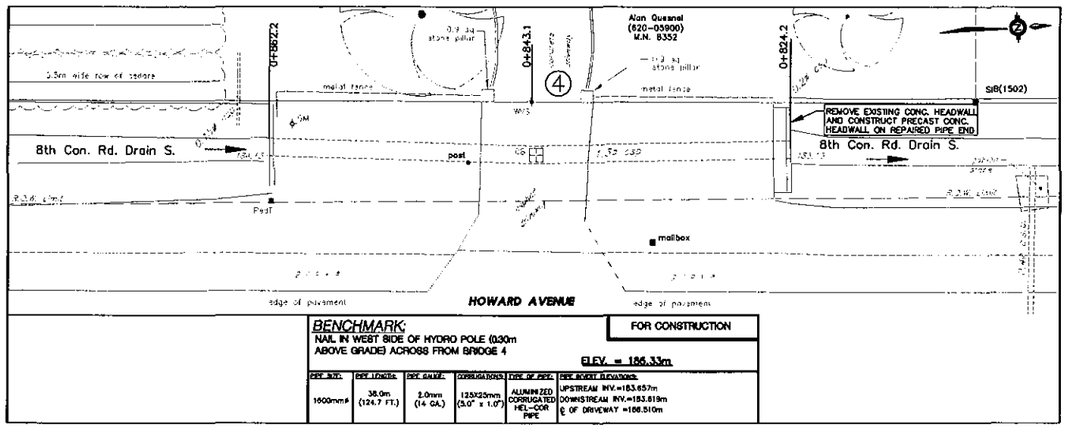

BRIDGE #4 PLAN
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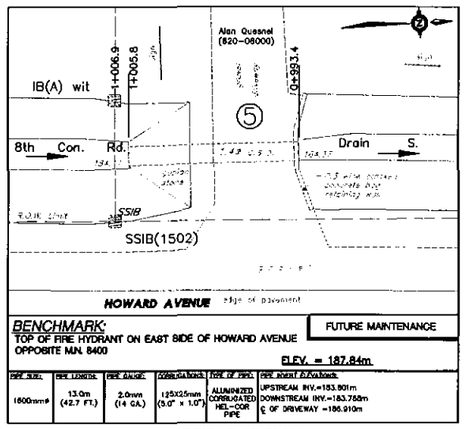

BRIDGE #5 PLAN
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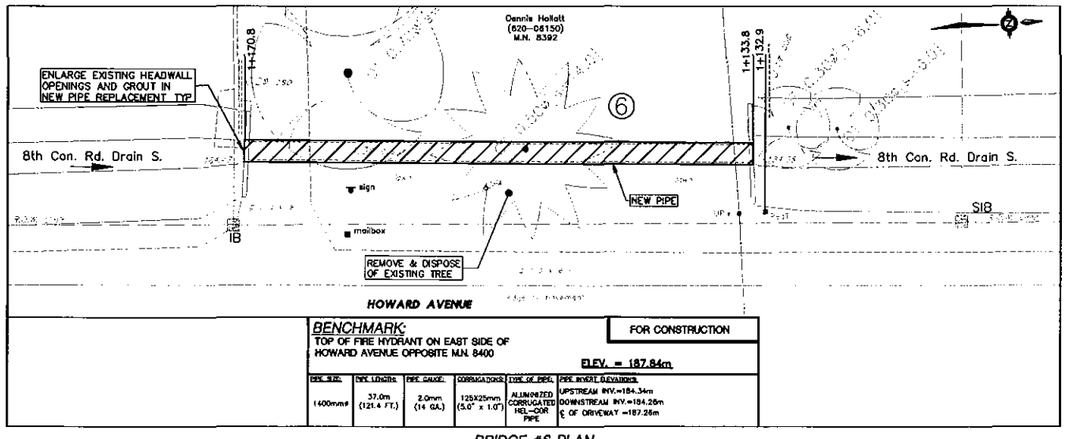

BRIDGE #6 PLAN
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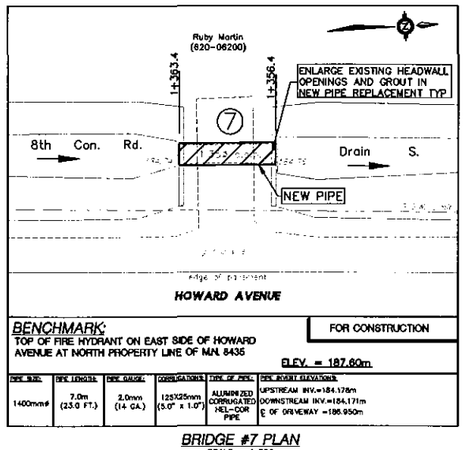

BRIDGE #7 PLAN
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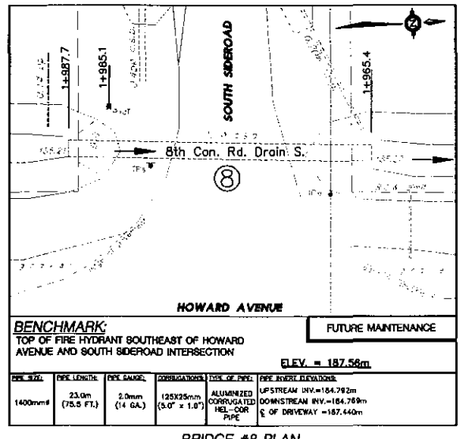

BRIDGE #8 PLAN
SCALE = 1:200

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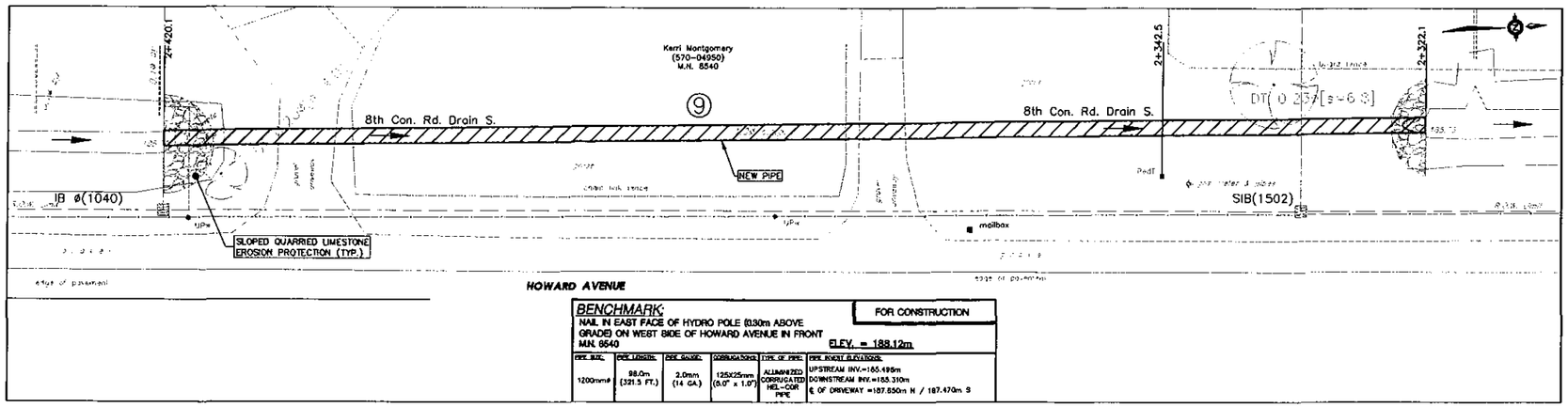
DRAWN BY: H.S./G.S./K.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

PWD-MD-2012-017

FILE No.: 2012D017

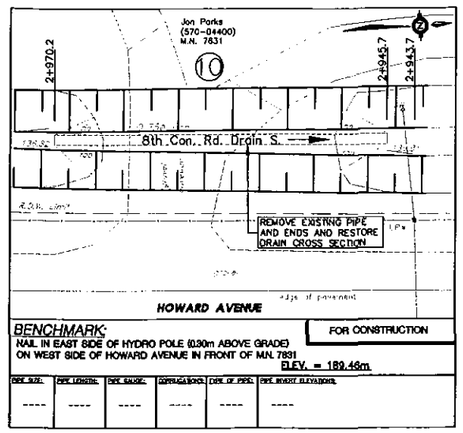
SHEET No.: 3 OF 14



BENCHMARK: NAIL IN EAST FACE OF HYDRO POLE (0.30m ABOVE GRADE) ON WEST SIDE OF HOWARD AVENUE IN FRONT M.N. 8540 — ELEV. = 188.12m — FOR CONSTRUCTION

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
1200mmø	98.0m (321.5 FT.)	2.0mm (14 GA.)	125X25mm (5.0" x 1.0")	ALUMINIZED CORRUGATED HEL-COR PIPE	UPSTREAM INV.=185.495m DOWNSTREAM INV.=185.310m ℄ OF DRIVEWAY =187.550m N / 187.470m S

BRIDGE #9 PLAN
SCALE = 1:200



BENCHMARK: NAIL IN EAST SIDE OF HYDRO POLE (0.30m ABOVE GRADE) ON WEST SIDE OF HOWARD AVENUE IN FRONT OF M.N. 7831 — ELEV. = 189.46m — FOR CONSTRUCTION

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
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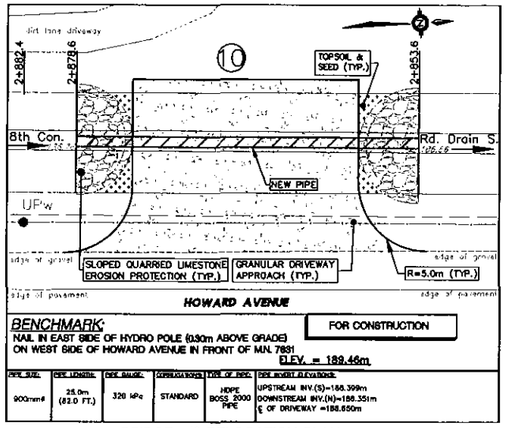
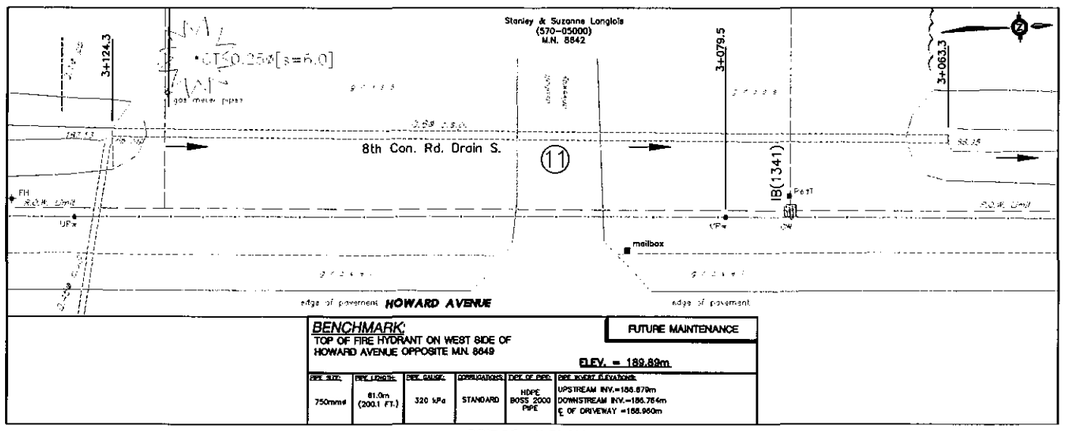
BRIDGE #10 REMOVAL PLAN
SCALE = 1:200



BENCHMARK: NAIL IN EAST SIDE OF HYDRO POLE (0.30m ABOVE GRADE) ON WEST SIDE OF HOWARD AVENUE IN FRONT OF M.N. 7831 — ELEV. = 189.46m — FOR CONSTRUCTION

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
900mmø	25.0m (82.0 FT.)	320 kPa	STANDARD	HDPE BOSS 2000 PIPE	UPSTREAM INV.(S)=186.399m DOWNSTREAM INV.(N)=186.351m ℄ OF DRIVEWAY =188.550m

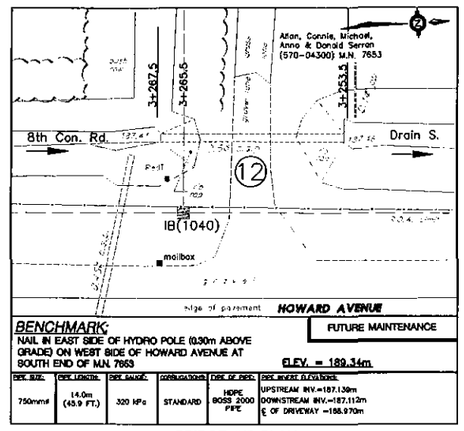
BRIDGE #10 RELOCATION PLAN
SCALE = 1:200



BENCHMARK: TOP OF FIRE HYDRANT ON WEST SIDE OF HOWARD AVENUE OPPOSITE M.N. 8649 — ELEV. = 189.89m — FUTURE MAINTENANCE

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
750mmø	61.0m (200.1 FT.)	320 kPa	STANDARD	HDPE BOSS 2000 PIPE	UPSTREAM INV.=186.879m DOWNSTREAM INV.=186.764m ℄ OF DRIVEWAY =188.950m

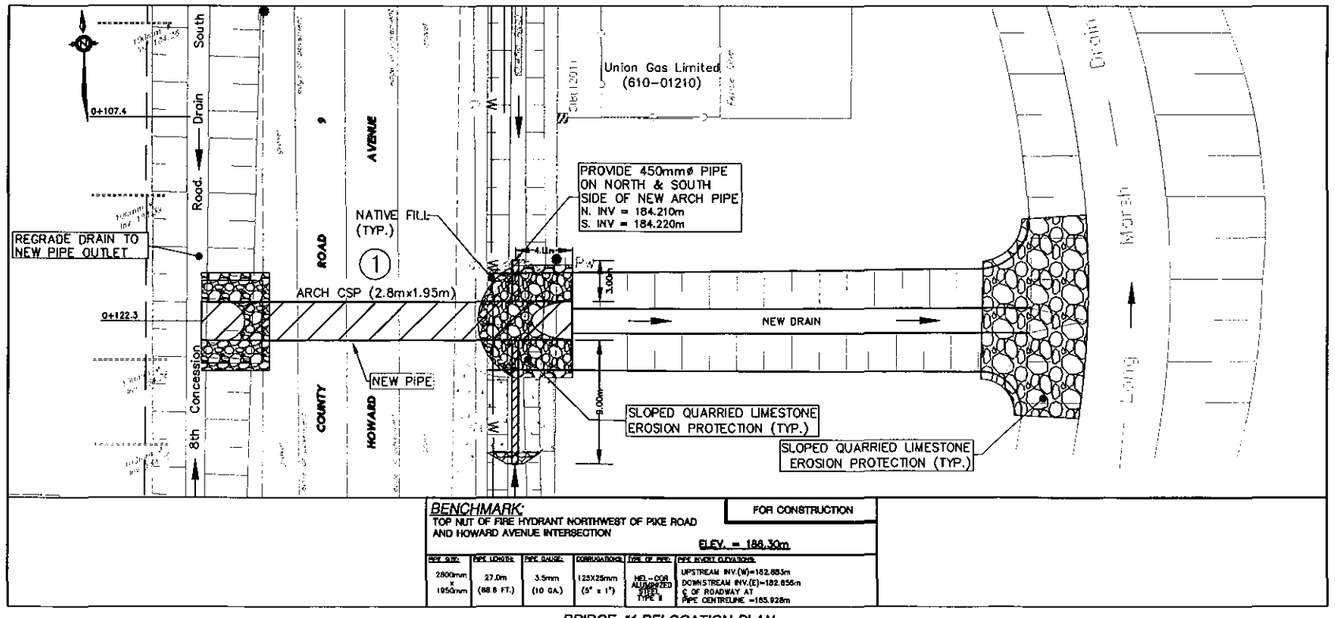
BRIDGE #11 PLAN
SCALE = 1:200



BENCHMARK: NAIL IN EAST SIDE OF HYDRO POLE (0.30m ABOVE GRADE) ON WEST SIDE OF HOWARD AVENUE AT SOUTH END OF M.N. 7653 — ELEV. = 189.34m — FUTURE MAINTENANCE

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
750mmø	14.0m (45.9 FT.)	320 kPa	STANDARD	HDPE BOSS 2000 PIPE	UPSTREAM INV.=187.139m DOWNSTREAM INV.=187.110m ℄ OF DRIVEWAY =188.970m

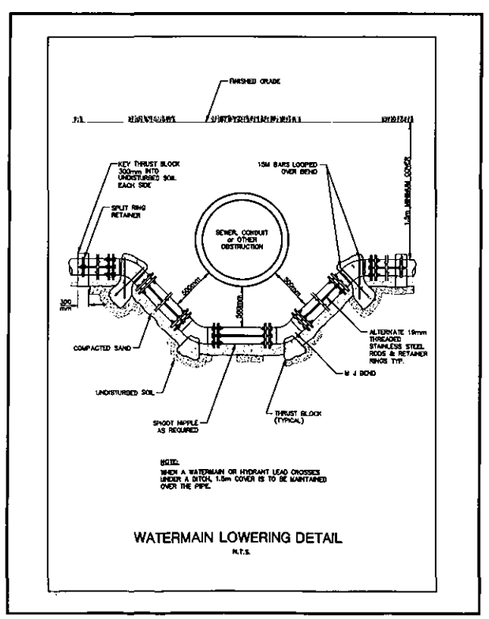
BRIDGE #12 PLAN
SCALE = 1:200



BENCHMARK: TOP NUT OF FIRE HYDRANT NORTHWEST OF PIKE ROAD AND HOWARD AVENUE INTERSECTION — ELEV. = 186.30m — FOR CONSTRUCTION

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
2800mm x 1950mm	27.0m (88.6 FT.)	3.5mm (10 GA.)	125X25mm (5" x 1")	HEL-COR ALUMINIZED STEEL TYPE II	UPSTREAM INV.(W)=182.883m DOWNSTREAM INV.(E)=182.856m ℄ OF ROADWAY AT PIPE CENTRELINE =185.928m

BRIDGE #1 RELOCATION PLAN
SCALE = 1:200



WATERMAIN LOWERING DETAIL
N.T.S.

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DRAWN BY: H.S./G.S./K.S.
PLOT CODE: 1:1
COMPUTER FILE: 20120017.DWG

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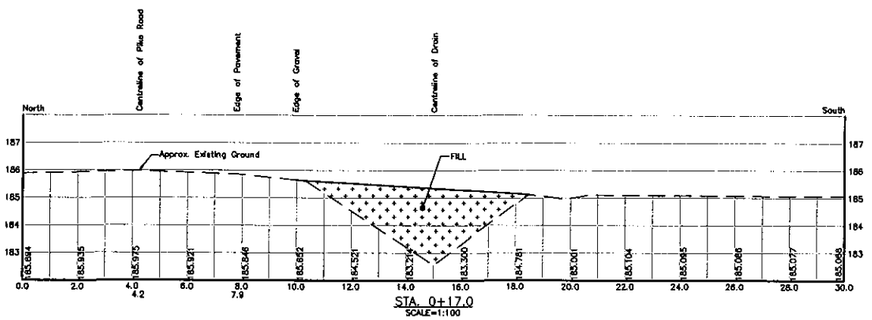
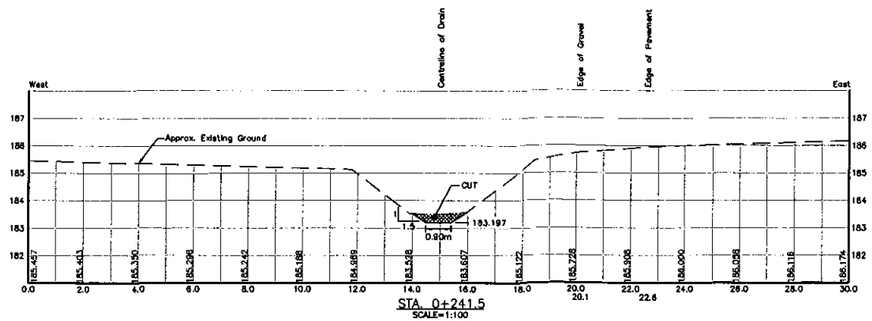
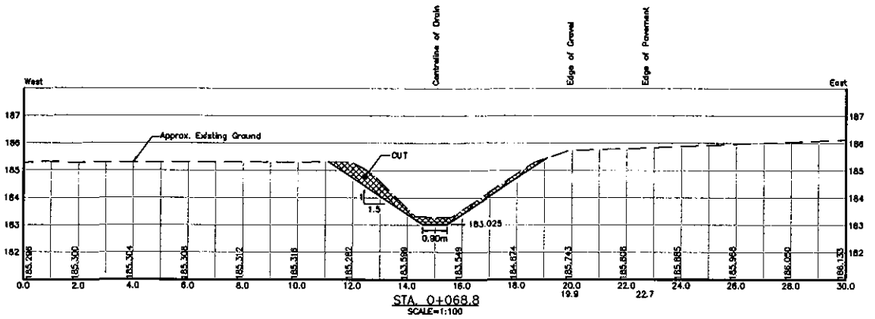
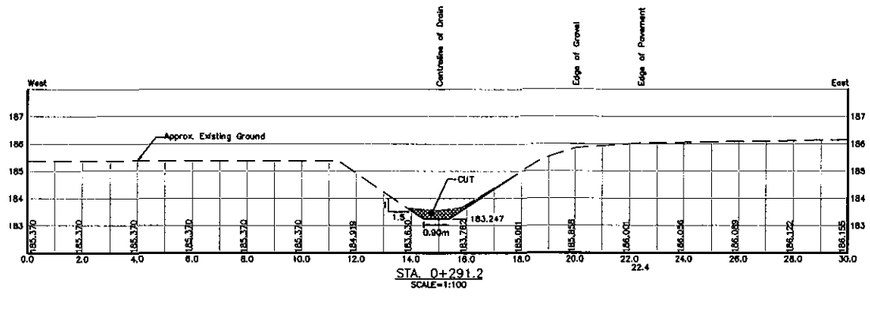
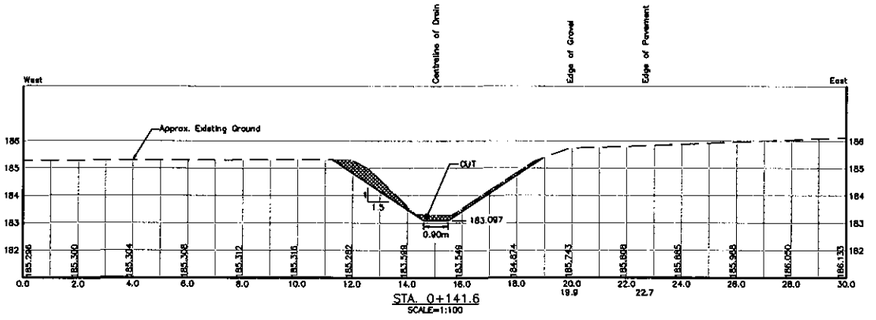
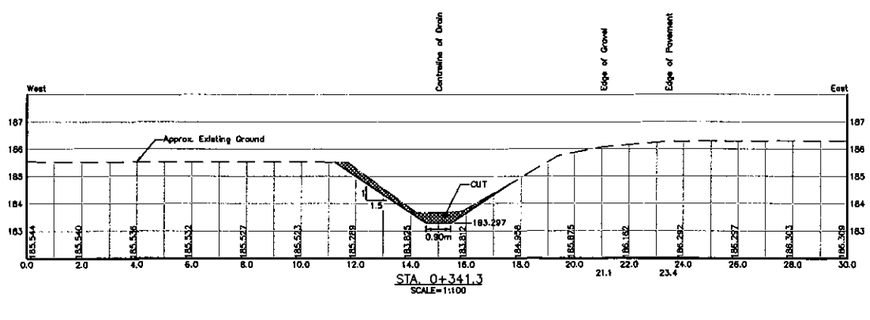


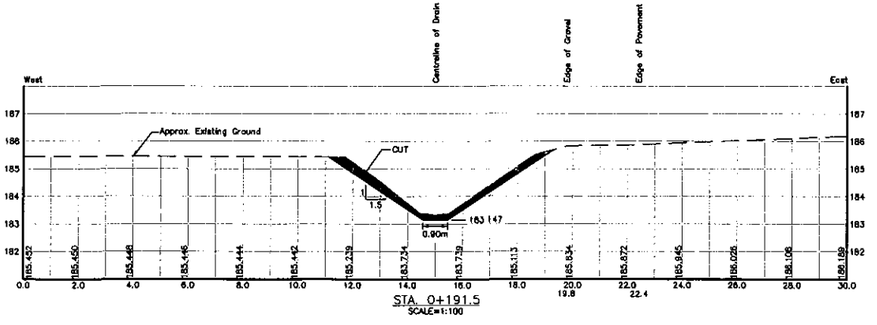


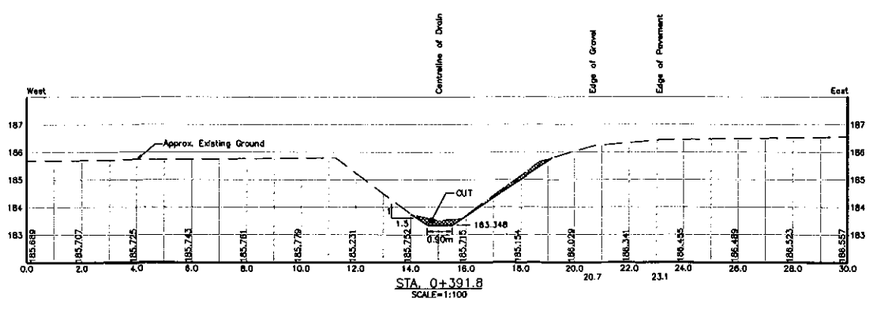










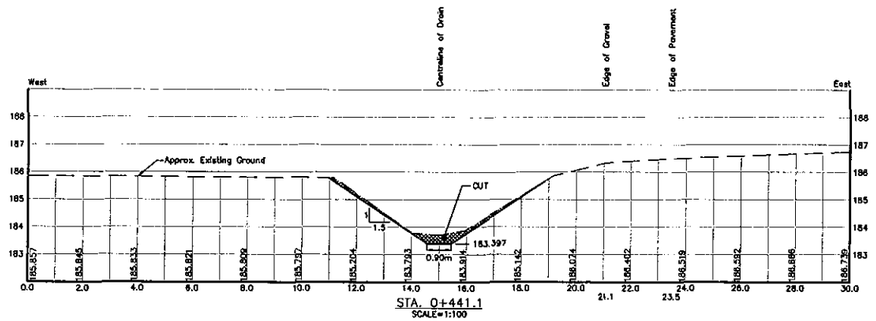


THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

DRAWN BY: K.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

FILE No.: 2012D017

SHEET No.: 5 OF 14



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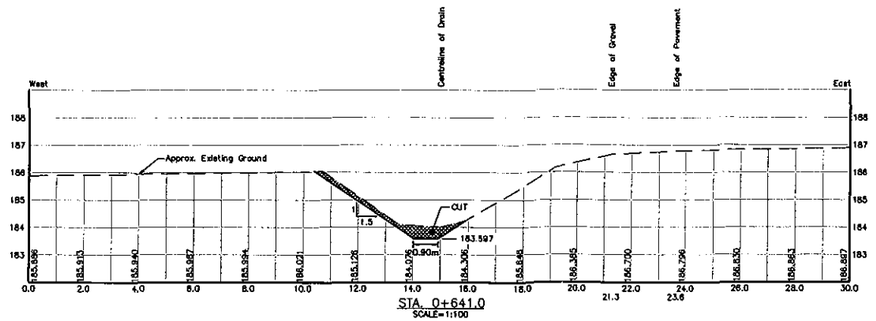

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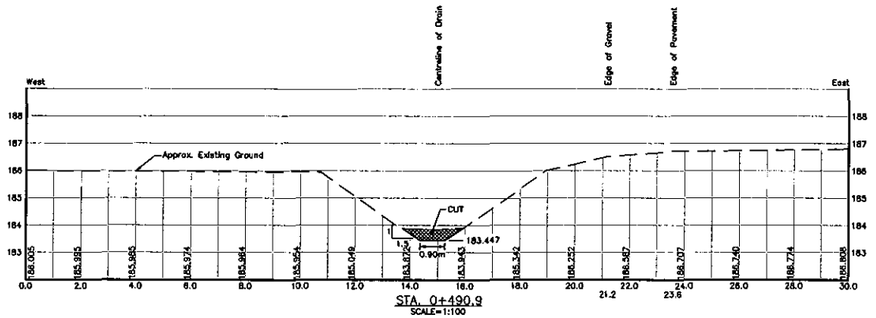

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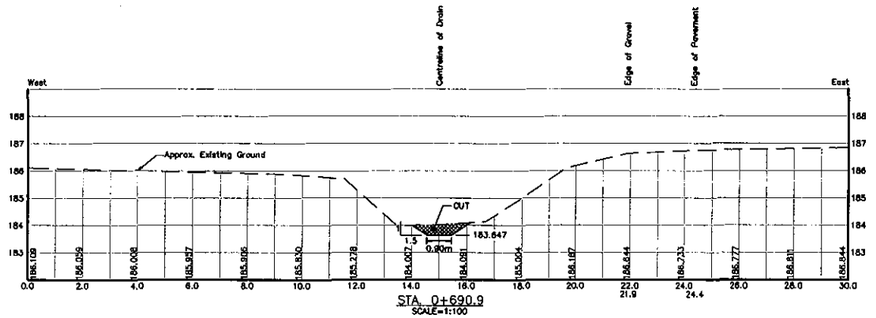

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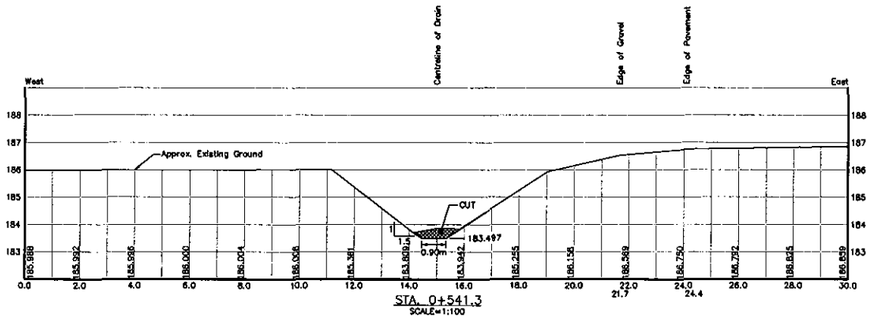

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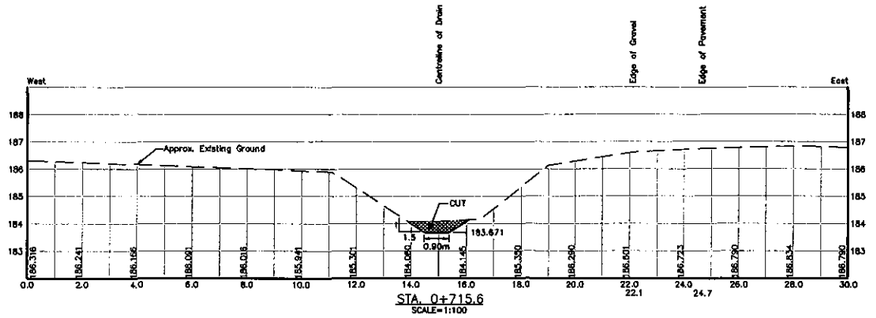

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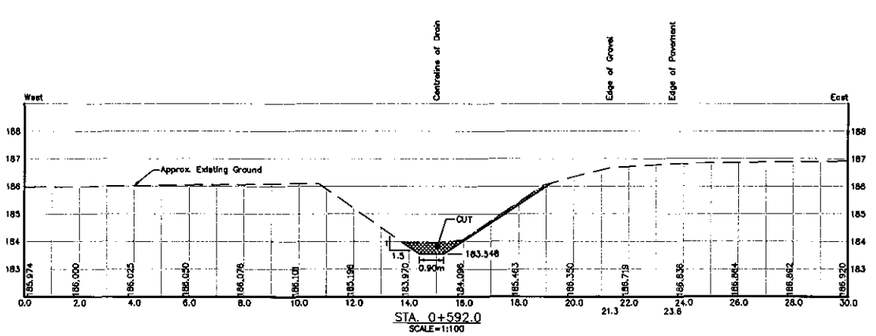

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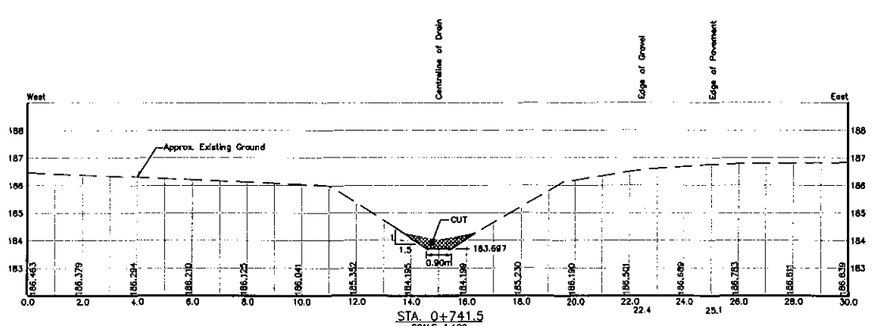

STA. 0+741.5
SCALE=1:100

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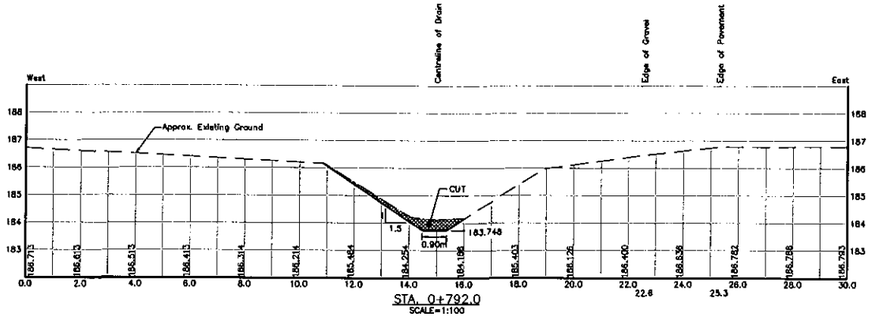
DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 20120017.DWG

FILE No.: 2012D017

SHEET No.: 6 OF 14



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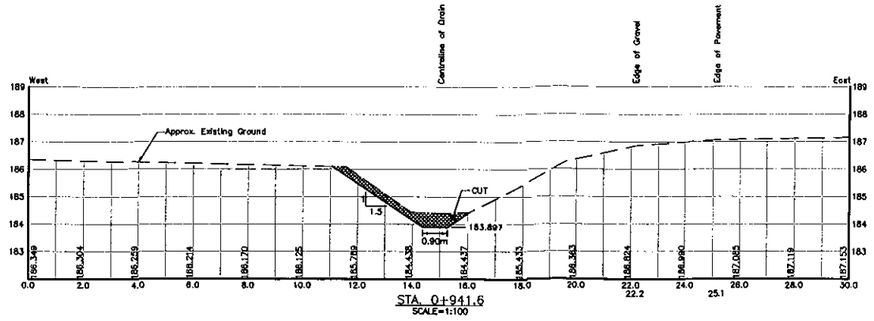

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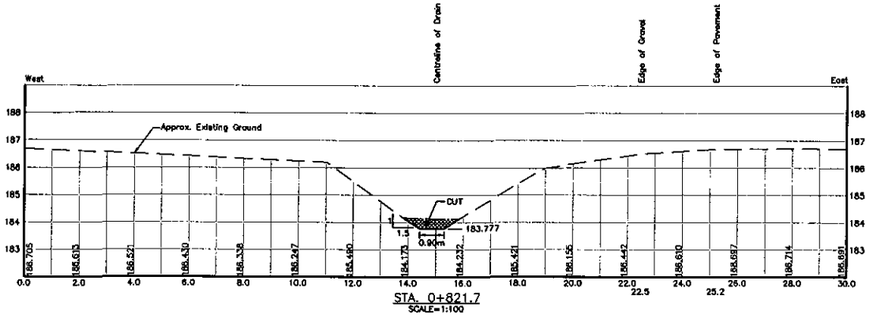

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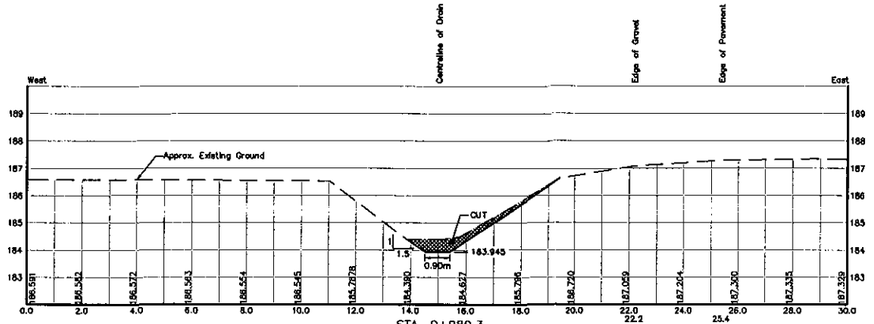

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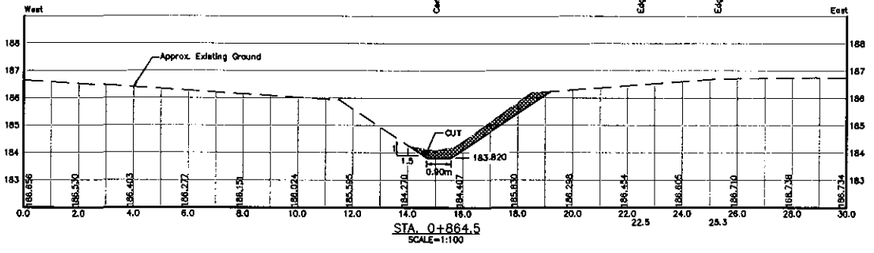

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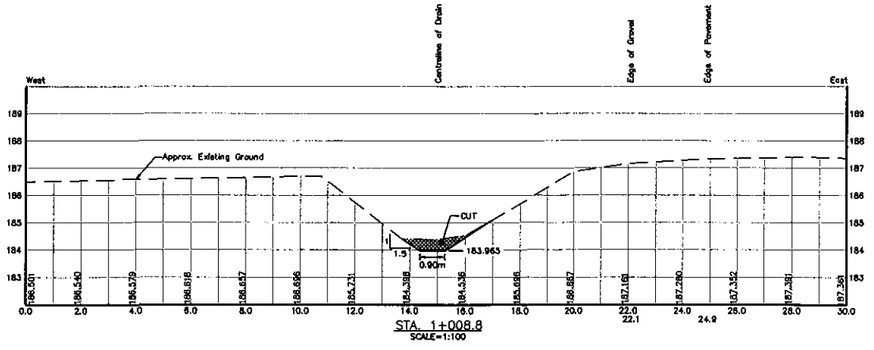

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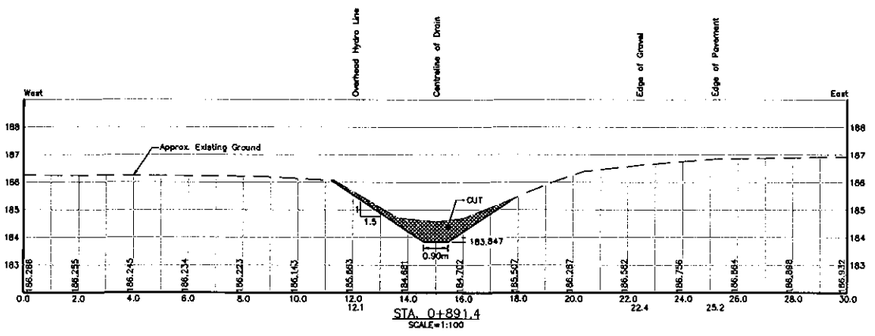
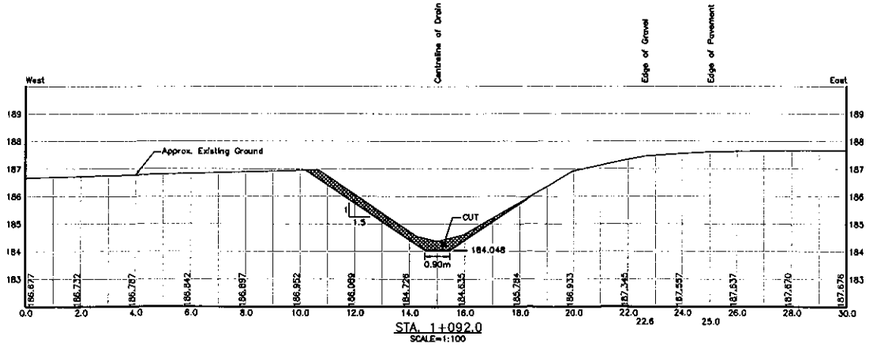


STA. 0+891.4
SCALE=1:100



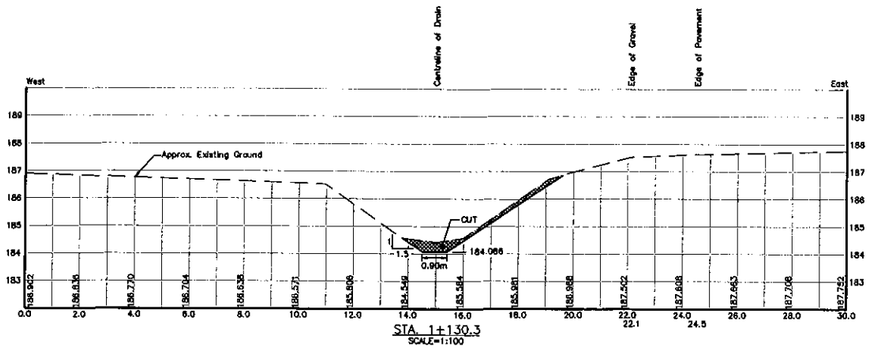
STA. 1+092.0
SCALE=1:100

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

DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

FILE No.: 2012D017

SHEET No.: 7 OF 14



STA. 1+130.3
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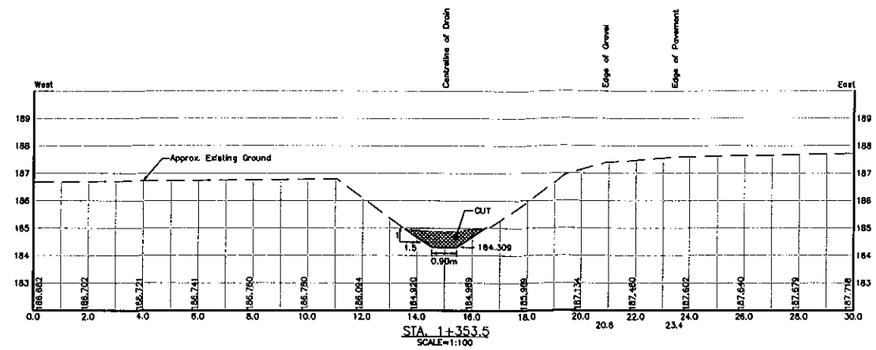

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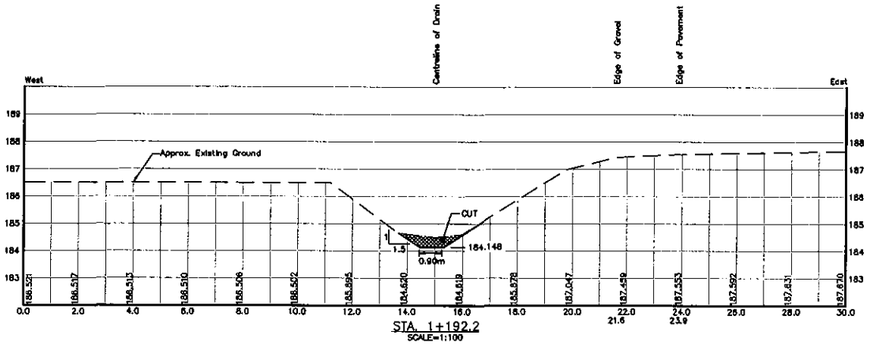

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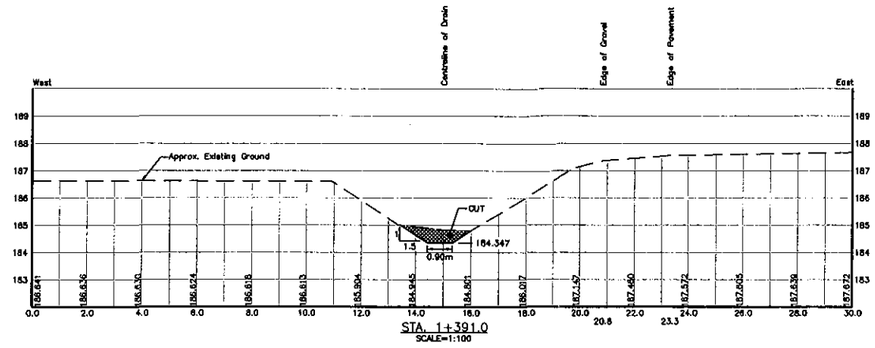

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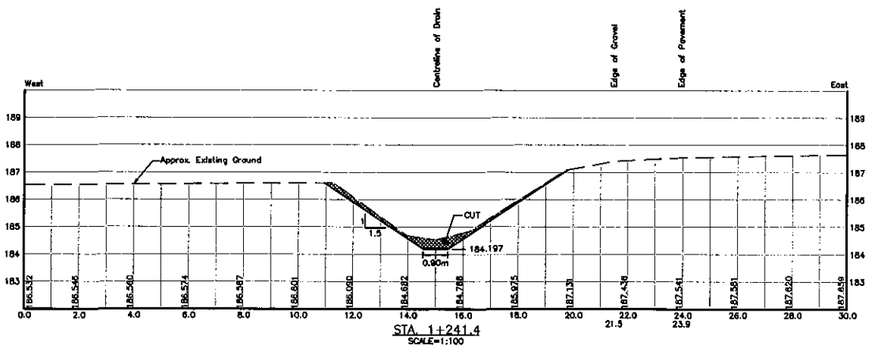

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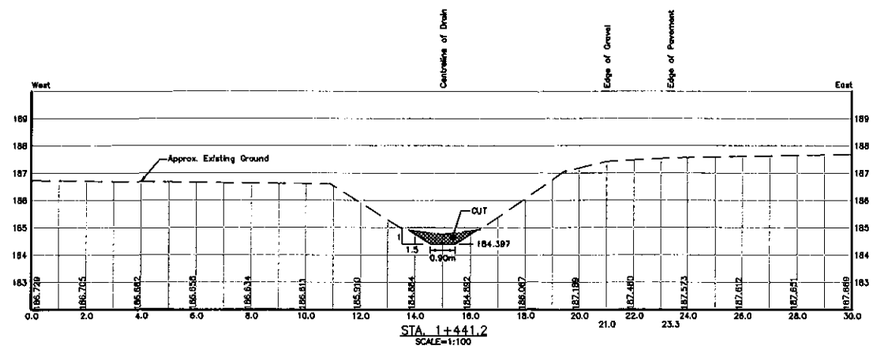

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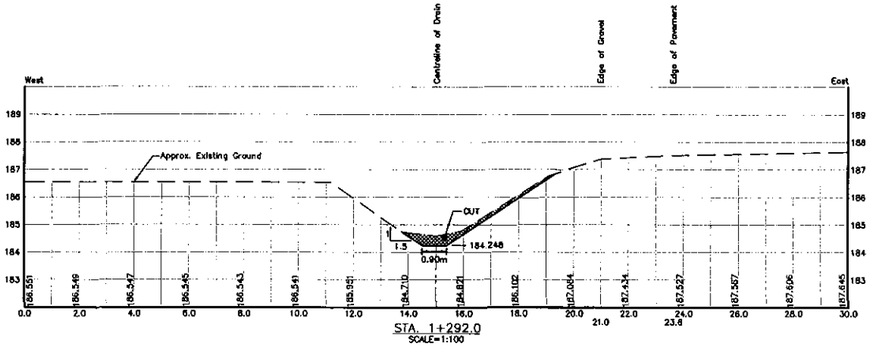

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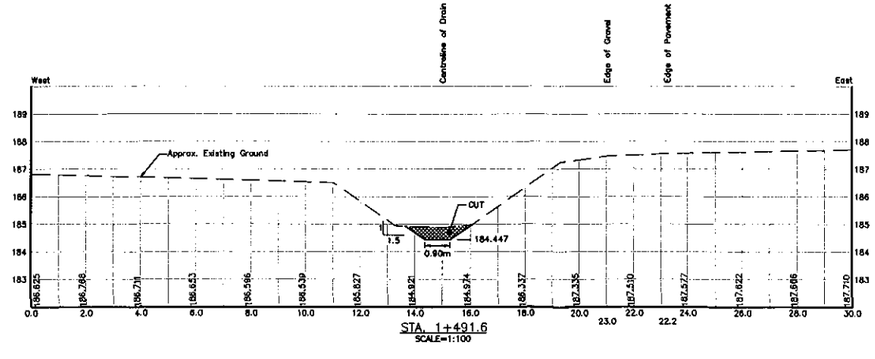
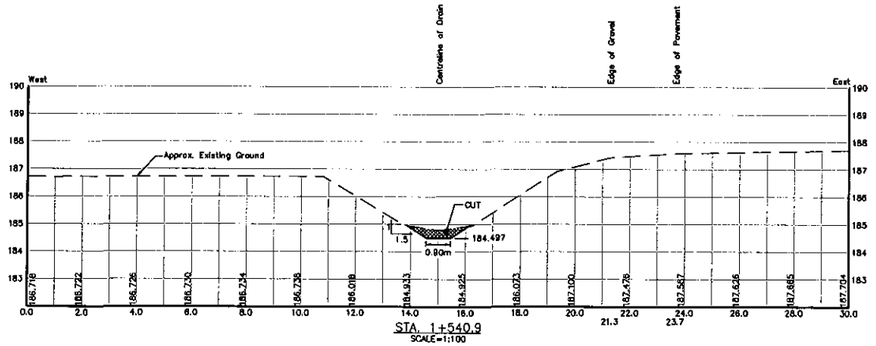


STA. 1+491.6
SCALE=1:100

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

DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2011D000.DWG

FILE No.:	SHEET No.:
2012D017	8 OF 14



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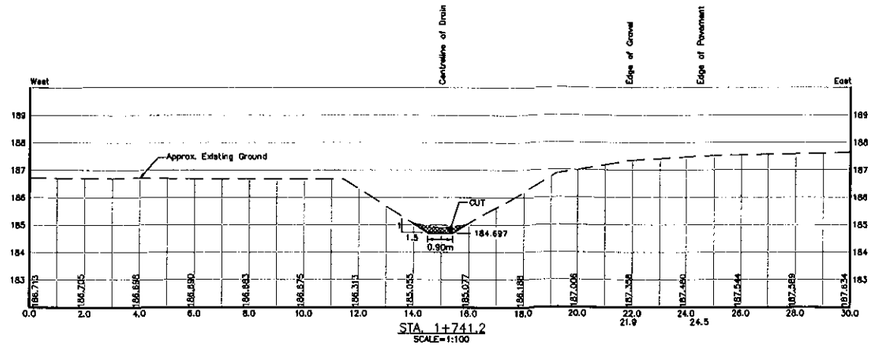

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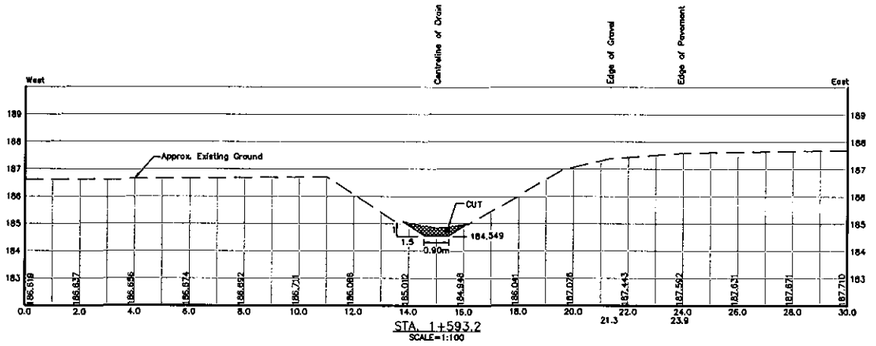

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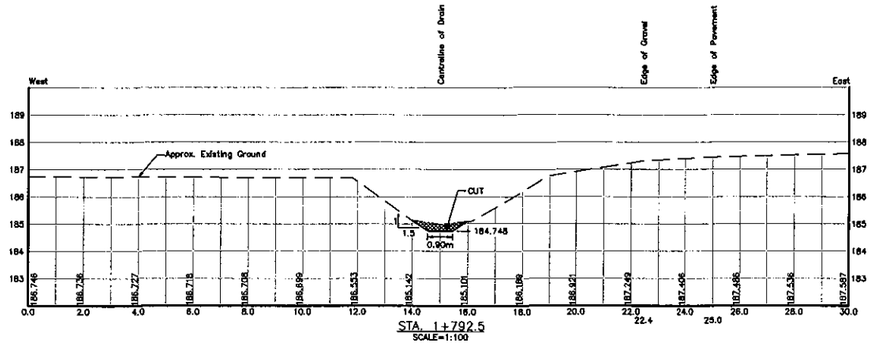

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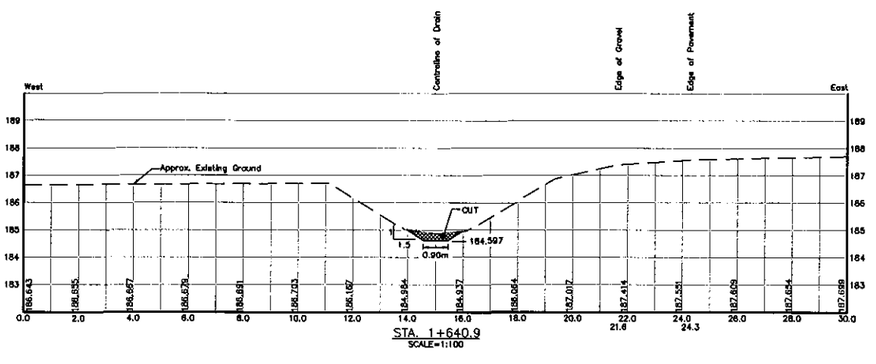

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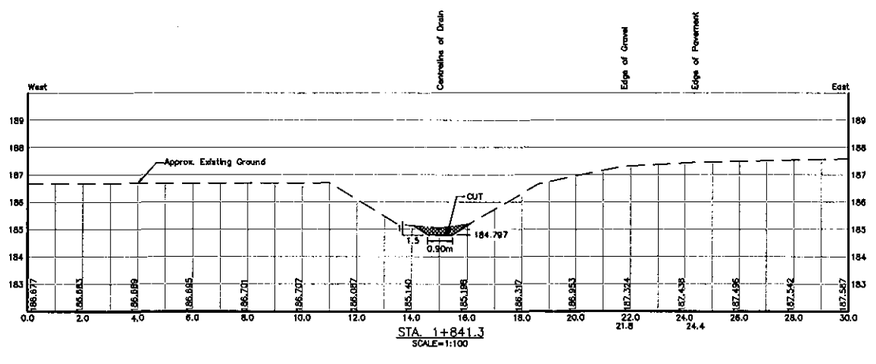

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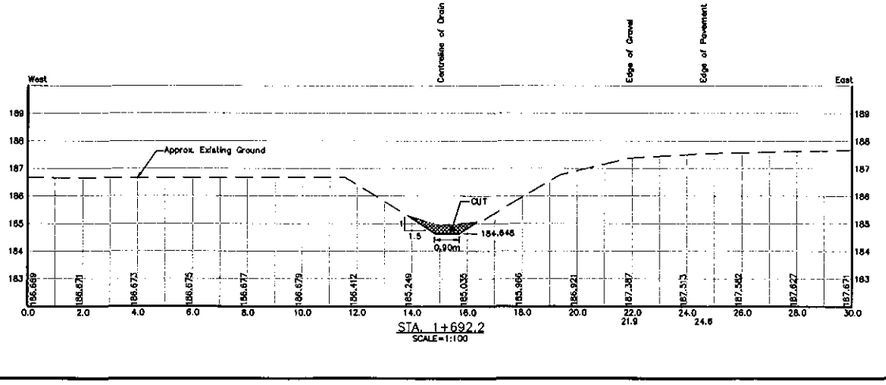

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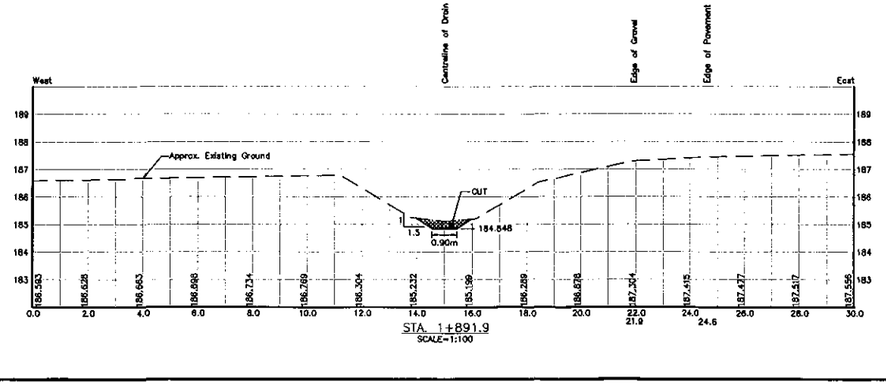


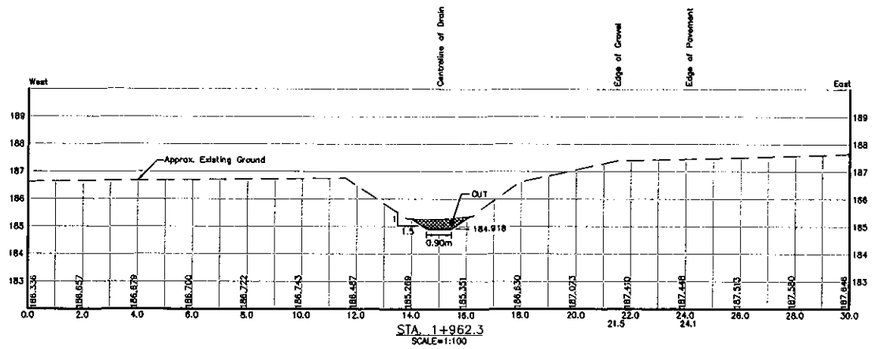
STA. 1+891.9
SCALE=1:100

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

DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 20120017.DWG

FILE No.: 2012D017

SHEET No.: 9 OF 14



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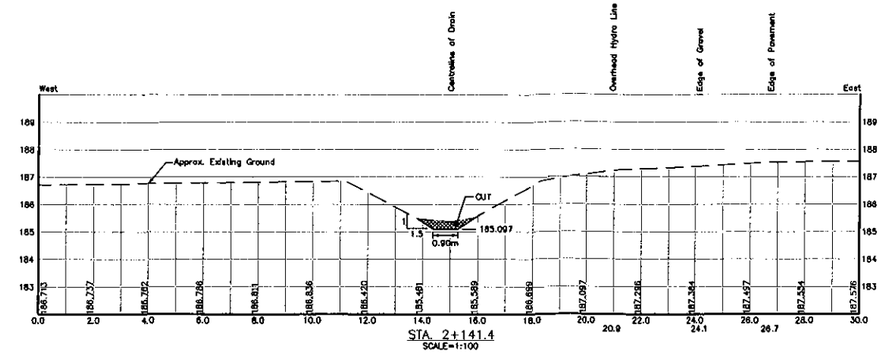

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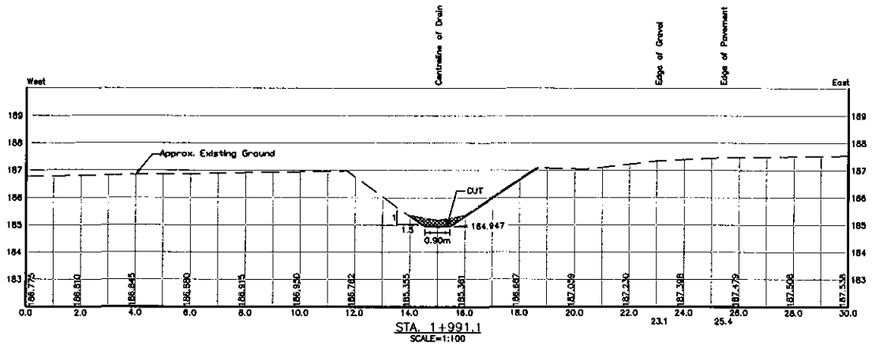

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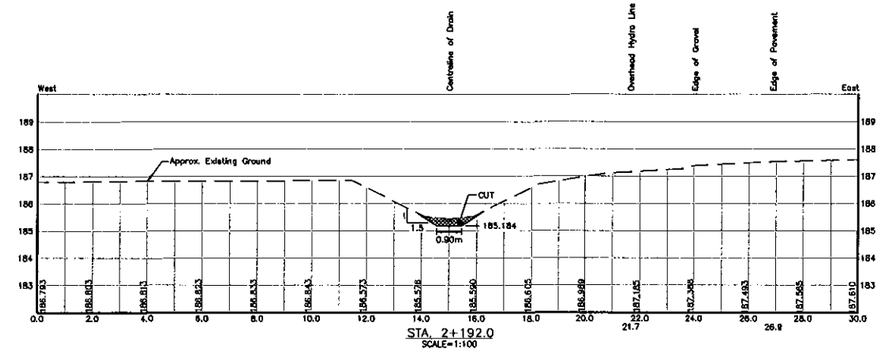

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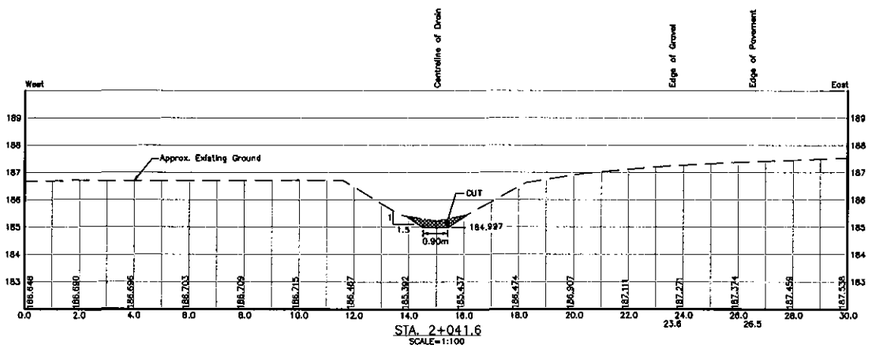

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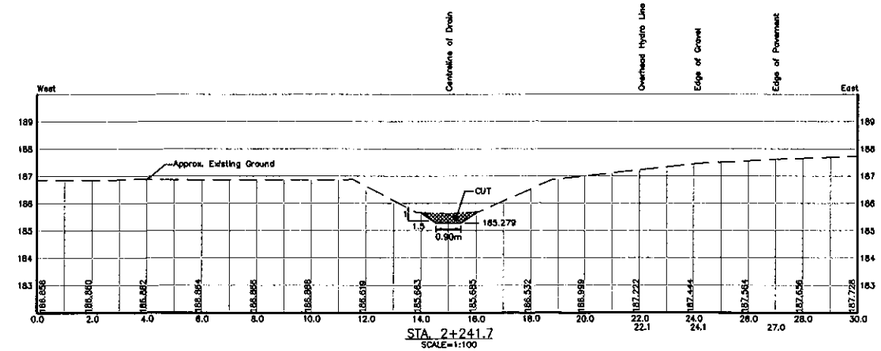

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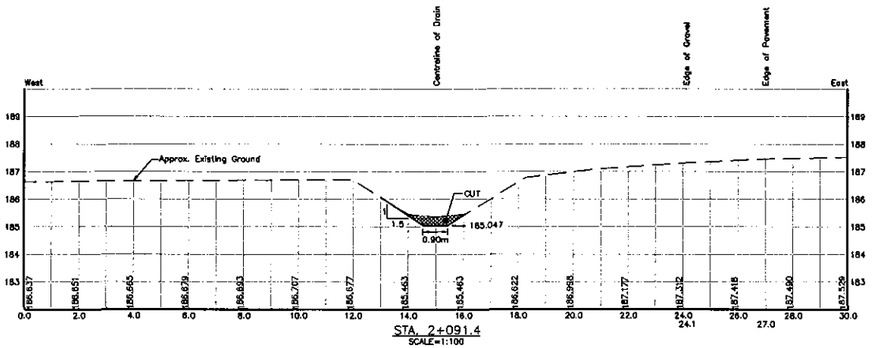

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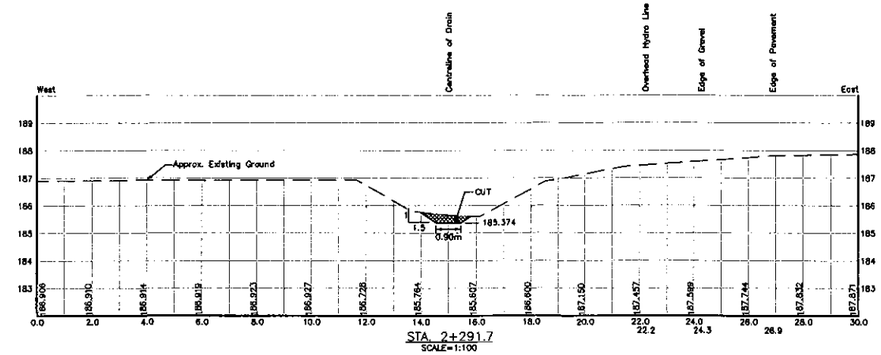
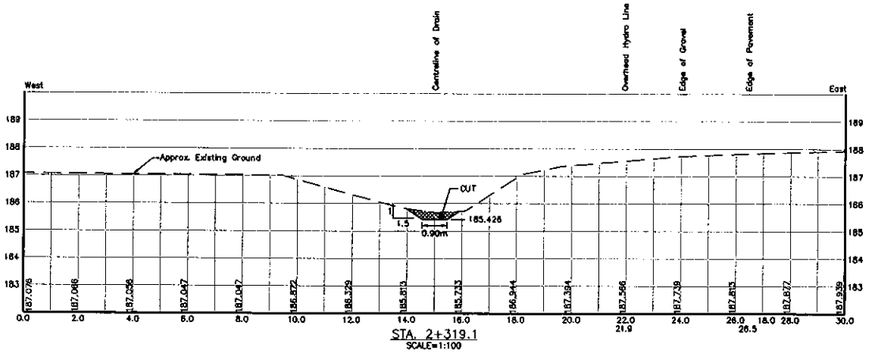


STA. 2+291.7
SCALE=1:100

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

DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

FILE No.: 2012D017
SHEET No.: 10 OF 14



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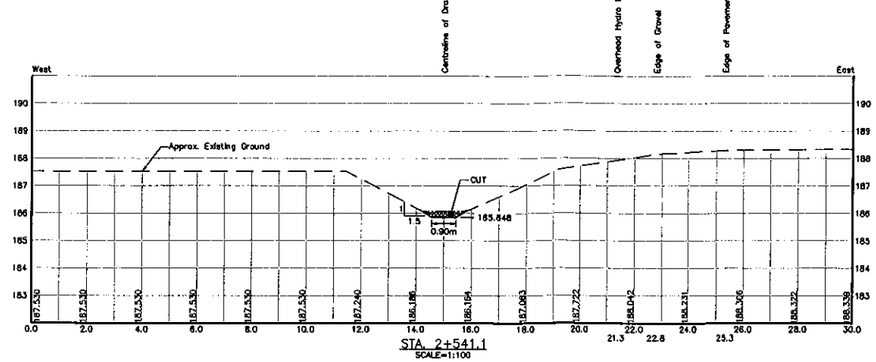

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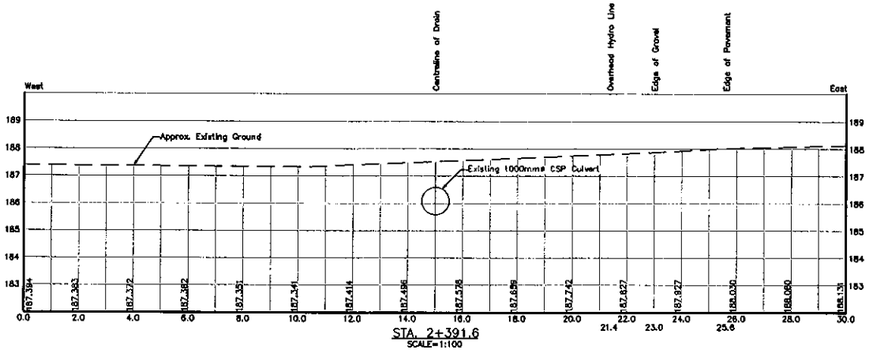

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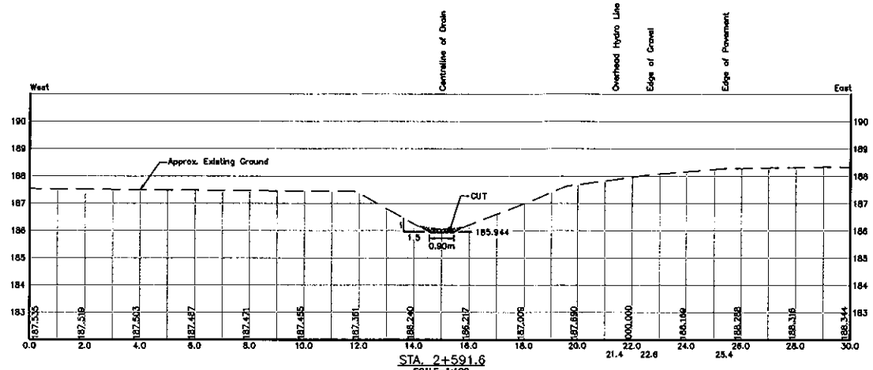

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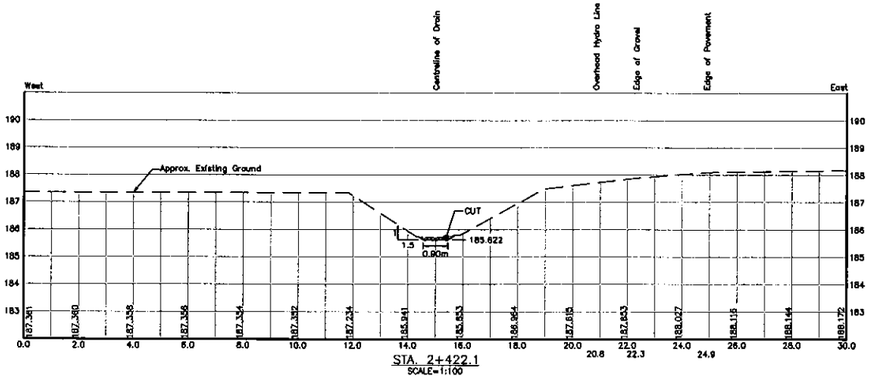

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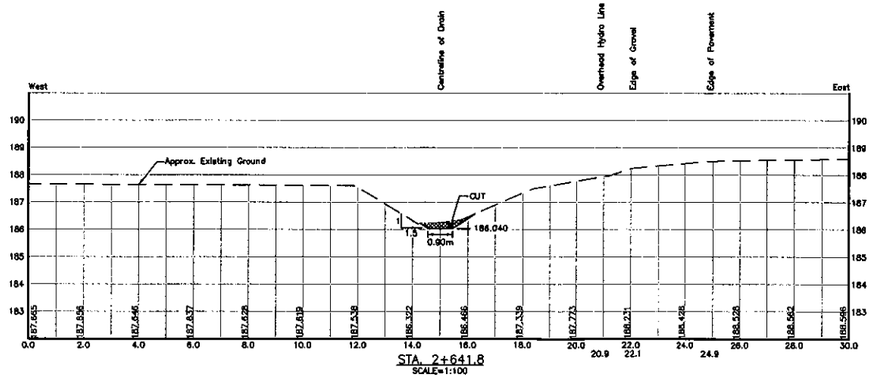

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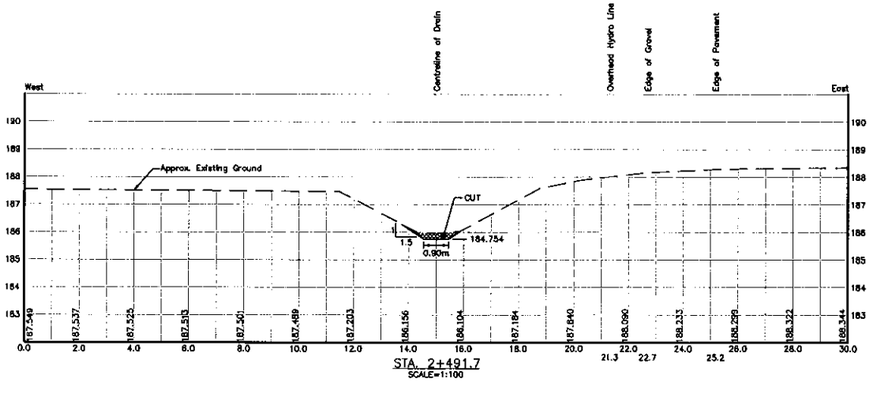

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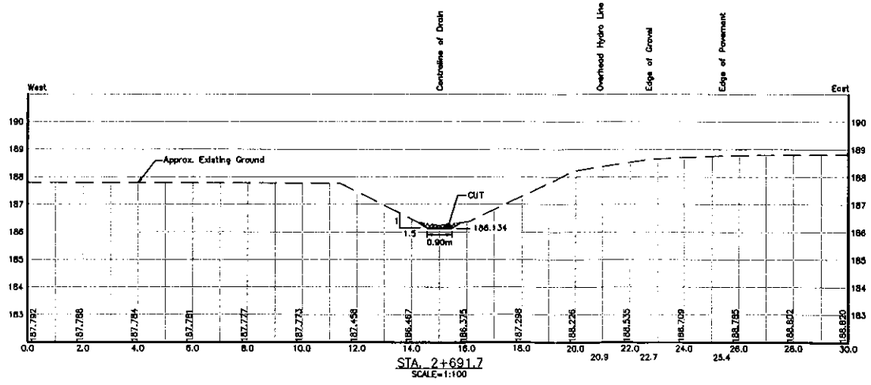

STA. 2+691.7
SCALE=1:100

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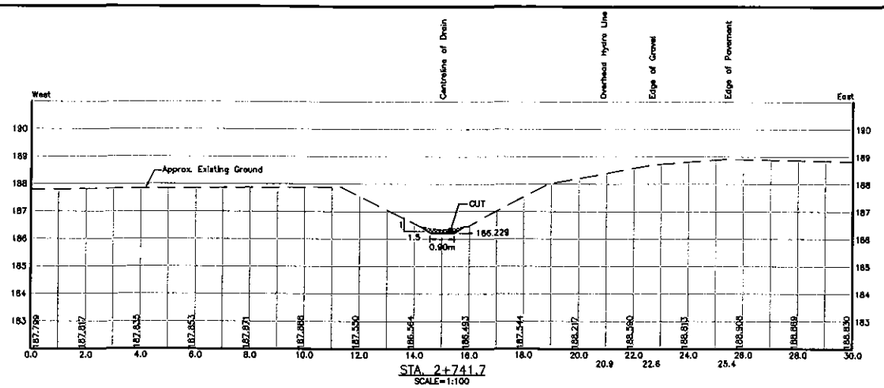
DRAWN BY: H.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

FILE No.: 2012D017

SHEET No.: 11 OF 14



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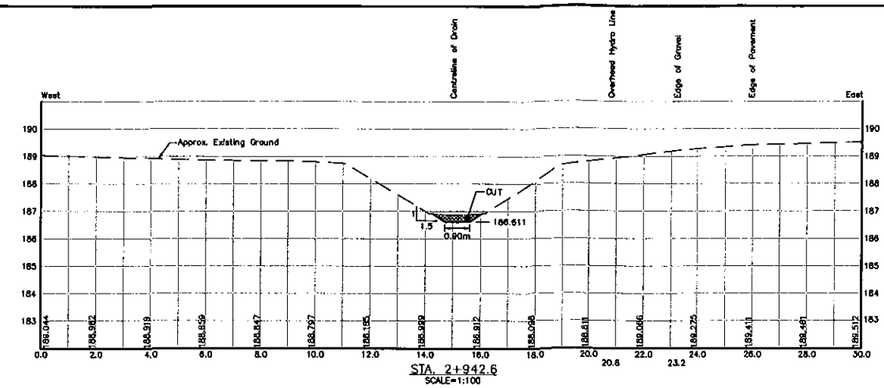

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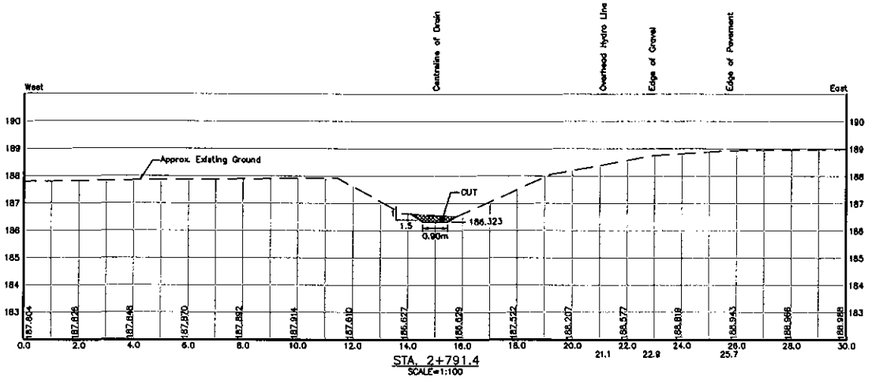

STA. 2+791.4
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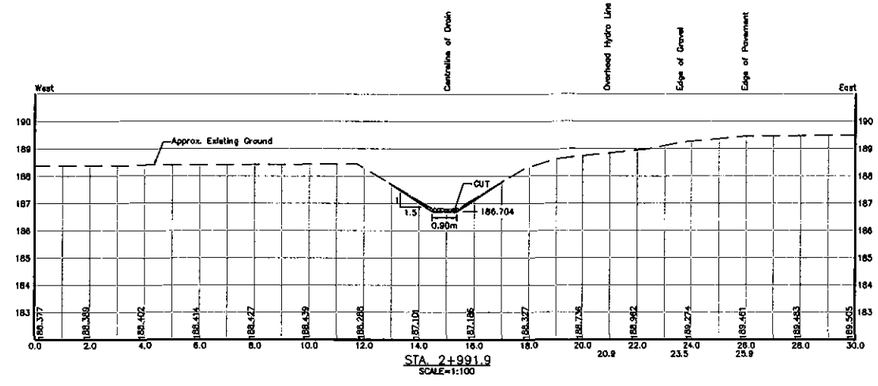

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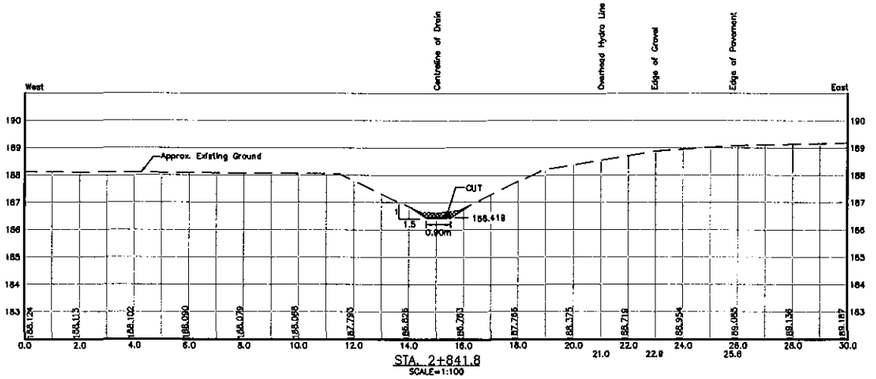

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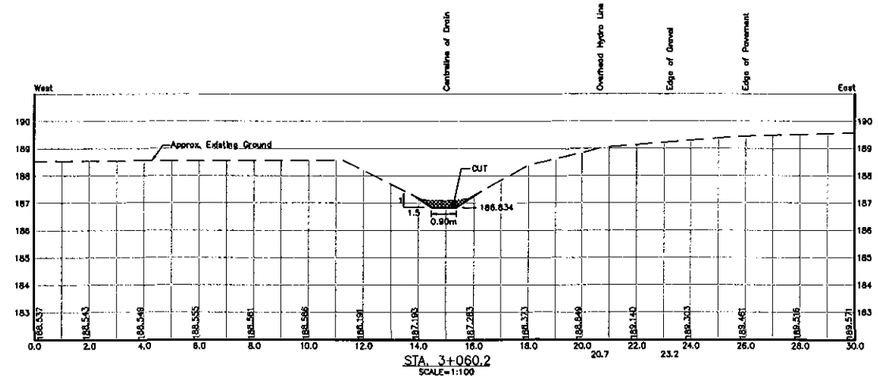

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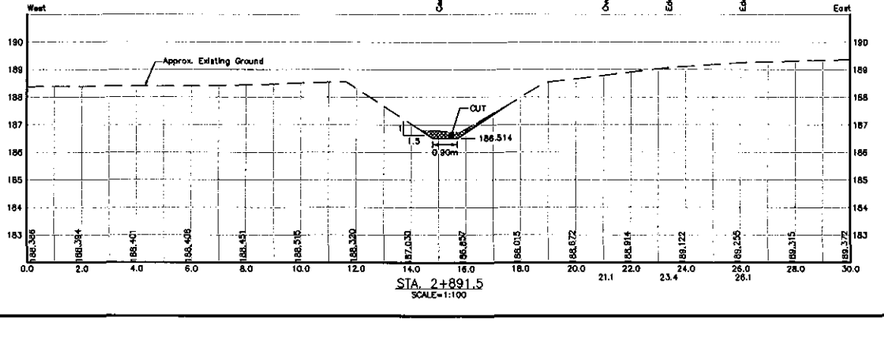

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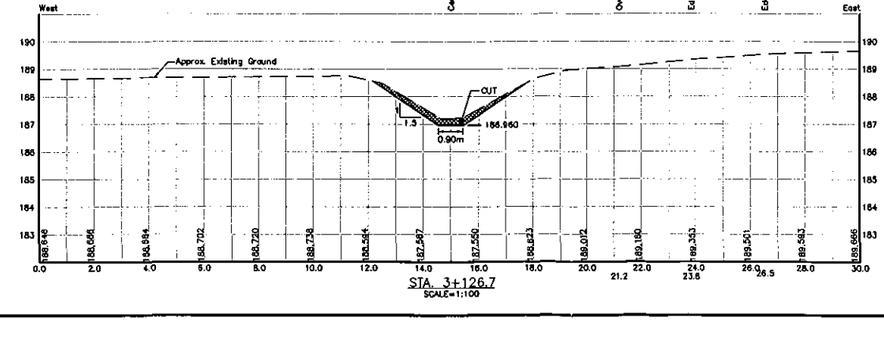

STA. 3+126.7
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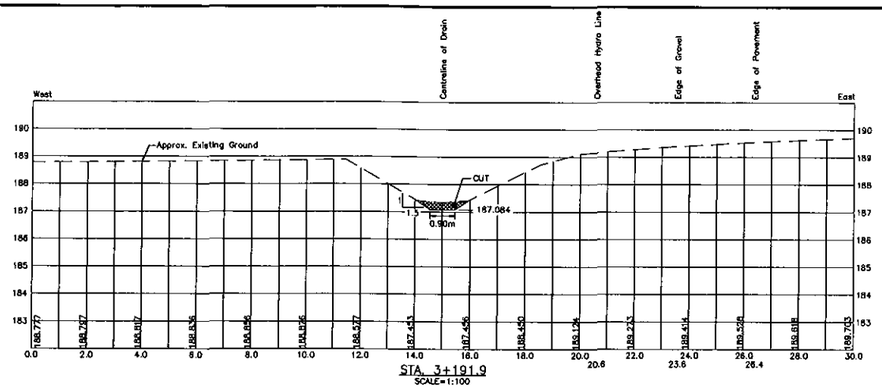
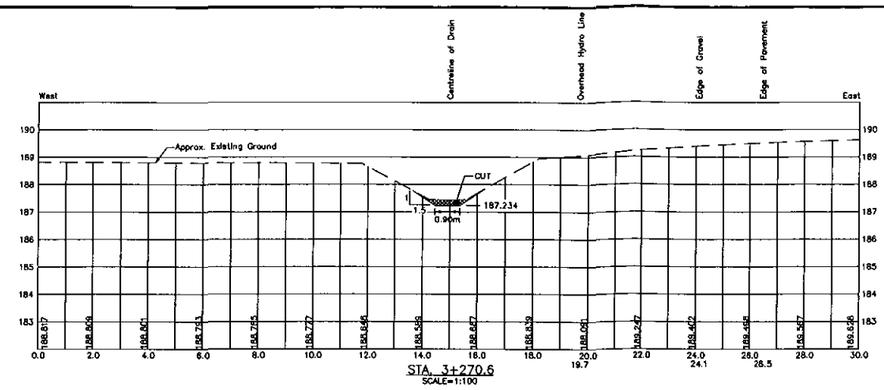
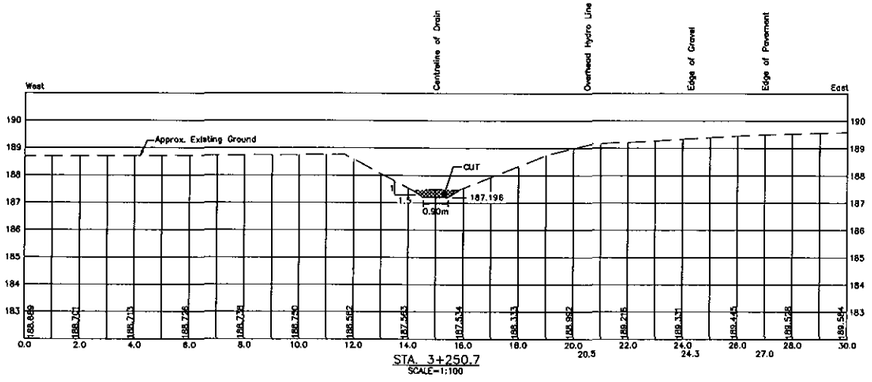
THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

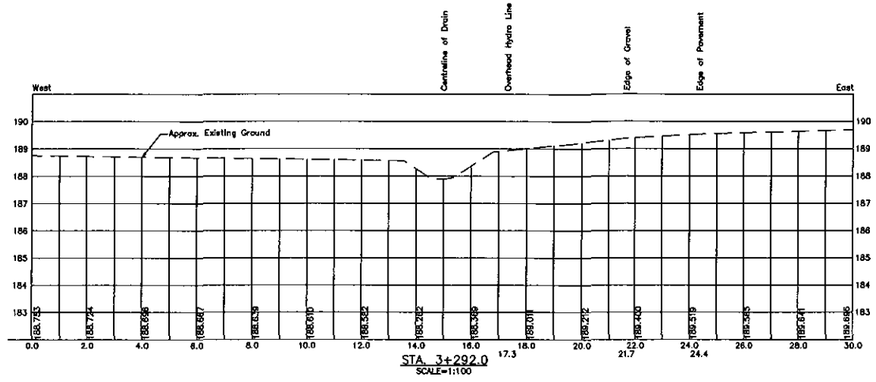
DRAWN BY: K.S./G.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

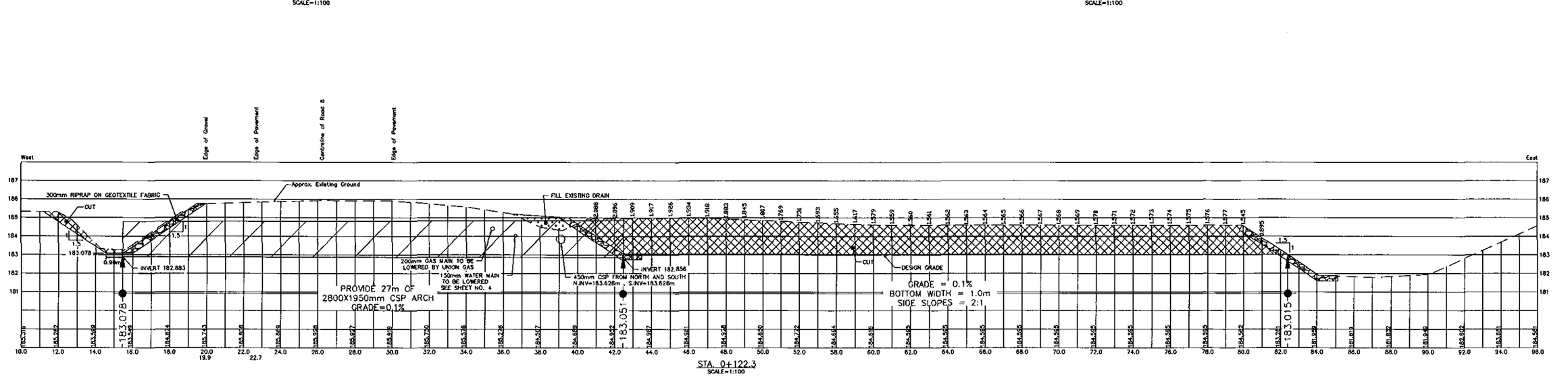
FILE No.: 2012D017
SHEET No.: 12 OF 14











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DRAWN BY: H.S./G.S./K.S.
PLOT CODE: 1:1
COMPUTER FILE: 2012D017.DWG

FILE No.: 2012D017

SHEET No.: 13 OF 14

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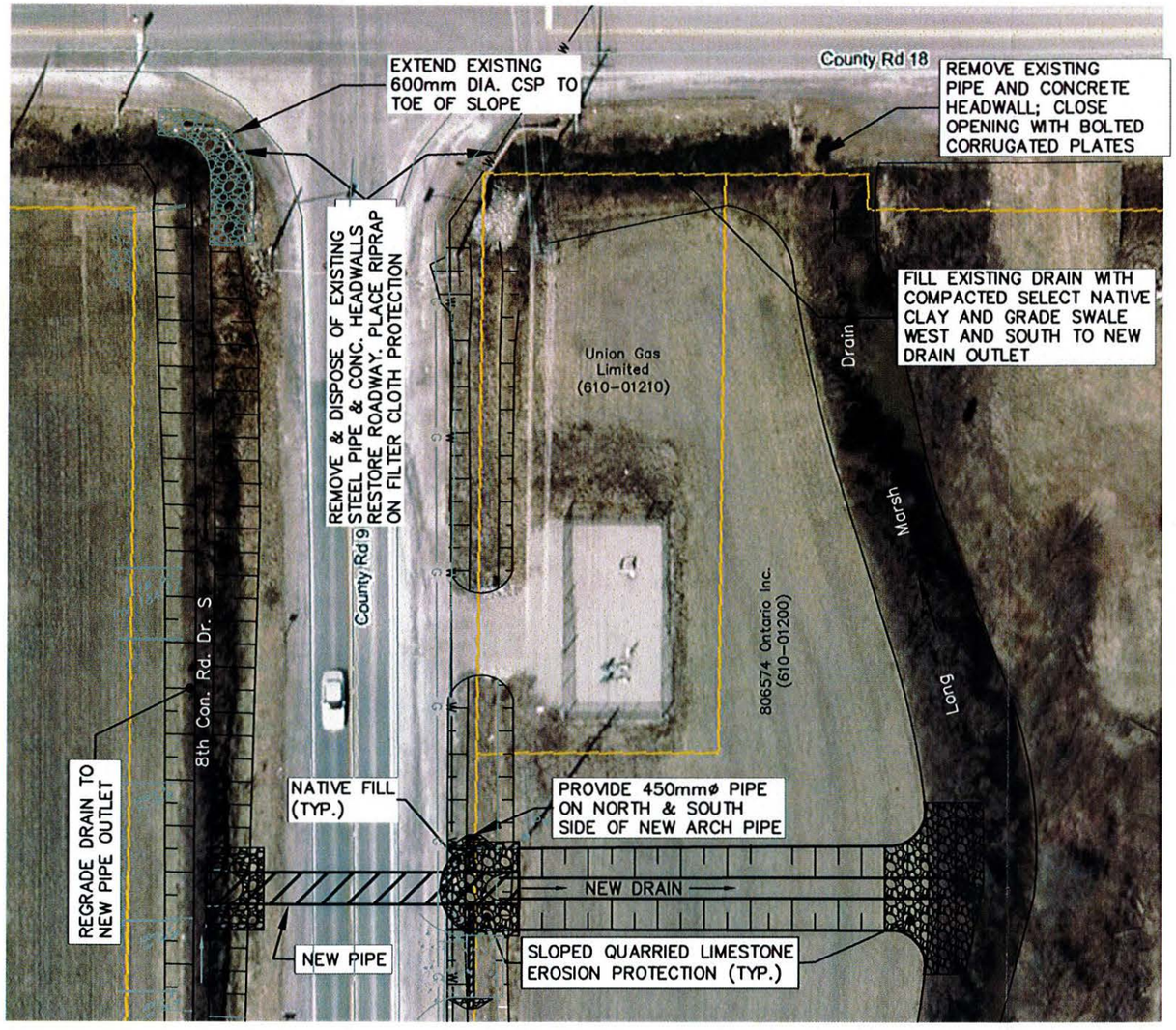
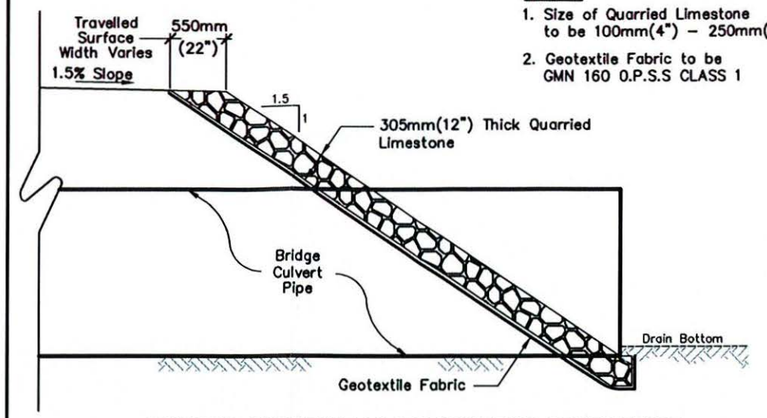


RELOCATION OF PIPE PLAN

Scale = 1:500

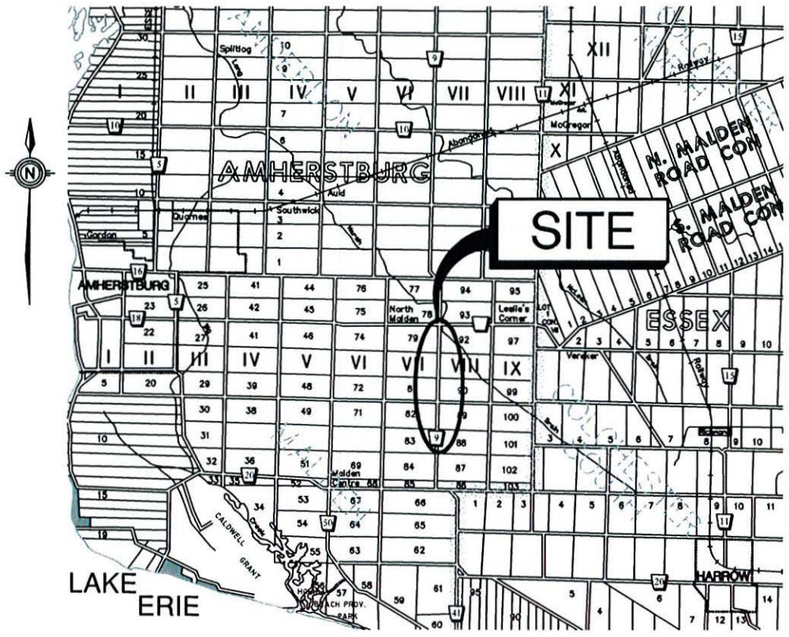
NOTE:

1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1



TYPICAL QUARRIED LIMESTONE END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:150,000

PWD-MD-2012-017

BENCHMARK:

TOP OF FIRE HYDRANT LOCATED ON NORTH WEST CORNER OF COUNTY ROAD NO. 18 AND COUNTY ROAD NO. 9 INTERSECTION.

ELEV. = 186.300m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	PIPE INVERT ELEVATIONS:
2800mm x 1950mm	27.0m (88.6 FT.)	3.5mm (10 GA.)	125X25mm (5" x 1")	HEL-COR ALUMINIZED STEEL TYPE II	UPSTREAM INV.(W)=182.883m DOWNSTREAM INV.(E)=182.856m ℄ OF ROADWAY AT PIPE CENTRELINE =185.928m

8TH CONCESSION ROAD DRAIN SOUTH

(Geographic Township of Malden)

IN THE

TOWN OF AMHERSTBURG

IN THE

COUNTY OF ESSEX • ONTARIO

ROOD ENGINEERING INC.

CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: 2016-09-12

FILE No.:	DRAWN BY: G.S. PLOT CODE: 1:1 FILE: REI2012D017.dwg	SHEET NO.:
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