BY-LAW NUMBER 90-22

-of-

THE CORPORATION OF THE COUNTY OF BRANT

To provide for drainage works in the County of Brant (Mather Drain 2022).

WHEREAS the Council of the Corporation of the County of Brant has received a request for improvements to the Mather Drain and the requisite number of owners have petitioned for a new branch drain in accordance with the provisions of the Drainage Act requesting that the following lands be drained: Part of lot 2 and Concession 8, geographic Township of Burford and Part of Lot 1, Concession 7 East in the Township of Norwich;

AND WHEREAS the Council of The Corporation of The County of Brant has procured a report under Sections 4 and 78 of the Drainage Act, R.S.O. 1990, as amended, Chapter D.17, by K. Smart Associates Limited, dated July 22, 2022, attached hereto as Schedule "A" and forming part of this by-law;

AND WHEREAS the estimated total cost of constructing the drainage works is two hundred and fifty-four thousand dollars ($254,000);

AND WHEREAS two Hundred and fifty-four thousand dollars ($254,000) is the amount to be contributed by the municipality for construction of the drainage works;

AND WHEREAS two hundred four thousand four hundred and twenty-two dollars ($204,422) is being assessed in the Corporation of the County of Brant;

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

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE COUNTY OF BRANT enacts as follows:

1. **THAT** the report prepared by K. Smart Associates Limited dated July 22, 2022 and attached hereto as Schedule "A" is hereby adopted and the drainage works as therein indicated and set forth is hereby authorized and shall be completed in accordance therewith.

2. **THAT** the Corporation of the County of Brant may borrow on the credit of the Corporation the amount of Two hundred and fifty-four thousand dollars ($254,000) being the amount necessary for construction of the drainage works.

3. **THAT** 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 lands and roads assessed within the municipality;
   c) money paid under Subsection 61(3) of the Act; and
   d) money assessed in and payable by another municipality, and such debentures shall be made payable within five (5) years from the date of the debenture and shall bear interest at a rate not higher than the rate charged by Infrastructure Ontario on the date of sale of such debenture.

4. **THAT** 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 the Schedule to be collected in the same manner and at the same time as other taxes are collected in each year for five (5) years after the passing of this by-law.

5. **THAT** for paying the amount of Ninety thousand eight hundred and ninety five dollars ($90,895), being the amount assessed upon the lands and roads belonging to or controlled by the municipality, a special rate sufficient to pay the amount assessed, plus interest thereon, shall be levied upon the whole rateable property in The Corporation of The County of Brant for one (1) year after the passing of this by-law to be collected in the same manner and at the same time as other taxes are collected.

6. **THAT** all assessments of One Hundred Dollars ($100.00) or less are payable in the first year in which the assessment is imposed.

7. **THAT** this by-law comes into force on the passing thereof and may be cited as the Mather Drain 2022.

READ a first and second time and provisionally adopted, this 27th day of September 2022.

THE CORPORATION OF THE COUNTY OF BRANT

David Bailey, Mayor

Alysha Dyjach, Clerk

READ a third time and finally passed in Council, this 22nd day of November 2022.

THE CORPORATION OF THE COUNTY OF BRANT

David Bailey, Mayor

Alysha Dyjach, Clerk

Schedule A to By-law 90-22

ENGINEERING REPORT

MATHER DRAIN 2022

COUNTY OF BRANT

(Geographic Township of Burford)

Date: July 22, 2022

File No. 19-132

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS & PLANNERS
85 McIntyre Drive
Kitchener, ON N2R 1H6
Tel: 519-748-1199
Fax: 519-748-6100

This page intentionally left blank

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY 1
2 BACKGROUND 2
3 DRAINAGE HISTORY 2
3.1 Mather Drain History 2
3.2 1932 Agreement Drain within Watershed (Ditches and Watercourses Act) 3
4 INITIAL INVESTIGATION 3
4.1 On-Site Meeting 3
4.2 Site Examination & Survey 5
4.3 Watershed Description 5
5 AUTHORITY FOR REPORT 6
5.1 Section 78 6
5.2 Section 4 6
6 RECOMMENDED WORK 7
7 DESIGN CONSIDERATIONS 9
7.1 Sufficient Outlet 9
7.2 Drain Capacity 9
7.3 Soil Conditions 9
8 MEETING(S) 8
9 ENVIRONMENTAL CONSIDERATIONS 10
9.1 Agency Consultation 10
10 CONSTRUCTION CONSIDERATIONS 10
10.1 Pre-Construction Approvals 10
10.2 Construction Scheduling 11
10.3 Changes During Construction 11
10.4 Alignment of Drains 11
11 DRAWINGS AND SPECIFICATIONS 11
11.1 Drawings 11
11.2 Specifications 12
12 COST ESTIMATE 12
12.1 Allowances 12
12.2 Construction Cost Estimate 13
12.3 Engineering Cost Estimate 14
12.4 Estimate of Section 73 Administration (Other) Costs 14
12.5 Harmonized Sales Tax 15
12.6 Estimated Cost Summary 15
13 ASSESSMENTS 16
13.1 Calculation of Assessments 17
13.2 Benefit Assessments (Section 22) 17
13.3 Outlet Liability Assessments (Section 23) 17
13.4 Increased Cost (Special) Assessments (Section 26) 18
13.5 Assessment Schedules 19
14 GRANT 20
15 PRIVACY OF LANDS 20
16 MAINTENANCE 20
16.1 General 20
16.2 Updating Future Maintenance Schedules 21
17 BYLAW 21
Schedule A – Schedule of Assessments 22
Schedule B – Schedule of Assessments for Future Maintenance 23
Schedule C – Schedule for Actual Cost Bylaw 24
Appendix A – Calculation of Assessments 25
Appendix B – Calculation of Assessments for Future Maintenance 27
STANDARD SPECIFICATIONS

- Section 200 – General Conditions
- Section 300 – Special Provisions (see Drawings 5 & 6)
- Section 400 – Standard Specifications for Construction of Drains
- Section 410 – Standard Specifications for Open Drains
- Section 420 – Standard Specifications for Tile Drains
- Section 430 – Standard Specifications for Jacking and Boring

DRAWINGS 1 TO 8

Definitions:

"Act" or "Drainage Act" means The Drainage Act RSO 1990
"CSP" means corrugated steel pipe
"Drain" means Mather Drain 2022
"Grant" means grant paid under the Agricultural Drainage Infrastructure Program
"HDPE" means high-density polyethylene
"KSAL" means K. Smart Associates Limited
"Municipality" or "County" means County of Brant
"OMAFRA" means the Ontario Ministry of Agriculture, Food and Rural Affairs
"Tribunal" or "Drainage Tribunal" means Agriculture, Food and Rural Affairs Appeal Tribunal
"UTRCA" means Upper Thames River Conservation Authority
"ø" means diameter of pipe or tile

Tables:

Table 12.1-1 - Summary of Allowances 13
Table 12.6-1 - Estimated Cost Summary 15
Table 13.2-1 - Benefit Assessments 17
Table 13.3-1 - Runoff Factors 18
Table 13.4-1 - Estimated Special Assessments 18

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS & PLANNERS

85 McIntyre Drive
Kitchener, ON N2R 1H6

Tel: 519-748-1199
Fax: 519-748-6100

July 22, 2022 File No. 19-132

MATHER DRAIN 2022

COUNTY OF BRANT

1 EXECUTIVE SUMMARY

This report is prepared pursuant to Sections 4 and 78 of the Drainage Act, RSO 1990 (the Act).

On October 30, 2018 the County of Brant received a request from Lola-May Farms Ltd. (Roll No.'s 010-33801 & 010-33150, Part Lot 24, Concession 8, Ward 4) for improvement of the Mather Drain, originally constructed under the Act in 1970. Pursuant to Section 8 of the Act, on October 30, 2018, K. Smart Associates Limited was appointed by resolution of Council to prepare a report under Section 78. During the investigation/design stage, the County received a *Petition for Drainage Works by Owner* under Section 4 of the Act signed by two owners: Patrick & Joanne Talbot, as well as Joseph Kloepfer for an outlet to the northwest corner of the farm in Lot 24, Concession 8, as well as the southeast corner of Lot 1, Concession 7 East, in the Township of Norwich. On September 21, 2021, as per Section 8(4) of the Act, KSAL was appointed by resolution of Council to prepare one report for both the new petition and the current request for improvement.

To address the request and petition received, this report recommends the following:

Main Drain

- 80m of ditch cleanout (Guider Drain Improvement of Big Creek)
- Installation of 842m of closed tile drain (600mmø to 525mmø)
- Installation of 18m of 500mmø steel casing pipe across 8th Concession Road by jack/boring
- Two (2) 900 x 1200mm concrete catchbasins
- One (1) – 900x1500mm concrete junction box

"B" Branch

- Installation of 62m of 300mmø solid plastic pipe
- Installation of 21m of 300mmø steel casing pipe across Muir Road South/C.R. 22 by jacking/boring
- Two (2) 600 x 600mm concrete catchbasins

The watershed served is approximately 106.7 ha (263.7 acres). The total length of Mather Drain 2022 is 943m of closed drain (860m Main Drain and 83m "B" Branch).

The estimated cost of the project is **$254,000.**

Assessment schedules are included for construction and future maintenance of the Drain.

- Schedule A shows the assessment of the total estimated project cost.
- Schedule B is for prorating future maintenance costs, when incurred, on the Mather Drain 2022 and 1970.
- Schedule C is for levying the final cost of the Drain.
- Appendix A & Appendix B show the calculation of the assessments outlined in Schedules A & B, respectively.

2 BACKGROUND

The County of Brant, in the latter part of 2018, received a request for improvement of the Mather Drain, by Lola-May Farms Ltd. This improvement request was understood to be primarily to accommodate increased tiling and surface water concerns on properties of Lola-May Farms. The County subsequently appointed K. Smart Associates Limited (KSAL) in accordance with Section 78 of the Drainage Act at a council meeting on October 30, 2018. K. Smart advised that Kenn Smart, P. Eng. and Ray Roscovich, P. Eng. would be the engineers in charge of the project.

During the investigation/design stage, the County received a petition under Section 4 of the Act signed by two owners: Patrick & Joanne Talbot, as well as Joseph Kloepfer for an outlet to the northwest corner of the farm in Lot 24, Concession 8, as well as the southeast corner of Lot 1, Concession 7 East, in the Township of Norwich. On September 21, 2021, as per Section 8(4) of the Act, KSAL was appointed by resolution of Council to prepare one report for both the new petition and the current request for improvement. In response to the additional appointment, KSAL confirmed that a change of engineer would be made to Curtis MacIntyre, P. Eng.

3 DRAINAGE HISTORY

3.1 Mather Drain History

The Mather Drain was originally constructed as a 'Main Drain' and an '"A" Branch' in accordance with a report of H. M Gibson, P. Eng., O.L.S. (H.M Gibson Ltd.) dated September 5, 1970 (By-law 1710). The Main Drain consisted of 400mm (16") diameter (ø) tile constructed from the open ditch of the Guider Improvement of Big Creek northerly across the farmland now owned by Lola-May Farms Ltd. to a 600mmø catchbasin on the north property line. The Main Drain continues northerly as a 350mmø (14") and a 300mmø (12") tile across a second Lola-May farm before curving westerly to a crossing of 8th Concession Road with a 300mmø (12") CSP near the intersection with Muir Road South (also C.R. 22). On the north side of 8th Concession Road, the 300mmø (12") tile continues across the currently severed property now owned by R. & M. Hoskins, then through the Elermae Acres Ltd. farm to the intersection with the "A" Branch (also constructed under this H. M. Gibson

report). From this intersection, the Main Drain continues westerly as a 250mmø (10") tile to a crossing of Muir Road South to service the north half of the original Mather Farm (now Talbot Farms), with catchbasins on both sides of Muir Road South.

The '"A" Branch' consisted of a 200mmø (8") tile commencing on the Elermae Acres Ltd. farm heading eastward to service the farm currently owned by B. & A. Van Haastert. At the property line the size changes to a 150mmø (6") tile and continues to its terminus near the lot line between Lot 23 & 24.

3.2 1932 Agreement Drain (Ditches and Watercourses Act)

A letter of agreement for a previously constructed private drain servicing similar lands to the abovementioned 1970 Mather Drain report exists as signed by nine (9) participants, including the Reeve of Burford, dated October 24, 1932. This agreement described a 7" (175mm) tile commencing at the creek (Guider Drain Improvement of Big Creek) heading northerly along the east side of the Townline between East Oxford Twp and Burford Twp (now Muir Road South). The tile ran northerly to a catchbasin at the intersection of the Townline and 8th Concession Road. From there a 6" (150mm) tile proceeds northerly across the 8th Concession Road (still along the east side of Muir Road South) to the middle of Concession 7 where it crossed the Townline to a catchbasin on the west side of the road (same approximate location as the Main Drain crossing of Muir Road South in 1970).

The agreement outlined the responsibility of the Township of Burford and the 9 landowners to maintain the drain with cost proportions ranging between 2.5-30%.

The 1970 H. M. Gibson report made no mention as to the status of this Agreement Drain.

4 INITIAL INVESTIGATION

4.1 On-Site Meeting

Attendees:

Egbert Kroondijk	Jason DeMunck (County of Brant)
Ben Van Haastert (Roll No. 010-31100)	Dirk Kramer (Township of Norwich)
Joe Kloepfer (Lola-May Farms)	Kenn Smart. P. Eng. (KSAL)
Ed Kloepfer (Lola-May Farms)	Curtis MacIntyre, E.I.T. (KSAL)
Rob Hoskins (Roll No. 010-31200)	

On July 24, 2019, the on-site meeting for the Section 78 appointment was held in the yard of 112 Muir Road South (Elermae Acres Ltd.), and those in attendance are listed above. Upon reviewing the history of the drain, each attendee was given the opportunity to provide their comments/concerns about the Mather Drain and drainage on their properties. The subsequent comments and discussions are described below.

Joe & Ed Kloepfer (Lola-May Farms) (Roll No.'s 010-33150, 010-33801, 020-06800)
Joe explained that they have tiled their farm in Lot 24, Concession 7 in the previous couple of years and did not feel the Mather Drain contained enough capacity downstream of the 8th Concession Road. The option to twin the drain downstream of the 8th Concession Road through the two Lola-May Farms to the outlet at the Guider Drain was discussed. Kenn agreed that this would likely be the primary option to be considered.

The Kloepfers also had concerns with surface water on their farm in Lot 24, Concession 8 (south of 8th Concession Road). Water from the southeastern portion of the old Mather farm in Norwich Township (Roll No. 020-06900) crosses Muir Road South through a surface water culvert and washes easterly across their field through the low run. An old 1932 Agreement Drain that runs south along the eastern side of Muir Road South was also discussed. Ed Kloepfer showed the engineer some ditch work he had done along the east ditch of Muir Road South to try to bring the surface water into an old catchbasin on the 1932 Agreement Drain. He did not feel it was working very well downstream as the water did not get away very quickly. Landowners also mentioned that the tenant for the old Mather Farm (Pat Talbot) had attempted to fix some tiles in the south eastern part of the farm to improve the drainage, however they ran into the same issue that the 1932 Agreement/Award Drain is not functioning very well downstream.

In order to address this surface water problem, the option to extend a branch from the Mather Drain westerly over to Muir Road South was discussed, however, Lola-May Farms would be required to sign a petition under Section 4 of the Drainage Act. Most in attendance agreed that it would also be desirable to continue the branch drain across Muir Road South to pick up the surface water at the Mather Farm (later Talbot Farms), though this would require an additional signature from the owners of the Mather farm. It was noted that Mr. Mather does not live within the province.

The Kloepfers asked if the catchbasin in the middle of the two fields (Roll No. 010-33801 & 010-33150) needed to remain since they often hit it with machinery. Kenn felt it would not need to remain.

Rob Hoskins (Roll No. 010-31200)
Mr. Hoskins stated that ponding did occur on the west half of his property around the area of the Mather Drain. This potentially indicates a poor inlet on the north side of 8th Concession Road or perhaps not enough capacity downstream.

Ben Van Haastert (Roll No. 010-31100)
He recently purchased the farm and was aware that the "A" Branch of the Mather Drain crossed into his farm. He provided a tile map for the farm. His main drainage concerns were regarding the southeastern portion of his farm and did not relate to the Mather Drain watershed. He had no concerns at this time regarding the Mather Drain.

Long Point Region Conservation Authority (LPRCA)
LPRCA were sent an invitation to the meeting, but did not attend.
Jason DeMunck said he received no concerns from them prior to the meeting either.

Jason DeMunck (Drainage Superintendent, County of Brant)
Jason did not feel the County had any concerns with road drainage, but understood that the recommended solution may involve improvement of the Mather Drain up to and including the 8th Concession Road, as well as a crossing of Muir Road South if a petition were to be received by the Mather property (Roll No. 020-06900). Jason provided County aerials showing locations of tile runs.

Dirk Kramer (Drainage Superintendent, Township of Norwich)
Did not have any concerns.

General Comments
Most landowners in attendance agreed that the watershed boundary for the Mather Drain did not match the current conditions. The engineer and his assistant agreed that it did not and stated that the watershed boundary would be revised to consider the newest contour information in conjunction with tile patterns/tile plans received.

The owners reported that the 1970 drain appeared to cross over top of the Enbridge gas main along the east side of Muir Road South. Crossing of this gas line would be of concern if a new branch drain extending across Muir Road South to the Mather farm were to be pursued.

4.2 Site Examination & Survey

At the conclusion of the on-site meeting, the engineer reviewed the surface water problems at the corner of 8th Concession Road and Muir Road South along with the owners and the County of Brant Drainage Superintendent. It was evident that the existing private agreement drain in this area was not functioning well and perhaps a new branch drain would improve the drainage. The engineer explained to those in attendance that a separate Section 4 petition would be required to address this problem with the current Mather Drain Section 78 appointment.

The route of the Mather Drain from the outlet to upstream of 8th Concession Road and along 8th Concession Road west to and across Muir Road South were also examined after the on-site meeting. Topographic (GPS) survey occurred during the early part of September 2019. Approximately 20 test holes were dug along the route to determine the drain's alignment and depth, as well as soils conditions for construction.

4.3 Watershed Description

The perimeter watershed of the Drain has been established based on site investigation, tile plans provided by landowners, historical drain reports, and using current topographic information provided by the province.

The Mather Drain 2022 watershed consists of approximately 106.7 hectares (263.7 acres) of surface drainage. Of this, approximately 12.9 hectares are tile drained out of the surface water watershed, but an additional 3.3 hectares are tile drained into the watershed. Of the total 106.7 hectares, the watershed for the proposed "B" Branch contains approximately 9.9 hectares of surface drainage, with 0.4 hectares tile drained out of the surface water watershed. The majority of lands in the watershed are cleared agricultural lands with two rural residential lots.

The proposed Mather Drain 2022 watershed boundary and the original 1970 watershed boundary show on drawing 1 of this report. The watershed has been expanded to the east on the B. & B. Van Haastert farm and now also includes additional area in the southwestern part of the watershed to reflect new lands brought into the Mather Drain by the proposed "B" Branch.

5 AUTHORITY FOR REPORT

5.1 Section 78

Section 78 of the Drainage Act provides for the repair and improvement of an existing drain constructed under the Drainage Act through a new engineer's report. The Mather Drain was constructed under the Drainage Act, and it was determined at the on-site meeting and site examination that the Drain, in part, requires improvement. Therefore, this report, as it relates to improvement of the existing Main Drain, is properly initiated under Section 78 of the Drainage Act.

5.2 Section 4

Section 4 of the Drainage Act provides for the construction of new drainage works for an area requiring drainage. As a result of the discussion at the on-site meeting pursuant to the original Section 78 appointment it was determined that a new petition would be required to address drainage concerns near the intersection of 8th Concession Road and Muir Road South.

The official on-site meeting for the petition received was jointly held with the information meeting on March 9, 2022. The discussions from the meeting are later described in *Section 7 INFORMATION MEETING & ON-SITE MEETING FOR PETITION* of this report. The area requiring drainage was determined to be the south third of property with Roll No. 020-06800, the northwest intersection of Muir Road South and Substation Road, the southeast intersection of Muir Road South and 8th Concession Road, and an approximate one acre area in the northwest corner of property with Roll No. 010-33150. The petition was signed/submitted by 2 of the 3 owners, representing a majority (66%) of the owners in number requiring drainage. Separately, the lands signed on the petition also represent greater than 60% in total area requiring drainage. The petition is therefore sufficient in accordance with Sections 4(1)(a) and 4(1)(b) of the Drainage Act.

6 RECOMMENDED WORK

Major work items are described property by property below. Further detail regarding the construction and maintenance of the Drain can be found in the Special Provisions/Drawings and also in the Maintenance section of this Report.

Guider Drain Improvement of Big Creek

Lola-May Farms Ltd. (Roll No. 010-33801)

- Temporary straw bale dam/sediment trap or silt fence 80m downstream in Guider Drain Improvement of Big Creek Drain. Not part of the Drain.
- 80m of ditch cleanout of Guider Drain Improvement of Big Creek. Excavate small (5m long x 0.3m deep) stilling basin in ditch at tile outlet. Not part of Drain.

Main Drain

Note: No portion of the existing Main Drain originally constructed from the report by H. M. Gibson, P. Eng., O.L.S., dated September 5, 1970 is proposed to be abandoned/removed by the recommendations of this report. The full existing 1970 Main Drain is to remain, with the portion downstream of 8th Concession Road to be "twinned" by the proposed tile below. See *Section 8.2 Drain Capacity* for the design capacity of the "twinned" Drain.

Lola-May Farms Ltd. (Roll No. 010-33801)

- 25m² of riprap at outlet of new and existing drains
- Remove and replace existing CSP outlet pipe with 6m of 450mmø HDPE pipe with rodent gate for existing Mather Drain (1970).
- 6m of 600mmø HDPE pipe with rodent gate at outlet of new Drain.
- 235m of 600mmø concrete tile beside existing 1970 drain.
- Remove existing catchbasin. Replace with 900x1500mm concrete junction box
- Existing 400mmø (16") concrete tile from 1970 to remain as part of the Drain.

Lola-May Farms Ltd. (Roll No. 010-33150)

- 329m of 525mmø concrete tile beside existing 1970 drain.
- 272m of 525mmø concrete tile beside existing 1970 drain.
- Existing 350mm to 300mmø (14" to 12") concrete tile from 1970 to remain as part of the Drain.

County of Brant (8th Concession Road)

- 900x1200mm concrete catchbasin with birdcage grate, on south side of road
- 18m of 500mmø steel casing pipe across 8th Concession Road by jack and boring methods. Existing crossing to be grouted if not destroyed.
- Remove existing CB and replace with 900x1200mm concrete catchbasin with birdcage grate, on north side of road.

"B" Branch

Lola-May Farms Ltd. (Roll No. 010-33150)

- 62m of 300mmø solid plastic (HDPE) pipe.

County of Brant/County of Oxford (Muir Road South/C.R. 22)

- 600x600mm concrete catchbasin with birdcage grate, on east side of road.
- 21m of 300mmø steel casing pipe across Muir Road South/C.R. 22 by jack and boring methods.
- 600x600mm concrete catchbasin with birdcage grate, on west side of road.

7 INFORMATION MEETING & ON-SITE MEETING FOR PETITION

On March 9, 2022, an information meeting was held with the owners. Notice for the meeting was sent to all landowners in the watershed. At the meeting, the results of the investigation to-date were presented along with a summary of the proposed work (as described above), preliminary cost estimates and assessments. The meeting also served as the official on-site meeting for the Lola-May Farms/Talbot Farms petition ("B" Branch") filed after the original on-site meeting.

The petitioners, Pat Talbot and Joe Kloepfer, were provided an opportunity to explain their drainage objectives for filing the petition. Mr. Talbot explained that he had subsurface tile drained the farm the previous summer and that a portion of the farm outlets to the southeast corner of the property. At this location there was an existing 5" tile under Muir Road South that they had attempted to flush out and connect to, with no luck. Currently, without a proper subsurface outlet the water is boiling to the surface and crossing Muir Road South to the east through an existing corrugated steel surface culvert. Joe Kloepfer added that his farm is wet up in the northwest corner (location where Talbot waters cross Muir Road South) and he would also like to see the water drained away. Both agreed it made the most sense to bring the proposed "B" Branch to the east and connect into the Main Drain, rather than attempting to take the water south along the route of the existing agreement drain.

Mr. Talbot also provided a tile plan for his farm. The plan showed that an area north of the house (approximately 2.1 hectares) was tile drained away from the Mather Drain watershed, contrary to original belief. The engineer acknowledged this would be revised in the final watershed and schedules.

One of the main discussion points was the 200mmø (8") high pressure Enbridge gas line located along the east side of Muir Road South, likely to be in conflict with the proposed "B" Branch design. The engineer explained that though a draft design for the improvement of the Main Drain has been prepared, it will likely require deepening/alterations to provide an outlet for the proposed "B" Branch installed below the gas line. The engineer suggested to the owners that the increased costs added to the project beyond the total project cost outlined at this meeting (to work

around the gas line and install the Drain deeper), would be assessed to Enbridge under Section 26 of the Drainage Act. In other words, the draft assessments given to the owners at this meeting should not change drastically.

With respect to the full project, including improvement of the Main Drain and construction of a new "B" Branch, those present at the meeting were in general agreement with the proposed work, share of assessments and required next steps.

8 DESIGN CONSIDERATIONS

8.1 Sufficient Outlet

Section 15 of the Act requires that the proposed work be continued downstream to a sufficient outlet. Section 1 of the Act defines sufficient outlet as "a point at which water can be discharged safely so that it will do no damage to lands or roads".

For this project, the Guider Drain Improvement of Big Creek, including a proposed cleanout downstream of the tile, provides sufficient outlet and will allow the proposed works to function as intended.

Additionally, the "B" Branch is proposed to outlet into the Main Drain at Sta. 0+842. The Main Drain downstream of this location was sized for the 38mm (1.5") drainage coefficient for the total catchment area of the Main Drain and the "B" Branch, therefore provides a sufficient outlet for the proposed "B" Branch.

8.2 Drain Capacity

The size of the proposed tile drain was determined using the Drainage Coefficient Method outlined in the *Drainage Guide for Ontario*, published by OMAFRA. The drainage coefficient is a measure of the amount of runoff that a closed drain can remove from an upstream watershed in a 24-hour period. Based on the watershed examination and landowner discussions, the proposed tile drains on this project have been designed for a 38mm (1.5") drainage coefficient. In the case of the Main Drain, the 38mm drainage coefficient design is the combination of capacities between the proposed tile drain (525mmø, 600mmø tiles etc.) and the existing Mather Drain from 1970 (300mm-400mmø tiles).

8.3 Soil Conditions

A review of three (3) soils reports was undertaken; the 1961 report titled: "The Soil Survey of Oxford County" prepared by the Research Branch, Canada Department of Agriculture and the Ontario Agricultural College, the 1996 report titled: "Upgrade of the Soil Information for Oxford County" prepared on behalf of the Research Branch, Agriculture and Agri-Food Canada, and the 1989 report titled" "The Soils of Brant County" prepared by the Ministry of Agriculture and Food.

The Brant County soils map indicates that the areas of the proposed Main Drain and "B" Branch construction generally contain Kelvin soils (clay loams and silty clay

glacial till with poor drainage), and slight pockets of Muriel soils (clay loams and silty clay glacial till with that are moderately well drained). The majority of the upper watershed of the Mather Drain in Brant County can be categorized as Muriel soils.

The Oxford County soils maps indicate that the upper watershed of the Mather Drain in Oxford County contains Perth Silt Loams with imperfect drainage.

Twenty test holes were dug along the route of the Main Drain in September 2019. The test holes indicated that the soils were silty clay/ clay loams, with no stones. Photographs of the test holes are shown on drawings 7 & 8.

Based on the available information, adverse subsurface conditions are not expected on this project, and the use of conventional construction equipment is anticipated. Refer to the Standard Specifications for Drain Construction Procedures when adverse subsurface conditions are encountered.

9 ENVIRONMENTAL CONSIDERATIONS

9.1 Agency Consultation

9.1.1 Long Point Region Conservation Authority (LPRCA)

The LPRCA did not request an environmental appraisal under Section 6 of the Act. A notice for the on-site meeting was sent to the Conservation Authority. No comments regarding the request for improvement of the Mather Drain (closed tile) were received.

The LPRCA will be sent a copy of this report for their review.

10 CONSTRUCTION CONSIDERATIONS

10.1 Pre-Construction Approvals

Before starting work, the Contractor shall ensure all public utilities are located and shall contact all landowners along the proposed drain route to determine the location of any private utilities.

It is noted that there are overhead hydro lines along the north side of 8th Concession Road and along the west side of Muir Road South. There is also underground fibre optic lines on the west side of Muir Road South and an underground Enbridge Gas line inside private property along the east side of Muir Road South. The engineer has located the 200mmø Enbridge gas line during design and received general approval for the proposed "B" Branch with a 0.6m vertical separation between the drain and the pipeline. Upon award of the tender, the engineer will work with the selected contractor and municipality to complete the necessary crossing application/agreement with Enbridge.

10.2 Construction Scheduling

Construction cannot commence until ten days after a bylaw adopting this report is given third reading in accordance with the Act.

10.3 Changes During Construction

Changes to the Drain requested by landowners, agencies or other authorities after the bylaw is passed cannot be undertaken unless the report is amended.

Section 84.1 of the Act and the associated regulation, O. Reg. 500/21, now provide a process to amend this report if design changes are required during construction. Design changes must: arise from unforeseen circumstances encountered during construction, comply with existing agency approvals, not increase the total project cost to more than 133% of the tendered amount and not impact drain capacity. If design changes meet these criteria and are approved by the Engineer, the report can be amended after construction with the as-constructed design before passing the actual cost bylaw.

Additional work desired by the landowner(s) which is not part of the drainage works may be arranged with the Contractor provided the cost of the work is paid by the landowner(s), and the engineer reviews the additional work in advance. Such additional work is not part of the drainage works for future maintenance. If a substantial alteration is required, a revised report can be prepared and processed through the act, or an application can be made under the Act to the Drainage Tribunal to recognize the substantial alteration. The application to the Tribunal must occur before final costs are levied.

10.4 Alignment of Drains

All drains shall be constructed and maintained generally to the alignment as noted on the plans and specified by the Special Provisions. In the absence of survey bars, existing fences and similar boundary features are assumed to represent property lines.

Should landowners desire a more precise location for the drains in relation to their property line, or if there is a dispute about the location of any property line, landowners may obtain a legal survey at their own cost before construction.

11 DRAWINGS AND SPECIFICATIONS

11.1 Drawings

The location of the Drain, watershed boundary and the affected properties are shown on Drawing 1 included with this report. The heavy solid line indicates the location of the proposed drain work. The numbers adjacent to the Drain are station numbers which indicate in meters the distance along the Drain from the outlet. Drawing 1 also shows the remainder of the existing 1970 drain stations in feet upstream of the 8th Concession Road. The heavy broken (dashed) lines indicate

the approximate perimeter watershed boundaries for the drain(s). The plan also shows other drains, property boundaries, the Municipality(s) assessment roll numbers, property owners' names, hectares owned and hectares affected for each parcel within the Drain watershed.

Drawing 1 also shows, by cross hatching, where subsurface drainage directions are, or will be, different than surface drainage direction. Affected hectares involved are also shown.

The profiles for the Drain are on drawing 2. Each profile shows the depth and grade for proposed work and future maintenance.

Drawings 3 & 4 contain the details at specific locations, such as outlets and road crossings.

Drawings 5 and 6 contain the Construction Notes (Special Provisions).

Drawings 7 & 8 contain observations and pictures of the Soils Investigation.

11.2 Specifications

This report incorporates the General Conditions, Standard Specifications and Special Provisions listed in the Table of Contents, which govern the construction and maintenance of the Drain.

12 COST ESTIMATE

The estimated cost of this project includes allowances to owners, the construction cost, the engineering cost and other costs associated with the project.

12.1 Allowances

Sections 29 to 33 of the Drainage Act provides for allowances (compensation) to owners affected by proposed drain construction. On this project, there are only allowances for Section 29 (R-O-W) and Section 30 (Damages).

12.1.1 Section 29 (Right of Way)

Section 29 provides for payment of an allowance to landowners for the right of way necessary for construction and maintenance of the new Drain and for access routes to the drain as necessary. Generally the width of the R-O-W is the width needed to construct and/or maintain the drain. The width along the drain for construction is 30m wide for the Main Drain and 25m wide for the "B" Branch. For future maintenance both are considered to be a 10m width. The width along access routes to the drain is 6 metres. Section 29 allowances for Right-of-Way and Access are based on values to be provided now that will compensate the owners for future land damages at the time of future maintenance.

The calculation of allowances for land used as R-O-W during maintenance is based on the determination of the principal (allowance) that should be given now, that if invested,

will generate a sufficient interest annually, that if and when accumulated will compensate for the damages when the R-O-W is used. A frequency of maintenance of 25 years is assumed and an interest rate of 3% was used in the calculation on this project. The value of the damage per unit of area is equal to the Section 30 damage rate discussed in the next section.

12.1.2 Section 30 (Damages)

Section 30 provides for the payment of an allowance to landowners along the Drain for damages caused by the construction of the Drain.

In agricultural areas, crop damages are computed based on published crop values and declining productivity loss in the years following construction. The allowance for damage to land and crops was calculated using a rate of $2000 per hectare applied to the defined working area (R-O-W widths for construction as stated in the previous section). On this project, there is a minimum Section 30 allowance of $100.

The table below summarizes the amounts of the allowances to be provided under this report.

Table 12.1-1 - Summary of Allowances

Roll No.	Right of Way (Sec. 29) $ Drain & Access	Damages (Sec. 30) $ Drain & Access	Total $
Main Drain			
010-31200	--	100	100
010-33150	1,700	3,600	5,300
010-33801	950	1,700	2,650
	2,650	5,400	8,050
"B" Branch			
010-33150	150	350	500
020-06900	--	100	100
	150	450	600
TOTAL ALLOWANCES:	2,800	5,850	**$8,650**

In accordance with Section 62(3) of the Act, the allowances shown may be deducted from the final assessment levied. Payment to the owner would only be made when the allowance is greater than the final assessment. The allowances are a fixed amount and are not adjusted due to construction.

12.2 Construction Cost Estimate

The estimated cost of Labour, Equipment and Materials to construct the proposed Drain is outlined in detail in *Table 12.6-1 - Estimated Cost Summary*. The construction cost estimate is based on recent costs for comparable work. A

contingency amount is included to cover additional work that may be required due to field conditions or minor alterations to the project.

The contract for the Drain will be awarded by public tender. If the contract price is more than 33% over the engineer's estimate, Section 59 of the Act requires a Council meeting with the petitioners and other assessed landowners to determine if the project should proceed.

12.3 Engineering Cost Estimate

Engineering costs include report preparation and attending the Council meetings to consider the report and the Court of Revision.

Construction Phase Services may include: preparing tender documents and tender call, review of tenders, attending pre-construction meeting, periodic construction inspection, payments, final inspection, post-construction follow-up, final cost analysis and preparation of the grant application. The cost for report preparation is usually not altered at the conclusion of a project unless the report is referred back or the report is appealed to the Drainage Tribunal, which would result in additional costs. The amounts shown for meetings is an estimate. The final cost will be based on the actual time required for meetings. The estimate shown for construction phase services is based on experience and assumes good construction conditions and a Contractor who efficiently completes the construction. The final cost for the construction phase services will vary as per the actual time spent during and following drain construction. Engineering costs are summarized in *Table 12.6-1 - Estimated Cost Summary*.

12.4 Estimate of Section 73 Administration (Other) Costs

Section 73(2) and 73(3) of the Act direct that the cost of services provided by municipal staff and the Council to carry out the Act process shall not form part of the final cost of the Drain. However, Section 73(1) outlines that the following costs incurred by the Municipality can be included in the cost of the Drain: *"cost of any application, reference or appeal and the cost of temporary financing."*

The estimate of Section 73 costs is included to cover the above-referenced items from Section 73(1) and primarily provides for interest charges on financing the project until it is completed. This cost estimate may not be adequate to cover legal or engineering costs incurred by or assessed to the Municipality should the project be appealed beyond the Court of Revision though such costs will form part of the final drain cost.

Grant policy indicates that municipal cost for photo-copying and mailing required to carry out the required procedures under the Act can be included in the final drain cost. Section 73 costs are summarized in *Table 12.6-1 - Estimated Cost Summary*.

12.5 Harmonized Sales Tax

The Harmonized Sales Tax (HST) will apply to most costs on this project. The Municipality is eligible for a partial refund on HST paid. The approximate resulting net 1.76% HST is included in the cost estimates in this report.

12.6 Estimated Cost Summary

Table 12.6-1 - Estimated Cost Summary

DESCRIPTION			TOTAL
ALLOWANCES:			**$8,650**
CONSTRUCTION COST ESTIMATE			
Item	Stations	Description	Cost
i) MAIN DRAIN			
M1	-0+080 to 0+000	80m of ditch bottom cleanout (1.0m bottom width, 1.5:1 side slopes). Level on north side. Excavate small (5m Long x 0.3m deep) stilling basin in bottom of existing ditch adjacent to tile outlets	2,000
M2	0+000	25m^2 of riprap at outlet	2,500
M3	0+000 to 0+006	Remove and dispose of existing 6m of 450mmø CSP outlet of existing drain and install 6m of 450mmø solid plastic pipe with rodent gate at outlet	1,800
M4	0+000 to 0+006	6m of 600mmø solid plastic pipe with rodent gate at outlet	2,100
M5	0+006 to 0+241	235m of 600mmø concrete tile with joint wrap by wheel machine	21,150
M6	0+241	Construct 900x1500mm JB, including connections	4,500
M7	0+241 to 0+570	329m of 525mmø concrete tile with joint wrap by wheel machine	24,675
M8	0+570 to 0+842	272m of 525mmø concrete tile with joint wrap by wheel machine	21,760
M9	0+842	Construct 900x1200mm CB, including birdcage grate and connections	3,600
M10	0+842 to 0+860	18m of 500mmø steel casing pipe across 8th Concession Road by jack and boring methods. Grout approx. 14m of existing 300mmØ tile under 8th Concession Road if left intact after new bore.	24,000
M11	0+860	Construct 900x1200mm CB, including birdcage grate and connections	3,000
		Sub Total Part i):	**111,085**
ii) "B" BRANCH			
B1	0+000 to 0+062	62m of 300mmø solid plastic pipe	7,400
B2	0+056 to 0+062	Locate expose and protect 200mmø Enbridge natural gas pipeline with extreme caution for Drain construction to proceed underneath of pipeline. Consult specifications.	5,000
B3	0+030	Connect existing offset CB at 8th Concession Road culvert with 5m of 200mmø plastic tubing	300
B4	0+062	Construct 600x600mm CB, including birdcage grate and connections	2,600
B5	0+062 to 0+083	21m of 300mmø steel casing pipe across Muir Road South/ C.R. 22 to be installed by jack and boring methods (actual bore pipe length can be	15,000

	DESCRIPTION			TOTAL
		18m).		
B6	0+083	Construct 600x600mm CB, including birdcage grate and connections	2,400	
		Sub Total Part ii):	**32,700**	
iii) Contingencies				
C1	Increased costs to install 50m of tile by backhoe in areas of muck or wet/unstable soils, including geotextile and 300mm of clear crushed stone. (Contingency is intended to be independent of tile size. If required and authorized, would be paid in addition to regular bid item above).		3,000	
C2	Increased costs to install 150m of tile by backhoe in stony conditions, where authorized and with thin bedding of clear crushed stone. (Contingency is intended to be independent of tile size. If required and authorized, would be in paid in addition to regular bid item above).		6,000	
C3	Contingency allowance for lift-outs of wheel machine to allow for stone removal, including the stone removal and restarting/continuing the wheel machine (based on 3 @ $300/lift-out).		900	
C4	Tile Connections (based on 6 @ $150/connection).		900	
C5	Lump sum contingency allowance		3,600	
		Sub Total Part iii):	**14,400**	
		Sub Total Construction:	**158,185**	
		Net HST (1.76%)	**2,780**	
	TOTAL CONSTRUCTION COST ESTIMATE:			**$160,965**
ENGINEERING COSTS				
		Report Preparation	48,000	
		Enbridge pipeline and Execulink fibre optic line locating (Super Sucker Hydro Vac Services)	5,000	
		Consideration of Report Meeting	1,000	
		Court of Revision	1,000	
		Construction Phase Services	21,000	
		Net HST (1.76%)	1,340	
	TOTAL ENGINEERING COSTS ESTIMATE:			**77,340**
SECTION 73 COSTS				
		Interest estimate	5,000	
		Unforeseen costs & applications	2,045	
	TOTAL SECTION 73 COSTS ESTIMATE:			**7,045**
		TOTAL ESTIMATED COST:		**$254,000**

13 ASSESSMENTS

The Drainage Act requires that the total estimated cost be assessed to the affected lands and roads under the categories of Benefit (Section 22), Outlet Liability (Section 23), Injuring Liability (Section 23), Special Benefit (Section 24) and Increased Cost (Section 26). On this project assessment for Benefit, Outlet Liability and Increased Cost (Special) Assessments are involved only.

13.1 Calculation of Assessments

For each individual drain, the first step in the assessment calculation is to determine the benefit assessment to the affected lands and roads, then special assessments to roads and utilities are determined, where applicable. After deducting the total benefit and special assessments from the total cost of each branch/interval, the balance of the cost is then assessed as outlet liability on a per hectare basis to all lands and roads in the watershed.

13.2 Benefit Assessments (Section 22)

Section 22 benefits were determined based on the estimated value provided to the property by the works and are not proportional to the watershed area. Criteria for benefit assessments are based on direct outlet (ability of lands to connect directly to the Drain), improved drainage along the drain, and improved area serviced.

Table 13.2-1 - Benefit Assessments provides a summary of the benefit assessments.

Table 13.2-1 - Benefit Assessments

Roll Number	Description	Main Drain	"B" Branch	Total
010-33801	*-for improved drainage along drain*	13,350		13,350
010-33150	*-for improved drainage along drain* *-for improved direct outlet* *-for improved sub-surface service area*	30,350 1,500 9,700		41,550
010-31200	*-for improved direct outlet* *-for improved sub-surface service area*	500 500		1,000
010-31300	*-for improved outlet downstream*	500		500
010-31100	*-for improved outlet downstream*	500		500
020-06900	*-for improved direct outlet* *-for improved outlet downstream* *-for improved sub-surface service area*	500	1,500 4,000	6,000
8th Conc. Road	*-for improved drainage along drain* *-for improved direct outlet*	3,000 2,000		5,000
Muir Road S. / C.R. 22	*-for improved direct outlet ($1,500 to each County)* *-for improved outlet downstream ($1,000 to each County)*	 2,000	3,000	5,000
TOTAL BENEFIT		64,400	8,500	**72,900**

13.3 Outlet Liability Assessments (Section 23)

Section 23(3) of the Drainage Act states that outlet liability assessment is to be based on the volume and rate of flow of the water artificially caused to flow. Therefore the lands and roads in the watershed are assessed on a per hectare basis, with adjustments made to recognize the different amount of runoff generated by different land uses. The basis for the adjustments is 1 hectare of cleared agricultural land contributing both surface and subsurface water to the Drain. Land

uses with a different runoff rate are adjusted by the factors given in *Table 13.3-1 - Runoff Factors.*

Table 13.3-1 - Runoff Factors

Land Use	Runoff factor
Agricultural	1
Lands Tiled In/Away	0.5
Forest	0.5
Paved Road	3
Gravel Road	2

13.4 Increased Cost (Special) Assessments (Section 26)

Section 26 of the Drainage Act directs that any increased cost due to a public utility (utility) or road authority (road) shall be paid for by that utility or road. This assessment is known as a Special Assessment. The estimated special assessments are presented in *Table* 13.4-1 - *Estimated Special Assessments.* The equivalent drain cost is based on the length of Drain affected by the road allowance or utility right of way and the normal cost of drain construction. The increased cost caused by the road or utility is determined by subtracting the equivalent drain cost from the construction and engineering costs.

Table 13.4-1 - Estimated Special Assessments

Drain	Location	Authority/ Owner	Construction Cost	+ Eng. Cost	- Equiv. Drain Cost	+ Net HST	= Est. Special Assess.
(A) Main Drain	0+570 to 0+842	Enbridge Gas Inc.	25,360 *(Items M8 & M9)*	3,000	-20,680	135	**7,815**
(B) Main Drain	0+842 to 0+860	County of Brant	25,500 *(Items M10 & M11 ÷ 2)*	13,500	-1,600	660	**38,060**
(C) "B" Branch	0+000 to 0+062	Enbridge Gas Inc.	12,400 *(Items B1 & B2)*	9,300	-3,100	325	**18,925**
(D) "B" Branch	0+062 to 0+083	County of Brant	8,800 *(Items B4 & B5) ÷ 2*	5,500	-580	240	**13,960**
(E) "B" Branch	0+062 to 0+083	County of Oxford	8,800 *(Items B4 & B5) ÷ 2*	5,500	-580	240	**13,960**

The actual special assessments will be determined after construction by inserting the actual construction and engineering costs in the Special Assessments Table. Any additional costs identified by the engineer will be added to the Special Assessment where appropriate.

The road authority or utility may elect to construct the Drain within their right of way with their forces. In this case, the special assessment is calculated by inserting zero for the construction cost.

If there are increased costs to the drain project at the time of construction due to a utility or road not listed in the table above, a Special Assessment will be based on the actual costs incurred.

Special Assessments do not apply to future maintenance assessments.

13.5 Assessment Schedules

In the assessment schedules each parcel of land assessed has been identified by the municipal assessment roll number at the time of the preparation of this report. The size of each parcel was established using the assessment roll information. If an "F" is shown in the first column, it denotes lands with current Farm Property Tax Class designation that may qualify for Grant. For convenience only, each parcel is also identified by the owner name(s) from the last revised assessment roll.

13.5.1 Schedule A- Schedule of Assessments

The estimated cost for the drainage works in this report is distributed among lands, roads and utilities, as shown in Schedule A, the Schedule of Assessments for Construction.

13.5.2 Schedule B -Schedule of Assessments for Future Maintenance

In accordance with Section 74 of the Act, the Drain shall be maintained by the Municipality, and the cost of maintenance shall be assessed to lands and roads upstream of the maintenance location, pro rata with the amounts in Schedule B. The $ amounts in Schedule B are listed solely for calculating percentages (share of future maintenance costs) and will not be levied with the final cost of the Drain.

Schedule B in this report also includes the remainder of the 1970 Main Drain upstream of 8th Concession Road, and the “A” Branch.

Schedule B is divided into columns to reflect the different drains/branches/intervals where maintenance work may be undertaken. These column intervals assist in identifying upstream lands and roads to be assessed for future maintenance. The percentages shown in Schedule B determine the share of future maintenance to be levied to property or road. For example, a $1,000 tile repair will result in a $50 assessment to a property with a 5% maintenance assessment.

The Municipality will confirm eligibility for the grant at the time the maintenance cost is levied.

13.5.3 Schedule C – Schedule for Actual Cost Bylaw

After the construction of the Drain is certified complete by the engineer, the Municipality will determine the actual cost of the Drain. Actual assessments will be determined by prorating the actual cost of the Drain using Schedule C. Schedule C illustrates the estimated net assessments after deducting allowances and grants from the total assessments shown in Schedule A. Eligibility for the grant will be confirmed by the Municipality at the time the actual cost is levied. Actual assessments in Schedule C will be levied to the owner of the identified parcel at the time the Actual Cost Bylaw is passed.

14 GRANT

In accordance with the provisions of Section 85 of the Act, a grant not exceeding 1/3 (33-1/3%) may be available on the assessments against lands used for agricultural purposes. The current OMAFRA grant policy defines agricultural lands as privately owned parcels of land which have the Farm Property Class Tax Rate. Based on Municipal assessment roll information, parcels that have the Farm Property Tax Class are identified with an 'F' in the first column of the assessment schedules.

Section 88 of the Act provides for the Municipality to apply for this grant after the construction of the Drain is certified complete by the engineer. The Municipality must confirm the Farm Property Tax Class on the assessed parcels at the time the grant application is completed and submitted to OMAFRA. OMAFRA has the authority to determine grant eligibility regardless of the designation herein.

If any portion of the drainage works is not eligible for the grant, those ineligible costs have been separately identified in this report.

15 PRIVACY OF LANDS

A right-of-way for the Municipality exists along the drain on each property. However, the property on which the right of way is located remains private property. Other landowners or the public may not enter or use the drain right-of-way. Persons authorized to enter the drain right-of-way to carry out duties authorized under the Act include: Engineers, Contractors, and the appointed Drainage Superintendents and/or their assistants.

16 MAINTENANCE

16.1 General

Section 74 of the Act requires that the Drain, as outlined in this report, as well as the 1970 Main Drain and "A" Branch upstream of 8th Concession Road, is to be maintained by the Municipality, with the cost of maintenance to be assessed to the upstream lands and roads pro rata with the assessments in Schedule B – Schedule of Assessments for Future Maintenance.

The Mather Drain for future maintenance purposes shall consist of all components listed in the cost estimate for the Main Drain and "B" Branch in this 2022 report, except for the work in the Guider Drain Improvement of Big Creek. It shall also include the existing 1970 Main Drain downstream and upstream of 8th Concession Road, as well as the "A" Branch, which are to remain as part of the drain.

The plan, profiles, special provisions/specifications and Schedule B from this 2022 report, as well as the profiles and specifications for the Main Drain and "A" Branch from the H. M. Gibson Mather Drain report dated September 5, 1970, are to be used for future maintenance.

Though it will be cut off in part by the proposed "B" Branch, the 1932 Agreement Drain is to remain. However, due to its location within the road allowance and it no longer being required to service private lands, it is recommended that the 1932 Agreement Drain be maintained in the future by, and at the expense of, the County of Brant.

The cost of replacing, repairing and/or maintaining any road culverts or crossings are to be fully assessed to the road authority/municipality. The Municipality is given the option of replacing or maintaining any crossing directly with their own forces.

A right-of-way along the drain and access routes to the drain exist for the Municipality to maintain the drain. The right-of-way for the Drain, as described in the "Allowances" section of this report, shall remain free of obstructions. The cost of removing obstructions is the responsibility of the owner.

Any landowner making a new connection to the drain shall notify the appropriate Drainage Superintendent before making the connection. If the Drainage Superintendent is not notified, the cost to remedy new connections that obstruct or otherwise damage the drain will be the responsibility of the owner.

16.2 Updating Future Maintenance Schedules

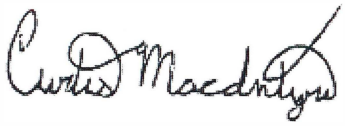
To ensure future maintenance assessments are equitable, the assessments provided in this report should be reapportioned under Section 65 when severances or amalgamations occur when new lands are connected to the Drain or when a land-use change occurs that can be accommodated by the existing Drain. If a future land-use change will cause the drain capacity to be exceeded, a report under Section 4 or 78 may be required to provide increased capacity.

17 BYLAW

This report including the drawings, specifications, assessment schedules and appendices, when adopted by bylaw in accordance with the Act, provides the basis for construction and maintenance of the Mather Drain 2022. Also, the profiles and specifications for the 1970 Main Drain and "A" Branch upstream of the 8th Concession Road are to be referred to and used for maintenance of the remainder of the Mather Drain.

All of which is respectfully submitted,

K. SMART ASSOCIATES LTD.



Curtis MacIntyre, P. Eng.

SCHEDULE A - SCHEDULE OF ASSESSMENTS
MATHER DRAIN 2022
COUNTY OF BRANT / TOWNSHIP OF NORWICH

	Con	Lot	Roll No.	Owner	Main Drain Total ha affected	Main Drain Benefit (Sec. 22)	Main Drain Special (Sec. 26)	Main Drain Outlet (Sec. 23)	Main Drain Total	"B" Branch Total ha affected	"B" Branch Benefit (Sec. 22)	"B" Branch Special (Sec. 26)	"B" Branch Outlet (Sec. 23)	"B" Branch Total	Gross Total Assessment ($)
County of Brant (Roll No. 2920011-)				(Burford Twp)											
F	7	Pt. Lots 23 & 24	010-31100	B. & B. Van Haastert	18.1	500	0	12,635	13,135	0.0	0	0	0	0	13,135
F	7	Pt. Lot 24	010-31200	R. & M. Hoskins	2.1	1,000	0	1,893	2,893	0.0	0	0	0	0	2,893
F	7	Pt. Lot 24	010-31300	Elermae Acres Ltd.	30.3	500	0	27,122	27,622	0.0	0	0	0	0	27,622
	8	Pt. Lot 24	010-33100	A. & E. Van ee	1.1	0	0	754	754	0.0	0	0	0	0	754
F	8	Pt. Lot 24	010-33150	Lola-May Farms Limited	19.5	41,550	0	12,005	53,555	0.1	0	0	23	23	53,578
F	8	Pt. Lot 24	010-33801	Lola-May Farms Limited	3.8	13,350	0	2,195	15,545	0.0	0	0	0	0	15,545
				Subtotal (Lands):	74.9	56,900	0	56,604	113,504	0.1	0	0	23	23	113,527
		8th Concession		County of Brant	1.1	5,000	38,060	2,319	45,379	0.1	0	0	23	23	45,402
		Muir Road S./C.R. 22		County of Brant	0.9	1,000	0	2,293	3,293	0.0	1,500	13,960	0	15,460	18,753
		Enbridge Gas Inc. (Special Assessment)				0	7,815	0	7,815		0	18,925	0	18,925	26,740
				Subtotal (Roads & Utilities):	2.0	6,000	45,875	4,612	56,487	0.1	1,500	32,885	23	34,408	90,895
				Total Assessment County of Brant:	76.9	62,900	45,875	61,216	169,991	0.2	1,500	32,885	46	34,431	204,422
Twp of Norwich (Roll No. 3202040-)				(East Oxford Twp)											
F	7	Pt. Lot 1	020-06800	Oak Lane Farms Inc Trustee	7.0	0	0	3,262	3,262	0.4	0	0	77	77	3,339
F	7	S Pt. Lot 1	020-06900	Talbot Farms	18.1	500	0	16,440	16,940	8.1	5,500	0	3,100	8,600	25,540
	7	S. Pt. Lot 1	020-07001	A. & M. Romme	0.7	0	0	350	350	0.7	0	0	153	153	503
F	8	N. Pt. Lot 1	020-10600	Oak Lane Farms Inc Trustee	3.0	0	0	866	866	0.0	0	0	0	0	866
				Subtotal (Lands):	28.8	500	0	20,918	21,418	9.2	5,500	0	3,330	8,830	30,248
		Substation Road		Township of Norwich	0.2	0	0	436	436	0.1	0	0	115	115	551
		Muir Road S./C.R. 22		County of Oxford	0.8	1,000	0	1,975	2,975	0.3	1,500	13,960	344	15,804	18,779
				Subtotal (Roads & Utilities):	1.0	1,000	0	2,411	3,411	0.4	1,500	13,960	459	15,919	19,330
				Total Assessment Township of Norwich:	29.8	1,500	0	23,329	24,829	9.6	7,000	13,960	3,789	24,749	49,578
				TOTAL ASSESSMENT MATHER DRAIN 2022:	**106.7**	**64,400**	**45,875**	**84,545**	**194,820**	**9.8**	**8,500**	**46,845**	**3,835**	**59,180**	**254,000**

Notes:

1. Lands noted with an "F" are classified as agricultural and according to current OMAFRA policy qualify for the 1/3 grant Eligibility for the 1/3 grant will be confirmed at the time the final cost is levied.
2. Section 21 of the Drainage Act, RSO 1990 requires that assessments be shown opposite each parcel of land and road affected. The affected parcels of land have been identified using the roll number from the last revised assessment roll for the County/Township. For convenience the owner's names as shown by the last revised assessment roll have also been included.

SCHEDULE B - Schedule of Assessments for Future Maintenance
MATHER DRAIN
COUNTY OF BRANT / TOWNSHIP OF NORWICH

Con	Lot	Roll No	Owner	Main Drain												A" Branch		"B" Branch			
				Interval 1 0+000 to 0+570		Interval 2 0+570 to 0+842		Interval 3 0+842 to 0+860		Interval 4 28+50 to 40+00		Interval 5 40+00 to 47+20		Interval 6 47+20 to 48+00		Interval 1 0+00 to 13+00		Interval 1 0+000 to 0+061		Interval 2 0+061 to 0+083	
				$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
County of Brant (Roll No. 2920011-)			(Burford Twp)																		
7	Pt. Lots 23 & 24	010-31100	B. & B. Van Haastert	*982*	9.82	*581*	11.62	*154*	10.27	*1,333*	16.66	*0*	0.00	*0*	0.00	*3,244*	64.88	*0*	0.00	*0*	0.00
7	Pt. Lot 24	010-31200	R. & M. Hoskins	*142*	1.42	*93*	1.86	*25*	1.67	*750*	9.38	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00
7	Pt. Lot 24	010-31300	Elermae Acres Ltd.	*2,038*	20.38	*1,328*	26.56	*352*	23.47	*4,260*	53.24	*2,454*	49.08	*0*	0.00	*1,756*	35.12	*0*	0.00	*0*	0.00
8	Pt. Lot 24	010-33100	A. & E. Van ee	*74*	0.74	*20*	0.40	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00
8	Pt. Lot 24	010-33150	Lola-May Farms Limited	*2,820*	28.20	*1,372*	27.44	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*268*	10.72	*0*	0.00
8	Pt. Lot 24	010-33801	Lola-May Farms Limited	*1,757*	17.57	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00
			Subtotal (Lands):	*7,813*	78.13	*3,394*	67.88	*531*	35.41	*6,343*	79.28	*2,454*	49.08	*0*	0.00	*5,000*	100.00	*268*	10.72	*0*	0.00
	8th Concession		County of Brant	*210*	2.10	*325*	6.50	*761*	50.72	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*18*	0.72	*0*	0.00
	Muir Road S./C.R. 22		County of Brant	*183*	1.83	*103*	2.06	*23*	1.53	*91*	1.14	*92*	1.84	*375*	25.00	*0*	0.00	*100*	4.00	*375*	25.00
			Subtotal (Roads):	*393*	3.93	*428*	8.56	*784*	52.25	*91*	1.14	*92*	1.84	*375*	25.00	*0*	0.00	*118*	4.72	*375*	25.00
			Total Assessment County of Brant:	*8,206*	82.06	*3,822*	76.44	*1,315*	87.66	*6,434*	80.42	*2,546*	50.92	*375*	25.00	*5,000*	100.00	*386*	15.44	*375*	25.00
Twp of Norwich (Roll No. 3202040-)			(East Oxford Twp)																		
7	Pt. Lot 1	020-06800	Oak Lane Farms Inc Trustee	*237*	2.37	*171*	3.42	*43*	2.87	*335*	4.19	*338*	6.76	*174*	11.60	*0*	0.00	*36*	1.44	*15*	1.00
7	S Pt. Lot 1	020-06900	Talbot Farms	*1,225*	12.25	*884*	17.68	*130*	8.67	*1,140*	14.25	*2,024*	40.48	*528*	35.20	*0*	0.00	*1,694*	67.76	*614*	40.93
7	S. Pt. Lot 1	020-07001	A. & M. Romme	*27*	0.27	*20*	0.40	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*71*	2.84	*30*	2.00
8	N. Pt. Lot 1	020-10600	Oak Lane Farms Inc Trustee	*102*	1.02	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00
			Subtotal (Lands):	*1,591*	15.91	*1,075*	21.50	*173*	11.54	*1,475*	18.44	*2,362*	47.24	*702*	46.80	*0*	0.00	*1,801*	72.04	*659*	43.93
	Substation Road		Township of Norwich	*41*	0.41	*15*	0.30	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*0*	0.00	*52*	2.08	*24*	1.60
	Muir Road S./C.R. 22		County of Oxford	*162*	1.62	*88*	1.76	*12*	0.80	*91*	1.14	*92*	1.84	*423*	28.20	*0*	0.00	*261*	10.44	*442*	29.47
			Subtotal (Roads):	*203*	2.03	*103*	2.06	*12*	0.80	*91*	1.14	*92*	1.84	*423*	28.20	*0*	0.00	*313*	12.52	*466*	31.07
			Total Assessment Township of Norwich:	*1,794*	17.94	*1,178*	23.56	*185*	12.34	*1,566*	19.58	*2,454*	49.08	*1,125*	75.00	*0*	0.00	*2,114*	84.56	*1,125*	75.00
			TOTAL ASSESSMENTS:	*10,000*	100.00	*5,000*	100.00	*1,500*	100.00	*8,000*	100.00	*5,000*	100.00	*1,500*	100.00	*5,000*	100.00	*2,500*	100.00	*1,500*	100.00

Note:
1 Agricultural designation not included as grant eligibility has to be confirmed at the time of maintenance cost levy
2 $ amounts above are listed solely for calculating percentages (share of future maintenance costs) and will not be levied with the final cost of the drainage works

SCHEDULE C - SCHEDULE FOR ACTUAL COST BYLAW
MATHER DRAIN 2022
COUNTY OF BRANT / TOWNSHIP OF NORWICH

	Con	Lot	Roll No.	Owner	Ha. Affected	Gross Assessment	1/3 Grant	Allowances	NET ASSESS.
	County of Brant (Roll No. 2920011-)			(Burford Twp)					
F	7	Pt. Lots 23 & 24	010-31100	B. & B. Van Haastert	18.1	13,135	4,378		8,757
F	7	Pt. Lot 24	010-31200	R. & M. Hoskins	2.1	2,893	964	100	1,829
F	7	Pt. Lot 24	010-31300	Elermae Acres Ltd.	30.3	27,622	9,207		18,415
	8	Pt. Lot 24	010-33100	A. & E. Van ee	1.1	754	0		754
F	8	Pt. Lot 24	010-33150	Lola-May Farms Limited	19.5	53,578	17,859	5,800	29,919
F	8	Pt. Lot 24	010-33801	Lola-May Farms Limited	3.8	15,545	5,182	2,650	7,713
				Subtotal (Lands):	74.9	113,527	37,590	8,550	67,387
		8th Concession		County of Brant	1.1	45,402	0		45,402
		Muir Road S./C.R. 22		County of Brant	0.9	18,753	0		18,753
		Enbridge Gas Inc. (Special Assessment)				26,740			26,740
				Subtotal (Roads & Utilities):	2.0	90,895	0	0	90,895
				Total Assessment County of Brant:	76.9	204,422	37,590	8,550	158,282
	Twp of Norwich (Roll No. 3202040-)			(East Oxford Twp)					
F	7	Pt. Lot 1	020-06800	Oak Lane Farms Inc Trustee	7.0	3,339	1,113		2,226
F	7	S Pt. Lot 1	020-06900	Talbot Farms	18.1	25,540	8,513	100	16,927
	7	S. Pt. Lot 1	020-07001	A. & M. Romme	0.7	503	0		503
F	8	N. Pt. Lot 1	020-10600	Oak Lane Farms Inc Trustee	3.0	866	289		577
				Subtotal (Lands):	28.8	30,248	9,915	100	20,233
		Substation Road		Township of Norwich	0.2	551	0		551
		Muir Road S./C.R. 22		County of Oxford	0.8	18,779	0		18,779
				Subtotal (Roads & Utilities):	1.0	19,330	0	0	19,330
				Total Assessment Township of Norwich:	29.8	49,578	9,915	100	39,563
				TOTAL ASSESSMENT MATHER DRAIN 2022:	**106.7**	**254,000**	**47,505**	**8,650**	**197,845**

Notes:

1. Lands noted with an "F" are classified as agricultural and according to current OMAFRA policy qualify for the 1/3 grant Eligibility for the 1/3 grant will be confirmed at the time the final cost is levied.
2. Actual assessment is levied to the owner of the parcel at the time the final cost is levied.

APPENDIX A - Calculation of Assessments
MATHER DRAIN 2022
COUNTY OF BRANT / TOWNSHIP OF NORWICH

				Main Drain															
				Interval 1				Interval 2				Interval 3				Main Drain			
				Station	0+000	to	0+570	Station	0+570	to	0+842	Station	0+842	to	0+860	Total			
ESTIMATED COST	Allowances					5,500				2,450				100				8,050	
	Construction					64,625				27,860				29,700				122,185	
	Engineering					20,500				9,500				10,300				40,300	
	Construction Supervision					8,100				3,800				3,900				15,800	
	Administration					2,800				1,225				1,320				5,345	
	Net HST					1,640				725				775				3,140	
	TOTAL					103,165				45,560				46,095				194,820	
Roll No. (Owner)	Total Ha Affected	Run-off Factor	Total ha Adjusted	Benefit (Sec. 22)	Special (Sec. 26)	Adj Ha	Outlet (Sec. 23)	Benefit (Sec. 22)	Special (Sec. 26)	Adj Ha	Outlet (Sec. 23)	Benefit (Sec. 22)	Special (Sec. 26)	Adj Ha	Outlet (Sec. 23)	**Total Benefit**	**Total Special**	**Total Outlet**	**Total**
County of Brant (Roll No. 2920011-)																			
010-31100 (B. & B. Van Haastert)	18.1	0.8	14.5			14.5	8,374			11.9	3,534	500		11.9	727	500	0	12,635	13,135
010-31200 (R. & M. Hoskins)	2.1	1.0	2.1			2.1	1,213			1.9	564	1,000		1.9	116	1,000	0	1,893	2,893
010-31300 (Elermae Acres Ltd.)	30.3	1.0	30.1			30.1	17,383			27.2	8,078	500		27.2	1,661	500	0	27,122	27,622
010-33100 (A. & E. Van ee)	1.1	1.0	1.1			1.1	635			0.4	119			0.0	0	0	0	754	754
010-33150 (Lola-May Farms Limited)	19.5	1.0	19.5	28,100		19.5	11,262	13,450		2.5	743			0.0	0	41,550	0	12,005	53,555
010-33801 (Lola-May Farms Limited)	3.8	1.0	3.8	13,350		3.8	2,195			0.0	0			0.0	0	13,350	0	2,195	15,545
Subtotal (Lands):	74.9		71.1	41,450	0	71.1	41,062	13,450	0	43.9	13,038	2,000	0	41.0	2,504	56,900	0	56,604	113,504
8th Concession (County of Brant)	1.1	2.8	3.1	1,000		3.1	1,790	2,000		1.6	474	2,000	38,060	0.9	55	5,000	38,060	2,319	45,379
Muir Road S./C.R. 22 (County of Brant)	0.9	3.0	2.7	500		2.7	1,559	500		2.1	624			1.8	110	1,000	0	2,293	3,293
Enbridge Gas Inc. (Special Assessment)									7,815							0	7,815	0	7,815
Subtotal (Roads & Utilities):	2.0		5.8	1,500	0	6	3,349	2,500	7,815	4	1,098	2,000	38,060	3	165	6,000	45,875	4,612	56,487
Total Assessment County of Brant:	76.9		76.9	42,950	0	76.9	44,411	15,950	7,815	47.6	14,136	4,000	38,060	43.7	2,669	62,900	45,875	61,216	169,991
Twp of Norwich (Roll No. 3202040-)																			
020-06800 (Oak Lane Farms Inc Trustee)	7.0	0.5	3.5			3.5	2,021			3.5	1,040			3.3	201	0	0	3,262	3,262
020-06900 (Talbot Farms)	18.1	1.0	18.1			18.1	10,453			18.1	5,376	500		10.0	611	500	0	16,440	16,940
020-07001 (A. & M. Romme)	0.7	0.6	0.4			0.4	231			0.4	119			0.0	0	0	0	350	350
020-10600 (Oak Lane Farms Inc Trustee)	3.0	0.5	1.5			1.5	866			0.0	0			0.0	0	0	0	866	866
Subtotal (Lands):	28.8		23.5	0	0	23.5	13,571	0	0	22.0	6,535	500	0	13.3	812	500	0	20,918	21,418
Substation Road (Township of Norwich)	0.2	3.0	0.6			0.6	347			0.3	89			0.0	0	0	0	436	436
Muir Road S./C.R. 22 (County of Oxford)	0.8	3.0	2.4	500		2.4	1,386	500		1.8	535			0.9	54	1,000	0	1,975	2,975
Subtotal (Roads & Utilities):	1.0		3.0	500	0	3.0	1,733	500	0	2.1	624	0	0	0.9	54	1,000	0	2,411	3,411
Total Assessment Township of Norwich:	29.8		26.5	500	0	26.5	15,304	500	0	24.1	7,159	500	0	14.2	866	1,500	0	23,329	24,829
TOTAL ASSESSMENT MATHER DRAIN 2022:	**106.7**		**103.4**	**43,450**	**0**	**103.4**	**59,715**	**16,450**	**7,815**	**71.7**	**21,295**	**4,500**	**38,060**	**57.9**	**3,535**	**64,400**	**45,875**	**84,545**	**194,820**

APPENDIX A - Calculation of Assessments
MATHER DRAIN 2022
COUNTY OF BRANT / TOWNSHIP OF NORWICH

				"B" Branch								"B" Branch Total				Grand Total			
				Interval 1				Interval 2											
				Station	0+000	to	0+062	Station	0+062	to	0+083								
ESTIMATED COST	Allowances					500				100				600				8,650	
	Construction					14,000				22,000				36,000				158,185	
	Engineering					5,500				9,200				14,700				55,000	
	Construction Supervision					2,700				2,500				5,200				21,000	
	Administration					700				1,000				1,700				7,045	
	Net HST					390				590				980				4,120	
	TOTAL					23,790				35,390				59,180				254,000	
Roll No. (Owner)	Total Ha Affected	Run-off Factor	Total ha Adjusted	Benefit (Sec. 22)	Special (Sec. 26)	Adj Ha	Outlet (Sec. 23)	Benefit (Sec. 22)	Special (Sec. 26)	Adj Ha	Outlet (Sec. 23)	**Total Benefit**	**Total Special**	**Total Outlet**	**Total**	Total Benefits	Total Special	Total Outlets	TOTAL
County of Brant (Roll No. 2920011-)																			
010-31100 (B. & B. Van Haastert)	18.1	0.8	14.5			0.0	0			0.0	0	0	0	0	0	500	0	12,635	13,135
010-31200 (R. & M. Hoskins)	2.1	1.0	2.1			0.0	0			0.0	0	0	0	0	0	1,000	0	1,893	2,893
010-31300 (Elermae Acres Ltd.)	30.3	1.0	30.1			0.0	0			0.0	0	0	0	0	0	500	0	27,122	27,622
010-33100 (A. & E. Van ee)	1.1	1.0	1.1			0.0	0			0.0	0	0	0	0	0	0	0	754	754
010-33150 (Lola-May Farms Limited)	19.5	1.0	19.5			0.1	23			0.0	0	0	0	23	23	41,550	0	12,028	53,578
010-33801 (Lola-May Farms Limited)	3.8	1.0	3.8			0.0	0			0.0	0	0	0	0	0	13,350	0	2,195	15,545
Subtotal (Lands):	74.9		71.1	0	0	0.1	23	0	0	0.0	0	0	0	23	23	56,900	0	56,627	113,527
8th Concession (County of Brant)	1.1	2.8	3.1			0.1	23			0.0	0	0	0	23	23	5,000	38,060	2,342	45,402
Muir Road S./C.R. 22 (County of Brant)	0.9	3.0	2.7	750		0.0	0	750	13,960	0.0	0	1,500	13,960	0	15,460	2,500	13,960	2,293	18,753
Enbridge Gas Inc. (Special Assessment)					18,925							0	18,925	0	18,925	0	26,740	0	26,740
Subtotal (Roads & Utilities):	2.0		5.8	750	18,925	0.1	23	750	13,960	0	0	1,500	32,885	23	34,408	7,500	78,760	4,635	90,895
Total Assessment County of Brant:	76.9		76.9	750	18,925	0.2	46	750	13,960	0.0	0	1,500	32,885	46	34,431	64,400	78,760	61,262	204,422
Twp of Norwich (Roll No. 3202040-)																			
020-06800 (Oak Lane Farms Inc Trustee)	7.0	0.5	3.5			0.2	47			0.2	30	0	0	77	77	0	0	3,339	3,339
020-06900 (Talbot Farms)	18.1	1.0	18.1	1,000		8.1	1,897	4,500		8.1	1,203	5,500	0	3,100	8,600	6,000	0	19,540	25,540
020-07001 (A. & M. Romme)	0.7	0.6	0.4			0.4	94			0.4	59	0	0	153	153	0	0	503	503
020-10600 (Oak Lane Farms Inc Trustee)	3.0	0.5	1.5			0.0	0			0.0	0	0	0	0	0	0	0	866	866
Subtotal (Lands):	28.8		23.5	1,000	0	8.7	2,038	4,500	0	8.7	1,292	5,500	0	3,330	8,830	6,000	0	24,248	30,248
Substation Road (Township of Norwich)	0.2	3.0	0.6			0.3	70			0.3	45	0	0	115	115	0	0	551	551
Muir Road S./C.R. 22 (County of Oxford)	0.8	3.0	2.4	750		0.9	211	750	13,960	0.9	133	1,500	13,960	344	15,804	2,500	13,960	2,319	18,779
Subtotal (Roads & Utilities):	1.0		3.0	750	0	1.2	281	750	13,960	1.2	178	1,500	13,960	459	15,919	2,500	13,960	2,870	19,330
Total Assessment Township of Norwich:	29.8		26.5	1,750	0	9.9	2,319	5,250	13,960	9.9	1,470	7,000	13,960	3,789	24,749	8,500	13,960	27,118	49,578
TOTAL ASSESSMENT MATHER DRAIN 2022:	**106.7**		**103.4**	**2,500**	**18,925**	**10.1**	**2,365**	**6,000**	**27,920**	**9.9**	**1,470**	**8,500**	**46,845**	**3,835**	**59,180**	**72,900**	**92,720**	**88,380**	**254,000**

APPENDIX B - Calculation of Assessments for Future Maintenance
MATHER DRAIN
COUNTY OF BRANT / TOWNSHIP OF NORWICH

				Main Drain																																	
				Interval 1				Interval 2				Interval 3				Interval 4				Interval 5				Interval 6				Main Drain		
				Station	0+000	to	0+570	Station	0+570	to	0+842	Station	0+842	to	0+860	Station	28+50	to	40+00	Station	40+00	to	47+20	Station	47+20	to	48+00	Total		
ESTIMATED (HYPOTHETICAL) MAINTENANCE COSTS					**10,000**				**5,000**				**1,500**				**8,000**				**5,000**				**1,500**			**31,000**		
Roll No. (Owner)	Total Ha Affected	Run-off Factor	Total ha Adjusted	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	**Total Benefit**	**Total Outlet**	**Total**
County of Brant (Roll No. 2920011-)																														
010-31100 (B. & B. Van Haastert)	18.1	0.8	14.5		14.5	982	9.82		11.9	581	11.62		11.9	154	10.27	125	11.9	1,208	16.66		0.0	0	0.00		0.0	0	0.00	125	2,925	3,050
010-31200 (R. & M. Hoskins)	2.1	1.0	2.1		2.1	142	1.42		1.9	93	1.86		1.9	25	1.67	750	0.0	0	9.38		0.0	0	0.00		0.0	0	0.00	750	260	1,010
010-31300 (Elermae Acres Ltd.)	30.3	1.0	30.1		30.1	2,038	20.38		27.2	1,328	26.56		27.2	352	23.47	1,500	27.2	2,760	53.24	1,000	14.2	1,454	49.08		0.0	0	0.00	2,500	7,932	10,432
010-33100 (A. & E. Van ee)	1.1	1.0	1.1		1.1	74	0.74		0.4	20	0.40		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	94	94
010-33150 (Lola-May Farms Limited)	19.5	1.0	19.5	1,500	19.5	1,320	28.20	1,250	2.5	122	27.44		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	2,750	1,442	4,192
010-33801 (Lola-May Farms Limited)	3.8	1.0	3.8	1,500	3.8	257	17.57		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	1,500	257	1,757
Subtotal (Lands):	74.9		71.1	3,000	71.1	4,813	78.13	1,250	43.9	2,144	67.88	0	41.0	531	35.41	2,375	39.1	3,968	79.28	1,000	14.2	1,454	49.08	0	0.0	0	0.00	7,625	12,910	20,536
8th Concession (County of Brant)	1.1	2.8	3.1		3.1	210	2.10	250	1.6	75	6.50	750	0.9	11	50.72		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	1,000	296	1,296
Muir Road S./C.R. 22 (County of Brant)	0.9	3.0	2.7		2.7	183	1.83		2.1	103	2.06		1.8	23	1.53		0.9	91	1.14		0.9	92	1.84	375	0.0	0	25.00	375	492	867
Subtotal (Roads):	2.0		5.8	0	5.8	393	3.93	250	3.7	178	8.56	750	2.7	34	52.25	0	0.9	91	1.14	0	0.9	92	1.84	375	0.0	0	25.00	1,375	788	2,163
Total Assessment County of Brant:	76.9		76.9	3,000	76.9	5,206	82.06	1,500	47.6	2,322	76.44	750	43.7	565	87.66	2,375	40.0	4,059	80.42	1,000	15.1	1,546	50.92	375	0.0	0	25.00	9,000	13,698	22,698
Twp of Norwich (Roll No. 3202040-)																														
020-06800 (Oak Lane Farms Inc Trustee)	7.0	0.5	3.5		3.5	237	2.37		3.5	171	3.42		3.3	43	2.87		3.3	335	4.19		3.3	338	6.76		3.3	174	11.60	0	1,298	1,298
020-06900 (Talbot Farms)	18.1	1.0	18.1		18.1	1,225	12.25		18.1	884	17.68		10.0	130	8.67	125	10.0	1,015	14.25	1,000	10.0	1,024	40.48		10.0	528	35.20	1,125	4,806	5,931
020-07001 (A. & M. Romme)	0.7	0.6	0.4		0.4	27	0.27		0.4	20	0.40		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	47	47
020-10600 (Oak Lane Farms Inc Trustee)	3.0	0.5	1.5		1.5	102	1.02		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	102	102
Subtotal (Lands):	28.8		23.5	0	23.5	1,591	15.91	0	22.0	1,075	21.50	0	13.3	173	11.54	125	13.3	1,350	18.44	1,000	13.3	1,362	47.24	0	13.3	702	46.80	1,125	6,253	7,378
Substation Road (Township of Norwich)	0.2	3.0	0.6		0.6	41	0.41		0.3	15	0.30		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	56	56
Muir Road S./C.R. 22 (County of Oxford)	0.8	3.0	2.4		2.4	162	1.62		1.8	88	1.76		0.9	12	0.80		0.9	91	1.14		0.9	92	1.84	375	0.9	48	28.20	375	493	868
Subtotal (Roads):	1.0		3.0	0	3.0	203	2.03	0	2.1	103	2.06	0	0.9	12	0.80	0	0.9	91	1.14	0	0.9	92	1.84	375	0.9	48	28.20	375	549	924
otal Assessment Township of Norwich:	29.8		26.5	0	26.5	1,794	17.94	0	24.1	1,178	23.56	0	14.2	185	12.34	125	14.2	1,441	19.58	1,000	14.2	1,454	49.08	375	14.2	750	75.00	1,500	6,802	8,302
TOTAL ASSESSMENT MATHER DRAIN:	**106.7**		**103.4**	**3,000**	**103.4**	**7,000**	**100.00**	**1,500**	**71.7**	**3,500**	**100.00**	**750**	**57.9**	**750**	**100.00**	**2,500**	**54.2**	**5,500**	**100.00**	**2,000**	**29.3**	**3,000**	**100.00**	**750**	**14.2**	**750**	**100.00**	**10,500**	**20,500**	**31,000**

APPENDIX B - Calculation of Assessments for Future Maintenance
MATHER DRAIN
COUNTY OF BRANT / TOWNSHIP OF NORWICH

				"A" Branch				"B" Branch								"B" Branch Total			TOTAL		
					Interval 1				Interval 1				Interval 2								
				Station	0+00	to	13+00	Station	0+000	to	0+062	Station	0+062	to	0+083						
ESTIMATED (HYPOTHETICAL) MAINTENANCE COSTS					**5,000**				**2,500**				**1,500**			**4,000**			**40,000**		
Roll No. (Owner)	Total Ha Affected	Run-off Factor	Total ha Adjusted	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	Benefit (Sec. 22)	Adj Ha	Outlet (Sec. 23)	%	**Total Benefit**	**Total Outlet**	**Total**	Total Benefits	Total Outlets	TOTAL
County of Brant (Roll No. 2920011-)																					
010-31100 (B. & B. Van Haastert)	18.1	0.8	14.5	1,250	11.9	1,994	64.88		0.0	0	0.00		0.0	0	0.00	0	0	0	1,375	4,919	6,294
010-31200 (R. & M. Hoskins)	2.1	1.0	2.1		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	0	0	750	260	1,010
010-31300 (Elermae Acres Ltd.)	30.3	1.0	30.1	750	6.0	1,006	35.12		0.0	0	0.00		0.0	0	0.00	0	0	0	3,250	8,938	12,188
010-33100 (A. & E. Van ee)	1.1	1.0	1.1		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	0	0	0	94	94
010-33150 (Lola-May Farms Limited)	19.5	1.0	19.5		0.0	0	0.00	250	0.1	18	10.72		0.0	0	0.00	250	18	268	3,000	1,460	4,460
010-33801 (Lola-May Farms Limited)	3.8	1.0	3.8		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	0	0	1,500	257	1,757
Subtotal (Lands):	74.9		71.1	2,000	17.9	3,000	100.00	250	0.1	18	10.72	0	0.0	0	0.00	250	18	268	9,875	15,928	25,803
8th Concession (County of Brant)	1.1	2.8	3.1		0.0	0	0.00		0.1	18	0.72		0.0	0	0.00	0	18	18	1,000	314	1,314
Muir Road S./C.R. 22 (County of Brant)	0.9	3.0	2.7		0.0	0	0.00	100	0.0	0	4.00	375	0.0	0	25.00	475	0	475	850	492	1,342
Subtotal (Roads):	2.0		5.8	0	0.0	0	0.00	100	0.1	18	4.72	375	0.0	0	25.00	475	18	493	1,850	806	2,656
Total Assessment County of Brant:	76.9		76.9	2,000	17.9	3,000	100.00	350	0.2	36	15.44	375	0.0	0	25.00	725	36	761	11,725	16,734	28,459
Twp of Norwich (Roll No. 3202040-)																					
020-06800 (Oak Lane Farms Inc Trustee)	7.0	0.5	3.5		0.0	0	0.00		0.2	36	1.44		0.2	15	1.00	0	51	51	0	1,349	1,349
020-06900 (Talbot Farms)	18.1	1.0	18.1		0.0	0	0.00	250	8.1	1,444	67.76		8.1	614	40.93	250	2,058	2,308	1,375	6,864	8,239
020-07001 (A. & M. Romme)	0.7	0.6	0.4		0.0	0	0.00		0.4	71	2.84		0.4	30	2.00	0	101	101	0	148	148
020-10600 (Oak Lane Farms Inc Trustee)	3.0	0.5	1.5		0.0	0	0.00		0.0	0	0.00		0.0	0	0.00	0	0	0	0	102	102
Subtotal (Lands):	28.8		23.5	0	0.0	0	0.00	250	8.7	1,551	72.04	0	8.7	659	43.93	250	2,210	2,460	1,375	8,463.0	9,838
Substation Road (Township of Norwich)	0.2	3.0	0.6		0.0	0	0.00		0.3	52	2.08		0.3	24	1.60	0	76	76	0	132	132
Muir Road S./C.R. 22 (County of Oxford)	0.8	3.0	2.4	0	0.0	0	0.00	100	0.9	161	10.44	375	0.9	67	29.47	475	228	703	850	721	1,571
Subtotal (Roads):	1.0		3.0	0	0.0	0	0.00	100	1.2	213	12.52	375	1.2	91	31.07	475	304	779	850	853.0	1,703
Total Assessment Township of Norwich:	29.8		26.5	0	0.0	0	0.00	350	9.9	1,764	84.56	375	9.9	750	75.00	725	2,514	3,239	2,225	9,316.0	11,541
TOTAL ASSESSMENT MATHER DRAIN:	**106.7**		**103.4**	**2,000**	**17.9**	**3,000**	**100.00**	**700**	**10.1**	**1,800**	**100.00**	**750**	**9.9**	**750**	**100.00**	**1,450**	**2,550**	**4,000**	**13,950**	**26,050**	**40,000**

200 **GENERAL CONDITIONS**

TABLE OF CONTENTS

200.1	SCOPE	1
200.2	ORDER OF PRECEDENCE	1
200.3	MUNICIPALITY	1
200.4	TENDERS	1
200.5	EXAMINATION OF SITE, PLANS AND SPECIFICATIONS	1
200.6	COMMENCEMENT AND COMPLETION OF WORK	2
200.7	NOTICES RE COMMENCEMENT OF WORK	2
200.8	PERMITS, NOTICES, LAWS AND RULES	2
200.9	HEALTH AND SAFETY	2
200.10	LIMITATIONS OF OPERATIONS	2
200.11	SUPERVISION	3
200.12	CHARACTER AND EMPLOYMENT OF WORKERS	3
200.13	SUB-CONTRACTORS	3
200.14	PAYMENT	3
200.15	TERMINATION OF CONTRACT BY THE MUNICIPALITY	3
200.16	LIQUIDATED DAMAGES	4
200.17	CONTRACTOR'S LIABILITY	4
200.18	LIABILITY INSURANCE	5
200.19	LOSSES DUE TO ACTS OF NATURE, ETC.	5

200 GENERAL CONDITIONS

200.1 SCOPE

The work to be done under this contract consists of supplying all labour, equipment and materials to construct the drainage work as outlined in the Instructions to Tenderers, the Form of Tender and Agreement, the Schedule of Tender Prices, the Drawings, the General Conditions, Special Provisions and the Standard Specifications.

200.2 ORDER OF PRECEDENCE

In case of any inconsistency or conflict between the drawings and specifications, the following order of precedence shall apply: Addenda, Form of Tender and Agreement, Schedule of Tender Prices, Special Provisions, Contract Drawings, Standard Specifications, General Conditions.

200.3 MUNICIPALITY

Municipality refers to a municipal corporation in the Province of Ontario. Where reference to Township, County, Region, Town, City or Owner appears it shall be deemed to be the same as the word Municipality. Where reference to owner appears in the specifications it is usually in reference to the owner of the property on which the drain is being constructed.

200.4 TENDERS

Tenders are to be submitted on a lump sum basis for the complete works or a portion thereof, as instructed by the Municipality. The Schedule of Tender Prices must be completed and submitted with the Form of Tender and Agreement even though the Contract will be a lump sum. As outlined in the Instructions to Tenders a deposit in the form of a certified cheque, bank draft, bonding or irrevocable letter of credit must accompany each tender as a guarantee of good faith. The deposit shall name the Municipality as the payee. All deposits, except that of the Tenderer to whom the work is awarded, will be returned within 10 days of the time the contract is awarded. The certified cheque of the Tenderer awarded the work will be retained as Contract Security and returned with the Completion Certificate for the work. A Performance Bond may also be required to ensure maintenance of the work for a period of one year after the date of the Completion Certificate.

200.5 EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

Prior to the submission of the Tender, the Tenderer must examine the premises and site to compare them with the Drawings and Specifications in order to be satisfied with the existing conditions and the extent of the work to be done. The Tenderer must ensure that the meaning and intent of the drawings, estimated quantities and specifications is clearly understood before submission of the Tender. No allowances shall be made on behalf of the Contractor by reason of any error made in the preparation of the tender submission.

Any estimates of quantities shown or indicated on the drawings or elsewhere in the tender document are provided for the convenience of the Tenderer. The Tenderer should check the estimate of quantities for accuracy. Any use made of the estimated quantities by the Tenderer in calculating the tendered amounts is done at the Tenderers risk.

200.6 COMMENCEMENT AND COMPLETION OF WORK

The work must commence immediately after the Tenderer is notified of the contract award or at a later date, if set out as a condition in the Form of Tender and Agreement. If weather and ground conditions are unsuitable, work may be started at a later date from either of the above two dates if such delay is approved by the Engineer. The Contractor shall provide a minimum of 48 hours advance notice to the Engineer and the Municipality before commencement of any work. The work must proceed in such manner as to ensure its completion at the earliest possible date consistent with first class workmanship and within the time limit set out in the tender/contract document. Failure to commence or complete the work as set out in the tender/contract document may result in a forfeiture of all or part of the Contract Security if the Engineer deems that damages have been sustained to the Municipality or to any landowner because of the non-commencement or non-completion of the contract as awarded and that the failure to meet the specified dates has been the fault of the Contractor.

200.7 NOTICES RE COMMENCEMENT OF WORK

If the Contractor leaves the job site for a period of time after initiation of work, a minimum of 48 hours advance notice shall be given to the Engineer and the Municipality before commencement of any further work. If any work is commenced without the 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 judged to be inadequate or constructed in any manner that may have been subject to alteration if made known to the Engineer prior to commencement of construction.

200.8 PERMITS, NOTICES, LAWS AND RULES

The Contractor shall apply and pay for all necessary permits or licenses required for the execution of the work. This shall not include the obtaining of permanent easements or rights or servitude. The Contractor shall give all necessary notices and pay all fees required by the law and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public's health and safety and if the specifications and drawings are at variance therewith, any resulting additional expense incurred by the Contractor shall constitute an addition to the contract price.

200.9 HEALTH AND SAFETY

Contractor must comply with the Occupational Health and Safety Act (OHSA) and the associated Regulations for Construction Projects. Contractor will also follow any site-specific safety and training requirements of the Municipality, agencies, utility companies or other authorities.

Communication about site-specific hazards and safety requirements shall occur at the pre-construction meeting. If no pre-construction meeting is conducted, Contractor will communicate site-specific hazards and safety requirements before beginning work.

Contractor shall immediately report any workplace incidents, near misses, injuries and occupational illnesses to the Engineer.

200.10 LIMITATIONS OF OPERATIONS

Except for such work as may be required by the Engineer to maintain the works in a safe and satisfactory condition, the Contractor shall not carry out operations under the contract on Sundays or Statutory Holidays without permission in writing from the Engineer. The Engineer may direct in writing to the Contractor to cease or limit operations under the contract on any day or days if the operations are of such a nature, or if the work is so located, or if the traffic is of such a volume, that the Engineer deems it necessary or expedient to do so.

200.11 SUPERVISION

The Contractor shall provide constant supervision of the construction work and shall keep a competent foreman in charge at the site.

200.12 CHARACTER AND EMPLOYMENT OF WORKERS

The Contractor shall employ only orderly, competent and skillful workers to do the work and shall give preference to available qualified residents in the area of the contract. Whenever the Engineer informs the Contractor in writing that any workers are, in the opinion of the Engineer, disorderly, incompetent, or breaking the law, such workers shall be discharged from the job site and shall not again be employed on the job site without the written consent of the Engineer.

200.13 SUB-CONTRACTORS

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

200.14 PAYMENT

Progress payments in cash equal to about 90% of the value of the work done and materials incorporated in the work will be made to the Contractor monthly. If directed by the Engineer the Contractor may be required to provide a written request for the progress payment amount. An additional 7% will be paid 45 days after the date of the Completion Certificate by the Engineer and 3% of the contract price may be reserved by the Municipality as a maintenance holdback for one year from the date of the Completion Certificate.

The holdbacks noted above may be increased by the Municipality if, in the written opinion of the Engineer, particular conditions of the contract require such greater holdback.

After the completion of the work any part of maintenance holdback may be used to correct defects from faulty construction and/or materials provided that notice shall first be given by the Engineer in writing to the Contractor stating that the Contractor has seven (7) days in which to remedy the defect in construction and/or materials.

200.15 TERMINATION OF CONTRACT BY THE MUNICIPALITY

Termination of the contract by the Municipality may be considered if the Contractor:

1. should be adjudged bankrupt or make a general assignment for the benefit of creditors or if a receiver should be appointed on account of insolvency;
2. should refuse or fail to supply enough properly skilled workmen or proper materials after having received seven (7) days' notice in writing from the Engineer to supply such additional workmen or materials in order to commence or complete the works;
3. should fail to make prompt payment to sub-contractors or for materials or labour;
4. should persistently disregard laws, ordinances, or instructions from the Engineer, or otherwise be guilty of a substantial violation of the provisions of the contract;

then the Municipality, upon Certificate of the Engineer that sufficient cause exists to justify such action, may without prejudice to any other right or remedy, give written notice to the Contractor to terminate the employment of the Contractor and take possession of the premises, and of all materials, tools and appliances thereon, and may finish the work by whatever method the Municipality may deem expedient, but without undue delay or expense. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price will exceed the expense of finishing the work including compensation to the Engineer for additional

services and including other damages of every name and nature, such excess shall be paid to the Contractor. If such expense will exceed such unpaid balance including the Contract Security, the Contractor shall pay the difference to the Municipality. The expense incurred by the Municipality, as herein provided, shall be certified by the Engineer. If the contract is terminated by the Municipality due to the Contractor's failure to properly commence the works, the Contractor shall forfeit the Contract Security and furthermore shall pay to the Municipality an amount to cover the increased costs, if any, associated with a new tender for the contract being terminated.

If any unpaid balance and the Contract Security do not equal the monies owed by the Contractor upon the termination of the contract, the Municipality may also charge such expenses against any money which is or may thereafter be due to the Contractor from the Municipality.

200.16 LIQUIDATED DAMAGES

It is agreed by the parties to the Contract that in case all the work called for under the Contract is not finished or complete within the period of time as set forth in the Tender/Contract Document, damage will be sustained by the Municipality. It is understood by the parties that it will be impracticable and extremely difficult to ascertain and determine the actual damage which the Municipality will sustain in the event of and by reason of such delay. The parties hereto agree that the Contractor will pay to the Municipality a sum as set out in the Form of Tender and Agreement for liquidated damages for each and every calendar day delay, including Saturdays, Sundays and Statutory Holidays, in finishing the work in excess of the number of working days prescribed. It is agreed that the liquidated damages amount is an estimate of the actual damage to the Municipality which will accrue during the period in excess of the prescribed number of working days.

The Municipality may deduct any amount due under this section from any monies that may be due or payable to the Contractor on any account whatsoever. The liquidated damages payable under this section are in addition to and without prejudice to any other remedy, action or other alternative that may be available to the Municipality.

The Contractor shall not be assessed with liquidated damages for any delay caused by acts of nature, or of the Public Enemy, Acts of the Province or of any Foreign State, Fire, Flood, Epidemics, Quarantine Restrictions, Embargoes or any delays of Sub-Contractors due to such causes.

If the time available for the completion of the work is increased or decreased by reason of alterations or changes made under the provisions of the Contract, the number of working days shall be increased or decreased as determined by the Engineer.

If the Form of Tender and Agreement does not show an amount for Liquidated Damages then Liquidated Damages do not apply for this contract.

200.17 CONTRACTOR'S LIABILITY

The Contractor and all workers, agents or any party under the Contractor's control, including Sub-Contractors, shall use due care that no person or property is injured and that no rights are infringed during the construction work outlined in the contract. The Contractor shall be solely responsible for all damages by whomsoever claimable in respect of any injury to persons or to lands, buildings, structures, fences, livestock, trees, crops, roadways, ditches, drains and watercourses, whether natural or artificial, or property of whatever description and in respect of any infringement of any right, privilege or easement wherever occasioned in the carrying on of the work or any part thereof, or by any neglect, misfeasance or non-feasance on the Contractor's part or on the part of any workers, agents or parties under the Contractor's control including Sub-Contractors, and shall bear the full cost thereof. The Contractor shall be fully responsible to make such temporary provisions as may be necessary to ensure the avoidance of any such damage, injury or infringement and to prevent the interruption of or danger or menace to the traffic in any railway or any public or private road entrance or sidewalk and to secure to all persons and corporations the uninterrupted enjoyment of all their

rights, in and during the performance of the work. The Contractor shall indemnify and save harmless the Municipality and the Engineer from and against all claims, demands, losses, costs, damages, actions, suits or other proceedings by whomsoever made, brought or prosecuted in any manner based upon, occasioned by, or attributed to any such damage, injury or infringement.

Wherever any work is of such an extent and nature that it must necessarily be confined to particular areas of a roadway, a working area, or private property, the Contractor shall use reasonable care not to damage or deface the remaining portions of the property, and if any damage is occasioned as a result of the Contractor's operations, it shall be rectified by and at the expense of the Contractor, to the satisfaction of the Engineer. Notwithstanding the indemnity provisions contained in this section, where in the opinion of the Engineer the Contractor has failed to rectify any damage, injury or infringement or has failed to adequately compensate any person for any damage, injury or infringement for which the Contractor is responsible under the contract, the Engineer, following notice in writing to the Contractor of an intention so to do, may withhold payment of any monies due the Contractor under this or any other contract until the Contractor has rectified such damage, injury or infringement or has paid adequate compensation for such damage, injury or infringement, provided however, that the Municipality will not withhold such monies where in the opinion of the Engineer there are reasonable grounds upon which the Contractor denies liability for such damage, injury or infringement and the Contractor has given the claimant a reasonable time in which to establish the validity of the claim, and provided further that the amount withheld under this section shall not exceed the amount of such claims against the Contractor.

Where the Contractor uses privately owned lands for pits or waste disposal areas, the Contractor shall comply with applicable laws and provide the Engineer with a release signed by or on behalf of the owner of each pit or waste disposal area used by the Contractor. If the said release is not obtained, then sufficient monies will be withheld from the Contractor except, however, where the owner's signature is withheld solely on the basis of damage, injury, or infringement it will be dealt with as provided elsewhere in this subsection.

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 Completion Certificate nor final payment thereunder, nor any provision in the Contract Document shall relieve the Contractor from this liability.

200.18 LIABILITY INSURANCE

The Contractor shall take out and keep in force until the date of acceptance of the entire work by the Engineer, a comprehensive policy of public liability and property damage insurance providing insurance coverage of at least $3,000,000 for each and every accident, exclusive of interest and cost, against loss or damage resulting from bodily injury to or death of one or more persons and loss of or damage to property and such policy shall where, and as requested by the Municipality, name the Municipality and the Engineer as an additional insured thereunder and shall protect the Municipality against all claims for all damage or injury including death to any person or persons and for damage to any property of the Municipality or any other public or private property resulting from or arising out of any act or omission on part of the Contractor or any of his servants or agents during the execution of the Contract.

200.19 LOSSES DUE TO ACTS OF NATURE, ETC.

All damage, loss, expense and delay incurred or experienced by the Contractor in the prosecution of the work, by reason of unanticipated difficulties, bad weather, strikes, wars, acts of nature, or other mischances, shall be borne by the Contractor and shall not be the subject of a claim for additional compensation.

400 STANDARD SPECIFICATIONS FOR CONSTRUCTION OF DRAINS

TABLE OF CONTENTS

400.1 ABBREVIATIONS 1
400.2 PRE CONSTRUCTION MEETING 1
400.3 COLD WEATHER 1
400.4 WORKING AREA 1
400.5 ACCESS 1
400.6 ACCESS TO PROPERTIES ADJOINING THE WORK 2
400.7 DRAINAGE SUPERINTENDENT 2
400.8 ALTERATIONS TO WORK 2
400.9 ERRORS AND UNUSUAL CONDITIONS 2
400.10 TESTS 2
400.11 BENCHMARKS AND STAKES 3
400.12 OPENING UP OF FINISHED WORK 3
400.13 FINAL INSPECTION 3
400.14 WARRANTY 3
400.15 MATERIALS 4
400.16 RIPRAP 5
400.17 GEOTEXTILE 5
400.18 DISPOSAL OF MATERIALS 5
400.19 NOTIFICATION OF RAILROADS, ROAD AUTHORITIES AND UTILITIES 5
400.20 WORKING IN ROAD ALLOWANCES 6
400.21 LOCATIONS OF EXISTING UTILITIES 6
400.22 LANEWAYS 7
400.23 EXISTING CROSSING CLEANOUT 7
400.24 FENCES 7
400.25 LIVESTOCK 8
400.26 STANDING CROPS 8
400.27 CLEARING VEGETATION 8
400.28 ROCK REMOVAL 9
400.29 SEEDING 10
400.30 EROSION CONTROL BLANKETS 11
400.31 SEDIMENT CONTROL 11
400.32 GRASSED WATERWAYS AND OVERFLOW SWALES 12
400.33 BUFFER STRIPS 13
400.34 MAINTENANCE CORRIDOR 13
400.35 POLLUTION 13
400.36 SPECIES AT RISK 13

400 STANDARD SPECIFICATIONS FOR CONSTRUCTION OF DRAINS

400.1 ABBREVIATIONS

i) MTO means the Ministry of Transportation of Ontario.
ii) ASTM means the American Society for Testing Materials.
iii) CSA means the Canadian Standard Association.
iv) OPSD means Ontario Provincial Standard Drawings
v) OPSS means Ontario Provincial Standard Specifications
vi) DFO means Fisheries and Oceans Canada
vii) MNRF means Ministry of Natural Resources and Forestry
viii) MECP means Ministry of Environment, Conservation and Parks

400.2 PRE CONSTRUCTION MEETING

The Contractor should arrange a pre-construction meeting with the Engineer, Municipality, affected landowners prior to commencement of construction.

If there is no pre-construction meeting or if a landowner is not present at the pre-construction meeting, the following shall apply. The drain is to be walked by the Contractor and each landowner prior to construction to ensure that both agree on the work to be done. Any difference of opinion shall be referred to the Engineer for decision. If the landowner is not contacted for such review, they are to advise the Engineer and/or Municipality.

400.3 COLD WEATHER

When working in cold weather is approved by the Engineer, the Contractor shall provide suitable means for heating, protection, and snow and ice removal. All work completed in cold weather conditions shall be to the satisfaction of the Engineer and any additional cost to remedy unsatisfactory work, or protect the work shall be borne by the Contactor. All backfilling operations shall be done as soon as possible to avoid backfilling with ground containing frozen particles. The Contractor will assume all responsibility for damages to any tile drains and for settlements or bank slippages that may result from work in cold weather.

400.4 WORKING AREA

Where any part of the drain is on a road allowance, the road allowance shall be the working area. For a closed drain the working area shall be a 10 metre width on either side of the trench or any combination not exceeding 20 metres. A 10m x 10m working area shall exist around any catchbasin, junction box or access point. For an open drain the working area shall be 17 metres on the side for leveling and 3 metres on the opposite side. A 10m working area shall exist for any overflow swale or grassed waterway. If any part of the drain is close to a property line then the fence line shall be one of the limits of the work area. Reduced or increased working areas will be described in detail on the Drawings.

400.5 ACCESS

The Contractor shall have access to the drain by entering the working area directly from road allowances or along access routes shown on the Drawings. All specifications governing fences, livestock and crops during drain construction apply to access routes. No other access routes shall be used unless first approved by the Engineer and the affected landowner. The Contractor shall contact each landowner prior to using the designated access routes. Contractor shall make good any damages caused by using the designated access routes.

400.6 ACCESS TO PROPERTIES ADJOINING THE WORK

The Contractor shall provide at all times and at no additional cost, adequate pedestrian access to private homes and commercial establishments unless otherwise authorized by the Engineer. Where interruptions to access have been authorized by the Engineer, reasonable notice shall be given by the Contractor to the affected landowners and such interruptions shall be arranged to minimize interference to those affected.

400.7 DRAINAGE SUPERINTENDENT

Where a Drainage Superintendent (Superintendent) is appointed by the Municipality, the Engineer may designate the Superintendent to act as the Engineer's representative. If so designated, the Superintendent will have the power to inspect and direct the execution of the work.

Any instructions given by the Superintendent which change the proposed work or with which the Contractor does not agree shall be referred to the Engineer for final decision.

400.8 ALTERATIONS TO WORK

The Engineer shall have the power to make alterations, additions and/or deletions in the work as shown or described in the Drawings or Specifications and the Contractor shall proceed to implement such changes without delay. Alterations ordered by the Engineer shall in no way render the contract void.

If a landowner desires deviations from the work described on the Drawings, the landowner shall submit a written request to the Engineer, at least 48 hours in advance of the work in question.

In every such case, the contract amount shall be increased or decreased as required according to a fair evaluation of the work completed. Where such changes involve additional work similar to items in the contract, the price for additional work shall be determined after consideration is given to the tendered price for similar items.

In no case shall the Contractor commence work considered to be extra work without the Engineer's approval. Payment for extra work is contingent on receipt of documentation to the satisfaction of the Engineer. Refer to the Extra Work Summary included in the Special Provisions.

400.9 ERRORS AND UNUSUAL CONDITIONS

The Contractor shall notify the Engineer immediately of any error or unusual conditions which may be found. Any attempt by the Contractor to correct the error without notice shall be done at the Contractor's risk. Any additional cost incurred by the Contractor to remedy an error or unusual condition without notice shall be borne by the Contractor. The Engineer shall direct the alteration necessary to correct errors or unusual conditions. The contract amount shall be adjusted in accordance with a fair evaluation of documentation for the work added, deleted or adjusted.

400.10 TESTS

The Engineer reserves the right to subject any materials to a competent testing laboratory for compliance with the standard. If any materials supplied by the Contractor are determined to be inadequate to meet the applicable standards, the Contractor shall bear full responsibility to remove and/or replace all such inadequate materials with materials capable of meeting the standards.

The cost of testing the materials supplied by the Contractor shall be borne by the Contractor.

400.11 BENCHMARKS AND STAKES

Prior to construction, the Engineer will confirm the benchmarks. The Contractor shall be held liable for the cost of replacing any benchmarks destroyed during construction.

If the Engineer provides layout stakes, the Contractor shall be held liable for the cost of replacing any layout stakes destroyed during construction.

Where property bars are shown on the Drawings, they are to be protected and if damaged by the Contractor, they will be reinstated by an Ontario Land Surveyor at the expense of the Contractor. Where property bars not shown on the Drawings are damaged, they will be reinstated by an Ontario Land Surveyor at the expense of the project.

400.12 OPENING UP OF FINISHED WORK

If ordered by the Engineer, the Contractor shall make such openings in the work as are needed to re-examine the work, and shall forthwith make the work good again. Should the Engineer find the work so opened up to be faulty in any respect, the whole of the expense of opening, inspecting and making the work good shall be borne by the Contractor. Should the Engineer find the work opened up to be in an acceptable condition the Contractor shall be paid for the expense of opening and making the work good, unless the Contractor has been obligated by any specification or by the direction of the Engineer to the leave the work open for the Engineer's inspection.

400.13 FINAL INSPECTION

Final inspection by the Engineer will be made within twenty (20) days after receiving notice in writing from the Contractor that work is complete, or as soon thereafter as weather conditions permit. All the work included in the contract must at the time of final inspection have the full dimensions and cross-sections.

Prior to commencing the final inspection an on-site meeting may be held by the Engineer and landowners directly affected by the construction of the drain. The Contractor will attend this meeting upon notice by the Engineer.

If there is no on-site meeting with the Engineer and landowners, the Contractor shall obtain from each landowner a written statement indicating that the work has been performed to the owner's satisfaction. If the Contractor is unable to obtain a written statement from the landowner, the Engineer will determine if further work is required prior to issuing the Completion Certificate.

400.14 WARRANTY

There shall be a one-year warranty period on all completed work. The warranty period will commence on the date of the Completion Certificate.

When directed by the Engineer, the Contractor shall repair and make good any deficiencies in the work that may appear during the warranty period.

Before the work shall be finally accepted by the Municipality, the Contractor shall complete all work as directed by the Engineer and remove all debris and surplus materials and leave the work neat and presentable.

400.15 MATERIALS

400.15.1 Concrete Drain Tile

Concrete drain tile shall conform to the requirements of the most recent ASTM C412 specifications for heavy duty extra quality, unless a stronger concrete tile is required by the Special Provisions or Drawings. All tile furnished shall be subject to the approval of the Engineer.

The minimum nominal lengths of the tile shall be 750mm for 150 to 350mm diameter tile and 1200mm for 400 to 900mm diameter tile.

All tile should be of good quality, free from distortions and cracks and shall meet the standards specified. The ends should be smooth and free from cracks or checks. All rejected tile are to be immediately removed from the site.

Granular backfill, where required, shall consist of approved sand or gravel having no particles retained on a screen having 50mm square openings.

Earth backfill shall consist of approved material having no large lumps or boulders.

400.15.2 Corrugated Plastic Tubing

Corrugated plastic tubing shall conform to the *Land Improvement Contractors of Ontario Standard Specification for Corrugated Plastic Drainage Tubing, 2006*. Type of material (solid or perforated) and need for filter sock will be specified on the Drawings or in the description of the work in the Special Provisions. Filter sock where specified shall be a standard synthetic filter material as provided by a recognized plastic tubing manufacturer unless noted differently on the contract drawings or elsewhere in the contract document. Protect coils of plastic tubing from damage and deformation.

400.15.3 Corrugated Steel Pipe

Corrugated Steel Pipe (CSP) shall be according to OPSS 1801 (CSA G401). Unless stated otherwise in the Special Provisions the pipe shall be:

- galvanized
- helical corrugation with lock seam and re-rolled annular ends
- 68mm x 13mm corrugation profile for diameters up to 1200mm
- 125mm x 25mm corrugation profile for diameters 1200mm and larger
- minimum wall thickness of 1.6mm for diameters up to 500mm
- minimum wall thickness of 2.0mm for diameters 600mm and larger
- joined using standard couplers matching the pipe diameter and material

Other coatings that may be specified include aluminized Type 2 or polymer. Polymer coating shall be a 254mm polymer film laminated to both sides of the pipe.

400.15.4 Plastic Pipe

Plastic Pipe shall be a high density polyethylene (HDPE) double wall corrugated pipe with smooth inner wall, solid with no perforations in accordance with OPSS 1840.

A minimum stiffness of 320 KPa at 5% deflection

The pipe shall be joined with snap-on or split couplers.

400.15.5 Concrete Sewer Pipe

Concrete sewer pipe shall be in accordance with OPSS 1820.

Non-reinforced concrete sewer pipe shall be used for pipe 375mm in diameter and smaller and reinforced concrete sewer pipe shall be used for pipe over 375mm.

Classes shall be as shown on the Contract Drawings or as described in the Form of Tender.

All new concrete sewer pipe shall have rubber-type gasket joints.

Where concrete sewer pipe "seconds" are specified, the pipe should exhibit no damage or cracks on the barrel section and shall be capable of satisfying the crushing strength requirements of OPSS 1820. The pipe may contain cracks or chips in the bell or spigot which prevent the use of rubber gaskets but the joints must be protected with filter cloth.

400.16 RIPRAP

All riprap is to be placed on a geotextile underlay (Terrafix 360R or equal) unless directed otherwise in the specific construction notes. The riprap is to be graded heavy angular stone (quarry stone is recommended) with particles averaging in size from 200mm to 300mm and is to be placed at 300mm thickness. Fine particles may be included to fill voids. Along upstream edges of riprap, where surface water will enter, underlay is to extend a minimum of 300mm upstream from riprap and then be keyed down a minimum of 300mm. Wherever riprap is placed, the area is to be over-dug so that finished top of riprap is at design cross-section, at design elevation or flush with existing ground.

400.17 GEOTEXTILE

To be non-woven fabric that is rot proof, non-biodegradable, chemically resistant to acidic or alkaline soils and is dimensionally stable under different hydraulic conditions. The filter fabric is to be a material whose primary function is to act as a highly permeable, non-clogging soil separator for fine soils (Terrafix 360R or equal). Contractor is to follow the manufacturer's recommendations for cutting, installation and precautions necessary to avoid damage to fabric. Other approved equals will be considered by the Engineer prior to construction.

400.18 DISPOSAL OF MATERIALS

The Contractor shall remove all surplus materials from the job site at the end of the project. The Contractor shall locate the disposal site for all materials to be disposed of. Disposal of materials shall comply with applicable regulations.

400.19 NOTIFICATION OF RAILROADS, ROAD AUTHORITIES AND UTILITIES

Contractor will notify any Railroad, Road Authority or Utility at least 48 hours in advance regarding work to be performed on their property or affecting their infrastructure. The notice will be in writing and is exclusive of Saturdays, Sundays and Holidays.

A utility includes any entity supplying the general public with necessaries or conveniences.

400.20 WORKING IN ROAD ALLOWANCES

400.20.1 General

Work within public road allowances shall be done in accordance with the Ontario Traffic Manual Book 7, latest edition.

400.20.2 Road Crossings

If no specific detail is provided for road crossings on the drawings or in the specifications the following shall apply:

- A Road Authority will supply no labour, equipment or materials for the construction of the road crossing.
- Contractor will not commence road crossing work until any required permits have been obtained. The Engineer may apply for any required permits prior to construction.
- Contractor will notify the Road Authority at least 72 hours in advance of any construction in the road allowance.
- Road crossings may be made with an open cut unless otherwise noted.
- Exact location of crossing shall be verified with the Road Authority and the Engineer.
- Pipe shall be placed on a minimum 150mm depth of Granular A shaped for the pipe.
- Pipe backfill shall be compacted Granular A and extend 300mm above the top of the pipe.
- Trench shall be backfilled with acceptable native material for the base width of the road bed.
- The material shall be placed in lifts not exceeding 300mm in depth and shall be thoroughly compacted with an approved mechanical vibrating compactor.
- Top 600mm of the road bed backfill shall consist of 450mm Granular B and 150mm of Granular A placed in lifts and fully compacted.
- Any surplus excavated material within the road allowance may be spread on the right-of-way with consent of the Road Superintendent otherwise the surplus material shall be hauled away.
- Existing asphalt or concrete pavement or surface treatment shall be replaced by the Contractor to the satisfaction of the Engineer and Road Authority.
- Contractor shall be responsible for correcting any backfill settlement during construction and during the warranty period. Upon approval of the road authority, surplus gravel shall be stockpiled near gravel road crossings to provide backfill for future trench settlement.
- All road crossings shall meet the approval of the Road Authority.
- If any road crossing is not left in a safe manner at the end of the working day barricades and warning signs shall be erected to guarantee the safety of the travelling public.
- If the Engineer deems a road to surface to have been damaged by the construction of a drain, either across or along the road, the Engineer may direct the Contractor to restore the road surface to existing or better condition at no additional cost.

400.20.3 Maintenance of Traffic

Unless directed otherwise on the drawings or in the specifications the Contractor shall keep the road open to traffic at all times. The Contractor shall provide suitable warning signs and/or flagging to the satisfaction of the Road Authority to notify of the construction work.

If a detour is required, the Contractor shall submit a proposal as to the details of the detour for approval by the Road Authority. If necessary to close the road to through traffic, the Contractor shall provide for and adequately sign the detour route. Contractor shall undertake all notifications required for a road closure in consultation with the Municipality.

400.21 LOCATIONS OF EXISTING UTILITIES

The position of pole lines, conduits, watermains, sewers and other underground and overhead utilities are not necessarily shown on the Contract Drawings, and, where shown, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, the Contractor shall have all utilities located in accordance with the Ontario Underground Infrastructure Notification System Act.

All utilities shall be exposed to the satisfaction of the utility company to verify that the construction proposed will not conflict with the utility structure. Additional payment will be allowed for relocation of utilities if conflicts should occur.

The Contractor is responsible for protecting all located and exposed utilities from damage during construction. The Contractor shall assume liability for damage caused to all properly located utilities.

400.22 LANEWAYS

If no specific detail is provided for laneway crossings on the Drawings or in the Specifications the following shall apply:

- Pipe backfill shall be acceptable native material that can be compacted in place.
- Top 450mm of laneway backfill shall consist of 300mm Granular B and 150mm of Granular A placed in lifts and fully compacted.
- Minimum cover on laneway culverts shall be 300mm.
- Existing asphalt or concrete pavement or surface treatment shall be replaced by the Contractor.
- The width of surface restoration shall match the existing laneway.
- Contractor shall be responsible for correcting any backfill settlement during construction and during the warranty period.

The timing of laneway closures will be coordinated by the Contractor to the satisfaction of the landowner.

400.23 EXISTING CROSSING CLEANOUT

Where the Special Provisions require an existing crossing to be cleaned, the Contractor shall provide a bottom width and depth that provides capacity equivalent to the capacity of the channel on either side. Excavated materials shall be hauled away unless adjacent landowners give permission for leveling. Care shall be taken to ensure that existing abutments or any portion of the structure are not damaged or undercut. The method of removing the material is to be pre-approved by the Engineer.

400.24 FENCES

If the Contractor is responsible to remove and install fences, the following shall apply:

- All fences removed by a Contractor are to be re-erected in as good a condition as existing materials permit.
- All fences shall be properly stretched and fastened. Where directed by the Engineer, additional steel posts shall be placed to adequately support a fence upon re-erection.
- Where practical and where required by the landowner, the Contractor shall take down an existing fence at the nearest anchor post and roll the fence back rather than cutting the fence and attempting to patch it.
- Where fence materials are in such poor condition that re-erection is not possible, the Contractor shall replace the fence using equivalent materials. Such fence material shall be approved by the Engineer and the landowner. Where the Engineer approves new fence material, additional payment will be provided.

Any fences paralleling an open drain, that are not line fences, that hinder the proper working of the excavating machinery for drain construction or maintenance shall be removed and rebuilt by the landowner at their own expense. If such parallel fences are line fences they shall be removed and reinstalled by the Contractor.

No excavated or cleared material shall be placed against fences.

The installation of all fences shall be done to the satisfaction of the Engineer and the landowner.

400.25 LIVESTOCK

If any construction will be within a fenced field containing livestock that are evident or have been made known to the Contractor, the Contractor shall notify the owner of the livestock 48 hours in advance of access into the field. Thereafter, the owner shall be responsible for the protection of the livestock in the field during construction and shall also be liable for any damage to or by the livestock.

Where the owner so directs or where the Contractor has failed to reach the owner, the Contractor shall adequately re-erect all fences at the end of each working day. No field containing livestock shall have a trench left open at the end of the working day, unless the trench has been adequately backfilled or protected. Failure of the Contractor to comply with this paragraph shall render the Contractor liable for any damage to or by the livestock.

Where livestock may be encountered on any property the Contractor shall notify the Engineer to arrange for inspection of the work prior to backfilling.

400.26 STANDING CROPS

The Contractor shall not be held responsible for damages to standing crops within the working area for the drain. However, the Contractor shall notify the owner of the crops 48 hours prior to commencement of construction so as to allow the owner an opportunity to harvest or salvage the crop within the drain working area. If this advance notice is not given the Contractor may be liable for the loss of the standing crops.

400.27 CLEARING VEGETATION

400.27.1 General

The area for clearing, if not defined elsewhere, shall be 15m on each side of the drain.

400.27.2 Trees to Remain

Where it is feasible to work around existing trees that do not impede the function of the drainage works, the Contractor shall not remove any deciduous tree larger than 300mm and any coniferous tree larger than 200mm, unless authorized by the Engineer.

400.27.3 Incidental Clearing

Incidental clearing includes removal of trees, brush or other vegetation with an excavator during construction activities, and the cost is to be included in the price for the related construction activity.

400.27.4 Power Brushing

Power brushing includes removal of above-ground vegetation with a rotary brush cutter or other mechanical means. Stump and root removal is not required. Power brushed vegetation in a channel cross-section shall be removed and leveled in the working area. Excavated material may be placed and leveled on power brushed vegetation.

400.27.5 Close-Cut Clearing

Close-cut clearing includes removal of above-ground vegetation cut flush with the ground. Stump and root removal is not required.

400.27.6 Clearing And Grubbing

Clearing and grubbing includes removal of vegetation, including stumps and roots. Removal of earth from the grubbed area into the windrows or piles is to be minimized.

400.27.7 Disposal of Cleared Vegetation

400.27.7.1 *In Bush Areas*

Cleared vegetation is to be pushed into windrows or piles at the edge of the cleared area. Stumps and roots are to be piled first at the edge of the cleared area, followed by other vegetation (trunks, branches, etc.). Provisions for lateral drainage are required through all windrows. Windrows are not to block any laneways or trails. After removing cleared vegetation, the working area shall be leveled to the satisfaction of the Engineer.

400.27.7.2 *In Field Areas*

Cleared vegetation resulting from incidental clearing or power brushing may be hauled away, mulched in place or reduced to a size that permits cultivation using conventional equipment without causing undue hardship on farm machinery.

Cleared vegetation resulting from close-cut clearing or clearing and grubbing is to be hauled away to an approved location. Disposal sites may be in bush areas or other approved locations on the same farm. No excavated material shall be levelled over any logs, brush or rubbish of any kind.

400.27.8 Landowner Requested Salvage

A landowner may request that wood be separated from the windrows for the landowner's future use. This additional work would be eligible for extra payment, subject to the approval of the Engineer. The cost of the additional work would be assessed to the landowner.

400.27.9 Clearing by Landowner

Wherever the Special Provisions indicate that clearing may be undertaken by the landowner, work by the landowner shall be in accordance with the Clearing Vegetation requirements of this specification and must be completed so as not to cause delay for the Contractor. If the landowner does not complete clearing in accordance with these requirements, the Contractor will undertake the clearing at a price approved by the Engineer.

400.28 ROCK REMOVAL

400.28.1 General

Rock shall be defined as bedrock and boulders that are greater than one-half cubic metre in size and that require blasting or hoe-ram removal. Bedrock or boulders that can be removed with a standard excavator bucket are not considered rock removal.

400.28.2 Blasting Requirements

All blasting shall be performed by a competent, qualified blaster in accordance with OPSS 120. Blasting mats are required. A pre-blast survey meeting the requirements of OPSS 120 must be completed for any structure within 200m of any blasting. The cost for pre-blast survey shall be included in the tender price for rock removal.

400.28.3 Typical Sections and Pay Limits

For tile drains and road culverts, rock shall be removed to 150mm below the proposed grade shown on the profile so that pipes are not in direct contact with rock. The width of rock removal shall be 1m minimum or the diameter of the pipe plus 600mm.

For open drains, rock removal shall match the proposed grade and bottom width shown on the Drawings. Side slopes shall be vertical or sloped outward. Side slopes shall be free of loose rock when excavation is completed.

Payment for the quantity of rock removed will be based on the typical sections described in these specifications and confirmed by field measurements. There will be no payment for overbreak.

400.28.4 Disposal of Rock

Excavated rock shall be piled at the edge of the working area at locations designated by the landowner. The cost to pile excavated rock shall be included in the tender price for rock removal. If the Special Provisions or the landowner require excavated rock to be hauled away, additional payment will be considered.

Where approved by the Engineer, excavated rock may be used in place of imported riprap.

400.29 SEEDING

400.29.1 General

Contractor responsible for re-seeding as necessary for uniform catch during warranty period.
Areas that remain grassed after construction may not need to be seeded unless directed otherwise by the Engineer.

400.29.2 Drainage Works and Road Allowances

All disturbed ditch banks, berms and road allowances are to be seeded at the end of the day.

The following seed mixture shall be applied at 60kg/ha using a mechanical (cyclone) spreader:

- 35% Creeping Red Fescue
- 25% Birdsfoot Trefoil
- 25% Kentucky Bluegrass
- 10% Cover Crop (Oats, Rye, Barley, Wheat)
- 5% White Clover

Provide temporary cover for late fall planting by adding an additional 10 kg/ha of rye or winter wheat.

400.29.3 Hydroseeding

Where hydroseeding is specified, disturbed areas will be restored by the uniform application of a standard roadside mix, fertilizer, mulch and water at a rate of 2,000 kg/ha and be in accordance with OPSS 804.

400.29.4 Seeding Lawns

Unless specified otherwise, lawn areas shall be seeded with Canada No. 1 lawn grass mixture applied at 300 kg/ha using a mechanical (cyclone) spreader on 100mm of topsoil. Fertilizer shall be 5:20:20 or 10:10:10 applied at 300 kg/ha. Seed and fertilizer shall be applied together. Contractor shall arrange for watering with landowners.

400.29.5 Sod

Where sod is specified, sod is to be commercial grade turfgrass nursery sod, Kentucky Bluegrass placed on 50mm of topsoil. Fertilizer shall be 5-20-20 applied at 10kg/ha. Place sod in accordance with supplier instructions. Contractor is responsible for saturating the sod with water on the day of sod placement. Subsequent watering is the responsibility of the landowner.

400.30 EROSION CONTROL BLANKETS

Erosion Control Blankets (ECB) shall be biodegradable and made of straw/coconut (Terrafix SC200, Nilex SC32 or equal) or coconut (Terrafix C200, Nilex C32 or equal) with photodegradable, double net construction. The blanket and the staples shall be supplied and installed as per OPSS 804.

Erosion control blanket shall be placed and stapled into position as per the manufacturer's installation instructions on slopes as directed by the Engineer. Blankets shall be installed in direct contact with the ground surface to form a uniform, cohesive mat over the seeded earth area. The blankets are to be single course with 150mm overlap between blankets and joints are to be staggered. The Contractor shall ensure that the ECB is anchored to the soil and that tenting of the ECB does not occur.

On slopes, when the ECB cannot be extended 1m beyond the crest of the slope, the uppermost edge of the ECB shall be anchored in a 150mm wide by 150mm deep trench. The trench shall be backfilled with earth and compacted.

400.31 SEDIMENT CONTROL

400.31.1 General

Contractor shall install sediment control features at the downstream limits of the project and at other locations as shown on the drawings or directed by the Engineer.

Sediment control features shall be installed prior to any excavation taking place upstream of that location. The Contractor shall maintain all sediment control features throughout construction and the warranty period.

Sediment that accumulates during construction shall be removed and levelled as required.

400.31.2 Flow Check Dams

400.31.2.1 *Temporary Straw Bale Flow Check Dam*

The straw bale flow check dam shall consist of a minimum of 3 bales. Each bale is to be embedded at least 150mm into the channel bottom and shall be anchored in place with 2 T-bar fence posts or 1.2m wooden stakes driven through the bale.

Straw bales shall be hauled away at the end of the warranty period. Accumulated sediments shall be excavated and levelled when the temporary straw bale flow check dam is removed.

400.31.2.2 *Temporary Rock Flow Check Dam*

The temporary rock flow check dam shall extend to the top of the banks so that dam overtopping does not cause bank erosion. Rock shall be embedded a minimum of 150mm into the ditch bottom and banks. No geotextile is required for temporary rock flow check dams.

Accumulated sediments shall be excavated and levelled when the temporary rock flow check dam is removed at the conclusion of the warranty period.

400.31.2.3 *Permanent Rock Flow Check Dam*

The requirements of temporary rock flow check dams shall apply except rock shall be placed on geotextile and the dam shall remain in place permanently.

400.31.3 Sediment Traps

400.31.3.1 *General*
The channel bottom shall be deepened in accordance with the dimensions provided in the Drawings or Special Provisions. If dimensions are not specified on the Drawings, the sediment trap shall be excavated within the channel cross-section at least 0.3m below the design grade.

The Contractor will monitor the sediment trap during construction and cleanout accumulated sediments as required to maintain the function of the sediment trap.

If specified to be temporary, no sediment trap maintenance is required after construction is complete.

If specified to be permanent, the contractor will clean out the sediment trap at the conclusion of the warranty period, unless directed otherwise by the Engineer.

400.31.3.2 *Sediment Trap with Flow Check Dam*
A permanent rock sediment trap shall include a permanent sediment trap and a rock flow check dam.

A temporary rock/straw sediment trap shall include a temporary sediment trap and a rock/straw flow check dam.

400.31.4 Turbidity Curtains

A turbidity curtain is required when there is permanent water level/flow and a sediment trap is not feasible.

Turbidity curtains shall be in accordance with OPSS 805 and installed per manufacturer's instructions.

Turbidity curtains shall be sized and anchored to ensure the bottom edge of the curtain is continuously in contact with the waterbody bed so that sediment passage from the enclosed area is prevented. The curtain must be free of tears and capable of passing the base flow from the drainage works. Turbidity curtain locations may be approved by the Engineer.

Turbidity curtains are to remain functional until work in the enclosed area is completed. Prior to relocating or removing turbidity curtains, accumulated sediment is to be removed from the drain and levelled.

Where a turbidity curtain remains in place for more than two weeks it shall be inspected for damage or clogging and replaced, repaired or cleaned as required.

400.31.5 Silt Fence

Silt fence shall be in accordance with OPSS 805.07.02.02 and OPSD 219.110 (light-duty).

400.32 GRASSED WATERWAYS AND OVERFLOW SWALES

Grassed waterways and overflow swales typically follow low ground along the historic flow route. The cross-section shall be saucer shaped with a nominal 1m bottom width, 8:1 side slopes and 300mm depth unless stated otherwise in the Special Provisions.

All grassed waterways are to be permanently vegetated. Grassed waterways shall be seeded with the following permanent seed mixture: 50% red fescue, 45% perennial ryegrass and 5% white clover, broadcast at 80 kg/ha. Fertilizer to be 7-7-7 applied at 80 kg/ha.
Provide temporary cover for late fall planting by adding an additional 10 kg/ha of rye or winter wheat.

Overflow swales may be cropped using conventional farming practice.

400.33 BUFFER STRIPS

Open drains shall include minimum 3m wide, permanently vegetated buffer strips on each side of the drain. Catchbasins shall include a minimum 1m radius, vegetated buffer strip around the catchbasin.

Cultivation of buffer strips using conventional farming practice may be undertaken, provided sediment transport into the drain is minimized.

400.34 MAINTENANCE CORRIDOR

The maintenance corridor along the route of the drain, as established in the report, shall be kept free of obstructions, ornamental vegetation and structures. When future maintenance is undertaken, the cost of removing such items from the corridor shall be assessed to the landowner.

400.35 POLLUTION

The Contractor shall keep their equipment in good repair. The Contractor or any landowner shall not spill or cause to flow any polluted material into the drain that is not acceptable to the MECP. The local MECP office and the Engineer shall be contacted if a polluted material enters the drain. The Contractor shall refill or repair equipment away from open water. If the Contractor causes a spill, the Contractor is responsible to clean-up the spill in accordance with MECP clean-up protocols.

400.36 SPECIES AT RISK

If a Contractor encounters a known Species At Risk designated by the MECP, MNRF or DFO, the Contractor shall notify the Engineer immediately and follow the Ministry's guidelines for work around the species.

410 STANDARD SPECIFICATIONS

FOR

OPEN DRAINS

TABLE OF CONTENTS

410.1 DESCRIPTION 1
410.2 MATERIALS 1
410.3 CONSTRUCTION 1
410.3.1 Excavation 1
410.3.2 Low Flow Channels 1
410.3.3 Line 1
410.3.4 Grade Control 1
410.3.5 Variation from Design Grade 2
410.3.6 Excavated Material 2
410.3.7 Excavation at Existing Bridge and Culvert Sites 3
410.3.8 Bridges and Culverts 3
410.3.9 Obstructions 3
410.3.10 Tile Outlets 4
410.3.11 Completion 4

410.1 DESCRIPTION

Work under this item shall include the supply of labour, equipment and materials required for: channel excavation to the cross-section specified, leveling or disposal of all excavated material (spoil) as directed, reconstruction of all intercepted drains as required and any other items related to open drain construction as required by the Schedule of Tender Prices, Special Provisions or the Drawings.

410.2 MATERIALS

Refer to Section 400, Standard Specifications for Drain Construction for any materials required for open drain construction.

410.3 CONSTRUCTION

410.3.1 Excavation

The bottom width and the side slopes of the ditch shall be as shown on the profile drawing. If the channel cross-section is not specified in the Special Provisions it shall be a 1m bottom width with 1.5m horizontal to 1m vertical (1.5:1) bank slope. At locations along the drain where the specified side slopes change there shall be a transitional length of not less than 5m between the varying side slopes. At locations along the drain where the specified bottom width changes there shall be a transitional length of not less than 5m. In all cases there shall be a smooth transition between changes in any part of the channel cross-section. Where the bottom width of the existing ditch matches the specified bottom width, ditch excavation shall be completed without disturbing existing banks.

410.3.2 Low Flow Channels

Unless specified otherwise in the Special Provisions, all intermittent open drains with a bottom width greater than 1.8m and a grade less than 0.07%, shall have a low flow channel. The bottom of the low flow channel shall be the grade shown on the profiles.

The low flow channel shall have a U-shaped cross-section with an average top width of 0.5m and a minimum depth of 0.3m. The low flow channel will not be seeded and may meander along the main channel bottom provided it remains at least .3m from the toe of main channel bank slope.

410.3.3 Line

The drain shall be constructed according to the alignment shown on the drawings or shall follow the course of the existing ditch. All bends shall have a minimum inside radius of 2m. There shall be a smooth transition between changes in the channel alignment. The Contractor shall contact the Engineer before removing any bends or irregularities in an existing ditch.

410.3.4 Grade Control

The profile shows the grade line for the bottom of the ditch. Cuts may be shown on the profile from the existing top of bank and/or from the existing ditch bottom to the new ditch bottom. These cuts are shown for the convenience of the Contractor and are not recommended for quantity estimate or grade control. Accurate grade control must be maintained by the Contractor during ditch excavation. The ditch bottom elevation should be checked every 50 metres and compared to the elevation on the profile.

Benchmarks are identified on the Contract Drawings. The Engineer will confirm all benchmark elevations prior to construction.

410.3.5 Variation from Design Grade

A variation of greater than 25mm above the design grade line may require re-excavation. Excavation below design grade up to 150mm is recommended so that sediment accumulation during or following excavation will not place the ditch bottom above the design grade at completion. Under some circumstances the Engineer may direct that over excavation greater than 200mm will have to be backfilled. No additional payment will be made if backfilling is required to remedy over excavation.

410.3.6 Excavated Material

Excavated material (spoil) shall be deposited on either or both sides of the drain within the specified working area as directed in the Special Provisions. The Contractor shall verify the location for the spoil with each landowner before commencing work on their property. If not specified, spoil shall be placed on the low side of the ditch or opposite trees and fences. The spoil shall be placed a minimum 1m from the top of the bank. No excavated material shall be placed in tributary drains, depressions, or low areas such that water is trapped behind the spoil bank. Swales shall be provided through the leveled or piled spoil at approximately 60m intervals to prevent trapping water behind the spoil bank.

The excavated material shall be placed and leveled to a maximum depth of 250mm; unless otherwise instructed. If excavating more than 450mm topsoil shall be stripped, stockpiled separately and replaced over the leveled spoil, unless stated otherwise in the Special Provisions. The edge of the spoil bank furthest from the ditch shall be feathered down to existing ground. The edge of the spoil bank nearest the ditch shall have a maximum slope of 2:1. The material shall be leveled such that it may be cultivated with conventional equipment without causing undue hardship on farm machinery.

Wherever clearing is necessary prior to leveling, the Contractor shall remove all stumps and roots from the working area. No excavated material shall cover any logs, brush or rubbish of any kind. Large stones in the leveled spoil that are greater than 300mm in diameter shall be moved to the edge of the spoil bank nearest to the ditch but in general no closer than 1m to the top of bank.

Lateral channels that outlet into the drain shall be tapered over a distance of 10m to match the grade of drain excavation. No additional payment will be made for this work.

Where the elevation difference between the lateral channel and the drain is greater than 450mm, a rock chute or similar bank protection approved by the Engineer shall be provided. Additional payment may be allowed for this work.

Where it is specified to straighten any bends or irregularities in the alignment of the ditch or to relocate any portion of an existing ditch, the excavation from the new cut shall be used for backfilling the original ditch. Regardless of the distance between the new ditch and old ditch, no additional payment will be allowed for backfilling the existing ditch.

The Contractor shall contact the Engineer if a landowner indicates in writing that spoil on the owner's property does not need to be leveled. The Engineer may release the Contractor from the obligation to level the spoil and the Engineer shall determine the credit to be applied to the Contractor's payment. No additional compensation is provided to the owner if the spoil is not leveled.

The Engineer may require the Contractor to obtain written statements from any or all of the landowners affected by the leveling of the spoil. Final determination on whether or not the leveling of spoil meets the specification shall be made by the Engineer.

410.3.7 Excavation at Existing Bridge and Culvert Sites

The Contractor shall excavate the drain to the specified depth under all bridges and to the full width of the structure unless specified otherwise in the Special Provisions. All necessary care and precautions shall be taken to protect permanent structures. Temporary bridges may be removed and left on the bank of the drain. In cases where the design grade line falls below the top of footings, the Contractor shall take care to not over-excavate below the grade line. The Contractor shall notify the Engineer if excavation of the channel exposes the footings of the bridge or culvert, so the Engineer can make an evaluation.

The Contractor shall clean through all pipe culverts to the grade line and width specified on the profile. The Contractor shall immediately contact the Engineer after a culvert cleanout if it is found that the culvert bottom is above the grade line or where the structural integrity of the culvert is questionable.

Material resulting from cleanout through bridges or culverts shall be levelled on the adjacent private lands or hauled offsite at the expense of the bridge/culvert owner.

410.3.8 Bridges and Culverts

The size and material for any new ditch crossings shall be as outlined in the Special Provisions.

For culvert installation instructions, refer to the General Specifications for Drain Construction and the Drawings.

Any crossings assembled on-site shall be assembled in accordance with the manufacturer's specifications.

If directed on the drawings that the existing crossing is to be salvaged for the owner, the Contractor shall carefully remove the existing crossing and place it beside the ditch or haul to a location as specified by the owner. If the existing crossing is not to be saved then the Contractor shall remove and dispose of the existing crossing. Disposal by burying on-site must be approved by the Engineer and the owner.

All new pipe crossings shall be installed at the invert elevations as specified on the Drawings, usually a minimum of 50mm below design grade. If the ditch is over excavated greater than 200mm below design grade the Contractor shall confirm with the Engineer the elevations for installation of the new pipe crossing.

For backfill and surface restoration, refer to the General Specifications for Drain Construction and the Drawings.

Installation of private crossings during construction must be approved by the Engineer.

410.3.9 Obstructions

All trees, brush, fallen timber and debris shall be removed from the ditch cross-section and as required for spreading of the spoil. The roots shall be left in the banks if no bank excavation is required as part of the new channel excavation. In wooded or heavily overgrown areas all cleared material may be pushed into piles or rows along the edge of the cleared path and away from leveled spoil. All dead trees along either side of the drain that may impede the performance of the drain if allowed to remain and fall into the ditch, shall be removed and put in piles, unless directed otherwise by the Engineer.

410.3.10 Tile Outlets

The location of all existing tile outlets may not be shown on the profile for the drain. The Contractor shall contact each owner and ensure that all tile outlets are marked prior to commencing excavation on the owner's property. If a marked tile outlet or the tile upstream is damaged due to construction, it shall be replaced at the Contractor's expense. Additional payment will be allowed for the repair or replacement of any unmarked tile outlets encountered during excavation. In all cases, if an existing tile outlet requires replacement the Contractor shall confirm the replacement tile outlet with the Engineer. Where riprap protection exists at any existing tile outlet such protection shall be removed and replaced as necessary to protect the outlet after reconstruction of the channel.

If any tile outlet becomes plugged as a result of construction, the Contractor shall remove the obstruction.

410.3.11 Completion

At the time of final inspection, all work in the contract shall have the full dimensions and cross-sections specified.

420 **STANDARD SPECIFICATIONS**

FOR

TILE DRAINS

TABLE OF CONTENTS

420.1 DESCRIPTION 1

420.2 MATERIALS 1

420.3 CONSTRUCTION 1

420.3.1 Outlet 1
420.3.2 Line 1
420.3.3 Grade Control 2
420.3.4 Variation from Design Grade 2
420.3.5 Installation 2
420.3.6 Backfilling 3
420.3.7 Tile Connections 3
420.3.8 Stones and Rock 4
420.3.9 Brush, Trees and Debris 4
420.3.10 Subsoil Instability 4
420.3.11 Broken or Damaged Tile 4
420.3.12 Excess Tile 4
420.3.13 Catchbasins 5
420.3.14 Junction Boxes 5

420 STANDARD SPECIFICATIONS FOR TILE DRAINS

420.1 DESCRIPTION

Work under this specification will consist of supplying, hauling, laying and backfilling subsurface drainage conduit with the conduit materials as described on the Drawings and in the location, depth and invert grade as shown on the Drawings. In this specification the word "tile" will apply to all described conduit materials. Lengths are in millimeters (mm) and meters (m).

The work shall include the supplying of all labour, tools, equipment and extra materials required for the installation of the tile; the excavation and backfilling of the trenches; the hauling, handling, placing and compaction of the excavated material for backfill, the loading, hauling, handling and disposal of surplus excavation material; the removal and replacing of topsoil and sod where required by the Engineer.

All existing laterals crossed by the new line shall be reconnected in an approved manner. Either special manufactured connections shall be used or another method of sealing connections as approved by the Engineer. The Contractor shall also construct catchbasins, junction boxes and other structures where directed by the Engineer.

Except where complete removal of an existing pipe is required by new construction, existing pipes to be abandoned shall be sealed with a concrete or mortar plug with a minimum length of 300mm to the satisfaction of the Engineer.

Sections 6 and 7 of the current version of the *Drainage Guide for Ontario*, OMAFRA Publication 29 shall provide a general guide to all methods and materials to be used in the construction of tile drains except where superseded by this Contract.

The licensing requirements of the *Agricultural Tile Drainage Installation Act, 1990* will not be applicable to this Contract unless specified otherwise by this Contract.

420.2 MATERIALS

Refer to Section 400, Standard Specifications for Drain Construction for any materials required for tile drain construction.

420.3 CONSTRUCTION

420.3.1 Outlet

A tile drain outlet into a ditch or creek shall be protected using a 6m length of rigid pipe with a hinged grate for rodent protection. Maximum spacing between bars on the rodent grate shall be 50mm. Material for rigid pipe will be specified in the Special Provisions, plastic pipe is preferred. The joint between the rigid pipe and the tile drain shall be wrapped with filter fabric. All outlets will be protected with rock riprap to protect the bank cut and as a splash apron. In some locations riprap may also be required on the bank opposite the outlet. The quantity of riprap required will be specified in the Special Provisions. A marker stake as approved by the Engineer shall be placed at each tile outlet.

420.3.2 Line

The Engineer will designate the general location of the new drain. A landowner may indicate a revised location for the drain which must be approved by the Engineer. Where a change in alignment is required that is not accommodated in a catchbasin, junction box or similar structure the alignment change shall run on a curve with a radius not less than the minimum installation radius specified for the tile material.

The Contractor shall exercise care to not disturb any existing tile drains which parallel the course of the new drain, particularly where the new and existing tile act together to provide the necessary capacity. Where an existing tile is disturbed or damaged the Contractor shall perform the necessary correction or repair with no additional compensation.

NOTE: It is the Contractor's responsibility to ascertain the location of, and to contact the owners of all utility lines, pipes and cables in the vicinity of drain excavations. The Contractor shall be completely responsible for all damages incurred.

420.3.3 Grade Control

Tile is to be installed to the elevation and grade shown on the profiles. Accurate grade control must be maintained by the Contractor at all times during tile installation. The tile invert elevation should be checked every 50m and compared to the elevation on the profile.

Benchmarks are identified on the Contract Drawings. The Engineer will confirm all benchmark elevations prior to construction.

420.3.4 Variation from Design Grade

No reverse grade will be allowed. A small variation in grade can be tolerated where the actual capacity of the drain exceeds the required capacity. The constructed grade should be such that the drain will provide the capacity required for the drainage area. Constructed grade should not deviate from design grade by more than 10% of the internal diameter for more than 25m. Grade corrections shall be made gradually over a distance not less than 10m.

420.3.5 Installation

At each work stoppage, the exposed end of the tile shall be covered by a tight fitting board or metal plate. No installed tile shall be left exposed overnight. Any tile damaged or plugged during construction shall be replaced or repaired at the Contractor's expense.

Topsoil over the trench shall be stripped, stockpiled separately and replaced after the trench is backfilled. Where installation is across a residential lawn, existing sod over the trench shall be cut, lifted and replaced in a workmanlike manner or new sod laid to match pre-construction conditions.

420.3.5.1 Installation of Concrete Tile

Concrete tile shall be installed by a wheel trencher unless an alternate method of construction is noted on the Drawings.

Digging of the trench shall start at the outlet end and proceed upstream. The location and grade shall be as shown on Drawings but shall be liable to adjustment or change by the Engineer on site with no additional payment allowed except where the change involves increased depth of cut beyond the limitation of the wheel trencher in use at the time of the change. The trench width measured at the top of the tile should be at least 150mm greater than the tile diameter.

The bottom of the trench is to be cut accurately to grade and shaped so that the tile will be embedded in undisturbed soil or in a compacted bed at least for 10% of its overall height. Where hard shale, boulders or other unsuitable bedding material is encountered, the trench shall be excavated to 75mm below grade and backfilled with granular material compacted to a shaped, firm foundation. If the trench is overcut below the proposed grade, it is to be backfilled with granular material to the correct grade and compacted to a shaped, firm foundation.

Where the depth for the tile installation exceeds the depth capacity of the wheel trencher the Contractor shall excavate a trench of sufficient depth so that the wheel trencher can install the tile at the correct depth

and grade. The tender price shall include the cost of the additional excavation and backfilling and stripping and replacing topsoil over the trench.

The inside of the tile is to be kept clean during installation. All soil and debris should be removed before the next tile is laid. Maximum spacing at joints between tiles should be about 3mm. Directional changes can be made without fittings or structures provided the centre-line radius of the bend is not less than 15m radius. The tiles are to be beveled, if necessary, to ensure close joints on all bends.

All tile joints and connections with other pipe materials are to be fully and tightly wrapped with a minimum 300mm width of geotextile drain wrap. A 150mm overlap on top is required. No additional payment will be made for joint wrapping.

420.3.5.2 Installation of Corrugated Plastic Tubing

Corrugated plastic tubing shall be installed by a drainage plow or wheel trencher unless an alternate method of construction is specified on the Drawings. For other installation methods, proper bedding and backfill is required to maintain the structural integrity of the plastic tubing so that surface and earth loads do not deflect the tubing by more than 20% of its nominal diameter.

For all installation methods:

- the plastic tubing should not be stretched by more than 7% of its normal length
- protect tubing from floating off grade when installing in saturated soil conditions
- directional changes can be made without fittings provided the centre-line radius of the bend is not less than five times the tubing diameter

Drainage plow equipment should construct a smooth bottomed opening in the soil and maintain the opening until the tubing is properly installed. The size of the opening in the soil should conform closely to the outside diameter of the tubing.

420.3.5.3 Installation of Concrete Sewer Pipe or Plastic Pipe

The Contractor may install pipe using a wheel trencher. For concrete sewer pipe, the bells must be recessed.

The Contractor may install pipe using an excavator by shaping the bottom of the trench to receive and support the pipe over 10% of its diameter if the trench is backfilled with native material. Shaping the trench bottom is not required where 150mm of granular bedding is placed to the satisfaction of the engineer.

420.3.6 Backfilling

All tile should be blinded by the end of the day's work to protect and hold them in place against disturbances. After tile is inspected, it shall initially be backfilled with a minimum cover of 300mm.

For blinding and initial backfilling use clean native soil with no organic matter. Initial backfill shall be tamped around the pipe by backhoe bucket or similar if directed by the Engineer.

The tile shall be backfilled with native material such that there is a minimum cover of 600mm. In addition, a sufficient mound must be placed over the trench to ensure that no depression occurs after settling along the trench.

420.3.7 Tile Connections

All lateral drains encountered along the route of the new tile drain are to be connected to the new drain if the intercepted tile are clean and do not contain polluted water. Lateral drains that are full of sediments or contain polluted waters will be addressed by the Engineer at the time of construction. All lateral drains are to be connected to the new tile using a pipe material and size that will provide the same flow capacity as the existing lateral drain unless a different connection is described in the Special Provisions. Corrugated plastic tubing can be used for all tile connections. Tubing can be solid or perforated, filter sock is not required.

Contractor is responsible for installation and backfilling in a manner than maintains the structural integrity of the connection. Manufactured fittings should be used to ensure tight connections. Where an opening must be made in the new tile drain for a connection, the opening shall be field cut or cored. After the opening is cut in the new tile any gaps or voids around the connection shall be sealed with mortar, low-expanding spray foam or geotextile. Lateral tubing shall not protrude more than 25mm beyond the inside wall of the new tile drain. The Contractor shall ensure than any material used to seal the connection does not protrude beyond the inside wall of the new tile drain.

All connections that are described in the Special Provisions are considered to be part of the original Contract price. For all other connections the Contractor will be paid in accordance with the price established in the Schedule of Tender Prices. The Contractor must list all connections on the Lateral Connection Summary sheet, if included in the Special Provisions, in order to qualify for payment. The Lateral Connection Summary sheet describes all tile encountered based on location (station), side of trench, size and type of tile and approximate length and type of material used for the connection.

420.3.8 Stones and Rock

The Contractor shall immediately contact the Engineer if bedrock or stones of sufficient size and number are encountered such that installation by wheel trencher cannot continue. The Engineer may direct the Contractor to use some other method of excavation to install the tile. The basis of payment for such extra work shall be determined by the Engineer. Stones greater than 300mm in diameter that are removed during excavation shall be disposed of by the Contractor at an offsite location. No additional payment for excavating or hauling these stones will be provided.

420.3.9 Brush, Trees and Debris

Unless stated otherwise in the Special Provisions, the following requirements shall apply for installation of a tile drain in a wooded area. The Contractor will clear and grub a minimum corridor width of 30m centered on the tile drain alignment. The resulting debris shall be placed in a windrow along the edge of the working area. No additional payment will be made for such work.

420.3.10 Subsoil Instability

If poor subsoil conditions are encountered during tile installation by wheel trencher an attempt shall be made to install the tile with a continuous geotextile underlay in the trench bottom. The cost of the underlay, if approved by the Engineer, will be paid as an extra. If the continuous geotextile underlay is not sufficient then the tile will be installed by backhoe or excavator on a bedding of 19mm clear crushed stone (300mm depth) to achieve trench bottom stability for the new tile. If approved, the above work will be paid based on the unit price provided on the Form of Tender. The unit price shall include the cost to supply and place the stone. If more than 300mm depth of stone is required for bottom stability, additional payment will be allowed for the additional depth of stone. The additional quantity of stone shall be supported by weigh tickets and the suppliers invoice.

If poor subsoil conditions are encountered during tile installation by backhoe or excavator, the tile shall be installed on stone bedding as noted above. For this installation only the material cost of the stone will be paid as an extra. Supply of stone and cost to be supported by weigh tickets and supplier's invoice.

If the subsoil is a fine grained soil it may necessary to place the stone on a geotextile with the geotextile wrapped over the stone before laying the tile. Additional payment will be allowed to supply and install the geotextile.

420.3.11 Broken or Damaged Tile

The Contractor shall dispose of all damaged or broken tile and broken tile pieces off-site.

420.3.12 Excess Tile

All excess tile shall be removed from the job site.

420.3.13 Catchbasins

420.3.13.1 General

All catchbasins shall have minimum inside dimensions matching the dimensions shown on the Drawings. Contractor is responsible for ordering catchbasins to match the inlet and outlet connections and top elevations required by the Special Provisions and the Drawings.

420.3.13.2 Materials

Requirements in this section apply to catchbasins in non-travelled locations. Where catchbasins are proposed for travelled locations, refer to the Special Provisions and the Drawings for applicable OPSD information.

Precast concrete catchbasins shall be manufactured by as Coldstream Concrete or approved equal. Minimum wall thickness for catchbasins without reinforcement is 150mm and with reinforcement 100mm. The joints between precast catchbasin sections shall be protected with geotextile to prevent soil material from entering into the catchbasin. Joint protection using mortar or water tight barrier is also acceptable. Grates are to be birdcage grates as manufactured by Coldstream Concrete or approved equal unless specified otherwise on the Drawings. All grates to be secured with corrosion resistant hardware.

HDPE catchbasins shall be as fabricated by ADS, Armtec, Hancor or approved equal. Steel catchbasins shall be the Heavy Duty Steel Catch Basin as manufactured by AgriDrain or approved equal. PVC catchbasins shall be Nyloplast as manufactured by ADS or approved equal. HDPE, steel and PVC catchbasins shall be supplied with integral stubouts fabricated by the manufacturer and sized according to the pipe connections shown on the Drawings. Grates for HDPE, steel or PVC catchbasins shall be in accordance with the Special Provisions and manufacturer recommendations.

Marker stakes as supplied by Coldstream Concrete or equal are to be placed beside each catchbasin unless specified otherwise on the Drawings.

420.3.13.3 Installation

All tile or pipe connected to concrete catchbasins shall be mortared or secured in place so that no gaps remain at the connection. Mortar is to be applied on both the inside and outside wall surfaces.

Backfill around all new catchbasins is recommended to be 19mm clear crushed stone to avoid future settlements. The Contractor shall be responsible for backfilling all settlement areas around catchbasins during the contract warranty period. No additional payment will be provided for adding backfill to settlement areas around catchbasins.

All catchbasin sumps to be fully cleaned by the Contractor after completion of drain installation and backfilling.

420.3.14 Junction Boxes

Junction boxes shall be precast concrete to the same specification as above for catchbasins except that the junction box shall have a solid lid. The lid shall be a minimum of 125mm thick with wire mesh reinforcement and 2 lifting handles. The top of the junction box should have a minimum ground cover of 450mm.

430 **STANDARD SPECIFICATIONS**

for

JACKING AND BORING

TABLE OF CONTENTS

430.1 DESCRIPTION 1

430.2 MATERIALS 1

430.3 PRE-CONSTRUCTION 1

430.4 CONSTRUCTION 1

430.4.1 Traffic Control 1
430.4.2 Installation 1
430.4.3 Bore Pits 2
430.4.4 Restoration 2

430 STANDARD SPECIFICATIONS FOR JACKING AND BORING

430.1 DESCRIPTION

This specification covers the installation of pipes by jacking and boring. The Contractor shall be fully responsible for complying with any further specifications of the authority having jurisdiction over the lands or roads involved with the crossing.

430.2 MATERIALS

Unless specified elsewhere the pipe shall be new smooth wall welded pipe manufactured from steel according to ASTM A252, Grade 2 Steel and have a minimum wall thickness of 6.35mm.
Pipe ends shall be bevel edged on the outside to an angle of 30 degrees for butt weld splicing.
The following information shall be clearly marked on the inside of each section of pipe:

1) The name or trademark of the manufacturer.
2) The heat number.

430.3 PRE-CONSTRUCTION

The Contractor shall not commence work until required permits have been obtained. The Engineer may apply for required permits prior to Construction.

The Contractor shall give the authority responsible for the lands or roads being crossed at least 72 hours' notice before commencing any work on the crossing.

The authority having jurisdiction over the lands or roads involved with the crossing will supply no labour, equipment or materials for the construction of the crossing unless otherwise stated.

430.4 CONSTRUCTION

430.4.1 Traffic Control

No construction equipment is to be operated on the shoulders or asphalt of the road without the prior approval of the road authority.

Work within public road allowances shall be done in accordance with the Ontario Traffic Manual Book 7, latest edition. Any required traffic control measures shall be the responsibility of the Contractor and the cost of traffic control is to be included in the tender price for boring and jacking.

430.4.2 Installation

The pipe or casing shall be installed by means of continuous flight augering inside the casing and simultaneous jacking to advance the casing immediately behind the tip of the auger.

The pipe shall be of sufficient length so that no part of any excavation shall be closer than 3m to the edge of pavement, shoulder or ballast of the embankment being crossed. Excavation slopes shall be no less than 1:1.

Upon completion, there shall be a continuous length of welded steel casing across the full width of the right-of-way. Portions of the casing may be installed by open cut where approved by the Engineer.

Pipe when installed shall match the invert elevations and grade specified. Installed pipe not matching the grade and invert elevations specified may be rejected by the Engineer in whole or in part. Any work required to correct an unacceptable variation in grade or invert elevations shall be the responsibility of the Contractor.

430.4.3 Bore Pits

The location of the bore pit shall be as specified in the special provisions and if not specified shall be confirmed with the Engineer prior to commencing construction.

The bore pits shall be excavated so that the top edge of the pit shall not be closer than 3m to the edge of pavement, shoulder or ballast of the embankment being crossed. The bank slope of the pit shall not be steeper than 1:1. Shoring, sheeting, or other trench support if required shall be in accordance with the applicable and most recent Provincial Statutes. No additional payment will be allowed for trench wall support within the bore pit unless approved by the Engineer due to unstable subsoil.

The Contractor is to minimize the duration that bore pits are left open. If possible, casing installation should be scheduled so that pit excavation, placement of pipe and backfilling takes place in one working day. If a bore pit is left unattended, the pit shall be secured by the Contractor to the satisfaction of the Engineer. No additional payment will be made for securing the pit.

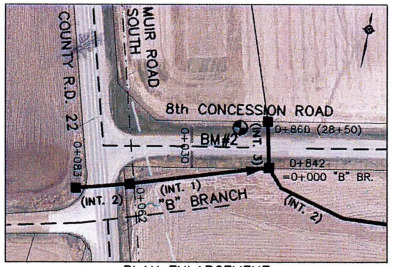
Dewatering of the bore pit is the responsibility of the Contractor and no additional payment will be made for dewatering. If unstable subsoil is encountered in the bottom of the pit, the Engineer shall be notified and a foundation of 19mm clear crushed stone (300mm minimum depth) may be approved to achieve pit bottom stability. If stone is approved by the Engineer, extra payment will be made for the material cost of the stone based on weigh tickets.

Any tile, catchbasin, junction box or any other structures, placed in the bore pit should be placed on a foundation of 19mm clear crushed stone (300mm minimum depth). The price for such structures shall include the cost of stone foundation.

430.4.4 Restoration

Prior to bore pit excavation, topsoil shall be separately stripped and saved for replacement on completion of the backfilling operation. If this is not possible or practical, the Contractor shall import and place a minimum of 150mm of good quality topsoil over all backfilled and disturbed areas. The finished work shall be left in a clean and orderly condition flush or slightly higher than the adjacent ground so that after settlement it will conform to the surrounding ground. Excess earth (if any) shall be disposed of as directed by the Engineer and no additional payment will be allotted for such work. Disturbed areas to be seeded after placement of topsoil in accordance with the specification for seeding.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL BE INFORMED OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.



PLAN ENLARGEMENT
(SCALE 1:2000)

BM#1
TOP CENTRE OF SW BOLT FOR MOST SOUTHERLY STEEL "I" BEAM GUARD RAIL POST, TOP OF CONCRETE CURB, WEST SIDE OF MUIR ROAD SOUTH AT CONCRETE BRIDGE
ELEV. 264.351

BM#2
BENT SPIKE (SHOT NEXT TO POLE) IN SOUTH SIDE OF H.P. #C8W6AD, 4m WEST OF EXISTING 600mmø CONCRETE CB
ELEV. 266.915

PLAN LEGEND

- MAJOR WATERSHED
- INTERMEDIATE WATERSHED
- PROPOSED WORK OR INCORPORATION
- EXISTING DRAIN
- EXISTING PRIVATE DRAIN (AGREEMENT DRAIN)
- ACCESS
- (12.8) APPROXIMATE HECTARES IN WATERSHED
- 5.2 ha — HECTARES OWNED
- (010-33100) ASSESSMENT ROLL NUMBER
- BUSH AREA
- LAND TILE DRAINED INTO/OUT OF THE WATERSHED AREA WITH DIRECTION
- BM#2 — BENCHMARK LOCATION AND NUMBER

DESIGNED BY: E.J.M.
CHECKED BY: K.A.S.
DRAWN BY: E.J.M.
CHECKED BY: K.A.S.

LICENCED PROFESSIONAL ENGINEER — C. J. MACINTYRE — 100507574 — JULY 22, 2022 — PROVINCE OF ONTARIO

SCALE
0 75 150m
(1:7,500 ON 11"x17")

MATHER DRAIN 2022

COUNTY OF BRANT — (COUNTY OF OXFORD) TOWNSHIP OF NORWICH

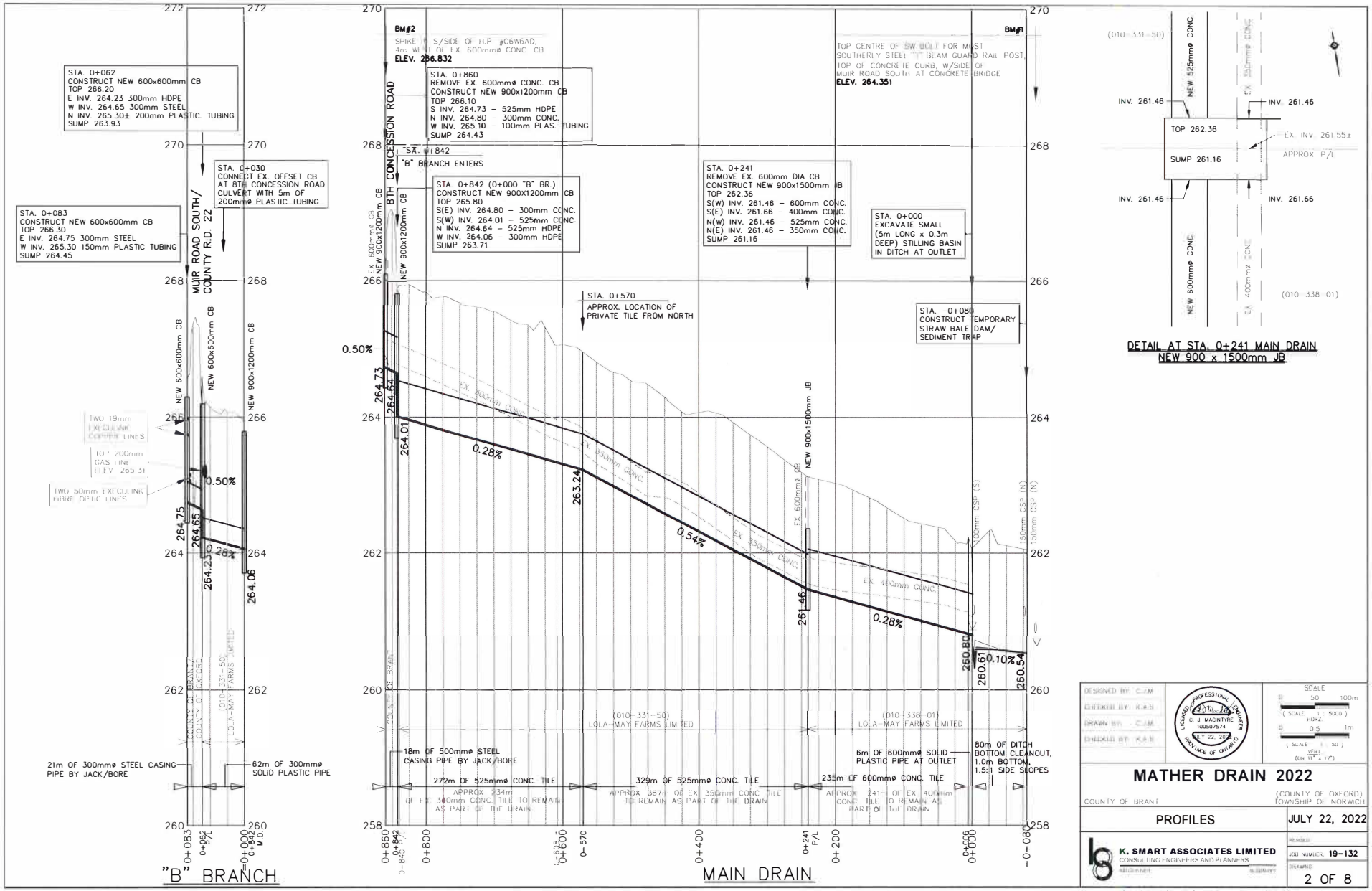
WATERSHED PLAN — JULY 22, 2022

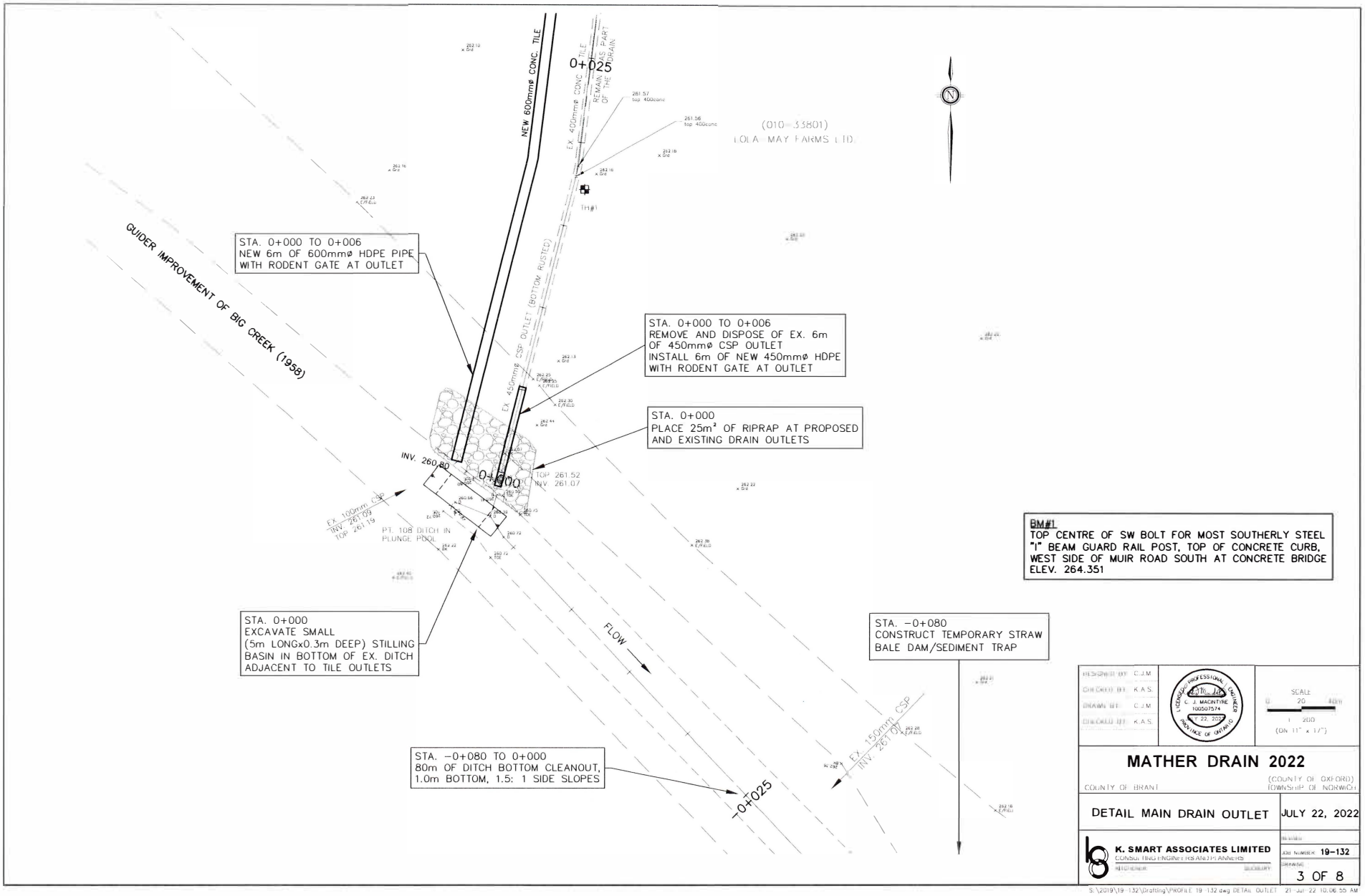
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS

JOB NUMBER 19-132

DRAWING 1 OF 8

S:\2019\19-132\Drafting\WS 19-132.dwg WS 21-Jul-22 4:08:35 PM


STA. 0+062
CONSTRUCT NEW 600x600mm CB
TOP 266.20
E INV. 264.23 300mm HDPE
W INV. 264.65 300mm STEEL
N INV. 265.30± 200mm PLASTIC. TUBING
SUMP 263.93
STA. 0+030
CONNECT EX. OFFSET CB AT 8TH CONCESSION ROAD CULVERT WITH 5m OF 200mmø PLASTIC TUBING
STA. 0+083
CONSTRUCT NEW 600x600mm CB
TOP 266.30
E INV. 264.75 300mm STEEL
W INV. 265.30 150mm PLASTIC TUBING
SUMP 264.45
MUIR ROAD SOUTH/ COUNTY R.D. 22
NEW 600x600mm CB
NEW 900x1200mm CB
TWO 19mm EXECULINK COPPER LINES
TOP 200mm GAS LINE ELEV. 265.51
TWO 50mm EXECULINK FIBRE OPTIC LINES
0.50%
0.28%
264.75
264.65
264.25
264.06
21m OF 300mmø STEEL CASING PIPE BY JACK/BORE
62m OF 300mmø SOLID PLASTIC PIPE
"B" BRANCH
BM#2
SPIKE IN S/SIDE OF H.P. #C6W6AD, 4m WEST OF EX. 600mmø CONC. CB
ELEV. 266.832
BM#1
TOP CENTRE OF SW BOLT FOR MOST SOUTHERLY STEEL "I" BEAM GUARD RAIL POST, TOP OF CONCRETE CURB, W/SIDE OF MUIR ROAD SOUTH AT CONCRETE BRIDGE
ELEV. 264.351
STA. 0+860
REMOVE EX. 600mmø CONC. CB
CONSTRUCT NEW 900x1200mm CB
TOP 266.10
S INV. 264.73 – 525mm HDPE
N INV. 264.80 – 300mm CONC.
W INV. 265.10 – 100mm PLAS. TUBING
SUMP 264.43
STA. 0+842
"B" BRANCH ENTERS
STA. 0+842 (0+000 "B" BR.)
CONSTRUCT NEW 900x1200mm CB
TOP 265.80
S(E) INV. 264.80 – 300mm CONC.
S(W) INV. 264.01 – 525mm CONC.
N INV. 264.64 – 525mm HDPE
W INV. 264.06 – 300mm HDPE
SUMP 263.71
8TH CONCESSION ROAD
EX. 600mmø CB
NEW 900x1200mm CB
STA. 0+241
REMOVE EX. 600mm DIA CB
CONSTRUCT NEW 900x1500mm JB
TOP 262.36
S(W) INV. 261.46 – 600mm CONC.
S(E) INV. 261.66 – 400mm CONC.
N(W) INV. 261.46 – 525mm CONC.
N(E) INV. 261.46 – 350mm CONC.
SUMP 261.16
STA. 0+000
EXCAVATE SMALL (5m LONG x 0.3m DEEP) STILLING BASIN IN DITCH AT OUTLET
STA. 0+570
APPROX. LOCATION OF PRIVATE TILE FROM NORTH
STA. -0+080
CONSTRUCT TEMPORARY STRAW BALE DAM/ SEDIMENT TRAP
0.50%
264.73
264.64
264.01
0.28%
263.24
0.54%
261.46
0.28%
260.80
260.61
0.10%
260.54
EX. 300mm CONC.
EX. 350mm CONC.
EX. 400mm CONC.
EX. 600mmø CB
NEW 900x1500mm JB
200mm CSP (S)
150mm CSP (N)
18m OF 500mmø STEEL CASING PIPE BY JACK/BORE
272m OF 525mmø CONC. TILE
APPROX. 234m OF EX. 300mm CONC. TILE TO REMAIN AS PART OF THE DRAIN
329m OF 525mmø CONC. TILE
APPROX. 367m OF EX. 350mm CONC. TILE TO REMAIN AS PART OF THE DRAIN
6m OF 600mmø SOLID PLASTIC PIPE AT OUTLET
235m OF 600mmø CONC. TILE
APPROX. 241m OF EX. 400mm CONC. TILE TO REMAIN AS PART OF THE DRAIN
80m OF DITCH BOTTOM CLEANOUT, 1.0m BOTTOM, 1.5:1 SIDE SLOPES
(010-331-50) LOLA-MAY FARMS LIMITED
(010-338-01) LOLA-MAY FARMS LIMITED
MAIN DRAIN
INV. 261.46
NEW 525mmø CONC.
EX. 750mmø CONC.
INV. 261.46
TOP 262.36
EX. INV. 261.55±
SUMP 261.16
APPROX P/L
INV. 261.46
INV. 261.66
NEW 600mmø CONC.
EX. 400mmø CONC.
DETAIL AT STA. 0+241 MAIN DRAIN
NEW 900 x 1500mm JB
DESIGNED BY C.J.M.
CHECKED BY K.A.S.
DRAWN BY C.J.M.
CHECKED BY K.A.S.
LICENSED PROFESSIONAL ENGINEER
C. J. MACINTYRE
100507574
JULY 22, 2022
PROVINCE OF ONTARIO
SCALE
HORZ. (SCALE 1 : 5000)
VERT. (SCALE 1 : 50)
MATHER DRAIN 2022
COUNTY OF BRANT
(COUNTY OF OXFORD) TOWNSHIP OF NORWICH
PROFILES
JULY 22, 2022
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
JOB NUMBER 19-132
2 OF 8
S:\2019\19-132\Drafting\PROFILE 19-132.dwg PROFILE 21-Jul-22 10:06:13 AM



DESIGNED BY: C.J.M.
CHECKED BY: K.A.S.
DRAWN BY: C.J.M.
CHECKED BY: K.A.S.

LICENSED PROFESSIONAL ENGINEER
C. J. MACINTYRE
100507574
JULY 22, 2022
PROVINCE OF ONTARIO

SCALE
0 20 40m
1 : 200
(ON 11" x 17")

MATHER DRAIN 2022

COUNTY OF BRANT
(COUNTY OF OXFORD)
TOWNSHIP OF NORWICH

DETAIL MAIN DRAIN OUTLET

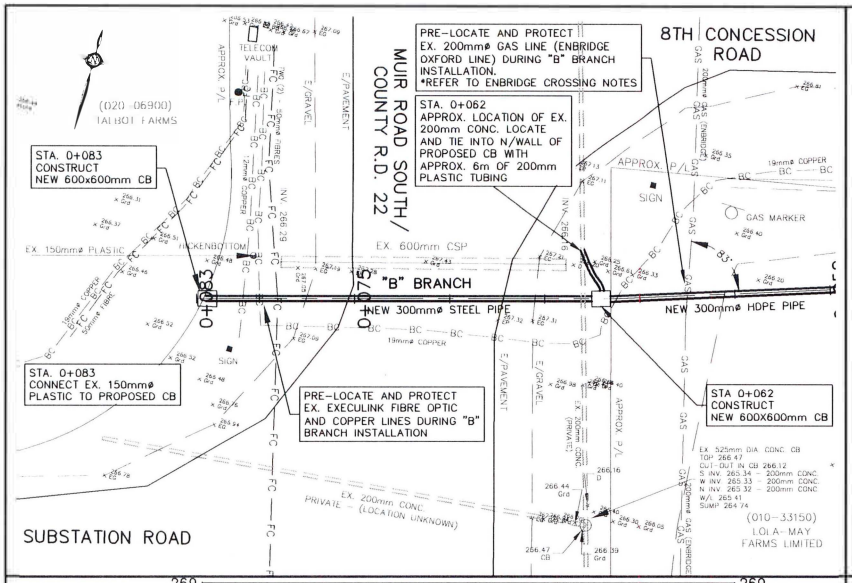
JULY 22, 2022

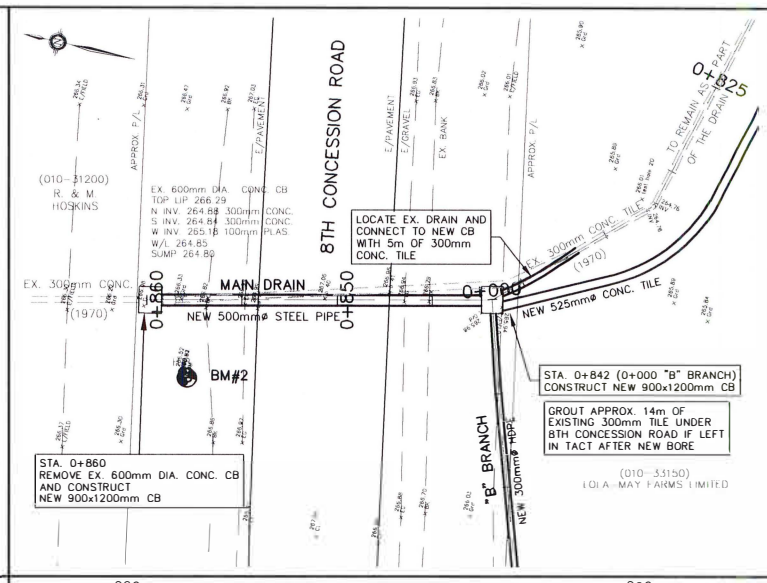
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
STRATHROY DUNDALK

JOB NUMBER 19-132

DRAWING 3 OF 8

S:\2019\19-132\Drafting\PROFILE 19-132.dwg DETAIL OUTLET 21-Jul-22 10:06:55 AM





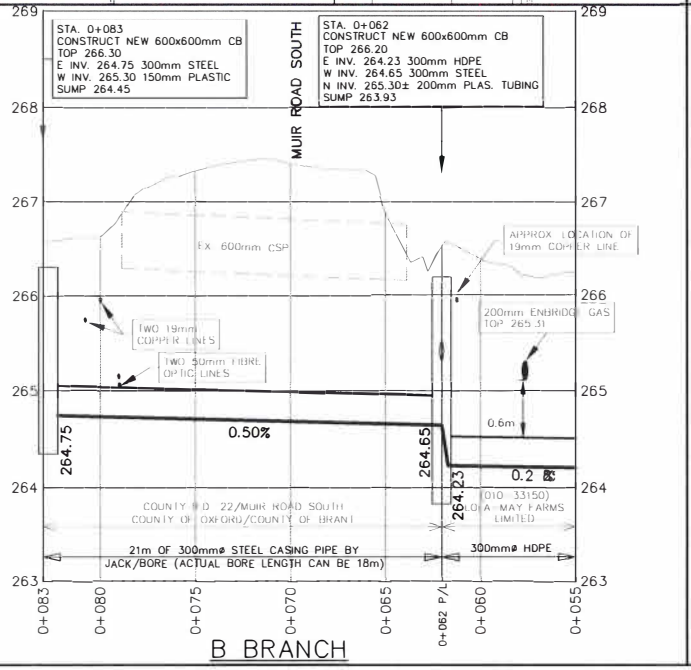
*ENBRIDGE CROSSING NOTES

1. MECHANICAL EXCAVATION IS NOT PERMITTED WITHIN 3m OF THE PIPELINE, UNLESS VERIFIED VISUALLY. AFTER THE EXACT LOCATION OF THE PIPELINE IS VERIFIED VISUALLY, MECHANICAL EXCAVATION IS ALLOWED UP TO 1m FROM THE PIPELINE. WITHIN 1m, ONLY HAND DIGGING OR HYDRO-EXCAVATION IS ALLOWED.
2. NEW "B" BRANCH UNDERNEATH ENBRIDGE GAS LINE (STA. 0+056 TO 0+062) TO BE INSTALLED AS PER OPSD 802.030. DRAIN PIPE BEDDING AND COVER MATERIAL TO BE GRANULAR A. BACKFILL MATERIAL UNDERNEATH ENBRIDGE GAS PIPES TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY. SAND PADDING MUST BE PLACED TO A LEVEL 150mm ABOVE AND BELOW THE GAS PIPE.
3. BACKFILL MATERIAL ABOVE SAND PADDING TO BE NATIVE, ENSURING NO LARGE ROCKS ARE PLACED NEAR THE PIPELINE.
4. REFER TO "THIRD PARTY REQUIREMENTS IN THE VICINITY OF NATURAL GAS FACILITIES STANDARD" (ENBRIDGE).

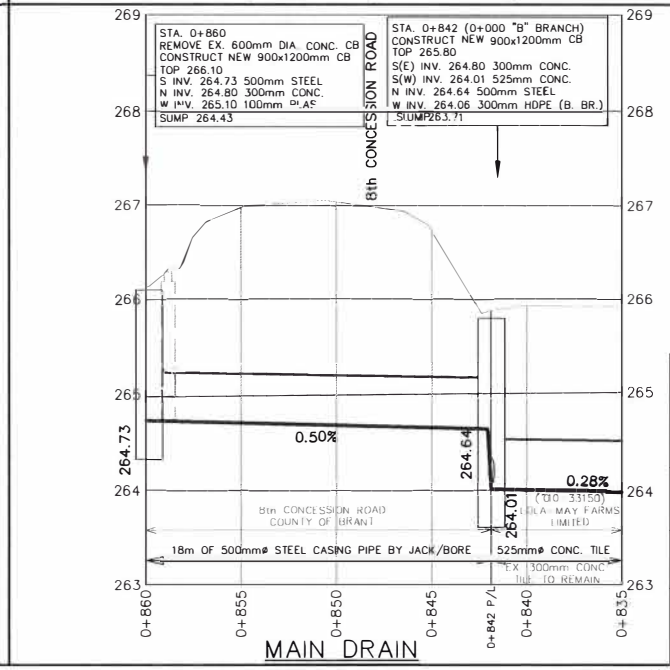
PLANS

0 2.5 5m

(SCALE 1:250 ON 11"x17")



B BRANCH



MAIN DRAIN

BM#2
SPIKE IN S/SIDE OF H.P. @ C6W6AD, 4m WEST OF EX. 600mmø CONC. CB
ELEV. 266.832

PROFILES

0 2.5 5m (SCALE 1:250)

0 1m (SCALE 1:50) VERT

(ON 11"x17")

DESIGNED BY C.J.M.
CHECKED BY K.A.S.
DRAWN BY C.J.M.
CHECKED BY K.A.S.

LICENCE PROFESSIONAL ENGINEER C. J. MACINTYRE 100507574 PROVINCE OF ONTARIO JULY 22, 2022

SCALE: AS SHOWN

MATHER DRAIN 2022

COUNTY OF BRANT (COUNTY OF OXFORD) TOWNSHIP OF NORWICH

PLAN AND PROFILE
MAIN DRAIN - 8th CONCESSION ROAD
"B" BRANCH - MUIR ROAD SOUTH

JULY 22, 2022

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER 19-132

DRAWING 4 OF 8

S:\2019\19-132\Drafting\PROFILE 19-132.dwg DETAIL ROAD CROSSINGS 21 Jul 22 10:08:10 AM

300) CONSTRUCTION NOTES (SPECIAL PROVISIONS)

300.1) CONSTRUCTION SPECIFICATION - SPECIFIC NOTES

i) MAIN DRAIN

Lola-May Farms Ltd. (Roll No. 010-338-01)

-0+080 to 0+025 - See Detail on Drawing 3.

-0+080 - Construct temporary straw bale dam sediment trap in Guider Improvement of Big Creek Drain. Bales to be double row and to be 3.5m± in width to span full ditch bottom width.

-0+080 to 0+000 - 80m of ditch cleanout (Guider Improvement of Big Creek Drain) (material to be levelled on site as directed).

-0+000 - Place 25m² of riprap on bank of Guider Improvement of Big Creek Drain at new drain outlets.
- Excavate small (5m long x 0.3m deep) stilling basin in bottom of existing ditch adjacent to tile outlets.

0+000 to 0+006 - Place 6m of 600mm (24") dia. HDPE pipe with rodent gate at new tile outlet.
- Remove and dispose of 6m of 450mm CSP outlet pipe of existing drain and place new 6m of 450mm HDPE pipe with rodent gate. Match existing invert elevation.

0+006 to 0+241 - 235m of 600mm (24") dia. concrete tile with joint wrap to the west side of the existing tile.

0+241 - Remove and dispose of existing 600mm dia. Concrete CB.
- Construct 900 x 1500mm concrete JB including connections.
- Existing tile drain also to be connected to JB. See details on Drawing 2.

Lola-May Farms Ltd. (Roll No. 010-338-01)

0+241 to 0+570 - 329m of 525mm (21") dia. concrete tile with joint wrap to the west side of the existing tile.

0+570 to 0+842 - 272m of 525mm (21") dia. concrete tile with joint wrap to the west/south side of the existing tile.

8th Concession Road (County of Brant)

0+842 - Construct 900x1200mm concrete CB including connections.
- Existing 300mm dia. concrete tile also to be connected with approx. 5m of concrete tile. See Detail Drawing 4.

0+842 to 0+860 - 18m of 500mm (21") dia. steel casing pipe across 8th Concession Road by jack and boring. Grout approx. 14m of existing 300mm diameter tile under 8th Concession Road if left in tact after new bore.

0+860 - Construct 900x1200mm concrete CB including connections.

ii) "B" Branch

Lola-May Farms Ltd. (Roll No. 010-331-50)

0+000 to 0+062 - 62m of 300mm (12") dia. solid plastic pipe (HDPE).

0+030 - Connect existing offset CB located at 8th Concession Road surface culvert to proposed "B" Branch with 5m 200mm dia. of plastic tubing and a 300mmx300mmx200mm tee. Existing CB already contains a hole for an existing 250mm plastic pipe. Cap top end of existing 250mm dia. plastic.

0+056 to 0+063 - Locate, expose, and protect existing 200mmø Enbridge Gas line with extreme caution. Drain construction to proceed underneath of the pipeline. Refer to "Enbridge Crossing Notes" on Drawing 4 for procedures involving working around Enbridge pipelines, and consult Enbridge representative on site.
- For bedding and backfill requirements of Drain around pipeline, also refer to "Enbridge Crossing Notes" on Drawing 4.

0+062 - Construct 600x600mm concrete CB including connections.

0+062 to 0+083 - 21m of 300mm (12") dia. steel casing pipe across Muir Road South by jack and boring (actual bore pipe length can be 18m).
- Due to the location of the gas line, it is anticipated that the pit for launching the bore pipe will have to be located on the west side of Muir Road South (launching from the upstream side).
- Pre-locate and protect existing Execulink fibre optic and copper lines during installation of bore.
- Three (3) – 19mm copper and three (3) – 50mm fibre optic Execulink lines on the west side of Muir Road South were daylighted by the Engineer during design. The 19mm copper and 50mm fibre optic lines located to the west of the proposed catchbasin at 0+083 (likely location of bore pipe launch pit) were measured to have elevations of 265.60±. The 19mm copper line located to the east of the proposed catchbasin at 0+062 was not daylighted.

0+083 - Construct 600x600mm concrete CB including connections.

300.2) CONSTRUCTION SPECIFICATIONS - GENERAL NOTES

1. Pre and Post Construction Meetings

The Contractor may be required to attend pre- and post-construction meetings with the engineer and landowners before starting and after finishing the work if requested.

2. *Working Area*

- For work to install new tile drains, average working area width is to be 30m for the Main Drain and 25m for the "B" Branch.
- A 30m radius turn-around area for equipment is to be provided at each end.
- A 10m x 10m area is required at catchbasin locations.

Refer to Standard Specification for Construction of Drains, Section 400.4 for exceptions.

3. *Access (Standard Specification for Construction of Drains, Section 400.5)*

Access to working area shall be from road allowance and as designated on the drawings and/or specific notes. No other access routes shall be used unless first approved by the engineer and the affected landowner. Specifications related to construction will apply to the access routes. Contractor shall make good any damages caused by using the designated access routes. The contractor shall contact each owner prior to commencing construction on their property.

Telephone numbers for contact are:

010-338-01,010-331-50	Joe Kloepfer	TO BE PROVIDED
010-31200	Rob Hoskins	AT TIME OF
020-06900	Pat Talbot	CONSTRUCTION

County of Brant (Jason DeMunck, Road Operations Manag.)	519-449-2451 EXT 2201
County of Brant (Shannon Tweedle, Drainage Supt)	1-800-265-9662
Township of Norwich (Dirk Kraemer, Drainage Supt)	519-468-2410 EXT 234
Engineer (Curtis MacIntyre, P. Eng.)	519-748-1199 EXT 252

4. *Tile Drain Work*

Refer to Specific Notes and 420 – Standard Specifications for Tile Drains.

TYPICAL NOTES FOR EACH NEW TILE LENGTH

i) Maintain all existing headers. Locate as part of existing drain location work.

ii) Existing Mather Drain (1970) tile to remain part of the Drain. Locate and protect existing Mather Drain (1970) tile to be paralleled by new drain. New drain to be constructed to the west side of the existing drain (unless altered by the engineer at time of construction).

iii) Ensure any existing connections to the west of the existing drain are connected/outletted to the new drain when crossed.

iv) On straight runs, ensure tile joints are parallel (maximum 12mm (½") gap), and tile wrap is flat, covers joint evenly and has overlap.

v) On curved runs, ensure tile joints are touching on one side with maximum gap of 12mm (½") on opposite side. Bevel cut tile or use elbow sections where curves are greater. Tile wrap to be flat, cover joints evenly and have overlap.

vi) Notes re Prelocates.
- The existing Mather Drain (1970) has been pre-located by the owner and engineer in approximately twenty (20) locations along the new route across Roll No. 010-338-01 & Roll No. 010-331-50, and will be re-flagged by the engineer at the time of construction. Flagged locations are to assist the contractor. The contractor is to verify the existing drain location at select flags prior to laying out/installing new tile. Repair existing tile if damaged.
- One deep hole to be dug at each trench so probability of hitting stone or poor soil is further checked out. Strip and replace topsoils separately. Repair existing tile if damaged.

vii) Test holes completed during design indicate very few stones will be encountered and that trench bottom conditions should be good throughout. As a result, tender prices for new tile are to be submitted for installation by tiling machine.

viii) If, after doing the tile locate work and/or at the time of installation, stones however are found, or if soft or unstable soils are found at invert grade, that make backhoe methods necessary vs tiling machine usage, the contingency rates will be applied.

ix) There is also to be a contingency rate for "liftouts" of the tiling machine due to stones.

5. *Concrete Tile Installation*

New tile to be installed by tiling (wheel) machine with joints tightly wrapped and topsoils to be separately stripped and replaced to width of machine plus width of spoil pile. For further materials information, refer to Standard Specification for Construction of Drain, Section 400.15.1. For information regarding installation procedure of concrete tile, refer to Standard Specification for Tile Drain, Section 420.3.5.1.

If backhoe methods are approved by engineer, the following shall be attended to: additional topsoils to be stripped and replaced, a shaped bottom to be provided and careful tamping around the tile is necessary. The Engineer may require a thin lift of stone bedding also as part of usage of backhoe if the native ground/shaped bottom is not satisfactory for long term integrity of the tile. Laser grade control required.

MATHER DRAIN 2022

County of Brant
File No. 19-132

County of Oxford/
Township of Norwich
July 22, 2022
Drawing 5 of 8

6. Solid Plastic Pipe or High Density Polyethylene Pipe (HDPE)

Solid plastic pipe to be high density polyethylene (HDPE) double wall (corrugated on the outside and smooth wall on the inside), such as BOSS 2000 Series 320 kPa or equal. Pipe material shall conform to CSA B182.8. Refer to Standard Specification for Tile Drains, Section 420.3.5.3 for installation on plastic pipe.

7. Tile Connections

The Contractor is to verify with each owner prior to starting, any systematic drainage scheme existing on each property and is to make provisions for connecting all headers and laterals.

All subsurface drainage tile encountered along the route of the proposed closed drain are to be connected up to the new drain if the intercepted tile are clean and do not contain polluted water.

All tile connections are to be flagged by the Contractor so the Engineer can GPS the location for future reference. The payment for connections is to be as set out in the tender form.

Refer to Standard Specification of Tile Drains, Section 420.3.7 for further information on tile connections.

8. Outlet Pipe

The outlet pipes specified in this report shall have rodent gates secured to them. The rodent gate shall be free moving and as supplied by Coldstream Concrete Products Ltd. or equal. The outlet pipe shall protrude no more than 1.0 metre from the bank and filter fabric and riprap shall be placed around and below the outlet pipe and into the channel bottom, with such riprap being set to be flush with the bank on either side. The discharge from the outlet pipe shall land on the riprap. Outlet pipes are to be a minimum of 6m in length and are to be desirably HDPE plastic pipe Series 210 with equal or larger diameter than the concrete tile.

9. Catchbasins and Junction Boxes

Catchbasins shall have secured grates and marker stakes. Grates are to be birdcage grates as manufactured by Coldstream Concrete or approved equal, unless otherwise specificed in the Specific Notes. All grates are to be secured with non-corrosive fasteners. Marker stakes as supplied by Coldstream Concrete or equal are to be placed beside each catchbasin.

Backfill around all new catchbasins and junction boxes is recommended to be compacted 19mm clear crushed stone to avoid future settlements and Contractor obligations to repair such and to ensure connected tile has granular backfill.
All catchbasin sumps to be fully cleaned by the Contractor after completion of drain installation and backfilling.

Refer to Standard Specification for Tile Drains, Section 420.3.13 and 420.3.14 for more details.

10. Geotextile Fabric

Refer to Standard Specification for Construction of Drains, Section 400.17 for references to use and installation of geotextile.

11. Utilities

The Contractor shall arrange with all local utility companies (telephone, gas, hydro) to verify the location of all utilities within road allowances and on private lands. All utilities shall be exposed to the satisfaction of the utility company to verify that their elevations will not conflict with the construction of the drain at the specified elevations. Provisions for protection and relocation of utilities that conflict with the drain as designed will be determined at the time of construction.

12. Seeding of Non-Lawn Areas

For seeding use mechanical (cyclone) spreader (or approved equal) and the following shall apply:
Seed mixture to be applied at 60kg/ha and to be as follows:
i) Ditch banks and roadside ditches
- 35% Creeping Red Fescue
- 25% Birdsfoot Trefoil
- 25% Kentucky Bluegrass
- 10% Cover Crop (Oats, Rye, Barley, Wheat)
- 5% White Clover

To provide temporary cover for late fall planting add an additional 10 kg/ha of rye or winter wheat.

Areas that remain grassed after excavation may not need to be seeded as directed by the Engineer.

Contractor responsible for additional seeding to provide uniform catch during one year maintenance period.

13. Temporary Straw Bale Flow Check Dam

Temporary straw bale dams/sediment traps shall be installed in any ditch prior to any excavation taking place upstream of that location. The trap may be straw bales unless rock is specified.

Refer to Standard Specification for Construction of Drains, Section 400.31.2.1 for more details.

14. Subsoil Instability

If poor subsoil conditions are encountered during tile installation by wheel trencher an attempt shall be made to install the tile with a continuous geotextile underlay in the trench bottom. The cost of the underlay, if approved by the engineer, will be paid as an extra.

If the continuous geotextile underlay is not sufficient then the tile will be installed by backhoe or excavator on a bedding of 19mm clear crushed stone (300mm depth) to achieve trench bottom stability for the new tile. If approved, the above work will be paid based on the unit price provided on the Form of Tender. The unit price shall include the cost to supply and place the stone. If more than 300mm depth of stone is required for bottom stability, additional payment will be allowed for the additional depth of stone. The additional quantity of stone shall be supported by weight tickets and the suppliers invoice.

The test holes completed while locating the existing drain did not identify areas of unstable subsoils. Refer to Drawings 7 & 8 for photos of Soils Investigation.

LICENSED PROFESSIONAL ENGINEER
C. J. MACINTYRE
100507574
July 22, 2022
PROVINCE OF ONTARIO

MATHER DRAIN 2022 - SOILS INVESTIGATION
COUNTY OF BRANT /
TOWNSHIP OF NORWICH

LOCATION: TWENTY (20) TEST HOLES COMPLETED ALONG THE ROUTE OF THE EXISTING MAIN DRAIN ACROSS LOLA-MAY FARMS LIMITED PROPERTIES FROM BIG CREEK TO 8th CONCESSION ROAD.

DATE: SEPTEMBER 4, 2019

OBSERVATIONS: ALL HOLES DUG SHOWED SIMILAR SILTY CLAY / CLAY LOAM SOILS.
LITTLE TO NO WATER OR STONES.
TRENCH WALLS HOLDING UP WELL.
PHOTOGRAPHS FOR 7 OF THE 20 TRENCHES HAVE BEEN INCLUDED BELOW.

LICENSED PROFESSIONAL ENGINEER
C. J. MACINTYRE
100507574
PROVINCE OF ONTARIO

MATHER DRAIN 2022

County of Brant
File No. 19-132

County of Oxford/
Township of Norwich
July 22, 2022
Drawing 7 of 8

LICENSED PROFESSIONAL ENGINEER
C. J. MACINTYRE
100507574
July 22, 2022
PROVINCE OF ONTARIO

MATHER DRAIN 2022

County of Brant
File No. 19-132

County of Oxford/
Township of Norwich
July 22, 2022
Drawing 8 of 8