Municipality of Middlesex Centre

Ross-Moir Municipal Drain

GMBP File: 515-031

November 2016
November 30, 2016  
Our File: 515-031

Mayor and Members of Council  
The Municipality of Middlesex Centre  
10227 Ilderton Road  
Coldstream, ON  N0M 2A0

Re: Ross-Moir Municipal Drain

Dear Mayor Edmondson and Members of Council:

We are pleased to present our Report on the “Ross-Moir Municipal Drain” in response to the petition signed by George Moir representing Moir Dairy Farms Ltd. of N Pt. Lot 11 Concession 9 and Marion & William Ross of S Pt. Lot 11 Concession 10 of the Municipality of Middlesex Centre, Former Township of London.

Authority to prepare this Report was obtained through a July 22, 2015 letter from the Municipality of Middlesex Centre stating that Municipal Council had appointed the undersigned Professional Engineer of GM BluePlan Engineering Limited to prepare an Engineer’s Report.

In accordance with your instructions pursuant to a request received by Council under Section 4 of the Drainage Act, R.S.O. 1990, for the petition for new drainage works, GM BluePlan has held an on-site meeting, undertaken a field survey and prepared for Council’s consideration the following Drainage Report, Plan, Profiles and Specifications for this work to be known as the Ross-Moir Municipal Drain.

We trust that the information contained within will be satisfactory. If there are any questions or concerns please do not hesitate to contact us.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED  
Per:  

Brad Bunke, P.Eng.
TABLE OF CONTENTS

1. INTRODUCTION ..................................................................................................................................................... 1
2. HISTORY ........................................................................................................................................................................ 1
3. PROCEEDINGS UNDER THE DRAINAGE ACT ........................................................................................................... 1
4. ON-SITE MEETING ..................................................................................................................................................... 2
5. FINDINGS ....................................................................................................................................................................... 3
6. BASIS FOR DESIGN ..................................................................................................................................................... 3
7. ENVIRONMENTAL APPROVAL ........................................................................................................................................ 4
8. RECOMMENDATIONS FOR THE ROSS-MOIR MUNICIPAL DRAIN ............................................................................... 4
9. WORKING AREA .......................................................................................................................................................... 4
10. WATERSHED CHARACTERISTICS ............................................................................................................................ 5
11. ALLOWANCES ............................................................................................................................................................ 5
12. ASSESSMENTS ............................................................................................................................................................ 6
13. COST ESTIMATE .......................................................................................................................................................... 7
14. MAINTENANCE ............................................................................................................................................................ 9

APPENDICES

APPENDIX A  SCHEDULE OF ESTIMATED ASSESSMENTS FOR CONSTRUCTION
APPENDIX B  SCHEDULE OF ASSESSMENTS FOR FUTURE MAINTENANCE
APPENDIX C  DRAWINGS
APPENDIX D  SPECIAL PROVISIONS
APPENDIX E  CONSTRUCTION SPECIFICATIONS
APPENDIX F  UNOFFICIAL CROSSING AGREEMENT AND OPERATIONAL CONSTRAINTS
ROSS-MOIR MUNICIPAL DRAIN
MUNICIPALITY OF MIDDLESEX CENTRE
NOVEMBER 2016
GMBP FILE: 515-031

1. INTRODUCTION

Property owners in Municipality of Middlesex Centre have petitioned under the Drainage Act for a new Municipal Drain. Drainage problems were outlined by comments received during the on-site field meeting from landowners within the catchment area. One low spot on the north side of Ten Mile Road on S. Pt Lot 11 Concession 10 is poorly drained, leading to prolonged ponding after heavy rainfall events.

The owners and properties represented on the petition are:

- Moir Dairy Farms c/o George Moir for N. Pt Lot 11 Concession 9
- Marion & William Ross for S. Pt Lot 11 Concession 10

Based on site observations and previous Drainage Reports, four properties have been determined to be within the drainage area of the proposed Ross-Moir Municipal Drain. The above mentioned S. Pt Lot 11 Concession 10 and N. Pt Lot 11 Concession 9, N. Pt Lot 10 & 11 Concession 9, and the Municipality of Middlesex Centre (Ten Mile Road). It should be noted that S. Pt Lot 11 Concession 10 and N. Pt Lot 11 Concession 9 combined occupy approximately 93.8% of the drainage area. Union Gas pipelines run through an easement in Concession 9.

2. HISTORY

The Ross-Moir is bordered on its west side by the Roberts-Moir Municipal Drain, which was constructed under a 1981 report by Spietz Associates. The land adjacent to the north and east sides of the watershed boundary generally drains to a natural watercourse, which is a tributary to the Medway Creek.

Private tile maps provided by landowners within the watershed indicate that the watershed is generally underdrained by private clay tile systems. An HDPE pipe crossing Ten Mile Road serves to allow surface water from S. Pt Lot 12 Concession 10 to drain to a 150mm (6") clay tile, which then flows south where it outlets to a ravine.

3. PROCEEDINGS UNDER THE DRAINAGE ACT

The Drainage Act is a vehicle by which a drainage scheme can be constructed and the cost raised by local special assessment. That is, the cost is assessed in varying proportions to lands within the watershed, as a one-time charge over and above any taxes paid. Maintenance of the drain is likewise charged to the watershed, most often in the same proportions as the original construction.

The Act has evolved over many years and attempts have been made to balance the rights of the individual against the benefits of the construction of drains that involve more than one property. The Act recognizes that perfect agreement is not possible in every case and provides a number of proceedings that give owners, and others, the opportunity to influence the outcome.
This Report is one of those proceedings. To aid in the understanding of the process, listed below in chronologica
order are all normal proceedings with the notation "Completed" beside those which have been completed. This listing is a
summary of many, but not all parts of the Drainage Act and applies to the ordinary course of events. Further
proceedings are available, and for these, the Drainage Act should be consulted directly.

2. Notification of the Project to the Upper Thames River Conservation Authority (UTRCA).  *Completed.*
3. Engineer appointed.  *Completed.*
4. On-site meeting.  *Completed.*
7. Report considered by Council and a By-Law is adopted.
8. Court of Revision convened to consider and deal with appeals on assessment if necessary.
9. Appeal is available from the decisions of the Court of Revision and on other matters to the Ontario
Drainage Tribunal.
10. Disposition of appeals by the Tribunal, or if none, final passage of the By-Law, which establishes the
drain in law and authorizes construction.
12. Levyng and collecting of assessments.

### 4. ON-SITE MEETING

In accordance with Section 9(1) of the Drainage Act, R.S.O. 1990 an on-site meeting was held on September 9th, 2015.
The meeting was scheduled to take place at 9:00 am of that morning on Ten Mile Road, 500m east of Adelaide Street
North. Persons in attendance were:

- **Brad Bunke, P.Eng.** GM BluePlan Engineering Limited
- **Ben Hyland** GM BluePlan Engineering Limited
- **Brian Lima** Municipality of Middlesex Centre
- **Heather Pierce** Municipality of Middlesex Centre
- **Cari Ramsey** Upper Thames River Conservation Authority
- **William Ross** S. Pt Lot 11 Concession 10
- **Donald Riddel** N. Pt Lot 11 Concession 10
- **William & Irena Code (and renter Kyle Burnett)** N. Pt Lot 10 & 11 Concession 9
- **Ida Regio & Diana Regio** N. Pt Lot 12 Concession 10
- **Dave Donaldson & Jamie Donaldson** N. Pt Lot 12 Concession 9
- **George Moir & Chris Moir** N. Pt Lot 11 Concession 9, S. Pt Lot 12 Concession 10

A handout was distributed which described the procedures under the Drainage Act, steps already taken by Council in
appointing an Engineer, a map of the pertinent part of the watershed, and preliminary results of the investigation to
date.

The following comments were received at the meeting:
William Ross stated that the low spot on his lot is directly on the west side of his laneway, where the corn could be seen to be stunted in growth. The poorly drained low spot incurs ponding of about ¼ of an acre in size following rainfall events which can take several days to drain. He provided a private tile map for his lot.

Don Riddel had no concerns relating to the drainage of his lots. Following the field survey, Don’s property was excluded from the drainage area.

William & Irena Code rent their land to Kyle Burnett. They stated that private tiling was done in 2012, providing maps of the tile installed and stating that they had no drainage concerns at that time.

Ida Regio and her daughter Diana Regio rent their land to Paul Robinson. Ida and Diana had no drainage concerns, however they provided Paul’s contact information. At a later date, Paul stated that there are two areas of ponding outside of the preliminary drainage boundary shown at that time. Following the field survey, this property was excluded from the watershed.

Dave Donaldson represented his brother Wilmer Donaldson, and works the land with his son Jamie. They stated that they were outside the watershed area. This was confirmed during the field survey.

George Moir was present with his brother Chris Moir. George stated that the best outlet for the proposed tile would be a ravine near the south end of his N. Pt Lot 11 Concession 9, where a private tile currently outlets. He provided a map showing the location of the existing private tile, expressing that the best location for the proposed municipal drain would be along the course of the private tile. He plans to systematically tile his land once the municipal drain is constructed.

Cari Ramsey of the UTRCA stated that no Species at Risk or wetland pockets are noted within the watershed or along the proposed outlet, which is a tributary of the Medway Creek. Cari noted that if pockets of wetland are found, DFO and MNR will need to be contacted.

Union Gas was not represented at the on-site meeting, however a representative was contacted at a later date. Bryce McFadden of Union Gas informed us that four natural gas transmission lines run through an easement, ranging in size from 48” (1200mm) in diameter to 26” (650mm) in diameter. He indicated that the pipelines would have to be exposed via hydrovac excavation to determine depth of cover.

5. FINDINGS

Based on the information discussed at the on-site meeting, we understand that water ponds on S. Pt Lot 11 Concession 10 near Ten Mile Road, damaging crops and creating unworkable conditions. We have made an examination of the drainage area and have determined that if this property is provided an outlet of sufficient size and grade, then water can be redirected to it, alleviating the ponding.

It was found that the petition is sufficient as over 60% of the land area within the drainage area is represented by landowners on the petition.

6. BASIS FOR DESIGN

Tile drains are generally designed to have capacity to remove between 12mm and 38mm of water from the watershed per day, and this rate of removal is called the drainage coefficient. 12mm is generally adequate when there is little surface water but the watershed is underdrained. When surface water is to be accommodated, 25mm to 38mm per day is typically used for the basis of design.

It is important to understand that the Municipal Drain in itself does not remove this amount of water. It serves as the conduit to convey water brought to it by under drainage, and for surface water finding its way or guided to the catch basins.
It is reported during heavy rain events, flooding creates unworkable conditions and has damaged a section of S. Pt Lot 11 Concession 10, and therefore GM BluePlan has selected a 38mm drainage coefficient. This level of service will provide a good outlet for under drainage and will convey a useful amount of surface water. During the growing season it is expected that flooding will not normally persist for more than 24 hours.

7. **ENVIRONMENTAL APPROVAL**

This Drain will be subject to the review of the UTRCA, the Department of Fisheries and Oceans (DFO), and consideration under the Species-at-Risk Act.

Although the exact views of these agencies cannot be known in advance, the environmental impacts are thought to be slight. Initial comments were received from the UTRCA at the on-site meeting, and were clarified through further communication. No Species at Risk are anticipated within the watershed area, and no provincially significant wetlands are currently noted.

This project is anticipated to have no permanent adverse impact on any species, as it intends to continue land use in the watershed as productive farmland.

A copy of this Report will be sent to the UTRCA, with a view to obtaining approval for construction.

8. **RECOMMENDATIONS FOR THE ROSS-MOIR MUNICIPAL DRAIN**

It is our recommendation that:

1. A new tile drainage system will be constructed along the route as shown on Drawing 1 – Ross-Moir Municipal Drain and shall consist of approximately 188m of existing open drain, 6m of 450mm diameter HDPE, 529m of 400mm diameter concrete field tile, and 6m of 300mm diameter concrete field tile.

2. A new road crossing will be constructed across Ten Mile Road consisting of a 300mm diameter PVC pipe, with catch basins located on either side.

3. The outlet will be constructed of a 6m section of 450mm diameter HDPE, complete with a rodent grate as well as 4m of rip rap on geotextile to control erosion.

4. The drainage coefficient design standard used for this drain shall be 38mm of rainfall per 24 hours.

The drawings included with the Report show the extent of the work, land affected, profile of the tile and other details of the work. The plan shown on Drawing 1 – Ross-Moir Municipal Drain gives the area considered to be in the drainage area of the work proposed.

During construction, contingencies may arise and will be dealt with as determined by the Engineer and included as part of construction. There will be no special assessments for contingencies. Common contingencies are the wrapping of tile joints, clear stone bedding, tile connections and extra effort to deal with stoney conditions.

The proposed work is not anticipated to have any long term detrimental effect on the environment.

9. **WORKING AREA**

The working area for construction purposes shall be a width of 20m centered on the proposed tile drain. The working areas for maintenance purpose shall be a width of 10m centered on the proposed tile drain. Each landowner on whose property the drainage work is to be constructed shall designate access to and from the working area at the time of construction or upon failure to do so, the Engineer or Drainage Superintendent, as the case may be, shall designate access.
10. **WATERSHED CHARACTERISTICS**

The Drainage Area comprises approximately 26.04 hectares. Land use within the watershed is primarily agricultural.

11. **ALLOWANCES**

Various allowances are considered part of a Municipal Drain. The Drainage Act provides in Sections 29 to 33 that the Engineer is to allow in money for the value of several items, as follows:

   a) **Section 29 – Right-of-Way**
   
   The Drainage Engineer is to provide for an allowance to be paid to the landowner whose land is proposed to be used for construction of the new ditch. While the lands used for the Drain are still legally owned by the landowner on title, they are no longer usable for the landowner. The Act requires the landowner to be compensated for the value of the land.

   Allowances for Right-of-Way are calculated based on 25% of a land value of $29,520/hectare ($11,950/acre) for a Right-of-Way width of 10m.

   b) **Section 30 - Damages**
   
   The Drainage Engineer is to provide for an allowance to be paid to the landowner of land that may be damaged during construction. Typically, this section refers to agricultural crops, however, it also applies to lawns, ornamental trees and fences.

   Damage from installing the tile is valued at $1,440/hectare ($583/acre), and is based on a 20m wide working area. The allowance is calculated on a 5 year declining balance basis, with 100% of the allowance paid for the first year, as total destruction of crop is anticipated. In the following 4 years, a declining allowance is paid based on a 5m width of disturbed ground, with 80% of the allowance paid in year 2, 60% in year 3, 40% in year 4, and 20% in year 5. This is done to reflect the decreased crop yields in the area where the subsoil was disturbed for drain installation.

   For example, a parcel of cropland 350m in length that is disturbed for drain installation would be given a damage allowance calculated as follows:

   
   Year 1: \[350m \times 20m = 0.70 \text{ ha} \times \$1,440 = \$1,008\]
   Year 2: \[350m \times 5m = 0.175 \text{ ha} \times \$1,440 \times 80\% = \$202\]
   Year 3: \[350m \times 5m = 0.175 \text{ ha} \times \$1,440 \times 60\% = \$151\]
   Year 4: \[350m \times 5m = 0.175 \text{ ha} \times \$1,440 \times 40\% = \$101\]
   Year 5: \[350m \times 5m = 0.175 \text{ ha} \times \$1,440 \times 20\% = \$51\]
   Total Damage Allowance Paid in Report = \$1,513

   Allowances are paid regardless of what crop is grown or whether or not it is harvested in advance of construction. Municipal Drains are generally constructed before beans and corn can be harvested, so the damage can be expected to occur. Crop value is calculated using the "Area, Yield, Production and Farm Value of Specified Field Crops, Ontario" as published annually by the Ontario Ministry of Agricultural, Food and Rural Affairs.

   c) **Section 31 – Allowance for Existing Drains**
   
   No allowances are provided for existing drains.

   d) **Section 32 – Allowance for Damage Due to Insufficient Outlet**
   
   As sufficient outlet has been confirmed, there is no allowance for insufficient outlet.

   e) **Section 33 – Allowance for Loss of Access**
   
   As crossings are not necessary for closed drains, no loss of access allowance is considered appropriate.
The allowances are generally less than the assessment to the properties and the property owner is billed the difference when the project is complete.

GM BluePlan determines the amounts to be paid in allowances to owners as shown in the following Schedule of Allowances. The allowances shall become due and payable according to Section 62 of the Drainage Act.

**SCHEDULE OF ALLOWANCES**

<table>
<thead>
<tr>
<th>Concession</th>
<th>Lot</th>
<th>Owner and Roll No.</th>
<th>Right-of-Way (Section 29)</th>
<th>Damages to Lands and Crops (Section 30)</th>
<th>Total Allowances</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>N. Pt 11</td>
<td>Moir Dairy Farms 030-033</td>
<td>$3,950.00</td>
<td>$2,310.00</td>
<td>$6,260.00</td>
</tr>
<tr>
<td>10</td>
<td>S. Pt 11</td>
<td>Marion &amp; William Ross 030-016</td>
<td>$40.00</td>
<td>$30.00</td>
<td>$70.00</td>
</tr>
<tr>
<td><strong>Total Allowances</strong></td>
<td></td>
<td></td>
<td><strong>$3,990.00</strong></td>
<td><strong>$2,340.00</strong></td>
<td><strong>$6,330.00</strong></td>
</tr>
</tbody>
</table>

### 12. ASSESSMENTS

Section 21 of the Drainage Act requires that the Engineer “shall assess for benefit, outlet liability and injuring liability, and shall insert in an assessment schedule, in separate columns, the sums assessed for each opposite each parcel of land and road liable therefore.” On this project, Benefit, Outlet liability and Section 26 assessments are involved.

**Assessment for Benefit** is described in Section 22 of the Act, which states “Lands, roads, buildings, utilities or other structures that are increased in value or are more easily maintained as a result of the construction, improvement, maintenance or repair of a drainage works may be assessed for benefit.” As defined in the act, benefits to landowners can include higher market value for the property, improved appearance or better control of surface or subsurface water, or any other advantages relating to the betterment of lands, roads, buildings or structures.

**Assessment for Outlet Liability** is described in Section 23(1) of the Act which states “Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or indirectly through the medium of any other drainage works or of a swale, ravine, creek or watercourse, may be assessed for outlet liability.” Outlet liability is the part of the cost of the works that is required to provide such outlet or improved outlet.

**Assessment for Special Benefit** is described in Section 24 of the Act and is defined as any additional work or feature included in the construction, repair or improvement of a drainage works that has no effect on the functioning of the drainage works.

There are no assessments under Section 24 as part of this report.

**Section 26** of the Act specifies that “the public utility or road authority shall be assessed for and shall pay all the increase of cost of such drainage works caused by the existence of the works of the public utility or road authority.” This means that any costs which are required solely because of the existence of Ten Mile Road or the Union Gas pipelines will be fully assessed to the Municipality of Middlesex Centre and Union Gas, respectively.

The Section 26 assessment to the Municipality consists of the actual cost of the road crossing pipe, the catch basins and connections to the drain, minus the normal installation cost of the drain should the road not exist.

The Section 26 assessment to Union Gas consists of the actual cost to expose the pipelines during the design process, as well as the cost of any special design and construction measures.

Outlet liability for all roads was calculated using the methodology outlined in “Outlet Liability Assessment Factors for Highway Rights of Way”, as published by the Ontario Ministry of Transportation. It was determined that 60% of the
right-of-way was developed and that the adjacent soil runoff coefficient (‘C’ factor) was 0.30. As a result the roadway was assigned an Equivalent Area factor of 2.5.

The Municipality of Middlesex Centre shall have the option of either performing the work of installing the road crossing and catch basins or may elect to have the work done by the general contractor. If done by the Municipality at its expense, no Section 26 assessment shall apply. However done, the future maintenance, reconstruction, replacement or alteration of the Ten Mile Road crossing and catch basins, including any incidental costs shall be the responsibility of the Municipality.

Assessments were determined using a modified “Todgham” method, a method of assessment that is recognized to be a fair and equitable way of dividing costs between the benefitting landowners. This methodology involves assigning Equivalent Area Factors to various types of property which reflect their runoff potential, using Agricultural lands as a base (Ag factor = 1.0). The cost of the drain is divided into logical sections, each property is assigned to a section, and benefit and outlet assessments are determined on a property by property basis, starting at the outlet and working towards the topmost property.

There is no injuring liability assessment on this drain. No property is considered to have riparian rights insofar as assessment is concerned.

Assessments on agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance. Should the project not proceed by reason of withdrawal from the petition, costs to date are payable by the petitioners prorated to the assessments contained herein. There is no grant should this happen.

13. COST ESTIMATE

The cost of this Municipal Drain Improvement is estimated as $78,052.50 and is raised by assessment from properties within the watershed. A Schedule of Estimated Assessments can be found in Appendix A.

GM BluePlan estimates the cost of the Ross-Moir Municipal Drain as follows:
### COST ESTIMATE - Ross-Moir Municipal Drain
Municipality of Middlesex Centre

<table>
<thead>
<tr>
<th>Allowances</th>
<th>$ 6,330.00</th>
</tr>
</thead>
</table>

**Ross-Moir Drain Construction**

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply and place 40m² of rip rap on geotextile - Sta. 0+188</td>
<td>$ 1,600.00</td>
</tr>
<tr>
<td>Supply 6m of 450mm diameter HDPE complete with rodent grate</td>
<td>$ 500.00</td>
</tr>
<tr>
<td>Install 450mm diameter HDPE complete with rodent grate - Sta. 0+188 to 0+194</td>
<td>$ 1,200.00</td>
</tr>
<tr>
<td>Supply 529m of 400mm diameter concrete field tile</td>
<td>$ 11,500.00</td>
</tr>
<tr>
<td>Install 400mm diameter concrete field tile - Sta. 0+194 to 0+723</td>
<td>$ 9,600.00</td>
</tr>
<tr>
<td>Supply 6m of 300mm diameter concrete field tile including cap</td>
<td>$ 100.00</td>
</tr>
<tr>
<td>Install 300mm diameter concrete field tile including cap - Sta. 0+734 to 0+740</td>
<td>$ 100.00</td>
</tr>
<tr>
<td>Allowance for 19mm clear crushed stone</td>
<td>$ 1,500.00</td>
</tr>
<tr>
<td>Allowance for stoney conditions</td>
<td>$ 1,000.00</td>
</tr>
<tr>
<td>Allowance for tile connections</td>
<td>$ 1,500.00</td>
</tr>
<tr>
<td>Contingency Fund at approx. 10% of construction</td>
<td>$ 2,900.00</td>
</tr>
</tbody>
</table>

**Total Estimated Drain Construction Cost**

| $ 31,500.00 |

**Construction - Work to be done on Ten Mile Road**

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply 11m of 300mm diameter PVC pipe</td>
<td>$ 600.00</td>
</tr>
<tr>
<td>Install 300mm diameter PVC pipe, complete with granular base and backfill and including the removal and reinstallation of the existing HDPE surface culvert - Sta. 0+723 to 0+734</td>
<td>$ 3,700.00</td>
</tr>
<tr>
<td>Supply and install 1 - 600mm x 600mm catch basin complete with birdcage grate - Sta. 0+734</td>
<td>$ 2,000.00</td>
</tr>
<tr>
<td>Supply and install 1 - 600mm x 600mm offset catch basin complete with birdcage grate, including 200mm diameter concrete field tile - Sta. 0+723</td>
<td>$ 2,200.00</td>
</tr>
<tr>
<td>Rip rap at catch basins (10m² at each catch basin) - Sta. 0+723, Sta. 0+734</td>
<td>$ 400.00</td>
</tr>
<tr>
<td>Contingency Fund at approx. 10% of construction</td>
<td>$ 900.00</td>
</tr>
</tbody>
</table>

**Total Estimated Road Crossing Construction Cost**

| $ 9,800.00 |

**Union Gas**

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure of gas lines during design stage (Badger Daylighting)</td>
<td>$ 3,922.50</td>
</tr>
<tr>
<td>Exposure of gas lines prior to construction</td>
<td>$ 3,900.00</td>
</tr>
<tr>
<td>Supply and install rubber protection pads</td>
<td>$ 1,500.00</td>
</tr>
<tr>
<td>Non-Construction - On-site survey during exposure of gas lines, protection design/specifications</td>
<td>$ 4,250.00</td>
</tr>
</tbody>
</table>

**Total Estimated Road Crossing Construction Cost**

| $ 13,572.50 |

**Non-Construction Costs**

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Site Meeting, Survey, Plan, Profile, and Report</td>
<td>$ 10,700.00</td>
</tr>
<tr>
<td>Tendering, Construction Review, Contract Administration and Grant Application</td>
<td>$ 2,750.00</td>
</tr>
<tr>
<td>Carrying Costs (est. @ 3% for 1 year) &amp; Net HST (1.76%)</td>
<td>$ 3,400.00</td>
</tr>
</tbody>
</table>

**Total Non-Construction Costs**

| $ 16,850.00 |

**TOTAL ESTIMATED COST**

| $ 78,052.50 |

*The above costs are estimates only. The final costs of engineering and administration cannot be determined until construction is completed. The above costs also do not include costs to defend the drainage report should appeals be filed with the Court of Revision, Drainage Tribunal and/or Drainage Referee as the extent of the work required cannot be determined. Should additional costs be incurred, unless directed otherwise, the costs would be assessed in pro rata fashion as per the Schedule of Assessments.*
In addition to the above, an allowance for the connection of tributary tile to the proposed works will be paid as follows:

<table>
<thead>
<tr>
<th>Connections to</th>
<th>100mm Coring</th>
<th>150mm Coring</th>
<th>200mm Coring</th>
</tr>
</thead>
<tbody>
<tr>
<td>250-675</td>
<td>$80.00</td>
<td>$95.00</td>
<td>$125.00</td>
</tr>
<tr>
<td>750-900</td>
<td>$120.00</td>
<td>$130.00</td>
<td>$165.00</td>
</tr>
</tbody>
</table>

The number of tributary tile connections required is unknown until construction commences.

14. MAINTENANCE

After construction of the improvements, the Ross-Moir Municipal Drain as described in this Report shall be maintained by the Municipality of Middlesex Centre at the expense of the lands and roads assessed, in the proportions set out in the By-Law which adopts this Report. Any future maintenance or repair costs shall be distributed in accordance with Appendix B, the Schedule of Assessments for Future Maintenance. The Schedule of Assessments for Future Maintenance is based on the assessment for outlet liability for all properties.

Future cost for maintenance of the road crossing is to be fully assessed to the Municipality of Middlesex Centre. As road authority, the Municipality has the right under Section 69(1) to undertake any maintenance or repair to their culverts as they deem necessary. The Drainage Superintendent should be advised of any works being undertaken.

Landowners should take note that there is responsibility for landowners to not damage or block flow in the Municipal Drain. Section 80(1) of the Drainage Act states;

“When a drainage works becomes obstructed by a dam, low bridge, fence, washing out of a private drain, or other obstruction, for which the owner or occupant of the land adjoining the drainage works is responsible, so that the free flow of the water is impeded thereby, the persons owning or occupying the land shall, upon reasonable notice sent by the council of the local municipality whose duty it is to maintain and repair the drainage works or by a drainage superintendent appointed by the council, remove such obstruction and, if it is not so removed within the time specified in the notice, the council or the drainage superintendent shall forthwith cause it to be removed, and the cost thereof is payable to the municipality by the owner or occupant of the land.”

Any landowners, who have questions as to their rights and responsibilities under the Drainage Act, should contact the Drainage Superintendent who can provide additional information and answer any questions that landowners may have.

Regular inspection of the culverts and drainage course should be undertaken by the Drainage Superintendent. Landowners can assist with the inspection by making regular inspections of the drain as it crosses their property, clearing debris from the drain and culverts if possible, and reporting any problems or concerns to the Drainage Superintendent who can inspect and take any necessary actions.

All of which is respectfully submitted.

Sincerely,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Brad Bunke, P.Eng.

Disclaimer: This report is intended for the sole use of the Municipality of Middlesex Centre for the purposes as expressed in the report. Any use of or reliance upon this report by third parties is at the expressed responsibility of the third party. GM BluePlan Engineering is not responsible for any damages suffered by any third party as a result of decisions or actions made based upon the information contained in this report.
APPENDIX A

Schedule of Estimated Assessments for Construction
<table>
<thead>
<tr>
<th>Conc</th>
<th>Lot</th>
<th>Owner</th>
<th>Roll No.</th>
<th>Affected Area</th>
<th>Adjusted Area</th>
<th>Benefit (sect. 22)</th>
<th>Section 24/26</th>
<th>Outlet (sect. 23)</th>
<th>TOTAL</th>
<th>Allowances</th>
<th>NET ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ac.</td>
<td>ha.</td>
<td>ac.</td>
<td>ha.</td>
<td>Specific</td>
<td>Normal</td>
<td>Direct</td>
<td>Normal</td>
</tr>
<tr>
<td>Lands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>N. Pt. 11</td>
<td>Moir Dairy Farms c/o George Moir</td>
<td>030-033</td>
<td>34.41</td>
<td>13.93</td>
<td>34.41</td>
<td>13.93</td>
<td>$ -</td>
<td>$ 6,910.00</td>
<td>$ -</td>
<td>$ 14,000.00</td>
</tr>
<tr>
<td>9</td>
<td>N. Pt. 10&amp;11</td>
<td>William Code</td>
<td>030-034</td>
<td>3.19</td>
<td>1.29</td>
<td>3.19</td>
<td>1.29</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
</tr>
<tr>
<td>10</td>
<td>S. Pt. 11</td>
<td>Marion &amp; William Ross</td>
<td>030-016</td>
<td>25.42</td>
<td>10.29</td>
<td>25.42</td>
<td>10.29</td>
<td>$ -</td>
<td>$ 5,110.00</td>
<td>$ -</td>
<td>$ 20,700.00</td>
</tr>
<tr>
<td>Total Estimated Assessment - Lands</td>
<td>63.03</td>
<td>25.51</td>
<td>63.03</td>
<td>25.51</td>
<td>$ -</td>
<td>$ 12,020.00</td>
<td>$ -</td>
<td>$ 34,700.00</td>
<td>$ 2,610.00</td>
<td>$ 49,330.00</td>
<td>$ 6,330.00</td>
</tr>
<tr>
<td>Roads and Utilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ten Mile Road</td>
<td>Municipality of Middlesex Centre</td>
<td>1.31</td>
<td>0.53</td>
<td>3.28</td>
<td>1.33</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 12,480.00</td>
<td>$ 2,670.00</td>
<td>$ -</td>
<td>$ 15,150.00</td>
</tr>
<tr>
<td>Union Gas</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 13,572.50</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 13,572.50</td>
<td>$ -</td>
</tr>
<tr>
<td>Total Estimated Assessment - Roads and Utilities</td>
<td>1.31</td>
<td>0.53</td>
<td>3.28</td>
<td>1.33</td>
<td>$ -</td>
<td>$ -</td>
<td>$ 26,052.50</td>
<td>$ 2,670.00</td>
<td>$ -</td>
<td>$ 28,722.50</td>
<td>$ -</td>
</tr>
<tr>
<td>TOTAL ESTIMATED ASSESSMENTS</td>
<td>64.34</td>
<td>26.04</td>
<td>66.31</td>
<td>26.84</td>
<td>$ -</td>
<td>$ 12,020.00</td>
<td>$ 26,052.50</td>
<td>$ 37,370.00</td>
<td>$ 2,610.00</td>
<td>$ 78,052.50</td>
<td>$ 6,330.00</td>
</tr>
</tbody>
</table>

Note: Agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance.
APPENDIX B

Schedule of Assessments for Future Maintenance
## Schedule of Assessment for Future Maintenance

Prepared by GM BluePlan Engineering Limited November 2016

**Ross-Moir Municipal Drain**

<table>
<thead>
<tr>
<th>Conc.</th>
<th>Lot</th>
<th>Owner and Roll No.</th>
<th>Affected Area</th>
<th>Adjusted Area</th>
<th>Maintenance Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Municipality of Middlesex Centre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>N. Pt. 11</td>
<td>Moir Dairy Farms c/o George Moir 030-033</td>
<td>34.41 ac.</td>
<td>13.93 ha.</td>
<td>34.41 ac. 13.93 ha. 51.9%</td>
</tr>
<tr>
<td>9</td>
<td>N. Pt. 10&amp;11</td>
<td>William Code 030-034</td>
<td>3.19 ac.</td>
<td>1.29 ha.</td>
<td>3.19 ac. 1.29 ha. 4.8%</td>
</tr>
<tr>
<td>10</td>
<td>S. Pt. 11</td>
<td>Marion &amp; William Ross 030-016</td>
<td>25.42 ac.</td>
<td>10.29 ha.</td>
<td>25.42 ac. 10.29 ha. 38.3%</td>
</tr>
</tbody>
</table>

**Total Assessment - Lands**

<table>
<thead>
<tr>
<th></th>
<th>ac.</th>
<th>ha.</th>
<th>ac.</th>
<th>ha.</th>
<th>Maintenance Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63.03</td>
<td>25.51</td>
<td>63.03</td>
<td>25.51</td>
<td>95.0%</td>
</tr>
</tbody>
</table>

**Roads and Utilities**

<table>
<thead>
<tr>
<th></th>
<th>Affected Area</th>
<th>Adjusted Area</th>
<th>Maintenance Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten Mile Road &amp; Union Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Municipality of Middlesex Centre</td>
<td>1.31 ac. 0.53 ha.</td>
<td>3.28 ac. 1.33 ha.</td>
<td>5.0%</td>
</tr>
<tr>
<td>Union Gas</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Total Assessment - Roads and Utilities**

<table>
<thead>
<tr>
<th></th>
<th>ac.</th>
<th>ha.</th>
<th>ac.</th>
<th>ha.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.31</td>
<td>0.53</td>
<td>3.28</td>
<td>1.33</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

**Total Assessment - Lands, Roads and Utilities**

<table>
<thead>
<tr>
<th></th>
<th>ac.</th>
<th>ha.</th>
<th>ac.</th>
<th>ha.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64.34</td>
<td>26.04</td>
<td>66.31</td>
<td>26.84</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
APPENDIX C
Drawings
1. CONTRACTOR IS TO OBTAIN UTILITY LOCATES PRIOR TO CONSTRUCTION.

2. CONTRACTOR IS TO CONNECT EXISTING TILES DURING CONSTRUCTION.

NOTES:
- **CP**: Constructed Property
- **CPM**: Constructed Property Maintenance
- **PM**: Public Property
- **G**: Gas Line

LEGEND:
- **CB**: Catch Basin
- **DICB**: Ditch Inlet Catch Basin
- **CSP**: Corrugated Steel Pipe
- **CONC**: Concrete
- **CSP**: Corrugated Steel Pipe
- **CB**: Catch Basin
- **DICB**: Ditch Inlet Catch Basin
- **CSP**: Corrugated Steel Pipe
- **CONC**: Concrete

**MUNICIPALITY OF MIDDLESEX CENTRE**

**PLAN AND DETAILS**

**CONTRACTOR TO**

TEL. 519-672-9403

**NOVEMBER 2016**

**B.H.**

**VARIES**

**SCALE :**

**DATE :**

**DESIGNED BY :**

**DRAWN BY :**

**APPROVED BY :**

**DRAWING NO. :**

**PROJECT NO. :**

**www.gmblueplan.ca**

---

**BENCHMARK LOCATION**

**PROPOSED CATCH BASIN**

**EXISTING CATCH BASIN**

**EXISTING HICKENBOTTOM**

**EXISTING WATERCOURSE**

**EXISTING GRADES AND EXISTING HICKENBOTTOM**

**PROPERTY LINE**

**RIGHT OF WAY**

**WATERSHED BOUNDARY**

**TYP. STATION**

**TYP. ELEVATION**

**APPROXIMATE ELEVATION**

**OFFSET 600mm x 600mm**

**APPROX. CURRENT LOCATION**

**RE-INSTALLED TO MATCH**

**TO BE REMOVED AND TO BE RELOCATED BY OTHERS**

**N. INV. = 97.85m**

**S. INV. = 97.85m**

**T/LIP ELEV. = 98.95m**

**T/G ELEV. = 98.80m**

**W.INV = 98.17m**

**CB c/w BIRDCAGE GRATE**

**OFFSET 600mm x 600mm**

**CB c/w BIRDCAGE GRATE**

**DIAMETER &211(&7&%72PP'&21&)**

**CONC. FIELD TILE @ 0.33%**

**PPP'&21&**

**PPP'&21&**

**PPP'&21&**

**PPP'&21&**
APPENDIX D
Special Provisions
SPECIAL PROVISIONS (NON-TENDER ITEMS)
FOR THE CONSTRUCTION OF THE
ROSS-MOIR MUNICIPAL DRAIN
MUNICIPALITY OF MIDDLESEX CENTRE
FORMER TOWNSHIP OF LONDON
GMBP FILE: 515-031

1. STANDARD SPECIFICATIONS

Where reference is made to OPSS or OPSD, the Contractor shall refer to the latest revision of the Ontario Provincial Standard Specifications and the Ontario Provincial Standard Drawings. These specifications and drawings may not be bound within this document. They are available on-line at:

www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/opshomepage
or
Ronen Publishing House Inc.
505 Consumers Road, Suite 910
Toronto, ON M2J 4V8
1-800-856-2196

Where in the Specifications the word “Corporation” or “Municipality” occurs it shall mean the “Corporation of the Municipality of Middlesex Centre”.

Where in the Specifications the word “Owner” occurs it shall mean the “Corporation of the Municipality of Middlesex Centre”.

Where in the Specifications the word “Engineer” occurs it shall mean “GM BluePlan Engineering Limited”.

2. SALES TAXES

Harmonized Sales Tax (H.S.T.)

The Total Tender Price shall include an allowance for H.S.T., calculated as 13% of the cost of the works as itemized in the Schedule of Unit Prices in the Form of Tender.

This allowance is simply an estimate of the amount of H.S.T. to be paid to the Contractor.

The Engineer will determine the appropriate amount of H.S.T. to be paid on each progress payment and on the final payment, and this amount may be more or less than the “allowance” included in the Total Tender Price.

3. LASER ALIGNMENT

The Contractor shall use a laser beam or equivalent line and grade control methods for laying all drain tile to maintain the on grade and alignment shown on the plans. Batter boards or any other means will not be acceptable.

4. TRENCHES TO BE CLOSED

No trench may be left open at the end of each day unless authorized by the Engineer. Any trench that is to be left open shall be completely fenced off with appropriate construction fencing. All fencing shall
be at the Contractor's expense. If the Contractor neglects to fence a trench, the Engineer shall have the right to have this work done by others and charged to the Contractor.

5. ROAD SIGNS

The Contractor, at his/her own expense, shall carefully remove and satisfactorily replace Municipal Road Signs which must be removed in order to carry out the contract. Where traffic control signs, such as Stop Signs, have to be temporarily or permanently relocated, they shall be immediately reset either temporarily or permanently, as conditions dictate. All temporarily relocated signs shall be permanently reset as soon as site conditions permit. Where replacements are necessary, new signs shall conform to Municipality of Middlesex Centre Development Standards.

6. DAMAGE TO TREES

A penalty of $1,000.00 will be levied against the Contractor to be deducted from monies payable under this Contract for each and every tree destroyed or damaged due to the Contractor's carelessness or negligence and which is not designated in the Contract for removal. As to what constitutes the carelessness or negligence on the part of the Contractor, the Engineer's decision shall be final.

7. COORDINATION MEETINGS

The Contractor shall attend such meetings with the Owner, Engineer, landowners and Utility Company Authorities (as necessary) as may be required by the Engineer to co-ordinate services affected by this Contract.

8. DISPOSAL OF SURPLUS OR UNSUITABLE EXCAVATED MATERIAL

All earth material excavated in carrying out the work of the various tender items included in this Contract and which is unsuitable for, or which is surplus to, the requirements for backfill shall be disposed of off-site. The excess material may be disposed of at a site arranged by the contractor upon receipt of a sign-off by the property owner.

All concrete, asphalt pavements, curbs, sidewalks, large boulders and other “solid” materials are to be loaded and hauled separately from the other earth and granular materials and disposed of at an MOECC-approved site obtained by the Contractor at no cost to the Owner.

9. COMPACTION

This Contract contains no separate tender item for compaction equipment as may be required to compact the earth or granular materials whether used for embankment construction, base courses, bedding, or backfill.

The Contract prices for the materials to be placed or the work to be carried out shall include full compensation for supplying and operating such compaction equipment as the Contractor may require and for compacting the materials to the specified density.

When it is impractical with the larger types of compaction equipment to obtain the required degree of compaction in areas where working space is limited, the Contractor shall provide and use mechanical hand compaction equipment in order to achieve the specified density.
Granular materials used as bedding shall be compacted to a density of 98% of the maximum dry density, granular backfill or base courses shall be compacted to a density of 100% of the maximum dry density. All other earth materials shall be compacted to a reasonable density as to prevent trench settlement.

When field tests indicate that the required degree of compaction cannot be obtained with the equipment in use or the procedure being followed, the Contractor's operations shall be halted until the Engineer is satisfied that the Contractor has made such modifications, in his/her equipment and procedure, which will produce the required results.

10. NATURAL GAS CONSTRUCTION SPECIFICATIONS

Where the Contractor is working near natural gas mains the work shall be carried out in accordance with the requirements and specifications of the Gas Company having control over such mains. A Union Gas representative shall be on-site during all construction activities in close proximity to the Union Gas pipelines.

Upon Contract award, the successful Contractor will be required to enter into a Crossing Agreement with Union Gas and operate under the policies outlined in the Operational Constraints document. An unofficial Crossing Agreement and Operational Constraints form can be found in Appendix F.

11. OTHER CONTRACTORS WITHIN OR ADJACENT TO THE LIMITS OF THE WORK

The Contractor is advised that other work may be in progress within and adjacent to the limits of this Contract and that he/she shall co-operate with other Contractors, Utility Companies, and the Corporation and they shall be allowed free access to their work at all times.

The Engineer reserves the right to alter the method of operation on this Contract to avoid interference with other work.

12. UTILITY POLE LINES

Where utility poles may have to be supported, the Contractor shall make arrangements with the hydro authority to do this work. There shall be no charge to the Contractor for this work.

13. UTILITIES AND PIPE CROSSINGS

The location and depth of underground utilities shown on the Contract Drawings are based on information received by the Engineer. The position of all pole lines, conduits, watermains, sewers and other underground and over ground utilities and structures is not necessarily shown on the contract drawings and where shown, the accuracy of the position of such utilities and structures is not guaranteed. It is the Contractor's responsibility before starting any work to contact the Municipal Authorities or Utility Companies for further information in regard to the exact location of these utilities and to take such other precautions as necessary to safeguard the utilities from damage.

Where pipes and other utilities are encountered in the excavation, these shall be maintained and supported by the Contractor to minimize damage done to them. Prior to backfilling, the Contractor shall submit to the Engineer, for his/her approval, details of the proposed method of support of such pipes and utilities and no backfilling may take place prior to the Engineer's review of such details. Approval
by the Engineer of any such details will in no way relieve the Contractor from his/her responsibility to avoid any damage where possible.

14. DAMAGE BY VEHICLES AND OTHER EQUIPMENT

If at any time, in the opinion of the Engineer, damage is being or is likely to be done to any highway or any improvement thereon, other than such portions as are part of the work, by the Contractor's vehicles or other equipment, whether licensed or unlicensed, the Contractor shall, on the direction of the Engineer and at the Contractor's own expense make changes in or substitutions for such vehicles or other equipment or shall alter loading or shall in some other manner remove the cause of such damage to the satisfaction of the Engineer. Where such damage has occurred, the Contractor shall make repairs satisfactory to the Owner or, where the Owner has found it necessary to make the repairs, make payment to the Owner of the cost of repairs carried out by the Owner.

15. SURVEY BARS AND MONUMENTS

The Contractor shall be responsible for replacing all survey bars which are bent, moved, removed, due to carelessness but will not be responsible for survey bars that have to be removed for construction. The contractor shall provide a list of all damaged and removed survey bars to the Engineer.

16. MAINTENANCE OF ROAD

The Contractor shall at all times and at his/her own expense, maintain safely and adequately, all private entrance facilities throughout the length of the Contract.

17. IMPERIAL CONVERSION OF METRIC SPECIFICATIONS

The Standard Specifications governing this work are in metric units. For the purpose of this Contract it is assumed that the metric units shall be hard converted to Imperial units, wherever necessary.

18. ACCESS TO PRIVATE PROPERTIES

If a traffic lane is closed temporarily to allow asphalt paving or road grading (including patch work), local access shall be maintained as much as possible and notifications shall be made 24 hours in advance.

19. CONSTRUCTION HOURS

The Contractor will be allowed to work from 7:00 a.m. to 7:00 p.m., Monday to Friday. Additional hours may be permitted under certain circumstances if approved by the Engineer.

20. MAINTENANCE OF FLOWS

The Contractor shall be responsible to maintain all drainage flows during construction. No extra payment will be made for pumping, hauling or disposing of any drainage flow or removing any granular material that enters the drainage system through manhole or catch basin frame adjustments. The Contractor will be responsible for maintaining and directing storm water flows during construction so that flooding of private property and silt migration or washouts do not occur. The Contractor shall be responsible to pay for any damages caused by storm water flooding due to, or as a result of, construction activities during the duration of this project.
SPECIAL PROVISIONS
FOR THE CONSTRUCTION OF THE
ROSS-MOIR MUNICIPAL DRAIN
MUNICIPALITY OF MIDDLESEX CENTRE
FORMER TOWNSHIP OF LONDON
GMBP FILE: 515-031

SPECIFICATIONS

The Special Provisions, along with the "Specifications for the Construction of Municipal Drainage Works" attached hereto, shall apply to and govern the construction of the "Ross-Moir Municipal Drain".

PLAN AND REPORT

The Plan and Profile and the Engineer's Report on the proposed Drainage Works shall be a part of this Specification.

EXTENT OF WORK

General

1. All standard Detailed Drawings are attached to these Specifications.

2. The Contractor shall notify the Owners and the Engineer forty-eight (48) hours prior to construction.

3. The Contractor shall verify the location of any existing drains as necessary to facilitate construction.

4. The Contractor shall verify the location of the new tile drains with the Engineer and the landowners prior to construction.

5. The working area shall be 20m centered on the proposed tile drain. Each landowner on whose property the drainage works is to be constructed shall designate access to and from the working area.

6. All utilities shall be located and uncovered in the affected areas by the Contractor prior to construction.

7. The Contractor shall supply all materials unless otherwise stated at the time of tendering.

8. All ditch inlet catch basins shall be precast concrete catch basins supplied by Coldstream Concrete or approved equal. Knockout shall be provided in the catch basins.

9. All standard catch basins shall be precast concrete catch basins supplied by Coldstream Concrete or approved equal. Knockout shall be provided in the catch basins.

10. The catch basin grate elevations shall be set to the satisfaction of the Engineer.

11. Stone rip-rap protection and geo-textile material (Terrafix 270R or approved equivalent) shall be placed around all catch basins as part of this contract.

12. All catch basin grates shall be fastened to the new catch basins.

13. All stone rip-rap material shall be quarry stone 150mm to 300mm diameter and placed to a depth of 400mm.

14. The Contractor shall supply all necessary materials to complete the connections of any existing drains to the new drain.

15. The Contractor shall be responsible for all trench settlement.
16. The Contractor shall supply and install catch basin markers beside all catch basins.

17. All concrete field tile shall be Heavy-Duty Extra Quality Concrete Drain Tile (1500D).

18. All HDPE pipe shall be double smooth wall interior, BOSS2000 or approved equivalent.

19. All 300mm diameter PVC pipe shall be Ultra Rib PVC Pipe or SDR35 PVC Pipe as supplied by IPEX Inc. or approved equivalent.

20. The Contractor shall strip the topsoil for a width of 6.0m centered on the drain (Sta. 0+188 to Sta. 0+723) before installing the drain. In deep cuts the Contractor shall strip the topsoil in the locations where the drain is being installed with an excavator for the full top width of the trench. The topsoil shall be later spread over the backfilled trench.

21. Contractor shall maintain the following minimum cover for all tile placed
   i. 600mm minimum cover for tile sizes up to 200mm diameter
   ii. 750mm minimum cover for tile sizes greater than 200 mm diameter

22. The Contractor shall grade the road ditches to the new catch basins. The disturbed areas within the Municipal Right-Of-Way shall be top soiled and seeded.

23. The Contractor shall clean up the site and leave it in a neat and workmanlike condition.

24. The tender shall be based upon unit prices and shall be as detailed on the tender form.

25. Nothing in these Specifications shall be construed as requiring less than a complete and satisfactory job in accordance with the obvious intent of the Drawings and Specifications.

26. All work shall be done to the satisfaction of the Engineer.

27. In accordance with Section A.24 of the General Specifications, the Contractor shall be responsible for all maintenance or faulty materials which appears within a one year period from the date of the Engineer's final Payment Certificate. An amount equal to 3% of the final contract price shall be retained for the maintenance period. Any part of the money retained may be used to make good any deficiencies after five (5) working days' notice being given to the Contractor. This notice may be either in writing or by telephone.
CLOSED WORK

C-1  Rip Rap at Outlet

Supply and install 40m² rip rap as shown on the drawings accompanying the Report for 4m beyond the outlet at Sta. 0+188. Rip rap shall be field or quarry stone, of minimum dimension, 150mm to 300mm diameter or as approved by the Engineer on a filter mat base (Terrafix 270R or approved equivalent), machine placed to produce a smooth locked surfaced. The protection shall extend to the top of the backfilled trench and below the pipe to 400mm under the streambed.

Payment for rip rap will be for the actual quantity placed at the rate quoted in the tender.

C-2  Outlet Pipe

Supply and install the 6m section of 450mm (18”) diameter HDPE pipe complete with rodent grate from Sta. 0+188 to 0+194. Connect the successive 400mm (16”) diameter concrete field tile by placing HDPE snug against the successive concrete field tile and sealing all around with 150mm of concrete or wrapping with a 500mm wide strip of Terrafix 270R filter cloth, or approved equivalent.

C-3  Concrete Field Tile

Contractor is to obtain utility locates prior to construction.

Supply and install 529m of 400mm (16”) diameter and 6m of 300mm (12”) diameter concrete field tile by trencher or backhoe. The 300mm (12”) diameter concrete field tile is to be capped to prevent sediment from entering the drain.

By whatever means the pipe is installed, the Contractor shall place it so that support is provided for the bottom and sides. This may require hand work to “blind” the pipe and place and compact soil under the haunches of the pipe, and/or modification to the excavator if placed by backhoe. The Contractor is responsible for any breakage of pipe in the ground, however it occurs and whether or not the method of installation is approved by the Engineer.

If the Contractor elects to install the pipe by backhoe, extra will not be paid for stoney conditions unless boulders are encountered, larger than can be lifted by the backhoe.

All pipe which crosses the natural gas lines is to be installed via open trench. A durable, non-conductive rubber material with a minimum thickness of 9mm shall be placed between the natural gas lines (including tracer wire) and the installed concrete field tile to prevent contact for a minimum of 100mm on each side of the natural gas line crossing, and a minimum of 100mm on the each side of the concrete field tile.

Wrapping of tile joints is included in this item. The Contractor shall supply and wrap all concrete tile joints with geotextile filter material as part of this contract. The width of the filter material should be:

a. 300mm wide for tile sizes 150mm diameter to 350mm diameter
b. 400mm wide for tile sizes 400mm diameter to 750mm diameter
c. 500mm wide for tile sizes larger than 750mm diameter

The filter material shall completely cover the tile joint and shall have a minimum overlap of 300mm. The type of filter material shall be Terrafix 270R or approved equal.

C-4  PVC Pipe – Road Crossing

Contractor is to obtain utility locates prior to construction.
Supply and install one 11m length 300mm (12") diameter PVC pipe. The price shall include removing, salvaging and reinstalling the existing HDPE surface culvert at the existing location and grade.

The excavation shall be as per OPSD 802.030. All bedding and cover material shall be Granular ‘A’, and all backfill material shall be Granular ‘B’. The finished road surface shall be a 150mm layer of Granular ‘A’ compacted to 100% SPDD.

Refer to A.17 of the Construction Specifications for installation requirements.

C-5 Catch Basins

Contractor is to obtain utility locates prior to construction.

Supply and install 2 – 600mm x 600mm catch basin complete with birdcage grate – Sta. 0+723 and Sta. 0+734. The catch basins shall have a flat top and heavy duty galvanized steel grate (minimum bar diameter 15mm, maximum spacing 75mm) of the “birdcage” type set so that the top of the inlet is approximately 50mm above the surrounding ground.

The catch basin at Sta. 0+723 shall be offset, and shall be connected to the 400mm diameter concrete field tile using approximately 5m of 200mm diameter concrete field tile. This catch basin shall be positioned to receive surface water from the reinstalled HDPE surface culvert.

Catch basins shall be by Coldstream Concrete or approved equivalent.

All necessary minor grading and contouring to convey water to the catch basins is included.

Securely fasten the grate to the catch basin with two galvanized bolts.

Supply and install approximately 10m² of rip rap at each catch basin to the standard described in Item C-1.

Payment for rip rap will be for the actual quantity placed at the rate quoted in the tender.

C-6 Tile Connections

All tile encountered shall be connected into the main drain or a catch basin. Tile connections may be made by using the same size of concrete field tile or one size larger of standard corrugated plastic drainage tubing. Connection at the main shall be “earth tight” to the satisfaction of the Engineer.

C-7 Stoney Conditions

Stoney conditions may be encountered. Should they occur and be sufficiently severe, in the opinion of the Engineer, to require additional excavation and bedding, extra will be paid at the rate quoted in the tender. Work under this item will include extra depth of excavation sufficient to install clear stone bedding.

C-8 Clear Stone

Supply and install 19mm diameter clear crushed stone for bedding or envelope. Location for installation shall be designated by the Engineer at the time of construction. Payment will be for the actual quantity placed.
APPENDIX E
Construction Specifications
SPECIFICATIONS
for the
CONSTRUCTION
of
MUNICIPAL DRAINAGE WORKS

Revised January 2016
# SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINAGE WORKS

## INDEX

### SECTION A - GENERAL

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>BENCH MARKS</td>
<td>1</td>
</tr>
<tr>
<td>A.2</td>
<td>STAKES</td>
<td>1</td>
</tr>
<tr>
<td>A.3</td>
<td>LINE</td>
<td>1</td>
</tr>
<tr>
<td>A.4</td>
<td>PROFILE</td>
<td>1</td>
</tr>
<tr>
<td>A.5</td>
<td>ERRORS OR OMISSIONS</td>
<td>1</td>
</tr>
<tr>
<td>A.6</td>
<td>CLEARING</td>
<td>2</td>
</tr>
<tr>
<td>A.7</td>
<td>FENCES</td>
<td>3</td>
</tr>
<tr>
<td>A.8</td>
<td>TRIBUTARY OUTLETS</td>
<td>3</td>
</tr>
<tr>
<td>A.9</td>
<td>ALTERATIONS</td>
<td>3</td>
</tr>
<tr>
<td>A.10</td>
<td>SPECIAL CONDITIONS</td>
<td>3</td>
</tr>
<tr>
<td>A.11</td>
<td>PERMITS, NOTICES, LAWS AND RULES</td>
<td>4</td>
</tr>
<tr>
<td>A.12</td>
<td>HIGHWAYS, RAILWAYS, UTILITIES</td>
<td>4</td>
</tr>
<tr>
<td>A.13</td>
<td>CONTRACTOR’S LIABILITY INSURANCE</td>
<td>4</td>
</tr>
<tr>
<td>A.14</td>
<td>SUB-CONTRACTORS</td>
<td>5</td>
</tr>
<tr>
<td>A.15</td>
<td>STANDING CROPS AND LIVESTOCK</td>
<td>5</td>
</tr>
<tr>
<td>A.16</td>
<td>SURPLUS GRAVEL</td>
<td>5</td>
</tr>
<tr>
<td>A.17</td>
<td>OPEN CUT ROAD CROSSINGS</td>
<td>5</td>
</tr>
<tr>
<td>A.18</td>
<td>LANEWAYS</td>
<td>6</td>
</tr>
<tr>
<td>A.19</td>
<td>FINAL INSPECTION</td>
<td>6</td>
</tr>
<tr>
<td>A.20</td>
<td>COMPLETION OF WORK</td>
<td>7</td>
</tr>
<tr>
<td>A.21</td>
<td>NOTICE OF COMMENCEMENT OF WORK</td>
<td>7</td>
</tr>
<tr>
<td>A.22</td>
<td>FIELD MEETINGS</td>
<td>7</td>
</tr>
<tr>
<td>A.23</td>
<td>SUPERVISION</td>
<td>7</td>
</tr>
<tr>
<td>A.24</td>
<td>MAINTENANCE OR FAULTY WORKMANSHIP</td>
<td>7</td>
</tr>
<tr>
<td>A.25</td>
<td>DRAINAGE SUPERINTENDENT</td>
<td>7</td>
</tr>
</tbody>
</table>

### SECTION B - OPEN DRAINS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.1</td>
<td>BOTTOM WIDTH AND SIDE SLOPES</td>
<td>8</td>
</tr>
<tr>
<td>B.2</td>
<td>EXCAVATED MATERIAL</td>
<td>8</td>
</tr>
<tr>
<td>B.3</td>
<td>SPREADING AND LEVELLING</td>
<td>8</td>
</tr>
<tr>
<td>B.4</td>
<td>FILLING OLD CHANNEL</td>
<td>8</td>
</tr>
<tr>
<td>B.5</td>
<td>INLETS FOR SURFACE WATER</td>
<td>8</td>
</tr>
<tr>
<td>B.6</td>
<td>EXCAVATION AT BRIDGE SITES</td>
<td>9</td>
</tr>
<tr>
<td>B.7</td>
<td>FARM BRIDGES AND FARM CULVERTS</td>
<td>9</td>
</tr>
<tr>
<td>B.8</td>
<td>RIP RAP PROTECTION FOR CULVERTS</td>
<td>9</td>
</tr>
<tr>
<td>B.9</td>
<td>OBSTRUCTIONS</td>
<td>9</td>
</tr>
<tr>
<td>B.10</td>
<td>ROADS</td>
<td>10</td>
</tr>
<tr>
<td>B.11</td>
<td>TILE OUTLETS IN EXISTING DITCHES</td>
<td>10</td>
</tr>
<tr>
<td>B.12</td>
<td>GRASS SEED AND FERTILIZER</td>
<td>10</td>
</tr>
<tr>
<td>B.13</td>
<td>EQUIPMENT</td>
<td>11</td>
</tr>
<tr>
<td>B.14</td>
<td>COMPLETION</td>
<td>11</td>
</tr>
</tbody>
</table>

### SECTION C - TILE DRAINS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.1</td>
<td>TILE QUALITY</td>
<td>12</td>
</tr>
<tr>
<td>C.2</td>
<td>LINE</td>
<td>12</td>
</tr>
<tr>
<td>C.3</td>
<td>TILE LAYING</td>
<td>12</td>
</tr>
<tr>
<td>C.4</td>
<td>LOWERING OF SURFACE GRADES</td>
<td>12</td>
</tr>
<tr>
<td>C.5</td>
<td>TRIBUTARY DRAINS</td>
<td>13</td>
</tr>
<tr>
<td>C.6</td>
<td>CONNECTIONS</td>
<td>13</td>
</tr>
<tr>
<td>C.7</td>
<td>BACKFILLING</td>
<td>13</td>
</tr>
<tr>
<td>C.8</td>
<td>OUTLET PROTECTION</td>
<td>13</td>
</tr>
<tr>
<td>C.9</td>
<td>CATCH BASINS</td>
<td>14</td>
</tr>
</tbody>
</table>
SECTION A - GENERAL

A.1 BENCH MARKS

The Bench Marks are set at intervals along the course of the work as shown on the accompanying Plan and Profile. Attention is drawn to Section 13 (2) of the Drainage Act regarding liability for interference with Bench Marks.

A.2 STAKES

Stakes are generally set 25m apart throughout the course of the work and at all fences or as shown on the accompanying Plan and Profile. The Contractor shall be held liable for the cost of replacing any stakes destroyed during the course of construction and the drainage area shall be liable for the cost of replacing stakes destroyed before commencement of construction.

A.3 LINE

The drain shall run in straight lines throughout each course except that at intersections of courses it shall run on a curve of at least 15m radius. The centre line of existing open drain shall in general be the centre line of the finished work but the straight lines of the drain shall be staked by the Contractor at least one complete course ahead of the digging, and all sloping and widening necessary shall be done in such a manner as to make the finished work uniform.

The Contractor shall exercise care not to disturb any existing tile drain or drains which parallel the course of the new drain, particularly where the new and existing tile act together to provide the necessary capacity. Where any such existing drain is disturbed or damaged, the Contractor shall perform all necessary correction or repair at his expense. The Engineer will designate the general location of the tile drain, but the landowners may indicate the exact location if approval is given by the Engineer.

The Contractor shall verify the location of the new tile drain with the Engineer, Drainage Superintendent and the landowners before proceeding with the work.

A.4 PROFILE

The drain is to be excavated to regular grade lines as shown on the Profile. These grade lines are governed entirely by the bench marks and show the bottom of the finished drain. In the case of tile drains, the grade line is that of the invert of the tile. The Profile shows, for the convenience of the Contractor and others, the approximate depths from the surface of the ground at the point where the numbered stakes are set and from the estimated average bottom of the present drain as taken at the time of survey, but the bench marks must govern the construction. The depths are indicated on the Profile. Open drains shall be brought to an even grade in the bottom so that water will not stand therein, except in special cases such as sediment traps.

The drain shall be constructed with a uniform grade in accordance with the Profile Drawing. A variation of 20mm from the proposed Profile shall be sufficient to require the Contractor to remedy this discrepancy.

A.5 ERRORS OR OMISSIONS

The Contractor shall satisfy himself before the commencement of any part of the work, of the meaning of all stakes and marks, and any errors or omissions he may find in Plans, Profiles or Specifications shall not relieve him of the responsibility of completing the work in accordance with the evident intention of such Plans, Profiles and Specifications. The Contractor shall report any such errors or omissions to the Engineer for correction before the work is commenced.
A.6  CLEARING

(a)  General

Brush, timber, logs, stumps, stones or any obstruction in the course of the work, and any brush along the banks thereof shall be removed to a sufficient distance to be clear of the excavated material or to the width as shown on the Profile.

The Special Provisions and the Engineering Plans lay out the amount of the work of clearing through bush and treed areas for both open and closed drains.

All brush and trees removed from the drain and banks thereof must be piled to the satisfaction of the Engineer for burning or disposal by the Owner.

Any deviation during construction will require the written authorization of the Engineer or the Drainage Superintendent in charge of the work. Other deviation will only be by Special Specification applicable to and governing certain aspects of special situations.

The Contractor will be permitted to cut standing timber along the banks of the drain to the extent that may, in the opinion of the Engineer, be reasonably necessary for the operation of the excavation equipment.

The quality of workmanship shall be equal to the best in the industry and the Contractor shall be held liable for all damages incurred due to carelessness, negligence or failure to adhere to this Specification.

(b)  Open Work

Clearing shall be 15m on the spoil side as designated on the Profile unless specified otherwise in the Special Provisions. All overhanging limbs and any dead or dying trees liable to fall into the drain on the opposite side shall be cut and removed. Care shall be exercised to prevent the scraping or barking of trees outside of the clearing area.

All trees 150mm in diameter, 450mm above the ground, must be cut, trimmed and stacked in log lengths in a location accessible to the Owner. These trees shall be cut sufficiently close to the ground in the cleared area that the spoil can be leveled over them.

No brush or trees are to be left inside the slopes of the drain whether they come within the limits of the excavation or not.

Under no circumstances shall the cleared material be pushed or deposited in any way in the uncleared area so as to impede the passage through the bush or to do damage to the uncleared bush. All remaining trees, bush and trimmed limbs shall be cleared with suitable equipment and temporarily placed on the edge of the cleared area remote from the drain. After the spoil has been spread and leveled, the cleared material is to be placed in piles along the centre of the cleared area free from dirt for disposal by others. The piles of brush shall be a minimum of 60m apart. For the clearing of willows, the Contractor shall use the equipment necessary to uproot and stack the bush in piles free from dirt for disposal by others.

(c)  Closed Work

Clearing width shall be as provided for in the Special Provisions.

In the normal case where the course of the drain is to be included in cultivated lands in the near future, all stumps shall be removed and the land leveled for the full width of the clearing.

Where the course of the drain is through low, wet or swampy land and clearing prior to tile installation is impractical, then with special written permission ONLY can the tile be laid before clearing. For drainage
purposes, the clearing shall be postponed until ground and weather conditions permit working within the area adjacent to the tile.

Where the course of the drain is not to be included in cultivated lands, all stumps shall be removed and the land leveled for 6m on each side of the installed tile. All stumps in the remaining cleared area shall be cut as close as is practically possible to the ground and chemically treated to prevent regrowth.

After the tiles have been laid, heavy machinery shall not be driven over it if there is any possibility of disturbing or damaging the tile.

Care shall be taken to prevent the scraping or barking of trees outside the cleared area.

All trees 150m in diameter, 450mm above the ground shall be cut, trimmed and stacked in log lengths, in a location accessible to the Owner.

The cleared material shall not be pushed or deposited in the uncleared area in any manner so as to impede the passage through the bush or to do damage to the uncleared bush. All trees, bush and trimmed limbs remaining shall be cleared with suitable equipment and placed in piles free from dirt at intervals of 60m for disposal by other methods.

Willows shall be cleared using the necessary equipment to uproot and stack the bush in piles free from dirt for disposal by others.

A.7 FENCES

The Contractor will be permitted to remove fences to the extent necessary to enable him to construct the drain and dispose of any excess material. Any such fences must be carefully handled so as to cause no unnecessary damage and shall be replaced by the Contractor in as good condition as found. Fences shall be properly stretched and fastened. The Contractor shall supply all wire and/or material necessary to properly reconstruct any fences. The Contractor shall not leave any fence open when he is not at work in the immediate vicinity. Replacing of the fences shall be to the satisfaction of the Engineer, or the Drainage Superintendent appointed to be in charge of the work.

A.8 TRIBUTARY OUTLETS

During the construction of an open drain, the Contractor shall guard against damaging outlets of any tributary drains and during the construction of a tile drain he shall connect all tributary tile drains to the main tile as work progresses and before backfilling the new drain. Attention is drawn to Article B.11 and Article C.5 of these Specifications. The Contractor will be held liable for damage caused by negligence or carelessness, on the part of himself, his workmen or subcontractors.

A.9 ALTERATIONS

The Engineer may make minor changes in the work as it progresses. An amount proportionate to the amount contained in the Tender or as Tendered in the Schedule of Unit Prices shall be added to or deducted from the contract price to cover such changes. No changes will be made unless ordered by the Engineer or the Drainage Superintendent in charge of the works.

A.10 SPECIAL CONDITIONS

If the Contractor should encounter any unusual soil conditions of any sort which may not have been known to the Engineer, and where not provided for by these Plans and Specifications and which would make necessary alternations to the Plans and Specifications in order that the work be completed in a satisfactory and
workmanlike manner, the Contractor shall immediately notify the Engineer who will make the necessary alterations.

Failure of the Contractor to so notify the Engineer shall not relieve the Contractor of the responsibility of fully completing the work to the satisfaction of the Engineer, and shall make the Contractor ineligible to receive any extra compensation made necessary by the alteration.

A.11 PERMITS, NOTICES, LAWS AND RULES

The Contractor shall apply and pay for all permits, licenses or approvals required for the completion of the work (but this shall not include the obtaining of permanent easement or rights of servitude). The Contractor shall give all necessary notices and pay all associated fees required by law and comply with all laws, rules and regulations relating to the work and to the preservation of the public’s health and safety. If the Specifications and Drawings differ, any resulting additional expenses incurred by the Contractor shall constitute an addition to the Contract Price.

A.12 HIGHWAYS, RAILWAYS, UTILITIES

The Contractor shall perform the work affecting any lands of the Ministry of Transportation of Ontario, or any Railway, Telephone, Pipeline Company or Public Utility in accordance with the Specifications or permit requirements of such Ministry, Company or Utility, as though said Specifications were hereto attached.

Notices Required

(a) Highways

Before any construction may take place on the right-of-way of any King's Highway, forty-eight (48) hours notice in writing, exclusive of Saturdays, Sundays and Holidays, must be given to the appropriate District Engineer of the Ministry of Transportation of Ontario.

(b) Railways

Before any construction may take place on the property of any Railway, a minimum of forty-eight (48) hours notice in writing, exclusive of Saturdays, Sundays and Holidays, must be given to the Area Engineer of the Railway Company.

Where a pipe is to be installed under Railway tracks by open cutting, a minimum of seventy-two (72) hours notice in writing, exclusive of Saturdays, Sundays and Holidays, must be given to the Area Engineer of the Railway Company.

A.13 CONTRACTOR’S LIABILITY INSURANCE

The Contractor shall protect himself and indemnify and save the Owner harmless from any and all claims which may arise from the Contractor’s operations under the Contract where bodily injury, death, or property damage is caused and for this purpose shall, without restricting the generality of the foregoing, maintain an insurance acceptable to the Owner, and subject to the limits and conditions under the Articles of Agreement of the tender, per occurrence for bodily injury, death, and damage to property including loss of use thereof. The Contractor will be solely liable for all injuries and/or accidents to workmen, and/or the public, and/or livestock, and/or property and for any expenses or damages created by fences being left open or improperly closed, insufficient guarding and lighting or bad workmanship at places where a drain runs along or across a road allowance or any negligence in completing the work.

The Contractor shall furnish evidence of compliance with all requirements of the applicable Workmen’s Compensation Act or Ordinance of the Province or Territory concerned including payments due there under.
Prior to the commencement of any work hereunder, the Contractor shall file with the Owner a copy of each insurance policy and certificate required. All such insurance shall be maintained until final completion of the work including the making good of faulty work or materials; except that coverage of completed operations liability in any event by maintained for one (1) year from the date of final payment certificate by the Engineer.

In addition to the above insurance requirements, the Contractor, at his/her own expense, shall carry and keep in full force effect the following Liability Insurance to meet the requirements of the Union Gas Crossing Agreement.

(a) **Comprehensive General Liability Insurance**

Comprehensive General Liability insurance with an inclusive limit for personal injury and property damage of Five Million Dollars ($5,000,000.00), and such limits may be made up of a combination of Primary and Excess Liability policy. Applicant must add Union Gas as an additional insured on this policy with respect to this agreement and have its insurers provide a waiver of subrogation in Union Gas’s favour.

(b) **Automobile Liability Insurance**

Automobile Liability Insurance ("Owned" and "Non-Owned") with an inclusive limit for bodily injury (including passengers) and property damage of One Million Dollars ($1,000,000.00).

A.14 **SUB-CONTRACTORS**

If the Municipality so directs, the Contractor shall not sublet the whole or part of this Contract without the written approval of the Engineer.

A.15 **STANDING CROPS AND LIVESTOCK**

The Contractor shall not be held responsible for damages to standing crops within the "working space" as defined in the report or in the access to and from such "working areas" such access having been defined by the owner of the property if he notifies the owner thereof in writing at least two (2) days prior to commencement of the work on that portion. Similarly, the Contractor constructing a tile drain shall not be held responsible for damages or injury to livestock occasioned by leaving trenches open for inspection by the Engineer if he notifies the owner in writing at least two (2) days prior to commencement of the work on that portion. But the Contractor will be held liable for such damages or injury if the backfilling of such trenches is delayed more than seven (7) days after acceptance by the Engineer.

When notified as outlined above, the owner of the property on which the drain is located shall be responsible for the protection of all livestock on said property during construction and shall also be liable for any damages caused by such livestock.

A.16 **SURPLUS GRAVEL**

If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used in the construction or the works, the Contractor shall haul away such surplus gravel or stone. This does not apply to a road crossing where surplus gravel is left to allow for building up the trench in the event settlement occurs.

A.17 **OPEN CUT ROAD CROSSINGS**

All road crossings may be made with an open cut unless otherwise noted. The exact location of the crossings shall be verified and approved by the Road Authority or the Engineer. A 150mm depth of Granular ‘A’, well compacted, shall be placed as a base for each pipe crossing. The pipe shall be backfilled with granular material for the width of the travelled portion plus 1,200mm on either side. The material shall be placed in lifts not exceeding 150mm in depth and shall be thoroughly compacted with an approved type mechanical vibrating compactor where so required by the Engineer. The top 150mm of the roadway backfill shall consist of crushed
granular material meeting the Specifications of the Ministry of Transportation of Ontario for Granular Base Course Class ‘A’ (Granular ‘A’) material.

The Contractor shall be responsible, however, for subsequent uneven joints in the pavement due to settling of the backfill. The Contractor shall arrange with the road authority to keep the crossing in repair if unable to do such personally. All road crossings shall meet the approval of the Road Authority. When doing work on or across any public road, care must be taken to protect the travelling public, the Contractor is required to erect and maintain, until the completion of the work, all signs, barricades, and lights necessary to indicate or warn the travelling public that the work is being undertaken, all in compliance with the Ontario Traffic Manual Book 7.

The excavated material from the travelled portion of the road and 1,200mm or the full width of the graveled shoulder, whichever is greater, on each side of the travelled portion shall be removed. Excavated material may be spread on the right-of-way with consent of the Road Authority. Surplus excavated material must be removed from the job site.

If the Engineer deems a gravel road to have been damaged by the construction of a drain either across or along the said road, the Engineer may direct the Contractor to supply and place sufficient crushed granular material on the roadway to restore it to a safe and passable condition at the Contractors expense.

A.18 LANEWAYS

All pipes crossing laneways shall be backfilled with material that is clean, free of foreign material or frozen particles and readily tamped or compacted in place unless otherwise specified. Laneway culverts on open ditch projects shall be backfilled with material that also is not easily erodible. All backfill material shall be thoroughly compacted as directed by the Engineer.

All pipe culverts located under laneways shall be backfilled with granular material to a minimum of 900mm beyond each side of the culvert. 150mm of granular ‘A’ shall be placed under the culvert as a base. Granular material shall be placed simultaneously on each side of the culvert in 150 mm layers and compacted to a ninety-five per cent (95%) Standard Proctor maximum dry density. All culverts are to be assembled according to the Manufacturers Specifications. Culverts to have a minimum of 600mm of cover over the pipe unless otherwise noted on the Drawings.

The backfill over culverts and subsurface pipes at all existing laneways that have granular surfaces on open ditch and closed drainage projects shall be surfaced with a minimum of 300mm of pit run granular material and 150mm of Granular ‘A’ material. All backfill shall be thoroughly compacted as directed by the Engineer. All granular material shall be placed to the full width of the travelled portion.

Any settling of backfilled material shall be repaired by or at the expense of the Contractor during the warranty period of the project as soon as required. Any existing bituminous pavement on laneways shall be placed to its original condition by the Contractor.

A.19 FINAL INSPECTION

Final inspection will be made by the Engineer within ten (10) days after he has received notice in writing from the Contractor that the work is completed or as soon thereafter as weather conditions permit.

If, after receiving notice from the Contractor that the work has been completed, the Engineer or Drainage Superintendent in charge of the work finds items uncompleted which entail a further inspection of the whole or part of the work, the cost of such further inspection may be charged against the Contractor.

All the work included in the Contract must, at the time of final inspection, have the full dimensions and cross-sections called for in the Plans and Specifications.
A.20 COMPLETION OF WORK

The work must commence immediately after the Contractor is notified of the acceptance of his Tender or at a later date as specified in the contract documents. If weather and ground conditions are unsuitable, work may be started at a later date from either of these two (2) dates if such delay is approved by the Engineer.

The work must proceed in such a manner as to ensure its completion at the earliest possible date consistent with the first class workmanship and within the time limit set out in the Tender or the Contract Documents.

A.21 NOTICE OF COMMENCEMENT OF WORK

The Contractor shall give the Engineer and the Drainage Superintendent a minimum of forty-eight (48) hours advance notice before commencement of work on any municipal drain.

If the Contractor leaves the job site for a period of time after initiation of work, he shall give the Engineer and Drainage Superintendent a minimum of forty-eight (48) hours advance notice prior to returning to the job.

If any work is commenced without such advance notice, the Contractor shall be fully responsible for all such work undertaken prior to such notification and shall make good any works or materials used to judge to be inadequate or constructed in a manner that may have been subject to alteration if made known to the Engineer prior to commencement of construction.

A.22 FIELD MEETINGS

At the Engineers discretion, a field meeting with the Contractor or his representative, the Engineer and with those others that the Engineer deems to be affected, shall be held after notification of commencement of work has been given and prior to commencement of, or during construction.

A.23 SUPERVISION

The Contractor shall provide site supervisors and/or foremen as required and assume all responsibility for control and direction of the work in accordance with section GC7.0 of the OPS General Conditions of Contract.

A.24 MAINTENANCE OR FAULTY WORKMANSHIP

The Contractor shall repair and make good any damages or faults in the drain that may appear within one (1) year after its completion (as evident by the final payment certificate) as the result of the imperfect or defective work done or materials furnished if certified by the Engineer as being due to one or both of these causes; but nothing herein contained shall be construed as in any way restricting or limiting the liability of the Contractor under the laws of the Country, Province or Locality in which the work is being done. Neither the final payment certificate nor payment there under, nor any provision in the Contract Documents shall relieve the Contractor from his responsibility.

A.25 DRAINAGE SUPERINTENDENT

Where a Drainage Superintendent is appointed by the Municipality, the Drainage Superintendent may act as the Engineer’s representative, if so directed by the Engineer. The Drainage Superintendent shall have the power to direct the execution of the work and to make any necessary minor adjustments.
SECTION B - OPEN DRAINS

B.1 BOTTOM WIDTH AND SIDE SLOPES

The drain shall have the full specified bottom width at the grade line at the time of final inspection. Both sides of an open drain are to be sloped 2.0m horizontally to 1.0m vertically, or as otherwise shown on the accompanying Profile. Bottom widths will vary with the size of the drain. Where the width of the bottom of the existing ditch is sufficient to permit the desired width, depth and back slopes for the new ditch to be constructed without disturbing the existing banks, such banks shall be left as is, subject to clearing required as described in Section B.9 “Obstructions”. Sides of the drain shall be smooth and have a uniform slope from top to bottom.

B.2 EXCAVATED MATERIAL

Excavated material shall be deposited on either or both sides of the drain as directed by the Engineer. In general, the material shall be placed on the low side of the drain or opposite trees and fences. The Contractor shall contact all landowners before proceeding with the work to verify the location to place and level the excavated material.

A clear berm or margin of at least 2.0m shall be left between the top edge of the ditch and the leveled spoil. In no case shall the side of the spoil bank nearest the ditch have a slope greater than 1.5m to 1m. Excavated material shall in general be placed on the lower side of the drain or on the side opposite trees and fences.

Any large stones or boulders which exceed 500mm in diameter shall be bulldozed into a pile and left near the ditch banks or a nearby fence line or bush, or such other convenient location as approved by the landowner.

Where it is necessary to straighten any unnecessary bends or irregularities in the alignment of the ditch or to relocate any portion or all of an existing ditch, the excavated material from the new cut shall be used for backfilling the original ditch. Regardless of the distance between the new ditch and the old ditch, no extra compensation will be allowed for this work and must be included in the Contractor’s lump sum price for the open work.

B.3 SPREADING AND LEVELLING

The spoil shall be deposited, spread and leveled up to a maximum depth of 200mm and be left so that the land on which it lies may be cultivated with adjacent lands by use of ordinary farm machinery. If the Contractor obtains a statement in writing, signed by the owner of the lands affected that he does not wish the spoil to be leveled, the Engineer may release the Contractor from his obligation in that regard. Disposal of the material shall be to the satisfaction of the Engineer. Through timbered land the excavated material may be spread to a maximum depth of 60mm unless otherwise noted on the Plans governing the work. The Contractor is not required to remove stones and boulders from the excavated material unless called for in the Special Provisions.

B.4 FILLING OLD CHANNEL

At every new cut, the excavated material shall be used to fill the abandoned channel unless otherwise directed by the Engineer. Fill shall be placed to 300mm below finished ground surface.

Where the on-site soil available is of insufficient quantity or quality to fill the abandoned channel, new soil shall be imported from an approved source. The imported soil shall be of the quality necessary to support agricultural operations, and shall meet the most current Table 1 standards for Agricultural Use under the “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act” as published by the Ontario Ministry of the Environment and Climate Change. All imported soil will be subject to the approval of the receiving landowner. Fill soil placed to fill in abandoned channels shall be compacted to 95% SPMDD or as otherwise directed by the Engineer.
Abandoned channels shall be finished with a 300mm layer of topsoil of the quality necessary to support agricultural operations, and subject to the approval of the Engineer and the receiving landowner.

B.5 **INLETS FOR SURFACE WATER**

Inlets shall be left in the leveled spoil on each property but not over 90m apart, or as shown on the Plan or Profile. No excavated material is to be left in or any damage done to any ditches, depressions, furrows, pipes, or tiles intended to conduct water into or across the open drain.

B.6 **EXCAVATION AT BRIDGE SITES**

The Contractor shall be required to excavate the drain to full depths and as nearly as possible to the full widths and slopes at the sites of all bridges. Bridges of a permanent character are not to be unnecessarily disturbed. The excavation at these bridges being made if necessary by hand, or by other suitable means.

Excavation under culverts and bridges is to conform to the grades, bottom widths and side slopes specified. The Contractor shall be held liable for any damage to any structure caused by his carelessness, neglect or over-excavation. The Contractor shall immediately notify the Engineer if it should become apparent that the excavation of the drain to the grades shown on the Plan will in any way endanger any culvert or bridge and the Contractor shall discontinue work on the drain until the Engineer instructs him to proceed.

B.7 **FARM BRIDGES AND FARM CULVERTS**

All farm bridges hereafter constructed or reconstructed, in order not to be regarded as obstruction, shall have minimum openings equal to the cross-section area recommended in the Report or of clear width equal to twice the specified bottom width of the drain. If required, it shall be the responsibility of the landowner to arrange for the supply, delivery and installation of a culvert of the recommended size. This work shall not form part of the Contract.

If a landowner at the time of construction has furnished a suitable culvert at the site, the Contractor shall install it as part of the work at the landowner’s expense, with the invert 150mm below the grade of the drain, and with a suitable earth backfill such that a crossing with normal farm machinery can be made. Final grading, shaping or rip rapping of backfill shall be the responsibility of the landowner(s) involved. A minimum of 500mm cover shall be placed over each culvert.

Where it is necessary to remove a temporary farm bridge in order to perform the necessary excavation, the material from the bridge shall be carefully handled and left at the side of the drain for the use of the owner.

B.8 **RIP RAP PROTECTION FOR CULVERTS**

Where rip rap protection is called for at either or both ends of a new culvert such rip rap shall be heavy field stone or quarry stone rip rap protection with geotextile filter material (Terrafix 270R filter cloth or approved equivalent).

The Contractor shall be responsible for any defects or damages that may develop in the rip rap or the earth behind the rip rap that the Engineer deems to have been fully or partially caused by the faulty workmanship of the materials for a period of one (1) year from the time of the final payment certificate.

B.9 **OBSTRUCTIONS**

All brush, bushes, fallen timber and debris shall be removed from the banks and slopes of the drain to such a distance on each side to eliminate any interference with the spreading of the spoil bank. Grubbing shall include the removal and disposal of all stumps to the satisfaction of the Engineer. The slopes shall be cleared whether or
not they are directly affected by the excavation. The roots shall be left in the banks if no bank excavation is required as part of the new channel excavation. Any tress necessarily removed, are to be brushed and left for the landowner. In wooded or heavily overgrown areas, the brush, limbs, etc. may be pushed into piles back out of the way. All dead trees alongside the drain that impede the performance of the drain shall be removed prior to excavation and put in piles, unless directed otherwise by the Engineer. All brush, limbs, debris, etc. shall be put into pile for disposal by the landowner.

B.10 **Roads**

Where an open drain is being removed from the road allowance, it must be reconstructed wholly on the adjacent farm land with a minimum berm width of 1,200mm on the roadway side of the ditch, unless otherwise noted on the Drawings. The excavated material shall be used to fill the existing open ditch and any excess excavated material shall be placed and leveled on the adjacent farm land. Any work done on the road allowance with respect to excavation, disposal of materials, installation of culverts, cleaning under bridges, etc., shall be to the satisfaction of the Road Authority. Any metal pipe culvert laid under the traveled portion of the road allowance shall be constructed as per Section A.17.

All excavated excess material from the construction of a road culvert or cleanout through culverts on any road allowance shall be trucked away or deposited and spread on the road allowance if permitted by the Road Authority. Any culverts suitable for salvage shall become the property of the landowner, if the landowner wishes to retain same, otherwise the Contractor be responsible for the disposal of the culvert to the satisfaction of the Engineer.

B.11 **Tile Outlets in Existing Ditches**

All tile outlets in existing ditches shall be noted by the Contractor prior to excavation. The Contractor shall contact all landowners and ask them to mark all their tile outlets which enter the ditch. Any tile drain outlets that were marked and are subsequently damaged by the Contractor shall be repaired by the Contractor at his expense. If any ditch bank is altered due to the construction at the tile outlet, the Contractor shall replace the altered outlet.

In general, if the existing outlet is tile only, the new outlet shall consist of undamaged lengths of tile. If the existing outlet is a metal pipe with or without a rodent grate, such outlet shall either be relocated to adjust to the new banks or shall be replaced if damaged. If any outlet becomes plugged as a result of construction, the Contractor shall be obliged to free such outlet of impediments. Where stone or concrete rip rap protection exists at any existing outlet, such protection shall be moved as necessary to protect the outlet after reconstruction of the ditch. Where any damage results to tile leading to and upstream of the outlet as a consequence of construction, the Engineer may direct the Contractor to repair such tile and shall determine fair compensation to be paid to the Contractor for performing the work.

B.12 **Grass Seed and Fertilizer**

The ditch slopes where disturbed shall be seeded using an approved seed mixture. The grass seed and fertilizer shall be applied the same day as the excavation of the open ditch. Grass seed shall only be applied between April 15th to November 15th, unless otherwise directed by the Engineer.

Grass seed shall be fresh, clean and new crop seed, meeting the requirements of OPSS 804 for Standard Roadside Mix.

Grass seed shall be applied at the rate of 170kg/ha (150lbs/acre) and the fertilizer shall be applied at the rate of 365kg/ha (325lbs/acre), or as directed otherwise. Fertilizer shall be 8-32-16 (N-P-K).
B.13  **EQUIPMENT**

An approved hydraulic backhoe shall be used to carry out the excavation of the open ditch unless otherwise directed by the Engineer.

B.14  **COMPLETION**

At the time of completion and final inspection, all work in the Contract shall have the full dimensions and cross-sections specified without any allowance for caving of banks or sediment in the ditch bottom.
SECTION C - TILE DRAINS

C.1 Tile Quality

All tile installed under these Specifications shall be sound and of first quality and shall meet all ASTM Specifications as set out in Designation C4-62 and C498-65 for Clay Tile and/or C412-65 for Concrete Tile. Where tile is being supplied by the Contractor, it shall be approved by the Engineer before being incorporated into the work and the Engineer shall have the right to order such tests as he deems necessary to be made upon the tile, including that of testing by an independent testing laboratory. The costs of all such tests shall be borne by the Contractor and may be deducted from monies due to the Contractor under this Contract.

C.2 Line

New tile drains shall be constructed at an offset from and parallel to any existing ditch or defined watercourse in order that fresh backfill will not be endangered by the flow of surface water. The Contractor shall exercise care not to disturb any existing tile drains which follow the same course as the new drain particularly where the new and existing tile act together to provide the necessary capacity. Where any such existing drain is disturbed or damaged, the Contractor shall perform the necessary correction or repair at his expense.

The Contractor shall verify the location of the new tile drain with the Engineer, Drainage Superintendent and the landowner before proceeding with the work.

C.3 Tile Laying

All tile shall be laid carefully on a smooth solid bottom with all joints aligned both vertically and horizontally. All tile being laid in a straight line shall be placed together as tightly as possible with the maximum space between successive tiles not exceeding 6mm. All tile being laid on a curve shall be fitted with a maximum space between successive tiles not exceeding 6mm at any point on the circumference. Any tile joint exceeding this tolerance shall be covered with wire mesh and sealed all around with concrete not less than 150mm thick. The grades and location of the tile shall be as specified on the Plan and Profile. No deviation shall be permitted without the written permission of the Engineer with the exception of that stated in Section A.4 of these Specifications. The maximum trench width at the top of the tile shall not be greater than the outside diameter of the tile plus 600mm. The trench shall not be opened up for a distance greater than 60m in advance of the tile laying. All dirt, foreign material and obstructions shall be removed from inside the tile before laying. Where corrugated metal pipe is used, the joints between the metal pipe and the field tile shall be sealed with concrete not less than 150mm all around. When construction is stopped for the day, the open ends of all tile drains shall be completely closed to prevent entry by animals or unnecessary water.

The sides of the tile are to be supported by partial filling of the trench prior to inspection by the Engineer. The remainder of the excavated material shall be used to restore and maintain the natural surface of the ground. No tile shall be backfilled until inspected by the Drainage Superintendent or Engineer unless directed otherwise by the Engineer. The tile shall be backfilled such that a sufficient mound of backfill is placed over the disturbed area. The Contractor’s Tender Price shall include the cost of stripping the topsoil, bulldozing of the subsoil to the depth required and subsequent replacement of subsoil and topsoil.

C.4 Lowering of Surface Grades

Where required, the Contractor shall strip back and stockpile the topsoil, and strip the subsoil in order that the tiling machine may trench to the correct depths. After the tile is installed, the trench shall be backfilled, subsoil replaced and the topsoil shall be spread over the disturbed area. The Contractor’s Tender Price shall include the cost of stripping the topsoil, bulldozing of the subsoil to the depth required and subsequent replacement of subsoil and topsoil.
C.5 TRIBUTARY DRAINS

Any tributary tile encountered in the course of the drain is to be carefully taken up by the Contractor and placed clear of the excavated earth. If the tributary drains encountered are clean or reasonably clean, they shall be connected into the new drain. Tributary tile drain connections into the new drain shall be made using high density polyethylene agricultural drain tubing installed on and backfilled with 19mm clear crushed stone. All tile drain connections into the new drain shall be cored hole with an InsertaTee or a manufactured “tee”.

Where the existing drains are full of sediment, the decision to connect or not to connect the new drain shall be left to the Engineer. The Contractor shall be paid for each tributary drain connection as outlined in the Form of Tender and Articles of Agreement.

The Contractor shall be responsible for all tributary tile connections for a period of one (1) year after the issuance of the final payment certificate by the Engineer. After construction, any missed tile connections required to be made into the new drain shall be paid at the same rate as defined in the Form of Tender and Agreement. The Contractor will have the option to make any subsequent tile connections or have the Municipality make the required connections and have the cost of which deducted from the holdback.

Where the Contractor is required by the Engineer to hook up an existing tile which is not encountered in the course of the drain, the cost of such work shall constitute an extra and the basis for payment shall be determined by the Engineer subject to the provision of Section A.20 “Completion of Work”.

C.6 CONNECTIONS

All tile encountered shall be connected into the main drain or a catch basin. Tile connections may be made by using the same size of concrete field tile or one size larger of standard corrugated plastic drainage tubing. Connections are included as part of the Contract. The Unit Price shall include the supply and installation of up to 3m of tile in order that the connection will be sloped at not greater than 3m horizontal to 1m vertical. All tile connections will be made in the upper 1/3 of the circumference of the main tile. Connection at the main shall be “earth tight” to the satisfaction of the Engineer. All connections shall be left uncovered for inspection by the Engineer.

Any open ends of tile left by making the connections shall be securely plugged with concrete.

C.7 BACKFILLING

All tile shall be left open, as the laying of tile progresses, until after inspection. After laying and prior to inspection, partial filling (blinding) is to be made at the sides of the tile and compacted sufficiently to maintain the alignment. The upper 1/3 of the tile shall be left uncovered until after inspection by the Engineer or Drainage Superintendent in charge of the works. Where conditions indicate that damage may occur, arrangements shall be made for daily or continuous inspection by the Engineer or Drainage Superintendent. The Engineer or the Drainage Superintendent in charge of the work reserves the right to demand that all or any part of the works be uncovered to allow for adequate inspection and the Contractor shall supply, at his own expense, all equipment and labour to do the said work.

After the work is inspected by the Engineer or Drainage Superintendent in charge of the work, the remainder of the excavated material shall be used to restore and maintain the natural surface of the ground. Stones having any dimensions larger than 150mm shall not be used for backfill material within 300mm of the tile.

C.8 OUTLET PROTECTION

The protection at the outlet of a tile drain shall be a length of corrugated metal pipe fitted with a rodent-proof grate. The grate shall be hinged at the top to permit the exit of foreign material from the tile. The pipe shall be protected with rip rap protection consisting of quarry stone or heavy field stone and geotextile filter material in a
manner satisfactory to the Engineer. The rip rap shall extend from the bottom of the trench to the original ground surface and for a distance of at least 3m from the end of the outlet pipe unless otherwise specified on the Drawings. The protection shall extend to the top of the backfilled trench and below the pipe to 300mm under the streambed and also extend 600mm into undisturbed soil on either side of the backfilled trench unless otherwise specified on the Drawings.

Where the outlet occurs at the end of an open ditch, the above sacked concrete or heavy field stone rip rap protection will extend all around the end of the ditch and to a point 800mm downstream on either side unless otherwise specified on the Drawings. Where heavy overflow is likely to occur, sufficient additional rip rap and filter material shall be placed as directed by the Engineer to prevent the water cutting around the protection. A concrete structure may be required to protect against heavy overflow if so indicated on the Drawings. The corrugated metal pipe shall have a hinged metal grate on the outlet end to prevent the entry of small animals. Maximum spacing between bars shall be 50mm.

C.9 CATCH BASINS

All catch basins shall be of 20 MPa concrete, either poured in place or of approved reinforced precast unit or sectional construction having inside dimensions 600mm x 600mm with 450mm sump or with the appropriate dimensions as noted on the Plan and Profile Drawings. The sides and bottom of poured in place catch basins shall have a minimum thickness of 150mm. The elevation of the top of the catch basin shall be as set by the Engineer at the time of construction. All necessary grading to convey water to the catch basin shall be included as part of the Contract.

All tile and pipe entering a catch basin shall be sealed all around with 15 MPa concrete which shall extend a minimum of 150mm beyond the OUTSIDE WALL of the catch basin. The INSIDE WALL of the catch basin shall be formed and the void around all tile and pipe entering a catch basin shall be completely filled with concrete to form a smooth flush surface.

If there are no existing drains to be connected to the catch basin at the top end of the drain, a plugged tile shall be placed in the upstream wall, with the same diameter and at the same elevation as the outlet tile.

Unless otherwise specified, all catch basins shall be offset with 200mm diameter tile. All offsets shall enter into the main tile at a maximum angle of 45 degrees downstream with a maximum grade of 0.50%. The connection into the main tile shall be fitted and sealed all around with a minimum of 150mm of 15 MPa concrete. It shall be the responsibility of the Contractor to supply and install all tile required for the construction of the offset. Payment shall be made, extra to the Contract, for the actual quantity installed, as measured at the time of construction, in accordance with the Unit Prices. All offsets shall be left open for inspection by the Engineer.

All blind inlets shall be constructed with 19mm clean, crushed stone placed to a minimum depth of 150mm over the top of the tile between the stations as specified in the Special Provisions.

C.10 JUNCTION BOXES

Where junction boxes are specified, they shall be constructed of not less than 20 MPa concrete. The sides, bottom and top shall be a minimum of 100mm thick or as specified. The inside dimensions of the box shall be a minimum of 300mm x 300mm wide x 300mm high but in no case shall they be less than 100mm larger than the outside diameter of the largest tile being connected.

All tile and pipe entering a junction box shall be sealed all around with 20 MPa concrete which shall extend a minimum of 150mm beyond the OUTSIDE WALL of the junction box. The INSIDE WALL of the junction box shall be formed and the void around all tile and metal pipe entering the junction box shall be completely filled with concrete to form a smooth, flush inside surface.
C.11 **Brush, Trees, Debris, Etc.**

The Contractor is to include the removal of all excavation of whatever nature, disposal of material, removal and cutting of all brush, supplying of all labour and completing the whole work in accordance with the Plan, Profile and Specifications. Any trees necessarily removed are to be brushed and left for the Owner of the property on which they are found. All brush, limbs, etc. are to be put in piles by the Contractor and left for disposal by the landowner. No additional payment will be made for brushing of scattered trees where required by the Engineer.

Where, in the opinion of the Engineer, the drain or proposed location of the drain is heavily overgrown with small trees and brush, the Contractor may use a bulldozer or other such equipment to clear a maximum width of 20m. The resulting debris shall be placed where directed by the Engineer and/or the landowner(s) and left for disposal by the landowner(s). Where roots may interfere with the new drain, all such roots shall be grubbed and placed in a pile convenient for disposal by the landowner. No additional payment will be made for such work.

C.12 **Quicksand**

The Contractor shall immediately contact the Engineer or Drainage Superintendent if quicksand is encountered. The Engineer or Drainage Superintendent shall direct the Contractor to construct a temporary open drain to lower the water table or to lay the tile on a crushed stone mat and wrap the tile joints with filter material, or to take such action as may be necessary. The basis of payment for such work shall be determined by the Engineer or Drainage Superintendent.

C.13 **Rocks**

The Contractor shall immediately contact the Engineer or Drainage Superintendent if boulders of sufficient size and number are encountered such that the Contractor cannot continue trenching with a tiling machine. The Engineer or Drainage Superintendent may direct the Contractor to use some other method of excavating to install the drain. The basis of payment for this work shall be determined by the Engineer or Drainage Superintendent.

If only scattered large stone or boulder are removed on any project, the Contractor shall either excavate a hole to bury same adjacent to the drain, or he shall haul the same to a nearby bush or fence line, or other convenient location as approved by the landowner(s).

C.14 **Broken or Damaged Tile**

The Contractor shall either bury or remove all damaged tile. NO tile shall be left on the ground for the landowner(s).

C.15 **Filling in Existing Ditches**

The Contractor shall backfill the ditch sufficiently for traversing by farm machinery. If sufficient material is not available from the old spoil banks to fill in the existing ditch, the topsoil shall be stripped and the subsoil shall be bulldozed into the ditch and the topsoil shall then be spread over the backfilled waterway.

C.16 **Construction of Grassed Swales/Waterways**

Where the Contractor is required to construct a grassed swale/waterway, the existing waterway shall be filled in, regarded, shaped and a seed bed prepared prior to applying the grass seed and fertilizer. The grass seed shall be fresh, clean and new crop seed, meeting the requirements of “Lowland Mix” as per OPS 804.

Grass seed shall be applied at the rate of 170kg/ha (150lbs/acre) and the fertilizer shall be applied at the rate of 350kg/ha (300lbs/acre), or as directed otherwise. Fertilizer shall be 8-32-16 (N-P-K).
C.18 TILE CROSSING ROADWAYS

(a) The Municipality will supply no labour, equipment or materials for the construction of any road crossing.

(b) The excavated material removed from the travelled portion of the road and 1.2m or the full width of the gravel shoulder, whichever is greater, on each side of the travelled portion shall be removed and disposed of off the site by the Contractor. No excavated material shall be spread on the right-of-way without written consent of the Engineer.

(c) The backfill material for the excavation on the travelled portion and 1.2m, or the full shoulder width, on either side, shall be in accordance with A.17 “Road Crossings”.

(d) A stockpile of approximately 1m of crushed gravel for each crossing shall be left by the Contractor for future levelling by the Municipality, at a location approved by the Engineer.

(e) The Contractor shall apply calcium chloride at the rate of 1 kg/m$^3$ to the finished surface for the entire width of the excavation covered in this section.

(f) The excavated material from the trench beyond a point 1.2m from the travelled portion or beyond the outside edge of the gravel shoulder, may be replaced in the trench in the case of covered drains. This material shall be compacted by hand tamping in layers not exceeding 600mm. The finished work shall be left in a clean and orderly condition, flush with or slightly higher than the adjacent ground, and seeded with a good quality grass seed mixture to the requirements of the Engineer.

(g) The type, location on the right-of-way and the elevation of the top of catch basins, inlets and junction boxes on the right-of-way shall be as required by the Engineer.

(h) (i) The Contractor shall give the road authority such notice as it may require before he commences any work on the right-of-way of any road. A copy of the notice shall at the same time be sent to the Township's Drainage Engineer.

(ii) The Contractor shall be responsible for maintaining the road crossing until the work has been approved by the Engineer and shall be responsible for any deficiencies arising from his work for the period of guaranteed maintenance.

(i) If at all possible, the Contractor shall keep the road open to traffic at all times. The Contractor shall provide suitable warning signs and/or flagmen to satisfy all requirements for safety and to notify the motorist of work on the road ahead. If it is necessary to close the road to through traffic, the Contractor shall provide for and adequately sign the detour road as per the Ontario Traffic Manual Book 7.

C.19 RECOMMENDED PRACTICE FOR CONSTRUCTION OF SUBSURFACE DRAINAGE SYSTEMS

The latest report of the Ontario Farm Drainage Association (OFDA), Construction Standard Committee dealing with the construction of Subsurface Drainage Systems, shall be the guide to all methods and materials to be used in the construction of tile drains except where superceded by other Specification of the Contract.
APPENDIX F

Unofficial Crossing Agreement and Operational Constraints
[Insert Date], 20____

[Applicant Company Name]
[Address]
[Domicile]
[Postal Code]

Attention: [Name and Title]

RE: ________________________________ (Applicant)
Proposed Crossing of Union Gas Limited's NPS ___ Natural Gas Pipeline
("Union Pipeline") with a __________ (the "Facility") in Lot ___, Concession ___,
Township of____________ (the "Crossing")

We acknowledge your request for Union Gas Limited ("Union") to consent to the Crossing.

Union constructs and operates natural gas transmission, distribution and storage pipeline facilities. Natural gas is viewed as the cleanest-burning fossil fuel and is an economical source of energy for those persons dependant on it for residential, industrial and commercial uses. Union's activities are regulated by the Ontario Energy Board who must determine, among other things, that our projects serve the public interest. Union must therefore protect its pipelines to ensure an uninterrupted supply of heat and energy in the public interest. Additionally, Union is a regulated utility subject to a fixed rate of return and must avoid unnecessary costs of operating its pipelines.

The Union Pipeline is contained within an easement registered against the title to the subject lands. Details of the easement agreement are available at the registry office or through our Lands Department.

In consideration of Union consenting to the Crossing, the Applicant agrees to the following general terms and conditions;

1. The Applicant and the Applicant’s Contractors will make the necessary arrangements through Union contacts as defined in Appendix A.

2. The Applicant and the Applicant’s Contractors will comply with the general conditions for consent in Schedule A, attached hereto;

3. The Applicant and the Applicant’s Contractors will install the Crossing strictly in the manner described in Schedule B and C, attached hereto;
[Name of Crossing Applicant]
[Insert Date], 20____
Page 2 of 2

4. The Crossing will be designed and constructed strictly in accordance with Schedule D, your drawing dated _______________, and approved by Union prior to commencing with construction.

Please have three (3) copies of this letter dated and executed by your authorized signing officer(s) and return it to the writer within 30 days of the date hereof. We will return one fully executed agreement to you whereupon it shall form an agreement between us for the Crossing. The Applicant and Applicant’s Contractor shall give Union a minimum of three (3) business days’ advance notice, by telephone and/or email, and receive confirmation before any work may begin.

Yours very truly,

[District Engineer]
[Title]

Read and agreed to at _______________________ this _____ day of ______________________, 20__.

Witness:  Applicant
(Name of Company/person(s))

____________________________________
Name/Title

____________________________________
Name/Title

"I/we have authority to bind the corporation."

Copies to:  Division/GSO
Lands (file)
APPENDIX A

Union Gas District and Contact Information

Please note the following pipelines that your proposed line would cross:

**CONTACTS**

NAME: ___________________________ PHONE: ________________________ (office)

CELL: ___________________________

NAME: ___________________________ PHONE: ________________________ (office)

CELL: ___________________________

London Planning (519) 667-4200 Ext. 147 to arrange for 3rd party observation

Emergency Call Centre 1-877-969-0999

**CRITERIA for Crossing Union Gas Pipelines;**

1. Field locates are required before any construction begins. These may be obtained by calling Ontario One Call - **ON1Call at 1-800-400-2255.**

2. The Applicant and the Applicant’s Contractors are responsible to contact appropriate personnel **three (3) business days advance notice** to arrange for 3rd party inspection for the excavation and crossing. Third party observation is required when excavating within 1.5m of a pipeline(s).

3. It is the Applicant’s responsibility to verify depth of existing line to maintain this separation, using hydro vac excavation.

4. The Applicant and the Applicant’s Contracts are **NOT** to make any changes to the existing grade, as to maintain the depth of the pipelines.

5. The Applicant and the Applicant’s Contractors shall use extreme caution while working around these high pressure pipelines

6. Any pipe support drawings shall be reviewed by Union before beginning work.
CRITERIA for Crossing Union Gas Pipeline with Heavy Equipment;

The Applicant and the Applicant’s Contractors have approval to cross the sections of pipeline stated in Appendix B with the equipment referenced in Appendix B.

The Applicant and the Applicant’s Contractors shall not drive any other heavy equipment directly over the pipelines without first obtaining approval from Union Gas. If changes are required, the crossing will need to be re-assessed. Re-assessment turnaround time is 1-2 weeks, once all information is received from the Applicant.

When crossing the sections of pipeline stated in Appendix B with the above equipment, the following conditions must be followed by the Applicant and the Applicant’s Contractors;

1. The number of crossings (back and forth) should be minimized.
2. The equipment must cross our pipeline perpendicular to the line (not running along the length of the line).
3. Equipment using the crossing shall be operated at slow speeds when crossing the pipeline to minimize impact loading.
4. The equipment cannot remain stationary on the pipeline.
SCHEDULE A

General Conditions for Crossing Consent

1. In this agreement:
   (a) the term "Applicant" refers to the person(s) who will own, operate and maintain the Facility;
   (b) the term "Contractor" means the person(s) who constructs and installs the Facility;
   (c) the term "Facility" refers to the works of the Applicant as described in the covering letter-agreement to this Schedule;
   (d) the term "Crossing" refers to the crossing of Union's pipeline(s) by the Facility at the location described in the covering letter-agreement to this Schedule.

2. Union consents to the Crossing to the extent that it has the right to do so and the Applicant shall be responsible for obtaining all other applicable approvals, permits, orders and permissions required to construct and install the Facility.

3. Applicant agrees to comply with all applicable rules, orders, regulations, codes and guidelines of any competent government body or organization affecting the design, installation, construction and operation of the Facility.

4. Applicant agrees to indemnify and save Union harmless against any claims, demands, actions, suits, proceedings, damages, injuries (including injuries resulting in death) that may arise as a result of the construction, installation and operation of the Facility, unless caused by the negligent or intentional acts of union, its agents, employees, licensees, invitees, successors and assigns.

5. In connection with Clause 4, above, Applicant, at its own expense shall carry and keep in full force and effect:
   (a) Comprehensive General Liability insurance with an inclusive limit for personal injury and property damage of Five Million Dollars ($5,000,000.00), and such limits may be made up of a combination of Primary and Excess Liability policy. Applicant must add Union Gas as an additional insured on this policy with respect to this agreement and have its insurers provide a waiver of subrogation in Union Gas's favour, and;
   (b) Automobile Liability Insurance ("Owned" and "Non-Owned") with an inclusive limit for bodily injury (including passengers) and property damage of One Million Dollars ($1,000,000.00).
Applicant shall submit certificates or other evidence of such insurance to Union prior to any work commencing for the Crossing.

6. Applicant agrees to personally perform the installation and construction of the Facility or else to closely supervise its installation and construction by a duly qualified contractor(s) and to ensure that said contractor(s) complies with all terms and conditions of this agreement.

7. The Applicant shall pay forthwith upon presentation of an invoice by Union, all reasonable costs incurred by Union for:

   (a) Review, approval and inspection of the Crossing;

   (b) Reinforcing, modifying or relocating Union's pipeline(s) to accommodate the installation of Applicant's Crossing or the maintenance and repair of its Facility;

   (c) Any reasonable incremental costs incurred by Union in the operation, maintenance, inspection, replacement and repair of its pipeline(s) which are caused by the Crossing.

8. The terms and conditions of this consent shall apply to the construction and installation of the Crossing and any future maintenance work that may be required.

9. This consent is for the Facility shown in Schedule C only and any additional works or facilities proposed by the Applicant shall be the subject of a separate agreement.

10. Applicant hereby agrees and acknowledges that its rights in the Crossing are subordinate to the easement(s) of Union that have been registered or obtained prior to this date and Applicant shall cooperate with all reasonable requests made by Union related to the operation, maintenance and repair of Union's pipeline(s) within the easement(s).

11. In the case of default by the Applicant to carry out any of the provisions of this agreement or if the condition of Applicant's Facility has deteriorated and adversely affects to the operation of Union's pipeline(s), Union may give written notice thereof. If the Applicant fails to take all reasonable steps to remedy the default or the deterioration of the Facility within fifteen (15) days after receipt of the written notice by Union, Union may take such steps as are necessary to remedy the default or deterioration and Applicant shall be liable for and shall pay forthwith all reasonable costs incurred by Union in this regard.

12. All notices required to be given hereunder shall be delivered by registered mail or facsimile to the addresses shown on the covering letter-agreement and shall be deemed to be received on the fifth (5th) day following mailing thereof or upon confirmation of facsimile transmission.

13. This agreement shall be governed in accordance with the laws of Ontario.
14. Neither party to this agreement shall assign or transfer their rights and obligations hereunder to a third party without first obtaining the written consent of the other party, except for a Permitted Assignment. A Permitted Assignment is an assignment by Applicant to an affiliate of the Applicant or lender(s) to Applicant. Applicant does not need consent from Union for a Permitted Assignment, but Union must receive notice regarding any assignment or proposed assignment to an affiliate.

15. The rights and obligations of the parties hereto shall terminate upon the later of:

(a) two (2) years from the date hereof if the Applicant has not completed the construction and installation of the Facility and restoration of the lands affected by the Crossing; or,

(b) upon the proper abandonment or removal of the Facility and restoration of the lands to a condition acceptable to Union and the owner of the property where the Crossing is situate.

16. This agreement and Schedules A, B and C constitute the entire agreement between Union and the Applicant and any change or alteration hereof shall be made in writing between the parties.

17. If any part of this agreement shall become null and void by virtue of law or governmental regulation, it shall be severed from the agreement, but the remaining terms and conditions shall remain in full force and effect.
SCHEDULE B

Installation Guidelines

Excavation

1. The following conditions shall apply whenever any construction activities shall require the need for the operation of equipment or excavation near the Union pipeline(s).

   (a) To protect exposed Union Pipeline from damage during the proposed work, Union's on-site inspector may require the Applicant to install certain safety precautions before beginning construction.

   (b) To avoid possible damage to the Union Pipeline while excavating, it shall be supported adequately, as directed by Union's on-site inspector.

   (c) To avoid possible damage to Union Pipeline, heavy equipment shall be restricted to crossing within the travelled portion of the easement unless other crossing locations are approved by Union's on-site inspector.

   (d) Applicant shall provide at least three (3) business days' advance notice prior to commencing any excavation near the Union pipeline(s).

General Conditions for Crossings of the Pipeline by Highways, Private Roads, Railways and Utilities

2. The following general conditions shall apply to Crossings of the Union Pipeline by a highway, private road, railway or utility.

   (a) In the case of a crossing of the Union Pipeline by a highway, private road, railway or utility the Crossing shall, except as otherwise provided herein, conform to the respective specifications and requirements of the current Canadian Standards Association Z662 for Gas Pipeline Systems and if the facility will result in the Union Pipeline not conforming, the Crossing may be made only if the Union Pipeline is reconstructed to conform to such requirements, the cost of which shall be borne and paid for by the Applicant.

   (b) The Applicant shall pay all costs to ensure the Union Pipeline shall, in all cases, be of sufficient strength to withstand all stresses and strains resulting from the Crossing.

   (c) The Crossing shall be constructed so as to cross the Union Pipeline at an angle as close as practicable to ninety (90) degrees, but not less than forty-five (45) degrees.

3. At any crossing of the Union Pipeline, except crossings by overhead telephone,
telegraph, telecommunication or electrical power lines, the Union Pipeline and the Facility shall be identified by suitable markers.

4. A buried utility shall cross under the Union Pipeline unless otherwise approved by Union. A clearance of not less than 0.6m shall be maintained at the point of crossing between the utility and Union Pipeline and all other underground structures. In all circumstances, minimum clearances as stipulated in the current edition of Canadian Standards Association code CAN/CSA-Z662 "Gas Pipeline Systems" shall be complied with.

(a) Underground utility crossings shall also be subject to the following design constraints:

(i) Utilities must be installed at a level grade across the entire width of the Union Pipeline easement with the exception of gravity dependent structures. In such cases, the minimum clearances specified in between the utility and Union Pipeline(s) crossed must be maintained.

(ii) In the case of any Applicant's buried pipelines, no joints may be made over or under any Union Pipeline(s).

(iii) If Applicant's pipeline(s) will operate under pressure, it (they) shall be pre-tested to at least the required pressure test pressure prior to its installation across the Union Pipeline easement.

(iv) In the case of buried power cables or electrical grounding installed by open-cut method, the Applicant shall install a 75mm thick concrete slab, or suitable equivalent (i.e. patio paving stones) placed 300mm above the utility service installation, the full width of the Union Pipeline Easement. There shall be a minimum separation of 300mm between the top of the concrete slab and the bottom of the Union Pipeline(s). This separation shall be maintained over the entire width of the Union Pipeline easement(s). The concrete slab should be un-reinforced red dye concrete. The utility shall be permanently identified with "caution" tape on top of the concrete slab.

(v) In the case of buried power cables or electrical grounding conductors installed by directional drilling, the Applicant shall install the cables with a minimum 600 mm separation between the bottom of the Union Pipeline(s) and the top of the power cable.

(vi) In the case of buried cables, no joints, splices or other connections shall be made within the Union Pipeline easement.

(vii) The method of installation of all utilities crossing Union Pipeline(s) below ground level must be specified in the Applicant's submission to Union.

5. A highway or private road shall be constructed so that the travelled surface thereof shall be not less than 1.2m above the top of the Union Pipeline or the casing pipe, where required. The bottom of the ditches shall be not less than 1.0m or the
minimum distance required by the local M.T.O. office above the top of the Union Pipeline or casing pipe.

**Railway Crossing Requirements**

6. The following conditions apply to the crossings of Union Pipeline(s) by railways and shall supplement or supersede the conditions detailed in Section 2 through 5.

(a) Where Union specifications stipulate, the Union Pipeline within the vicinity under and around the crossing as specified in CSA Z662-11 (latest edition) shall be subject to one of the following modifications:

- Replaced with new piping of sufficient grade and wall thickness to meet the design requirements for such a crossing; or
- Encased in a metal casing pipe, to be installed by Union.

  o The design requirements for the pipe in either of the cased or uncased crossings are specified in CSA Z662-11 (latest edition), except where superseded by TC E-10 (Standards Respecting Pipeline Crossing Under Railways).

  o The cost of the selected course of action shall be borne and paid for by the Applicant.

(b) Railway crossings shall be constructed to allow the following minimum clearances for cased and uncased piping as specified in TC E-10:

  - (i) Cased Piping
    - One hundred and sixty-eight (168) centimetres between the top of the Union Pipeline or casing pipe and the base of the rail for a distance of at least 7.0m from the centreline of the outermost track.
    - Ninety-one (91) centimetres between the top of the Union Pipeline or casing pipe and the bottom of the railway right-of-way ditch and/or natural ground surface.

  - Uncased Piping
    - Three hundred and five (305) centimetres between the top of the Union Pipeline or casing pipe and the base of the rail for a distance of at least 7.0m from the centreline of the outermost track.
    - One hundred and eighty-three (183) centimetres between the top of the Union Pipeline or casing pipe and the bottom of the railway right-of-way ditch and/or natural ground surface.

The cost of ensuring all depth of cover requirements are met shall be borne and paid for by the Applicant.
(c) Accessible emergency shutoff valves shall be located each side of the railway within effective distances as mutually agreed to by the Chief Engineer of the railway company and the pipeline company. These valves shall be marked with signs for identification. The cost of installing said valves shall be borne and paid for by the Applicant. Where pipelines are provided with automatic control stations and/or valves that are remotely operated, no emergency shutoff valves are required.

(d) The pipeline right of way shall be prominently marked on either side of the rail crossing easement, approximately on the limits thereof, by signs in a language or languages appropriate to the region in which the sign is located. Such signs shall meet the requirements of C.S.A Z662-11 (latest edition), as amended herein. Where such signage is not deemed visible from the track by the Chief Engineer of the railroad company, the appropriate signage should be installed. The cost of installing any and all signage shall be borne and paid for by the Applicant.

Overhead Crossing Requirements

7. The following conditions apply when crossing, paralleling, or working in close proximity of the Union Pipeline by overhead and underground telephone, telegraph, telecommunication and electrical power lines.

(a) Prior to construction, unless otherwise agreed upon by both Union and Applicant, the Applicant shall determine if electrical interference between the Applicant's facilities and the Union Pipeline(s) will occur under the following conditions;
   - Steady State Induced Voltage when Paralleling Pipeline
   - Induced Voltage spikes from electric power line transient fault conditions
   - Energizing and Arcing to pipe under ground fault conditions at poles, ground rods, anchors

   If so, the Applicant is responsible for conducting an Engineering study and providing mitigation as required to ensure that no unsafe voltage levels greater than 15 volts A.C. will be impacted on the Pipeline. Generally in accordance with CSA Standard C22.3 No 6M-91 (Reaffirmed 2003 – latest edition), "Principles and Practices of Electrical Coordination Between Pipelines and Electric Supply Lines". Included in the Applicant's facilities are the poles, pylons, towers, guys, anchors, ground rods and any other supports of an overhead line. The Engineering study shall be made available to Union Gas for review.

(b) The vertical distance between the lowest wire of an overhead line catenary and the surface of the ground within the pipeline easement shall not be less than the minimum vertical clearance distance set out in that part of the Canadian Electrical Code Part 111 (CSA Standard C22.3, "Overhead Systems and Underground Systems").

(c) The poles, pylons, towers, guys, anchors and any other supports of an overhead line and grounding items of underground line, shall be located
outside the Union Pipeline easement and not within ten (10) metres of any Union Pipeline or appurtenance, unless locations are otherwise agreed to by Union and Applicant.

(d) The Applicant, for an overhead line shall, where directed by Union, install aerial warning devices for the protection of Union personnel and equipment conducting aerial patrols.

(e) Overhead utilities are not allowed to be overhead of any above grade piping, or fenced-in area of a Union facility.

(f) Upon completion of Electrical power lines that run parallel to Union pipeline, voltage testing will be required to ensure unsafe voltage levels, are not induced on Union Pipeline(s). The Applicant will be responsible for the cost of such testing and any mitigation requirements as a result of the Applicant’s facilities will be conducted by either Union or Applicant.

**Blasting Requirements**

8. Prior written approval is required if construction of the Facility requires the use of explosives. The Contractor shall comply with all applicable government laws, regulations and orders concerning the use, storage and transportation of explosives, including, but not limited to, the Canadian Explosives Act. The applicant shall comply with the safety requirements of Union.

9. The following conditions shall apply whenever any construction activities shall require the need for blasting when working within thirty (30) metres of the Union Pipeline.

   (a) The effects of blasting shall be controlled.

   (b) A leakage survey of the designated area shall be performed prior to and after blasting by the Union inspector to determine the effect of such operations, the cost of which shall be borne and paid for by the Applicant.

   (c) When blasting is necessary in the vicinity of the Union Pipeline under pressure, the Applicant shall limit the intensity of the ground vibrations emanating from any particular blast, measured on the ground’s surface above the pipeline at the location nearest to the blast to the following specifications:

      (i) Maximum amplitude of vibrations 0.1524 mm.

      (ii) Maximum horizontal peak particle velocity 50 mm/sec.

      (iii) The permissible quantities of explosive per delay period shall be governed by the recorded measurements as influenced by the work site conditions.

      (iv) Explosive agents must, in all instances, be acceptable to Union.
(v) Delays shall be designed to prevent double readings.

(vi) Further restrictions shall be stipulated, as required, by Union.

Cathodic Protection Requirements

10. Applicant agrees to install, at its cost, all cathodic protection facilities deemed necessary by Union to protect the Union Pipeline(s) or otherwise, reimburse Union for the costs of such facilities and installation. Testing may be required to ensure that Union’s Pipeline cathodic protection system does not impact the Applicant’s facilities. The Applicant is responsible for conducting this testing and implementation of any mitigation requirements.
SCHEDULE C

General Guidelines for Union Gas Collector System Installations

A. Overhead Systems (34.5 kv)

For all new overhead (34.5 kv) systems, it is recommended that any grounded part of the 34.5 kv lines (i.e. ground rods, anchors, metal poles, etc.) be installed to maintain a minimum distance of 300 mm from any pipelines. This would include all transmission, distribution and any service laterals that run from the main to the individual customer meter sets serving the homes along the pipeline system.

If this distance cannot be maintained for some reason, then these specific locations (i.e. where separation is less than 300 mm) will need to be identified and further field investigations will need to be conducted. Investigation of impacts shall occur once the system is operational to identify specific impacts and to determine potential remediation measures, as required. For any locations where facilities are installed closer than 2144 mm from the pipeline, Union shall be provided with a drawing showing the specific location with GPS coordinates, and measurements from the structure, etc. to the pipeline.

When installing or drilling (poles) near pipeline facilities, a minimum clearance of 300 mm must be maintained from any structure, anchor, etc. Appropriate locates are required and third part inspection may also be necessary when constructing near gas lines.

B. Perpendicular Underground Crossing of High Pressure Lines on Easements

Applicable Drawing – Directional Bore Details (Gas Pipeline Crossings)

When crossing high pressure transmission lines, extreme care must be taken to prevent any damage to these facilities. Cable crossings of pipeline easements shall be perpendicular to the pipeline and shall undercross the pipeline. A minimum separation distance of 300 mm shall be required between the bottom of the pipeline and top of casing containing power cables. The casing pipe must be installed at the same elevation for the entire width of the easement. Union shall be advised of the method of construction of each crossing in advance of work for approval and be provided with a drawing (see Schedule D for details) for each crossing location.

Structures (poles) are not permitted to be installed on any pipeline easement corridor.

C. Perpendicular Underground Crossing of Distribution Pipelines (Road Allowance)

All locations where cables will undercross distribution lines and service lines, a minimum separation of 600 mm will be required. Cables shall be encased at all crossings for a minimum distance of 460 mm on either side of the pipeline. Union shall be advised of the method of construction of each crossing in advance of work for approval and be provided with a drawing (see Schedule D for details) for each crossing location.
D. **Buried Cables Running Parallel to Gas Lines**

For situations where buried cables are to run parallel to existing gas pipelines, a minimum separation of 600 mm will be required. If this separation distance cannot be maintained, then Union shall be advised of the method of installation of each crossing in advance of work for approval and be provided with a drawing (see Schedule D for details) for each crossing location.

E. **Directional Drilling of Crossings**

Any directional drilling shall use the wireline directional drilling method, in which route of drill head can be tracked to ensure proper clearance. Gas pipelines are to be exposed at each crossing location during directional drilling and monitoring of the drill head as it approaches the pipeline shall be completed until the drill is known to be past the pipeline. Exposure must be in the upstream direction of the drilled pipe coming towards the crossing. Drilling is to stop immediately if the drill is observed in the monitoring hole ahead of the pipeline.

F. **Heavy and Compacting Equipment**

Detailed load analysis will be required for crossing all pipeline with heavy and compacting equipment used in the construction of wind towers. The following detailed information will be required for each piece of heavy and compacting equipment;

- make
- model
- specifications – including dimensions, weights, track information (gauge, track width and track length)

Union will provide a form to complete for each piece of heavy and compacting equipment used in the construction of the wind towers.
SCHEDULE D

Plan Showing Approved Crossing

A drawing of each crossing shall be prepared in accordance with sub-sections A, B and D below. The drawing shall show the location and dimensions of the crossing and the clearance between the lowest catenary and the surface of the ground within the pipeline right-of-way or its projected limits.

**Standard Drawing Requirements**

*Note:* **ALL VIEWS TO BE COMBINED IN ONE DRAWING.**

A. **Plan View**

Scale
- in metric - scale of 1:500 or at a scale which clearly defines all details of the crossing.

Dimensions
- distance along the Union Pipeline easement to the crossing from a definable legal limit; ie. lot line, river, road allowance limit, etc.
- width of the Union Pipeline easement to one-tenth (0.0) of a metre.
- location of the Union Pipeline(s) within the easement to one-tenth (0.0) of a meter at right angles to the pipeline easement.
- angle of the crossing (measured to the Union Pipeline easement)
- show the width of the utility easement(s) to one tenth (0.0) of a metre.
- width of streets in vicinity of crossing.

*Note:* **Parallel Utility easements shall not encroach on the Union Pipeline easement without the written consent of Union.**

Identify
- legal description of the crossing location; ie. lot, section, concession, township, town, village, etc.
- all additional Union Pipeline appurtenances; ie' concrete slabs, weights, pipeline markers, etc.
- north arrow
- scale
B. **Section View**

The section view is to be along the proposed utility that crosses the Union Pipeline.

**Scale**
- in metric, vertical 1:100, horizontal 1:200 or to a scale that clearly identifies all details of the crossing.

**Dimensions**
- depth of the Union Pipeline(s) to one-tenth (0.0) of a metre
- Vertical distance of the proposed utility below grade to one-tenth (0.0) of a metre
- clearance to the Union Pipeline
- diameter of each Union Pipeline to be crossed
- easement or right-of-way limits

**Identify**
- if elevations are assumed, then reference the point of the assumed datum
- distance of the pipeline(s) to the Union Pipeline easement limits
- ground surface profile for 20m on either side of crossing
- scale

C. **Profile View**

The profile view is to be along the Union Pipeline and is only required if the encroachment is on the Union Pipeline easement for a definable distance; ie. parallel encroachments such as roads and any grading of the easement, etc.

**Scale**
- in metric, vertical 1:100, horizontal 1:200 or to a scale that clearly identifies all details of the crossing

**Dimensions**
- depth of the Union Pipeline(s) to one-tenth (0.0) of a metre
- depth of the proposed utility to one-tenth (0.0) of a metre
- clearance to the Union Pipeline
- diameter of each Union Pipeline to be crossed
- easement or right-of-way limits

**Identify**

- if elevations are assumed, then reference the point of the assumed datum
- distance of the pipeline(s) to the Union Pipeline easement limits to one-tenth (0.0) of a meter
- ground surface profile for 20m on either side of crossing
- scale
- existing Union Pipeline markers

**D. Location Plan View**

**Scale**

- in metric, scale of 1:12000 or to a scale that clearly identifies the location

**Dimensions**

- distance to the nearest town of major geographic feature to 0.1 of a kilometre
Identify
  ▪ township, town, village, city, county, regional municipality, etc.
  ▪ lot, concession, street, highway, road, etc.
  ▪ north arrow

TITLE BLOCK
Identify
  ▪ name of the Applicant and the name of the engineering company who compiled the drawing (where applicable)
  ▪ drawing number and the date of the drawing
  ▪ revision dates (if applicable)
  ▪ signature of the applicant and the engineering company
  ▪ legal description of the crossing location
  ▪ description of the utility
  ▪ date of the survey

ADDITIONAL INFORMATION
Identify
  ▪ all specifications of the utility, ie. diameter, wall thickness, material to be conveyed, minimum yield strength, operating pressure, field test pressure, mill test pressure, materials comprising the utility, protective devices to be installed and the proper method of installation.
  ▪ show a note referencing compliance with the applicable CSA standards, Union Gas Limited's Specifications for Pipeline Crossings and the National Energy Board Pipeline Crossing Regulations.
  ▪ date of the proposed crossing
OPERATIONAL CONSTRAINT – UNION GAS PIPELINE

COMPLIANCE MEASURES

The Contractor shall contact all pipeline owners listed below and request from them a copy of their technical guidelines for work adjacent to their pipelines.

<table>
<thead>
<tr>
<th>Pipeline Owner</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNION GAS</td>
<td>Bryce McFadden</td>
</tr>
<tr>
<td></td>
<td>519-683-4468 ext 5102227</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:bmcfadden@uniongas.com">bmcfadden@uniongas.com</a></td>
</tr>
</tbody>
</table>

The Contractor shall comply with all conditions, requirements and procedures of the pipeline owner.

The Contractor shall submit a written application to the pipeline owner in accordance with the requirements of the pipeline owner, seeking permission to perform the work under this contract.

Activities requiring permission from the pipeline owner include;

- Construction or installation of a facility across, on, along, or under an existing pipeline right of way;
- Excavation using explosives or power-operated equipment over the right of way;
- Operation of a vehicle or mobile equipment across a right of way, outside the travelled portion of a highway or public road (any equipment or vehicle greater than a 3,800 kg pickup truck);
- Excavation using explosives or power-operated equipment within 30 metres of the pipeline right of way or;
- Seismic/vibration activity within 40 metres of a pipeline right of way.

Once the pipeline owner has given its permission, the Contractor shall comply with the following:

1. Notification of the Pipeline Owner

   - Provide the pipeline owner three working-days notice before starting any work approved in the application.
   - Provide 24 hours notice before backfilling over the pipe (if applicable).
   - Any contact with the pipe or its coating shall be reported to the pipeline owner immediately.

2. The Contractor shall comply with the following rules for excavation within three metres of the pipe;

   Excavation using power-operated equipment is not permitted within three metres of the pipe unless:

   a) The pipe has been exposed by hand under the direct supervision of the pipeline representative at the point of crossing or;

      i) where the excavation runs parallel to the pipe, the pipe has been exposed at sufficient intervals to confirm its location or,

      ii) the pipeline owner has informed the Contractor that it has confirmed the location of the pipe by probing and has staked the location of the pipeline.
b) Where the excavation crosses a pipe, the pipeline owner has informed the Contractor that it has confirmed the location of the pipe by probing and the pipe is at least 600 mm deeper than the proposed excavation.

c) Where ground conditions render exposure of the pipe by hand impractical, the pipeline owner has agreed that the excavation may be performed safely to within one metre of the pipe under the direct supervision of the pipeline representative.

The Contractor shall not move or alter the pipe or its fittings, or in any other way interfere with the pipe without the written consent of the pipeline owner.

3. Equipment Loading Forms

These forms must be filled out and returned to Union Gas after award. These forms will be used to perform loading calculations prior to the start of construction and will form the basis of construction stipulations.
# Vehicles or Equipment with Tires

<table>
<thead>
<tr>
<th>Equipment Description:</th>
<th>Manufacturer and Model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Loaded Gross Vehicle Weight:</td>
<td>Road legal without overweight permit? Y / N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Axle</th>
<th>Maximum weight on axle</th>
<th>Tire pressure</th>
<th>Distance between tire set centerlines</th>
<th>Centerline distance between axle in front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment Description:</th>
<th>Manufacturer and Model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully Loaded Gross Vehicle Weight:</td>
<td>Road legal without overweight permit? Y / N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Axle</th>
<th>Maximum weight on axle</th>
<th>Tire pressure</th>
<th>Distance between tire set centerlines</th>
<th>Centerline distance between axle in front</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Submitted by: __________________________ Date: ______________

Retain a copy with calculation spreadsheet.
## Equipment on Tracks

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>Manufacturer and Model</th>
<th>Fully Loaded Gross Vehicle Weight</th>
<th>Track Shoe Width (W)</th>
<th>Track Length on Ground (L)</th>
<th>Track Gauge (on centre) (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Diagram of equipment on tracks]

Submitted by:  
Date:  

Retain a copy with calculation spreadsheet.
## Compaction Equipment

<table>
<thead>
<tr>
<th>Manufacturer:</th>
<th>Model:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Equipment Description:

*Attach equipment manufacturer's data sheets if available.*

<table>
<thead>
<tr>
<th>Select or sketch the correct loading diagram</th>
<th>Drum and 2 tires</th>
<th>2 drums</th>
<th>4 drums</th>
<th>Other (sketch here)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### Dimensions (per circled/selected diagram)

<table>
<thead>
<tr>
<th></th>
<th>Drum width:</th>
<th>Drum diameter:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D=</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Wheelbase:</th>
<th>Tire width:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B=</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gauge (on centre):</th>
<th>G=</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Other dimensions from sketch:</th>
<th>=</th>
<th>=</th>
<th>=</th>
</tr>
</thead>
</table>

### Loading (include units):

<table>
<thead>
<tr>
<th>Total operating weight:</th>
<th>□ Smooth drums</th>
<th>□ Padfoot drums</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Static weight on front drum/axle:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Static weight on rear drum/axle:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Centrifugal force:</th>
<th>High Vibration</th>
<th>Low Vibration</th>
</tr>
</thead>
</table>

### Other information which may be relevant:

<table>
<thead>
<tr>
<th>Submitted by:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Retain a copy with calculation spreadsheet.
MUNICIPALITY OF MIDDLESEX CENTRE

BY-LAW NUMBER 2017-022

BEING A BY-LAW TO PROVIDE A DRAINAGE WORKS
TO BE KNOWN AS ROSS-MOIR MUNICIPAL DRAIN

WHEREAS the requisite number of owners have petitioned the Council of the Municipality of Middlesex Centre in accordance with the provisions of the Drainage Act, requesting that the following lands and roads may be drained by a drainage works as follows:


AND WHEREAS the Council of the Municipality of Middlesex Centre in the County of Middlesex has procured a report made by Spriet Associates;

AND WHEREAS the estimated total cost of reconstructing the drainage works is $78,052.50;

AND WHEREAS $15,150.00 is the amount to be contributed by the Municipality for construction of the drainage works;

AND WHEREAS the Council is of the opinion that the drainage of the area is desirable;

THEREFORE the Council of the Municipality of Middlesex Centre pursuant to the Drainage Act enacts as follows;

1. The report dated originally submitted April 15, 2016 and resubmitted August 26, 2016 is hereby adopted and the drainage works as therein indicated and set forth is hereby authorized, and shall be completed in accordance therewith.

2. (1) The Municipality of Middlesex Centre may borrow on the credit of the Corporation the amount of $15,150.00 being the amount necessary for construction of the drainage works.
   
   (2) The Corporation may issue debentures for the amount borrowed less the total amount of:
       a) grants received under Section 85 of the Act;
       b) commuted payments made in respect of the lands and roads assessed within the Municipality;
       c) monies paid under Subsection 61 (3) of the Act; and
       d) monies assessed in and payable by another municipality, and such debentures shall be made payable within five years from the date of the debenture and shall bear interest at a rate not higher than the rate charged by the Ontario Municipal Improvement Corporation on the date of sale of such debentures.

3. A special equal annual rate sufficient to redeem the principal and interest on the debentures shall be levied upon the lands and roads as set forth in Schedule “A” attached to be collected in the same manner and at the same time as other taxes are collected in each year for five years after the passing of this By-law.
4. For paying the amount of $15,150.00 being the amount assessed upon the lands and roads belonging to or controlled by the municipality.

5. For paying the amount of $56,572.50 being the amount assessed upon the landowners in accordance with the schedule of Net Assessment and Special Assessment as provided in the report, a special rate sufficient to pay the amount assessed plus interest therein shall be levied upon each of he assessed owners, to be collected in the same manner and at the same time as other taxes are collected.

6. All assessments over $1,000.00 will automatically be placed on the tax roll without further notification unless the Treasurer is contacted by the owner to have the amount debentured for five years at the going rate.

7. All assessments of $1,000.00 or less are payable in the first year in which the assessment is imposed or will automatically be placed on the tax roll without further notification.

8. The Treasurer and Collector of taxes are hereby authorized to accept part payment, from time to time, on account of any taxes due and to give a receipt for such payment provided that acceptance of any such payment shall not affect the collection of any percentage charge imposed and collectable under this Clause hereof in respect of non-payment of any taxes or any class of taxes or of any installment thereof.

9. In respect to the payment of taxes by tenants of lands owned by the Crown or in which the Crown has an interest provision is hereby provided that where any such tenant has been employed either within or outside the municipality by the same employer for not less than thirty (30) days such employer shall pay over to the Treasurer or Collector on demand out of any wages, salary or other remuneration due to such employee the amount then payable for taxes under this By-law and any such payment shall relieve the employer from any liability to the employee for the amount so paid.

10. In accordance with Ontario Regulation 403/02 the Treasurer has calculated the Annual Repayment limit for long-term debt charges and has certified the present capacity available to the Corporation is $2,482,961.00 and that this By-law is not in contravention of the Regulation.

11. This By-law comes into force on the passing thereof and may be cited as ROSS-MOIR MUNICIPAL DRAIN.

PROVISIONALLY ADOPTED
This 25th day of January, 2017.

_______________________________
Mayor

_______________________________
Clerk
THIRD READING AND FINALLY PASSED
This day of , 2017.

Mayor

Clerk
GROSS DEBT CHARGES
Principal  Sch 74 Ln 3099 01  1,573,447
Interest  Sch 74 Ln 3099 02  869,511  2,442,958

DEBT CHARGE ON PROVINCIAL PROJECTS  Sch 74 Ln 2810-40  N/A

PAYMENT IN RESPECT TO LONG TERM COMMITMENT  Sch 42 Ln 6010  N/A

SUBTOTAL : DEBT CHARGES  2,442,958

DEBT CHARGES FOR MUNICIPAL UTILITIES  -

PAYMENTS TO PROVINCE FOR DOWNTOWN REVITALIZATION LOANS  N/A

DEBT CHARGES FOR TILE LOANS  Sch 74 Ln 3015 01-02  35,766

SUBTOTAL : DEBT CHARGES TO BE EXCLUDED  35,766

NET DEBT CHARGES  2,407,192

CALCULATION OF ANNUAL REPAYMENT LIMIT : TOTAL REVENUE FUND REVENUES  Sch 10 Ln 9910  36,990,452

FEES TO PROVINCE FOR DOWNTOWN REVITALIZATION LOANS  N/A

FEES FOR TILE DRAINAGE AND SHORELINE  Sch 12 Ln 1850  9,065

EXCLUDED REVENUE AMOUNTS
Ontario Grants  Sch 10 Ln 699+810+815  2,063,468
Canada Grants  Sch 10 Ln 820+825  -
Deferred Revenue Earned (Canada Gas Tax)  Sch 10 Ln 831  1,282,580
Other Municipalities  Sch 10 Ln 1099  220,351
Gain/Loss on sale of land & capital assets  Sch 10 Ln 1811  -  39,948
Deferred Revenue Earned (Development Charges)  Sch 10 Ln 1812  2,190,748
Deferred Revenue Earned (Recreation Land)  Sch 10 Ln 1813  129,649
Donated Tangible Capital Assets  Sch 53 Ln 0610 01  -  5,846,988

NET REVENUE FUND REVENUES  21,134,519

25% OF NET REVENUE FUND REVENUES  5,283,630

ANNUAL REPAYMENT LIMIT  2,876,438

ADDITIONAL LONG TERM DEBT COMMITMENTS

COUNCIL COMMITMENTS FOR PLANNED PROJECTS  Debit/ear Date
2014 Approvals:
Bear Creek Drain - $15,007 @ 4%  5 yrs  3,573
Patyn Drain - $57,300 @ 4%  5 yrs  12,871
Burnett - Gloyne - $33,319 @ 4%  5 yrs  7,484
Fraser - $100,208 @ 4%  5 yrs  22,509

2015 Approvals:
Rennie - $54,379 @ 4%  5 yrs  12,215
Palmer - Shipley - $69,617 @ 4%  5 yrs  14,065
Covin Drain Culvert - $61,711 @ 4%  5 yrs  13,862
Kaiser - $26,618 @ 4%  5 yrs  5,979
Holden - $33,148 @ 4%  5 yrs  7,446
Weyer - $51,883 @ 4%  5 yrs  11,664
Dowan Drain - $28,678 @ 4%  5 yrs  6,442

2016 Approvals:
Ivan Drain - $223,470 @ 4%  5 yrs  27,735
Nixon Drain - Branch B - $38,611 @ 4%  5 yrs  8,673
McClary-Roberts Drain - $91,744 @4%  5 yrs  20,608
Mokkiiar Drain - $30,910 @4%  5 yrs  6,043
Baker-Weedle Boume Drain - $21,907 @4%  5 yrs  4,921

2017 Approvals:
OLC Application - Roads and Street Lights - $1,261,629.19 @4%  20 yrs  92,833
Goldstream Fire Hall - $1,372,000 @4%  20 yrs  100,954
Ross-Muir Municipal Drain - $66,572.50 @4%  5 yrs  12,708

TOTAL NEW COMMITMENTS  393,477

REVISED NET DEBT CHARGES  2,800,869

MMA REPAYMENT LIMIT  2,876,438

CHANGE IN REPAYMENT LIMIT  393,477

REVISED ANNUAL REPAYMENT LIMIT  2,482,961

TREASURER'S CERTIFICATION
I certify that I have recalculated the annual repayment limit of the Municipality of Middlesex Centre in accordance with the procedure of Ontario Regulation 403/02, as amended, and that the updated Annual Repayment Limit is $2,482,961.

Dated this 25th day of January, 2017

[Signature]
Director of Corporate Services

19/01/2017