THE TOWNSHIP OF NORTH HURON

COURT OF REVISION

Date: **Tuesday, September 5, 2017**

Time: **7:00 p.m.**

Location: **HELD IN THE TOWNSHIP COUNCIL CHAMBERS**

Pages

1. **Members of the Court of Revision**

Members of the Court of Revision for the Sturdy Municipal Drain Branch 'F' - 2017 shall consist of the following three members: Councillor Ray Hallahan, Deputy Reeve Campbell and Councillor Brock Vodden.

Council Members who are not on the Court of Revision please push back from the Council Table.

2. **Appoint Chairperson**

THAT the Chairperson for the Court of Revision for the Sturdy Municipal Drain Branch 'F' - 2017 be _____.

3. **Chairperson - Open the Court of Revision**

4. **Appeals**

4.1 Review of Written Appeals (read by the Clerk)

4.2 Verbal Appeals

THAT the Court of Revision hereby authorizes (or does not authorize) the hearing of verbal appeals for the Sturdy Municipal Drain Branch 'F' - 2017.

5. **Decision of the Court** 2

- To deny appeal or;
- To amend the Assessment Schedule

If the assessment schedule is to be amended, all Landowners affected by the decision must be present. If the Landowners are all not in attendance, the Court must be adjourned to a date to reconvene the hearing.

THAT that Members of the Court of Revision support the Engineer's Report for the Sturdy Municipal Drain Branch 'F' - 2017, based on the assessments as presented in the Engineer's Report.

6. **Adjournment**

THAT the Court of Revision for the Sturdy Municipal Drain Branch 'F' - 2017 be hereby Closed or Reconvened (if reconvened set a date).

Township of North Huron

Engineer's Report
Sturdy Municipal Drain Branch 'F' - 2017

GMBP File: 316053

Date: June 2017

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA
975 WALLACE AVENUE NORTH, LISTOWEL ON N4W 1M6 P: 519.291.9339
WWW.GMBLUEPLAN.CA

June 29, 2017
Our File: 316053

Mayor and Members of Council
The Township of North Huron

Re: Sturdy Municipal Drain Branch 'F' - 2017

Dear Reeve Vincent and Members of Council:

We are pleased to present our report on the "Sturdy Municipal Drain Branch 'F" - 2017 serving Lots 29 to 30, Concession 1East Wawanosh, in the Township of North Huron, County of Huron.

Authority to prepare this report was obtained by a resolution of the North Huron Council as stated in its November 9, 2016 letter to appoint GM BluePlan Engineering Limited (GMBP) to prepare an Engineer's Report.

In accordance with your instructions pursuant to a request received by Council under Section 78 of the Drainage Act, R.S.O. 1990, for the request for drainage works improvements, GM BluePlan has held an on-site meeting, undertaken a field survey and prepared for Council's consideration the following Drainage Report, Plan, Profiles and Specifications for this work to be completed on the Sturdy Municipal Drain.

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

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

John Kerr, P.Eng.
Encl.

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STURDY MUNICIPAL DRAIN BRANCH 'F' - 2017

THE TOWNSHIP OF NORTH HURON

JUNE 2017

GMBP FILE: 316-053

1. INTRODUCTION

At the request of property owners in the Township of North Huron, council have appointed GM BluePlan Engineering under Section 78 of the Drainage act to investigate improvements to be made to the Sturdy Municipal Drain, Branch 'F'. The section of interest, primarily Branch 'F', consists of approximately 543m of covered tile that outlet into the Sturdy Main Drain at the North property line of Pt. Lot 29, Concession 1 North Huron, immediately North of Huron County Road 25.

The owner and properties represented on the request are:

Dirk and Willy Nauwelaerts and Nancy Vannueten	For W Pt. Lot 30	Concession 1

Based on site observations and previous drainage reports, three properties have been determined as within the drainage area of the Sturdy Municipal Drain Branch 'F', which include Pt. Lot 29, W Pt. lot 30, and Pt. E Pt. Lot 30 Concession, 1 North Huron, as well as the County of Huron (County Road 25).

2. HISTORY

The Township of North Huron, along with the County of Huron have provided background municipal drain maps and reports. As the scope of improvements covered under this report are intended to deal primarily with Sturdy Branch 'F', our review of background information focused on the drainage history of the Main Drain and Branch 'F'.

The records made available to us for the Sturdy Municipal Drain indicate that the drainage works were originally adopted under the Drainage Act pursuant to a report prepared in 1920 by C.A. Jones, O.L.S. The original drainage works were indicated to consist of the Sturdy Main Drain, the Town Line Branch, and the Howatt Branch (now Branch'B').

The next record of drainage improvements appears to have taken place as per a report prepared by James A. Howes, O.L.S. in April of 1961. The 1961 report indicates that primarily cleanout and bank stabilization of the open portion of the drain were completed.

A report dated November 26th 1970 outlined additional works to be done to the existing drain including replacement of sections of covered portions of the drain, relocation of branch sections, and the construction of additional branches. It was indicated in this report that branches 'B' (formerly the Howatt branch) and Branch 'F' were to be located as such to remove the need for two additional crossings of County Road 25. As indicated in the 1970 Plan and Profile, Branch 'F' was to start on the property line between Pt. E Pt. Lot 30 and W Pt. Lot 30, and continue southwest as a covered tile. The 1970 report states that 900 ft. (275m) of 8" (200mm) diameter tile, as well as 880 ft. (268m) of 6" (150mm) diameter field tile were to be installed making up Branch 'F'. Catch Basins at the upstream and downstream end were also to be installed as part of the construction of Branch 'F'.

Another report prepared in 1986 by D.W. Pletch, P. Eng of Huron Middlesex Engineering, addressed drainage improvements related to the replacement the crossing of the Sturdy Main drain under County Road 25. Also addressed was the subsequent deepening of the downstream portion of the Sturdy Main drain, south of County Road 25 in order to provide adequate outlet to the upstream lands due to the improved crossing. Property owners within the Sturdy Branch 'F' sub-watershed, being upstream of the improved crossing were assessed for the improvement works outlined in this report.

Two reports prepared in 1995 by T.M. Pridham, P. Eng of R.J. Burnside and Associates addressed improvements to be made to the closed portion of the Sturdy Main drain, north of County Road 25, as well as the construction of a new drain north of Branch 'F'. In the report dated September of 1995, replacement of the closed portion of the main drain was proposed. It was found that the existing tile of the Main drain as installed in 1920 was undersized. Replacement of the tile with 710m of 600mm and 525mm diameter concrete field tile was completed. Following the improvements to the Sturdy Main, a report dated December of 1995 outlined the installation of a new Drain that would outlet into the Sturdy Main. The new Bylsma Drain started at the west property line of Pt. W Pt. Lot 31, Concession , and continued west where it drained into the Sturdy Main Drain on Pt. Lot 29.

3. PROCEEDINGS UNDER THE DRAINAGE ACT

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

The Act has evolved over many years and attempts have been made to balance the rights of the individual against the benefits of the construction of drains that involve more than one property. The Act recognizes that perfect agreement is not possible in every case and provides a number of proceedings that give owners and others the opportunity to influence the outcome.

This Report is one of those proceedings. To aid in the understanding of the process listed below in chronological order are all normal proceedings with the notation "Completed" beside those which have been completed. This listing is a summary of many but not all parts of the Drainage Act and applies to the ordinary course of events. Further proceedings are available, and for these the Drainage Act should be consulted directly.

1. Submission of a Request. *Completed.*
2. Notification of the Project to the Maitland Valley Conservation Authority (MVCA). *Completed.*
3. Engineer appointed. *Completed.*
4. On-site meeting. *Completed.*
5. Preparation of Report. *Completed.*
6. Report considered by Council and a By-Law is adopted.
7. Court of Revision convened to consider and deal with appeals on assessment if necessary.
8. Appeal is available from the decisions of the Court of Revision and on other matters to the Ontario Drainage Tribunal.
9. Disposition of appeals by the Tribunal, or if none, final passage of the By-Law, which establishes the drain in law and authorizes construction.
10. Construction of Municipal Drain Improvements.

11. Levying and collecting of assessments.

4. ON-SITE MEETING

In accordance with Section 9(1) of the Drainage Act, R.S.O. 1990 an on-site meeting was held on January 18, 2017. The meeting took place at 10:00 am at the North Huron Township office. Persons in attendance were:

John Kerr, P.Eng.	GM BluePlan Engineering Limited
Matt Ash	GM BluePlan Engineering Limited
Ross Daer	Landowner representing Pt. Lot 29 Concession 1

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

Landowners provided the following comments and observations:

Ross Daer reported that the issue with the drain is that the section of tile across Dirk Nauwelaerts property is too shallow. It was also confirmed that the path of the existing drain follows the existing low sections of the ground surface.

Owing to the absence of the principal landowner, a supplementary site meeting was held on Friday January 27, 2017 at 8:00 am at 43479 Blyth Road. Persons in attendance were:

John Kerr, P.Eng.	GM BluePlan Engineering Limited
Dirk Nauwelaerts	Landowner representing W Pt. Lot 30 and Pt. E Pt. Lot 30, Concession 1
Ron McCallum	Drainage Contractor

Mr. Nauwelaerts commented that the existing 'F' Branch drain no longer functioned adequately, was becoming problematic and needed to be replaced with an appropriately sized drain.

Erin Gouthro of the Maitland Valley Conservation Authority (MVCA) was not able to attend the site meeting but was able to forward her comments prior to the meeting's commencement via email correspondence. In a letter addressed to North Huron, she explained that the MVCA would have no concerns with work proposed to the closed drain, however would need to review the outlet into the open portion of the Sturdy Main Drain. She requested to review the plan and profile of the proposed drain prior to finalization of design.

5. FINDINGS

Based on the information obtained at the on-site meeting, we feel that the tile drain that currently services the Landowners contained within the watershed does not have sufficient size to convey runoff flows. Replacement of the existing drain has been proposed, with capacity to accommodate current drainage standards as well as achieve a more suitable installation depth.

6. BASIS FOR DESIGN

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

It is important to understand that the Municipal Drain in itself does not remove this amount of water. It serves as the conduit to convey water brought to it by under drainage, and for surface water finding its way or guided to the inlet structures.

It is noted that the Sturdy Municipal Drain supports the growing of high value cash crops, and therefore GMBP has selected a 38mm drainage coefficient.

This level of service will provide a good outlet for under drainage and will conduct a useful amount of surface water. During the growing season it is expected that flooding will not normally persist for more than 24 hours

7. ENVIRONMENTAL CONSIDERATIONS

This Drain will be subject to the review of the MVCA, and consideration under the Species-at-Risk Act.

Although the exact views of these agencies cannot be known in advance, the environmental impacts are thought to be slight. A copy of this report will be sent to MVCA with a view to obtaining approval for construction.

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

8. RECOMMENDATIONS FOR THE STURDY MUNICIPAL DRAIN

It is our recommendation that:

1. A new tile drainage system be constructed to replace the Sturdy Municipal Drain Branch 'F' beginning at the downstream catchbasin at Sta. 1+047 on W Pt. Lot 30 Concession 1, upstream to Sta. 1+457 at the property line of W Pt. Lot 30 and Pt. E Pt. Lot 30 Concession 1. The drain will consist of concrete field tile of 250mm diameter.

2. The ditch inlet catchbasin will remain in place at Sta. 1+047. Review of the existing conditions revealed that the Sturdy Main, the Sturdy Branch 'F', as well as an additional field tile outlet to the catchbasin currently at this location. Reconnection of the existing field tiles and new drainage tile will occur at this catchbasin during construction.

3. A new catch basin will be installed at the upstream end of Branch 'F', at Sta. 1+547, at the property line of W Pt. Lot 30 and Pt. E Pt. Lot 30 Concession 1.

The drawings included with the Report show the extent of the work, land affected, profile of the tile and other details of the work. The plan shown on Drawing No. 1 – Sturdy Municipal Drain branch 'F' Plan gives the area considered to be in the drainage area of the work proposed.

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

9. WORKING AREA

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

10. WATERSHED CHARACTERISTICS

The Drainage Area comprises approximately 6.30 hectares. Land use within the watershed is primarily agricultural.

11. ALLOWANCES

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

a) Section 29 – Right-of-Way
As the proposed drainage works are to follow the path of the existing drain, there is no allowance for Right-of –Way to be assessed.

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

Damage from installing the tile is valued at $1,400.00 / hectare ($570 / acre), and is based on a 20m wide working area. The allowance is calculated on a 5 year declining balance basis, with 100% of the allowance paid for the first year, as total destruction of crop is anticipated. In the following 4 years, a declining allowance is paid based on a 5m width of disturbed ground, with 80% of the allowance paid in year 2, 60% in year 3, 40% in year 4, and 20% in year 5. This is done to reflect the decreased crop yields in the area where the subsoil was disturbed for drain installation.

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

Year 1: 350m x 20m = 0.7 ha x $1,400	= $980
Year 2: 350m x 5m = 0.175 ha x $1,400 x 80%	= $196
Year 3: 350m x 5m = 0.175 ha x $1,400 x 60%	= $147
Year 4: 350m x 5m = 0.175 ha x $1,400 x 40%	= $98
Year 5: 350m x 5m = 0.175 ha x $1,400 x 20%	= $49
Total Damage Allowance Paid in Report	= **$1,470**

Allowances are paid regardless of what crop is grown or whether or not it is harvested in advance of construction. Municipal Drains are generally constructed before beans and corn can be harvested, so the damage can be expected to occur. Crop value is calculated using a 2 year average of the "Area, Yield, Production and Farm Value of Specified Field Crops, Ontario" as published annually by the Ontario Ministry of Agricultural, Food and Rural Affairs.

c) Section 31 – Allowance for Existing Drains
No existing private drains are involved in this project.

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

e) Section 33 – Allowance for loss of Access
As no crossings are required to landowners for the installation of the proposed drainage works, no loss of access allowance is considered appropriate.

The allowances are generally less than the assessment to the properties and the property owner is billed the difference when the project is complete.

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

Table 1: Schedule of Allowances

Concession	Lot	Owner and Roll No.		Damages to Lands and Crops (Section 30)	Category
1	Pt. Lot 29	Ross Daer Farms Inc.	100700	$ 360	Crop Damage
1	W Pt. Lot 30	Willy Nauwelaerts; Dirk Nauwelaerts & Nancy Vanneuten	100800	$ 1,760	Crop Damage
			Total	**$ 2,120**	**Crop Damage**

12. ASSESSMENTS

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

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

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

Outlet liability for all roads was calculated using the methodology outlined in "*Outlet Liability Assessment Factors for Highway Rights of Way*", as published by the Ontario Ministry of Transportation. It was determined that 67% of the right-of-way was developed and that the adjacent soil runoff coefficient ('C' factor) was 0.40. As a result the roadway was assigned an Equivalent Area factor of 2.0.

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

Section 26 of the Act specifies that *"the public utility or road authority shall be assessed for and shall pay all the increase of cost of such drainage works caused by the existence of the works of the public utility or road authority."* This means that any costs which are required solely because of the existence of County Road 25 will be fully assessed to the County of Huron. The Section 26 assessment consists of the actual cost of the road crossing pipe, the catch basins and connections to the drain, minus the normal installation cost of the drain should the road not exist.

As the road proposed drainage works do not cross the County Road, no assessment for benefit under section 26 will be made.

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

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

Assessments on agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance.

Should the project not proceed by reason of withdrawal from the petition, costs to date are payable by the petitioners prorated to the assessments contained herein. There is no grant should this happen.

13. COST ESTIMATE

The cost of this Municipal Drain Improvement is estimated as **$30,270.00** and is raised by assessment from properties within the watershed. A Schedule of Estimated Assessments can be found in **Appendix A**.

GM BluePlan estimates the cost of the Sturdy Municipal Drain Branch 'F' as follows:

COST ESTIMATE - Sturdy Municipal Drain Branch "F" - 2017 North Huron		
Allowances		**$ 2,120**
Sturdy Drain Construction		
Supply 500m of 250mm diameter concrete field tile	$ 6,900	
Install 250mm concrete pipe: Sta. 1+047 to 1+547	$ 5,500	
Allowance for Tile Connections	$ 500	
Allowance for Stoney Conditions	$ 1,000	
Allowance for connection to existing downstream catch basin - Including 250mm dia. HDPE extension	$ 600	
Supply and install 1-600x600 ditch inlet catch basins complete with birdcage grate; Sta. 1+547 (Including rip-rap on geotextile - 2 tonne)	$ 2,450	
Contingency Fund at approx. 10% of construction	$ 1,700	
Total Estimated Drain Construction Cost		**$ 18,650**
Non-Construction Costs		
On Site Meeting, Survey, Plan, Profile, and Report	$ 7,500	
Tendering, Construction Review, Contract Administration and Grant Application	$ 1,500	
Net HST (1.76%)	$ 500	
Total Non-Construction Costs		**$ 9,500**
TOTAL ESTIMATED COST		**$ 30,270**

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

14. MAINTENANCE

As per section 74 of the Act, after construction of the improvements the Sturdy Municipal Drain as described in this Report shall be maintained by Township of North Huron at the expense of the upstream lands and roads assessed, in the proportions set out in the By-Law which adopts this Report. Any future maintenance or repair costs shall be distributed pro rata in accordance with **Appendix B**, the Schedule of Assessments for Future Maintenance. The Schedule of Assessments for Future Maintenance is based on the equivalent contributing areas for all properties.

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

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

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

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

All of which is respectfully submitted.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

John Kerr, P.Eng.



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

Appendix A
Schedule of Estimated Assessments for Construction

Schedule of Estimated Assessments
Prepared by GM BluePlan Engineering Limited June 2017
Sturdy Municipal Drain Branch "F" - 2017

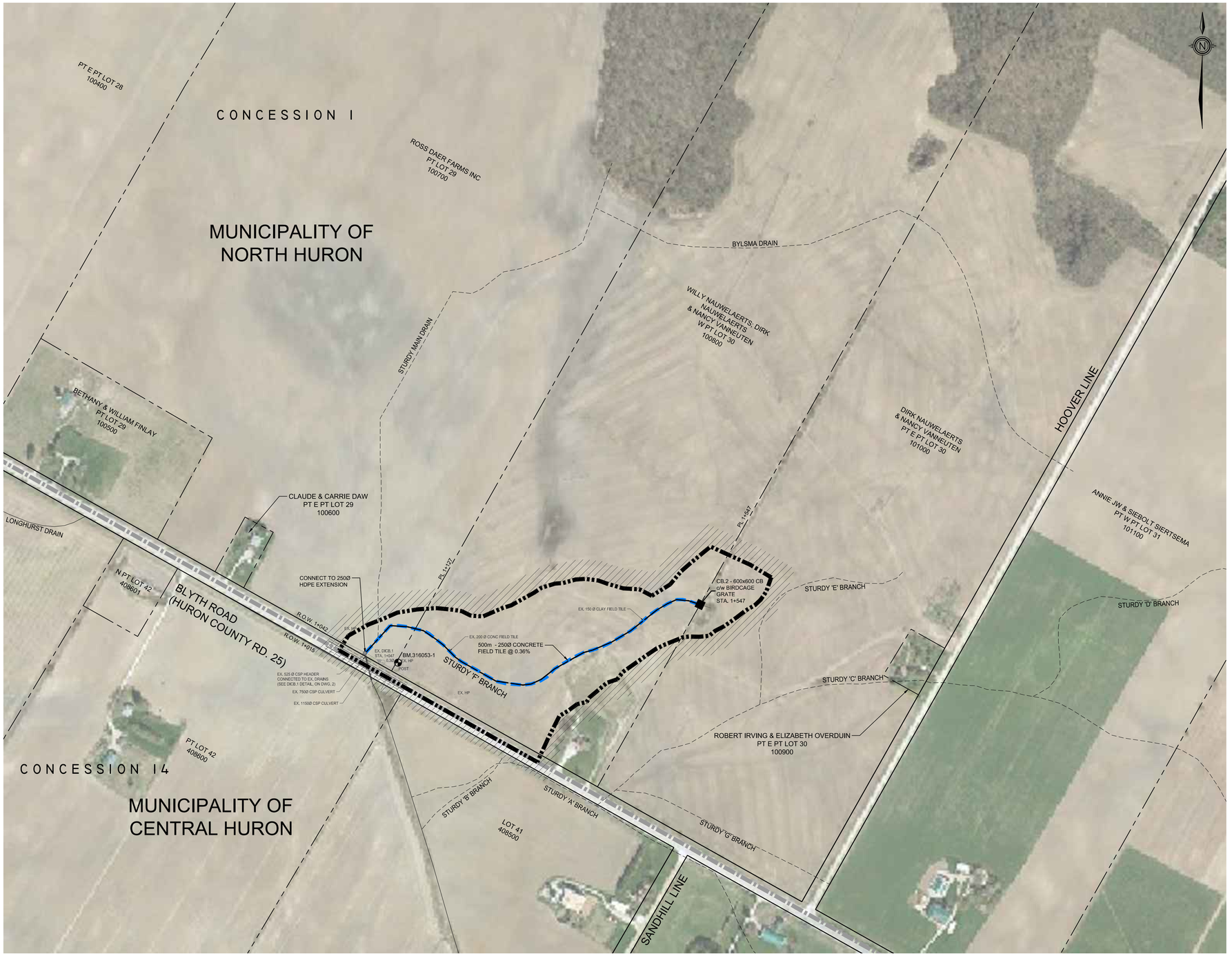
Roll No.	Conc	Lot	Owner	Affected Area ac.	Affected Area ha.	Adjusted Area ac.	Adjusted Area ha.	Benefit (sect. 22)	Outlet (sect. 23)	Section 24/26	TOTAL ASSESSMENT	Allowances	NET ASSESSMENT[1]
Lands													
100700	1	Pt. Lot 29	Ross Daer Farms Inc.	1.03	0.42	1.03	0.42	$ -	$ -	$ -	$ -	$ (360)	**$ (360)**
100800	1	W Pt. Lot 30	Willy Nauwelaerts; Dirk Nauwelaerts & Nancy Vanneuten	12.39	5.01	12.39	5.01	$ 9,040	$ 18,080	$ -	$ 27,120	$ (1,760)	**$ 25,360**
101000	1	Pt. E Pt. Lot 30	Dirk Nauwelaerts & Nancy Vanneuten	1.45	0.59	1.45	0.59	$ 1,050	$ 2,100	$ -	$ 3,150	$ -	**$ 3,150**
Total Estimated Assessment - Lands				*14.86*	*6.01*	***14.86***	***6.01***	***$ 10,090***	***$ 20,180***	***$ -***	***$ 30,270***	***$ (2,120)***	***$ 28,150***
Roads													
	1	County Road 25	Huron County	0.72	0.29	1.44	0.58	$ -	$ -	$ -	$ -	$ -	**$ -**
Total Estimated Assessment - Roads				*0.72*	*0.29*	***1.44***	***0.58***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***
TOTAL ESTIMATED ASSESSMENTS				*15.58*	*6.30*	*16.30*	***6.60***	***$ 10,090***	***$ 20,180***	***$ -***	***$ 30,270***	***$ (2,120)***	***$ 28,150***

[1]**Agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance**

Appendix B
Schedule of Assessments for Future Maintenance

Schedule of Assessment for Future Maintenance Prepared by GM BluePlan Engineering Limited June 2017 Sturdy Municipal Drain Branch "F" - 2017							
Conc.	Lot	Owner and Roll No.		Land Area	Adjusted Area		Maintenance
				ha.	ha.	ac.	Assessment
Municipality of North Huron							
1	Pt. Lot 29	Ross Daer Farms Inc.	100700	0.4	0.4	1.0	0.0%
1	W Pt. Lot 30	Willy Nauwelaerts; Dirk Nauwelaerts & Nancy Vanneuten	100800	5.0	5.0	12.4	89.5%
1	Pt. E Pt. Lot 30	Dirk Nauwelaerts & Nancy Vanneuten	101000	0.6	0.6	1.4	10.5%
Total Assessment - Lands				6.0	6.0	14.9	100.0%
Roads							
1	County Road 25	Huron County		0.3	0.6	1.4	0.0%
Total Assessment - Roads				0.3	0.6	1.4	0.0%
Total Assessment - Lands and Roads				6.3	6.6	16.3	100.0%

Appendix C
Drawings



NOTES :

1. CONTRACTOR IS TO OBTAIN UTILITY LOCATES PRIOR TO CONSTRUCTION.
2. CONTRACTOR IS TO CONNECT EXISTING TILES DURING CONSTRUCTION.

NOMENCLATURE:

APPROX.	APPROXIMATE
c/w	COMPLETE WITH
CB	CATCH BASIN
CONC.	CONCRETE
℄	CENTER LINE
CSP	CORRUGATED STEEL PIPE
Ø	DIAMETER
DICB	DITCH INLET CATCH BASIN
ELEV.	ELEVATION
EX.	EXISTING
INV.	INVERT
min.	MINIMUM
PL	PROPERTY LINE
R	RADIUS
STA.	STATION
TYP.	TYPICAL

NOTES :

- MUNICIPAL BOUNDARY
- WATERSHED BOUNDARY
- RIGHT-OF-WAY
- PROPERTY LINE
- CLOSED MUNICIPAL DRAIN (PROPOSED)
- OPEN MUNICIPAL DRAIN (EXISTING)
- CLOSED MUNICIPAL DRAIN (EXISTING)
- PROPOSED CATCH BASIN
- EXISTING DITCH INLET/ CATCH BASIN
- BENCHMARK LOCATION

30 15 0 25 50 100

BENCH MARKS :

BM 316053-1; ELV=100.000m
NAIL SET IN SOUTH FACE OF THIRD HYDRO POLE NORTHWEST OF HOUSE AT ADDRESS 39725 BLYTH ROAD, 0.23m FROM EX. GROUND ELEVATION, ON THE NORTH SIDE OF BLYTH ROAD.

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 OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

LICENSED PROFESSIONAL ENGINEER
L. J. C. KERR
7/7/17
PROVINCE OF ONTARIO
Prov. No. 316-053

NO.	MM/DD/YYYY	REVISION DESCRIPTION	CHKD
1	07/07/2017	ISSUED FOR TENDER	J.K.
0	05/23/2017	PRELIMINARY	J.K.

BluePlan ENGINEERING
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www.gmblueplan.ca

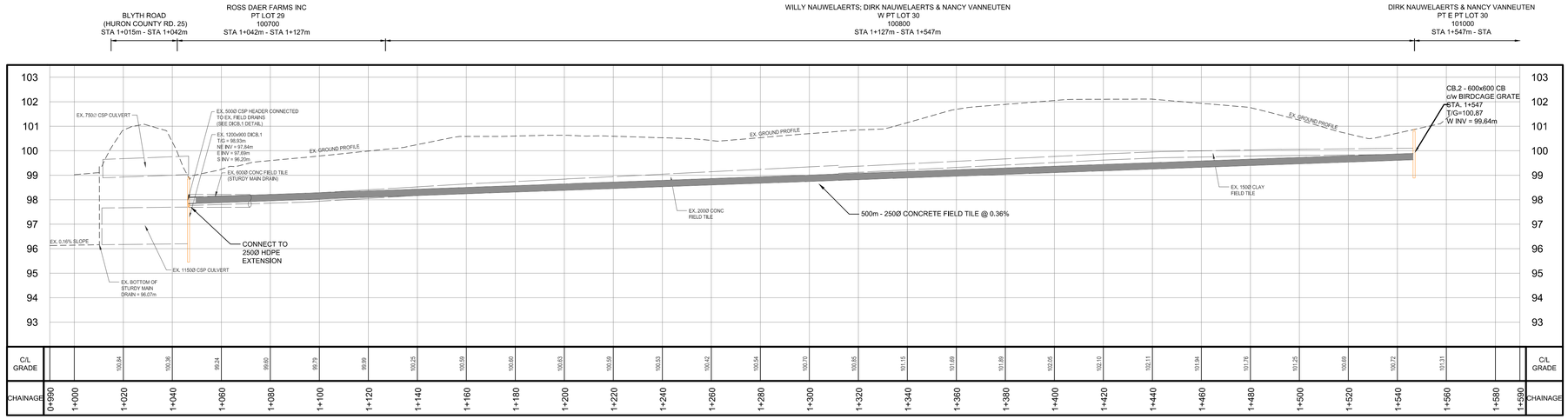
STURDY MUNICIPAL DRAIN - 'F' BRANCH 2017

TOWNSHIP OF NORTH HURON

PLAN

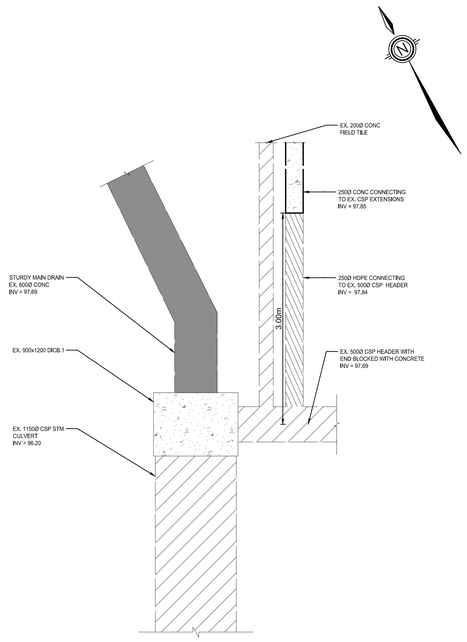
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
J.S. / K.N.	M.A.	316-053	1
DESIGNED BY :	DATE :		
B.G.	DECEMBER 2016		

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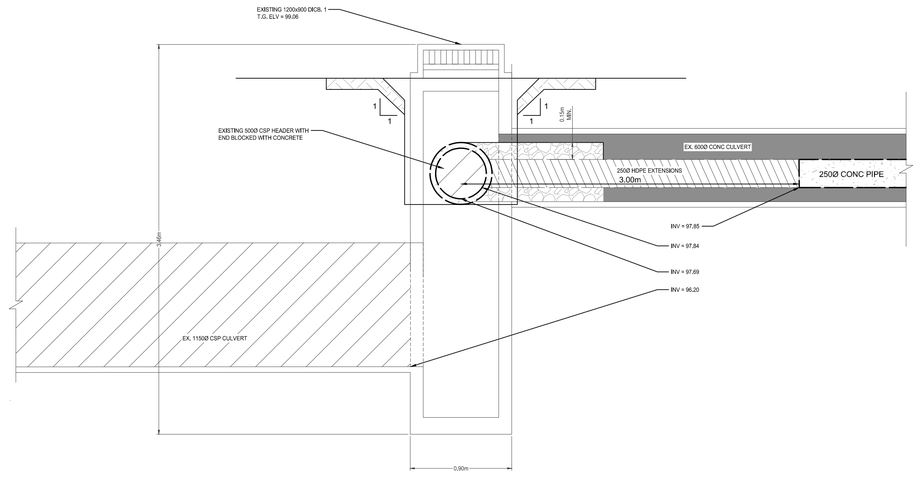


PROFILE - STURDY DRAIN - BRANCH 'F'

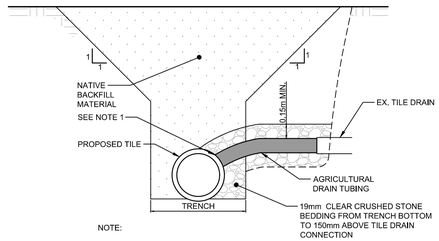
DETAIL SCHEDULE			
ITEM NO.	STA.	DESCRIPTION	LENGTH
1	1+047	250Ø HDPE EXTENSION @ 0.36%	-
2	1+047 TO 1+547	250Ø CONCRETE FIELD TILE @ 0.36%	500m
3	1+547	CB.2 (600x600 CB) c/w BIRDCAGE GRATE (C.W. RIP-RAP ON GEOTEXTILE)	-



DICB.1 - PLAN
N.T.S.



DICB.1 - PROFILE
N.T.S.



NOTE:
1, ALL TILE CONNECTIONS TO BE EITHER WITH AN INSERT COUPLER, OR A MANUFACTURED TEE

TYPICAL TILE CONNECTION DETAIL
N.T.S.

NOTES :

1. CONTRACTOR IS TO OBTAIN UTILITY LOCATES PRIOR TO CONSTRUCTION.
2. CONTRACTOR IS TO CONNECT EXISTING TILES DURING CONSTRUCTION.

NOMENCLATURE:

APPROX.	APPROXIMATE
c/w	COMPLETE WITH
CB	CATCH BASIN
CONC.	CONCRETE
℄	CENTER LINE
CSP	CORRUGATED STEEL PIPE
Ø	DIAMETER
DICB	DITCH INLET CATCH BASIN
ELEV.	ELEVATION
EX.	EXISTING
INV.	INVERT
min.	MINIMUM
PL	PROPERTY LINE
R	RADIUS
STA.	STATION
TYP.	TYPICAL

LEGEND:

- EX. SURFACE PROFILE
- CONCRETE FIELD TILE
- HIGH DENSITY POLYETHYLENE PIPE
- RIP-RAP
- PROPOSED CATCH BASIN
- STEEL PIPE

BENCH MARKS :

BM.316053-1; ELV=100.000m
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STURDY MUNICIPAL DRAIN - 'F' BRANCH 2017

TOWNSHIP OF NORTH HURON

PROFILE & DETAILS

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
K.N.	M.A.	316-053	2
DESIGNED BY :	DATE :		
B.G.	MARCH 2017		

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Appendix D
Special Provisions

Special Provisions (Non-Tender Items)
For The Construction Of The
Sturdy Municipal Drain Branch 'F' - 2017
The Township of North Huron

1. STANDARD SPECIFICATIONS

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

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

Where in the Specifications the word "Corporation", "Municipality" or "Owner" occurs it shall mean the "Corporation of the MMMM".

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

2. SALES TAXES

Harmonized Sales Tax (H.S.T.)

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

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

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

3. LASER ALIGNMENT

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

4. TRENCHES TO BE CLOSED

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

5. ROAD SIGNS

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

6. DAMAGE TO TREES

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

7. COORDINATION MEETINGS

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

8. DISPOSAL OF SURPLUS OR UNSUITABLE EXCAVATED MATERIAL

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

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

9. COMPACTION

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

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

When it is impractical with the larger types of compaction equipment to obtain the required degree of compaction in areas where working space is limited, the Contractor shall provide and use mechanical hand compaction equipment in order to achieve the specified density.

Granular materials used as bedding shall be compacted to a density of 98% of the maximum dry density, granular backfill or base courses shall be compacted to a density of 100% of the maximum dry density. All other earth materials shall be compacted to a density of 95% of the maximum dry density.

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

10. NATURAL GAS CONSTRUCTION SPECIFICATIONS

Where the Contractor is working near natural gas mains the work shall be carried out in accordance with the requirements and specifications of the Gas Company having control over such mains.

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

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

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

12. UTILITY POLE LINES

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

13. UTILITIES AND PIPE CROSSINGS

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

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

14. DAMAGE BY VEHICLES AND OTHER EQUIPMENT

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

make repairs satisfactory to the Owner or, where the Owner has found it necessary to make the repairs, make payment to the Owner of the cost of repairs carried out by the Owner.

15. SURVEY BARS AND MONUMENTS

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

16. MAINTENANCE OF ROAD

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

17. IMPERIAL CONVERSION OF METRIC SPECIFICATIONS

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

18. ACCESS TO PRIVATE PROPERTIES

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

19. CONSTRUCTION HOURS

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

20. MAINTENANCE OF FLOWS

The contractor shall be responsible to maintain all drainage flows during construction. No extra payment will be made for pumping, hauling or disposing of any drainage flow or removing any granular material that enters the drainage system through manhole or catch basin frame adjustments. The contractor will be responsible for maintaining and directing storm water flows during construction so that flooding of private property and silt migration or washouts do not occur. The contractor shall be responsible to pay for any damages caused by storm water flooding due to, or as a result of, construction activities during the duration of this project.

Special Provisions
For The Construction Of The
Sturdy Municipal Drain Branch 'F' - 2017
The Township of North Huron

SPECIFICATIONS

The Special Provisions, along with the *"Specifications for the Construction of Municipal Drainage Works"* attached hereto, shall apply to and govern the construction of the *"Sturdy Municipal Drain Branch 'F'".*

PLAN AND REPORT

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

EXTENT OF WORK

General

1. All standard Detailed Drawings are attached to these Specifications.
2. The Contractor shall notify the Owners and the Engineer forty-eight (48) hours prior to construction.
3. The Contractor shall verify the location of the new tile drains with the Engineer and the landowners prior to construction.
4. The working area shall be 20m centered on the proposed tile drain. Each landowner on whose property the drainage works is to be constructed shall designate access to and from the working area.
5. All utilities shall be located and uncovered in the affected areas by the Contractor prior to construction.
6. The Contractor shall supply all materials unless otherwise stated at the time of tendering.
7. All standard catch basins shall be precast concrete catch basins supplied by Coldstream Concrete or approved equal. Knockout shall be provided in the catch basins.
8. The catch basin grate elevations shall be set to the satisfaction of the Engineer.
9. Stone rip-rap protection and geo-textile material (Terrafix 270R or approved equivalent) shall be placed around all catch basins as part of this contract.
10. All catch basin grates shall be fastened to the new catch basins.
11. All stone rip-rap material shall be quarry stone 150mm to 300mm diameter and placed to a depth of 400mm.
12. The Contractor shall supply all necessary materials to complete the connections of any existing drains to the new drain.
13. All CSP pipe shall be minimum 2.0mm (14 gauge) with a 68mm x 13mm corrugation profile, and galvanized.
14. All HDPE pipe shall be CSA rated 320kPa with bell and spigot gasket joints. Pipe shall be double wall smooth interior, Boss2000 or approved equivalent.
15. The Contractor shall be responsible for all trench settlement.
16. The Contractor shall supply and install catch basin markers beside all catch basins.

17. All concrete tile shall meet the requirements of ASTM C412-15.

18. The Contractor shall clean up the site and leave it in a neat and tidy condition.

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

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

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

22. In accordance with Section A.19 of the General Specifications, the Contractor shall be responsible for all faulty materials or workmanship which appears within a one year period from the date of the Engineer's final Payment Certificate. An amount equal to 3% of the final contract price shall be retained for the maintenance period. Any part of the money retained may be used to make good any deficiencies after five (5) working days' notice being given to the Contractor. This notice may be either in writing or by telephone.

CLOSED WORK

C-1 Concrete Field Tile

Concrete tile shall be (Heavy-Duty Extra-Quality Concrete Drain Tile) as per ASTM C412-15.

Supply and install 500m of 250mm (10") diameter concrete field tile by trencher or backhoe. Use drain tile as supplied by Coldstream Concrete or approved equivalent.

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

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

This item shall include the wrapping of tile joints. The Contractor shall supply and wrap all concrete tile joints with geotextile filter material as part of this contract. The width of the filter material should be:

a. 300mm wide for tile sizes 150mm diameter to 350mm diameter

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

No payment will be made for partial wrapping of tile.

C-2 Catch Basins

a) 600 x 600

Supply and install 1 – 600 x 600 catch basin complete with birdcage grate by Coldstream Concrete or approved equivalent.

The catch basin shall be as supplied by Coldstream Concrete or approved equal. Ditch inlets shall have a 3:1 sloped top and heavy duty galvanized steel grate (minimum bar diameter 15mm, maximum spacing 75mm) of the "birdcage" type set so that the top of the back of the ditch inlet is approximately flush with the surrounding ground. Flat catch basins shall have a flat top and heavy duty galvanized steel grate (minimum bar diameter 15mm, maximum spacing 75mm) of the "birdcage" type set so that the top of the catch basins is approximately flush with the surrounding ground.

All necessary minor grading and contouring to convey water to the catch basin is included. The approximate top of grate elevation has been shown on the detailed plans; however the contractor shall confirm the surface elevations prior to ordering or placing any catch basins and shall ensure that the top does not extend above the ground surface. All catch basins shall include at least one 150mm riser section.

Securely fasten the grate to the catch basin with two galvanized bolts. All pipes connected to the catch basin shall be suitably grouted with concrete, and all grouted connections shall be completely wrapped with geotextile. Further, geotextile shall be placed over all the joints between sections of the box for the entire perimeter of the box.

Supply and install approximately 2 tonnes of rip rap at each catch basin. Rip rap shall be field or quarry stone, of minimum dimension, 150mm to 300mm diameter or as approved by the Engineer on a filter mat base (Terrafix 270R or approved equivalent), machine placed to produce a smooth locked surfaced. All rip rap shall be installed as shown on the drawings accompanying the Report.

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

C-3 Tile Connections

All tile encountered shall be connected into the main drain or a catch basin. Tile connections may be made by using the same size of concrete field tile or one size larger of standard corrugated plastic drainage tubing. Connection at the main shall be "earth tight" to the satisfaction of the Engineer. All tile connections shall be done by core drilling the main drain or catch basin, and the connection shall be sealed by a method satisfactory to the Engineer.

The contractor will be paid as follows for the connection of tributary tile to the proposed works:

100mm Connections to	Total c/w Coring	150mm Connections to	Total c/w Coring	200mm Connections to	Total c/w Coring
250-675	$ 80.00	300-675	$ 95.00	250-675	$ 125.00
750-900	$ 120.00	750-900	$ 130.00	750-900	$ 165.00

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

The above prices include supply and install of up to a 3m length of tile, or tubing to make connections. Connections in excess of 3m shall be paid for at the rate of $15.00/m for 100mm and 150mm diameter tile, and $25.00 for 200mm diameter tile.

C-4 Poor Soil Conditions

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

C-5 Clear Stone

Supply and install 19mm diameter clear crushed stone for bedding or envelope. Location for installation shall be designated by the Engineer at the time of construction. Payment will be for the actual quantity installed.

C-6 Connection to existing Catch Basin

Installation of the new concrete field tile shall include connection to the existing catch basin configuration at the downstream end of the proposed construction for this project, including installation of a new HDPE extension. The connection is to be constructed as per the connection detail and assumed existing catch basin and header configuration as noted on the contract drawings.

Appendix E
Construction Specifications

SPECIFICATIONS
for the
CONSTRUCTION
of
MUNICIPAL DRAINAGE WORKS

Revised January 2016

SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINAGE WORKS

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SECTION A - GENERAL

A.1 BENCH MARKS

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

A.2 STAKES

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

A.3 LINE

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

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

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

A.4 PROFILE

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

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

A.5 ERRORS OR OMISSIONS

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

A.6 CLEARING

(a) General

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

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

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

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

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

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

(b) Open Work

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

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

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

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

(c) Closed Work

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

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

Where the course of the drain is through low, wet or swampy land and clearing prior to tile installation is impractical, then with special written permission ONLY can the tile be laid before clearing. For drainage

purposes, the clearing shall be postponed until ground and weather conditions permit working within the area adjacent to the tile.

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

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

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

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

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

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

A.7 FENCES

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

A.8 TRIBUTARY OUTLETS

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

A.9 ALTERATIONS

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

A.10 SPECIAL CONDITIONS

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

workmanlike manner, the Contractor shall immediately notify the Engineer who will make the necessary alterations.

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

A.11 PERMITS, NOTICES, LAWS AND RULES

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

A.12 HIGHWAYS, RAILWAYS, UTILITIES

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

Notices Required

(a) Highways

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

(b) Railways

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

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

A.13 CONTRACTOR'S LIABILITY INSURANCE

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

The Contractor shall furnish evidence of compliance with all requirements of the applicable Workmen's Compensation Act or Ordinance of the Province or Territory concerned including payments due there under.

Prior to the commencement of any work hereunder, the Contractor shall file with the Owner a copy of each insurance policy and certificate required. All such insurance shall be maintained until final completion of the work including the making good of faulty work or materials; except that coverage of completed operations liability in any event by maintained for one (1) year from the date of final payment certificate by the Engineer.

A.14 SUB-CONTRACTORS

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

A.15 STANDING CROPS AND LIVESTOCK

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

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

A.16 SURPLUS GRAVEL

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

A.17 OPEN CUT ROAD CROSSINGS

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

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

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

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

A.18 LANEWAYS

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

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

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

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

A.19 FINAL INSPECTION

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

If, after receiving notice from the Contractor that the work has been completed, the Engineer or Drainage Superintendent in charge of the work finds items uncompleted which entail a further inspection of the whole or part of the work, the cost of such further inspection may be charged against the Contractor.
All the work included in the Contract must, at the time of final inspection, have the full dimensions and cross-sections called for in the Plans and Specifications.

A.20 COMPLETION OF WORK

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

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

A.21 NOTICE OF COMMENCEMENT OF WORK

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

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

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

A.22 FIELD MEETINGS

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

A.23 SUPERVISION

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

A.24 MAINTENANCE OR FAULTY WORKMANSHIP

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

A.25 DRAINAGE SUPERINTENDENT

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

SECTION B - OPEN DRAINS

B.1 BOTTOM WIDTH AND SIDE SLOPES

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

B.2 EXCAVATED MATERIAL

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

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

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

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

B.3 SPREADING AND LEVELLING

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

B.4 FILLING OLD CHANNEL

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

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

Abandoned channels shall be finished with a 300mm layer of topsoil of the quality necessary to support agricultural operations, and subject to the approval of the Engineer and the receiving landowner.

B.5 INLETS FOR SURFACE WATER

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

B.6 EXCAVATION AT BRIDGE SITES

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

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

B.7 FARM BRIDGES AND FARM CULVERTS

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

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

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

B.8 RIP RAP PROTECTION FOR CULVERTS

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

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

B.9 OBSTRUCTIONS

All brush, bushes, fallen timber and debris shall be removed from the banks and slopes of the drain to such a distance on each side to eliminate any interference with the spreading of the spoil bank. Grubbing shall include the removal and disposal of all stumps to the satisfaction of the Engineer. The slopes shall be cleared whether or

not they are directly affected by the excavation. The roots shall be left in the banks if no bank excavation is required as part of the new channel excavation. Any tress necessarily removed, are to be brushed and left for the landowner. In wooded or heavily overgrown areas, the brush, limbs, etc. may be pushed into piles back out of the way. All dead trees alongside the drain that impede the performance of the drain shall be removed prior to excavation and put in piles, unless directed otherwise by the Engineer. All brush, limbs, debris, etc. shall be put into pile for disposal by the landowner.

B.10 ROADS

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

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

B.11 TILE OUTLETS IN EXISTING DITCHES

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

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

B.12 GRASS SEED AND FERTILIZER

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

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

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

B.13 EQUIPMENT

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

B.14 COMPLETION

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

SECTION C - TILE DRAINS

C.1 TILE QUALITY

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

C.2 LINE

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

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

C.3 TILE LAYING

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

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

C.4 LOWERING OF SURFACE GRADES

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

C.5 TRIBUTARY DRAINS

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

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

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

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

C.6 CONNECTIONS

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

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

C.7 BACKFILLING

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

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

C.8 OUTLET PROTECTION

The protection at the outlet of a tile drain shall be a length of corrugated metal pipe fitted with a rodent-proof grate. The grate shall be hinged at the top to permit the exit of foreign material from the tile. The pipe shall be protected with rip rap protection consisting of quarry stone or heavy field stone and geotextile filter material in a

manner satisfactory to the Engineer. The rip rap shall extend from the bottom of the trench to the original ground surface and for a distance of at least 3m from the end of the outlet pipe unless otherwise specified on the Drawings. The protection shall extend to the top of the backfilled trench and below the pipe to 300mm under the streambed and also extend 600mm into undisturbed soil on either side of the backfilled trench unless otherwise specified on the Drawings.

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

C.9 CATCH BASINS

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

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

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

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

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

C.10 JUNCTION BOXES

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

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

C.11 BRUSH, TREES, DEBRIS, ETC.

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

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

C.12 QUICKSAND

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

C.13 ROCKS

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

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

C.14 BROKEN OR DAMAGED TILE

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

C.15 FILLING IN EXISTING DITCHES

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

C.16 CONSTRUCTION OF GRASSED SWALES/WATERWAYS

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

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

C.18 TILE CROSSING ROADWAYS

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

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

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

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

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

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

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

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

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

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

C.19 RECOMMENDED PRACTICE FOR CONSTRUCTION OF SUBSURFACE DRAINAGE SYSTEMS

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