ENGINEERING REPORT

For

EPP DRAIN (PELLER ESTATES)

Town of Niagara-on-the-Lake

(Geographic Township of Newark)

Region of Niagara

Date: September 30, 2019

File No. 18-160

K. SMART ASSOCIATES LIMITED

Kitchener Sudbury

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Definitions:

"Act" means The Drainage Act RSO 1990
"CSP" means Corrugated Steel Pipe
"Drain" means Epp Drain (Peller Estates)
"Grant" means grant paid under the Agricultural Drainage Infrastructure Program
"HDPE" means High-Density Polyethylene
"Municipality" means Town of Niagara-on-the-Lake
NPCA" means Niagara Peninsula Conservation Authority
"OMAFRA" means the Ontario Ministry of Agriculture, Food and Rural Affairs
"MECP" means Ministry of Environment, Conservation and Parks
"MNRF" means Ministry of Naturel Resources and Forestry
"DFO" means Fisheries and Oceans Canada
"Tribunal" or "Drainage Tribunal" means Agriculture, Food and Rural Affairs Appeal Tribunal

Tables:

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September 30, 2019 File No. 18-160

EPP DRAIN (PELLER ESTATES)

TOWN OF NIAGARA-ON-THE-LAKE

1 EXECUTIVE SUMMARY

This report is prepared pursuant to Section 78 of the Drainage Act RSO 1990 (the Act).

On May 16, 2018, the Municipality received a letter from Mark Torrance, National Director of Peller Estates Winery, requesting the tiling (closing in) of a portion of the Epp Drain that runs alongside their driveway. Pursuant to Section 8(1) of the Act, on June 11, 2018, K. Smart Associates Limited was appointed by Resolution (OPS-18-022) of Council to prepare an Engineer's report for the tiling (closing in) of a portion of the Epp Drain.

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

- Cleanout of 108m of the existing ditch
- Excavation of 163m of deeper and wider existing ditch to create fish habitat including 2 stone drop structures
- 100m² of riprap
- The estimated cost of this project is $108,160.
- The watershed served is approximately 138.1 hectares (341.1 acres).

Assessment schedules are provided for construction and future maintenance of the drainage works.

- Schedule A shows the assessment of the total estimated cost
- Schedule B will be used for prorating future maintenance cost
- Schedule C will be used for levying the final cost of the Drain and it indicates estimated net assessments after deducting grants and allowances where applicable.
- Appendix A illustrates the calculation of the assessments outlined in Schedule A.
- Appendix B illustrates the calculation of the assessments outlined in Schedule B.

2 BACKGROUND

The open channel drain on the Peller Estates property along the driveway is currently inundated with phragmites and cattails which obstructs the efficient flow of water.

Enclosing the drain in its existing location could provide a possible solution and could improve the efficiency of the drain.

Existing legislation mandates that there be no net loss of habitat, therefore there were discussions with the NPCA to seek approval of the enclosure.

Several options were surveyed and cost estimates were prepared and considered.

- The first option would be to enclose the existing ditch along the driveway. Communications with the NPCA have indicated that this option would not be approved and was not pursued further.
- Another option would involve a realignment of the drain to go approximately 190m further along the unopened road right-of-way as a ditch, then as a closed (pipe) drain to the existing ditch including filling in the existing ditch along the driveway. This option would be too costly and would not get approval from the NPCA and was therefore not pursued further.

The NPCA has indicated that another option is considered to improve the ditch in this location.

- The option considered would provide additional/improved habitat and would involve deepening and widening the ditch along the driveway and provide several stone drop structures and riprap along the channel and cleaning out the existing ditch downstream to the unopened road right-of-way. The winery would plant trees (landscaping) in the area also. This option is acceptable to the NPCA and to the Peller Estates Winery and is being pursued in this report.

3 DRAINAGE HISTORY

The Epp Drain was originally constructed as a result of a petition filed on December 13, 1973. Following the construction, further reports were completed in 1976 and 1977 titled "Epp Drain Diversion", to construct a diversion ditch from the John Street to the Niagara River, along the old railway right-of-way.

The next Engineer's report on the Epp Drain is dated October 31, 1994, prepared by Wiebe Engineering Group Inc. This report was prepared to provide for repair and improvements as required and to update the schedule of assessments for maintenance and other maintenance provisions for the Epp Drain.

Maintenance was last done on the full length of the drain in 2008.

The most recent Engineer's report on the Epp Drain is entitled "Epp Drain Outlet 2016" prepared by Neal Morris, P.Eng. (K. Smart Associates Limited) dated March 30, 2016. The 2016 report provided for the replacement of the outlet of the Epp Drain across the Niagara River Parkway upstream of Navy Hall property and was conducted as emergency works.

4 INVESTIGATION

4.1 On-Site Meeting

On June 21, 2018, an on-site meeting was held in accordance with S. 9(1) and 9(2) of the Act. Notice of the meeting was sent to the requesting landowner and the other landowners most affected by the drain closing in/realignment and the affected agencies.

In attendance

Josh Aitken, Ramesh Jain, Katie Dickison and Andrew Wade (Peller Estates) – Landowners
Rene Landry – Town of Niagara-on-the-Lake
Kevin Sidey – Niagara-on-the-Lake Hydro
Neal Morris, P.Eng. – K. Smart Associates Limited

Items Discussed

Katie Dickison/Andrew Wade (Peller Estates) (Roll No. 011-01301)

- Tile minimum between each row
- They would prefer fewer grape vines removed
- They might be able to relocate the vines
- They are okay with the open ditch along the unopened road

Ramesh Jain (Roll No. 011-00520)

- No concerns

Josh Aitken (Two-Sisters Vineyards) (Roll No. 002-00400)

- Did not want to remove grapevines
- Did not know their vines were on Town property (unopened right-of-way/ former railroad)
- Further research determined that Two Sisters Vineyards has an agreement with the Town allowing them the use of the Town property.

4.2 Site Examination and Survey

The routes of the existing drain and the proposed closing in/realignment option were examined after the on-site meeting and on several occasions during the fall of 2018 and in 2019. A topographic survey was completed along the existing and proposed drain routes from John Street East to the existing laneway culvert on the Peller Estates property in June 2018.

4.3 Watershed Description

The perimeter watershed of the Drain has been established based on-site investigation, topographic information and historical reports.

Land use in the watershed is predominately agricultural except for road allowances, scattered bush areas and several residential lots.

5 AUTHORITY FOR REPORT

Section 78 of the Drainage Act provides for the repair and improvement of an existing drain constructed under the Drainage Act through a new Engineer's report. The Epp Drain was constructed under the Drainage Act and it has been determined from the request to the Town and discussions at the on-site meeting and site examination and with the NPCA, that the drain requires improvement on the Peller Estates property. Therefore, this report is properly initiated under Section 78 of the Drainage Act.

6 DESIGN CONSIDERATIONS

6.1 Sufficient Outlet

Section 15 of the Act requires that proposed work be continued downstream to a sufficient outlet. Section 1 of the Act defines sufficient outlet as "a point at which water can be discharged safely so that it will do no damage to lands or roads." For this project, it was determined that the proposed ditch work outlets into the existing drain which provides sufficient outlet and will allow the proposed works to function as intended.

6.2 Drain Capacity (Sizing)

The open ditch portion of the drain was designed at the same capacity as per the 1994 report, which provides adequate depth for tile drain outlets and will also convey a 2-year storm within the channel cross-section. It is customary for open municipal drains serving agricultural or rural lands to be sized for a 2-year storm.

This approach is in accordance with the "Guide for Engineers Working under the Drainage Act in Ontario" OMAFRA Publication 852 and is in accordance with the Drainage Act.

6.3 Soil Conditions

The Region of Niagara soils mapping for this area indicates that the soils adjacent to this Drain are primarily Maplewood reddish-hued fine sandy loamy textures overlying silty clay or clay loam till which is smooth basin to level and has imperfect drainage.

If sandy soils are encountered, erosion control (biodegradable Terrafix SC 200, Nelix SC 32 or equal) blankets shall be installed to reinforce the ditch side slopes.

Based on available information, no adverse subsurface conditions are expected on this project and the use of conventional construction equipment is anticipated.

7 MEETING(S)

Several contacts have been made with the NPCA, Town and representatives of the winery to discuss the options considered, preliminary cost estimates and possible assessments. The winery representative, NPCA and Town were in general agreement with the work being proposed in this report.

8 ENVIRONMENTAL CONSIDERATIONS

8.1 Agency Notification

Contact was made with the NPCA, the MNRF and DFO during the process of preparing this report.

8.2 Agency Responses

8.2.1 NPCA

The NPCA did not request an environmental appraisal under Section 6 of the Act. The Conservation Authority received notice of the meetings conducted during the course of this project. In June 2018 and on January 14, 2019, meetings were held with NPCA staff at their office. Project description and drawing package were provided to the Conservation Authority for review in August 2018. Communications with the Conservation Authority provided comments and recommendations that have been addressed in this report. A permit is required before construction of the drain.

8.2.2 MNRF

A screening request for species at risk was submitted to MNRF in August 2018. The response from the ministry in an email noted there are no known endangered or threatened species or their habitat in the immediate project area.

8.2.3 DFO

The Epp Drain (Peller Estates) is rated Class F under DFO's drain classification system.

A Request for Review was submitted to DFO in August 2018 along with a project description and drawing package. The letter of authorization from DFO in a letter dated January 14, 2019, indicated the proposed works are not likely to result in serious harm to fish or prohibited on listed aquatic species at risk.

9 RECOMMENDED WORK

9.1 Description of the Work

A description of the Drain for construction and future maintenance can be found in the Special Provisions and Drawings.

10 CONSTRUCTION CONSIDERATIONS

10.1 Pre-Construction Approvals

Before starting work, the Contractor shall ensure all public utilities are located and shall contact all landowners along the existing and proposed drain route to determine the location of any private utilities. The Contractor is responsible for determining that there are no utility conflicts for the proposed drainage works.

A permit from NPCA is required before construction commences.

10.2 Construction Scheduling

Construction cannot commence until 10 days after a bylaw to adopt this report is given third reading in accordance with the Act.

10.3 Minor Adjustments During Construction

Minor changes to the drain may be made during construction if the changes are approved by the Engineer and the Municipality in accordance with the Specifications in this report. Such changes must occur before final costs are levied.

Additional work desired by landowner(s) which is not part of the drainage works may be arranged with the Contractor provided the cost of the work is paid by the landowner(s) and the additional work is reviewed by the Engineer in advance. Such additional work is not part of the drainage works for future maintenance.

10.4 Substantial Alterations to the Drain

Any alterations that would affect the function of the drain which is requested by landowners, agencies or other authorities after the bylaw is passed cannot be undertaken unless the report is amended.

If a substantial alteration is required, a revised report can be prepared and processed through the Act, or an application can be made under the Act to the Drainage Tribunal to recognize the substantial alteration. The application to the Tribunal must occur before final costs are levied.

10.5 Alignment of Drains

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

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

11 DRAWINGS AND SPECIFICATIONS

11.1 Drawings

The location of the Drain, watershed boundary and the affected properties are shown on Drawing No. 1 included with this report. The numbers adjacent to the drain are station numbers which indicate in metres the distance along the drain.

Drawing 2 is the Site Plan that shows the proposed work.

The profile for the Drain is on Drawing 3. The profile shows the depth and grade of the proposed work and future maintenance. Drawings No. 2 to 4 contain the cross-section and details.

Drawing No. 5 contains the Special Provisions for construction and maintenance of the Drain.

11.2 Specifications

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

12 COST ESTIMATE

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

12.1 Allowances

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

Section 29 – Right of Way

Section 29 provides for payment to of an allowance to landowners for a right of way required for construction and maintenance of a new drain. This allowance

compensates the owners for land to accommodate the drain, access routes to the drain and for a corridor along the drain for construction and maintenance purposes.

There are no Section 29 allowances to private lands in this report as these were provided in the 1994 report.

Section 30 - Damages

Section 30 provides for payment of an allowance to landowners along the drain for damages caused by the construction of the drain. Where separate access routes to the working area are specified in this report, Section 30 allowances also account for access route damage. In agricultural areas, crop damages are computed based on published crop values and declining productivity loss in the years following construction.

The allowance for damage to land and crops was calculated using a headland rate of $3,850 per hectare ($0.385/m²) for a 4m width. No damages will be given for loss of vineyards as the material is to be hauled off-site in lieu of spreading spoil.

There is a minimum damage allowance of $100.

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

Table 12.1-1 - Summary of Allowances

Roll Number	Damages Width (m)	Sec.30 ($)
011-01301	4	500
TOTAL ALLOWANCES:		**500**

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

12.2 Construction Cost Estimate

The estimated cost for Labour, Equipment and Materials to construct the proposed drain is outlined in detail in Estimated Costs Summary in Table 12.6-1 - Estimated Cost Summary. The construction cost estimate is based on recent costs for comparable work. A contingency amount is included to cover additional work that may be required due to field conditions or minor alterations to the project.

The contract for the drain will be awarded by public tender. If the contract price is more than 33% over the engineer's estimate, Section 59 of the Act requires a

Council meeting with the assessed landowners to determine if the project should proceed.

12.3 Engineering Cost Estimate

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

Construction Phase Services may include: preparing tender documents and tender call, review of tenders, attending pre-construction meeting, periodic construction inspection, payments, final inspection, post-construction follow-up, final cost analysis, prepare and sign grant application.

The cost for report preparation is usually not altered at the conclusion of a project unless the report is referred back or the report is appealed to the Drainage Tribunal which would result in additional costs. The amount shown for meetings is an estimate. The final cost will be based on the actual time required for meetings. The estimate shown for construction phase services is based on past experience and assumes good construction conditions and a Contractor who completes the construction in an efficient manner. The final cost for the construction phase will vary as per the actual time spent during and following drain construction. Engineering costs are summarized in Table 12.6-1 - Estimated Cost Summary.

12.4 An estimate of Section 73 Costs

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

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

Grant policy indicates that municipal cost for photo-copying and mailing required to carry out the required procedures under the Act can be included in the final drain cost. This cost estimate includes an allowance for these costs.

Section 73 costs are summarized in Table 12.6.1 Estimated Cost Summary.

12.5 Harmonized Sales Tax

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

12.6 Estimated Cost Summary

Table 12.6-1 - Estimated Cost Summary

DESCRIPTION							TOTAL COST
ALLOWANCES (from Table 12.1-1):							**$ 500**
CONSTRUCTION COST ESTIMATE							
Item	Stations	Description	Unit	Quantity	Unit Price	Cost	
i) Main Drain							
1	0+000 to 0+120	No work	m	0	0	0	
2	0+108	Construct temporary straw bale/dam sediment trap	Each	1	500	500	
3	0+120 to 0+228	Clean out ditch bottom.	m	108	7	800	
4	0+120 to 0+228	Hauling Spoil	L.S.	1	2,600	2,600	
5	0+226	Place 20m² of riprap at bend	m²	20	65	1,300	
6	0+228	Construct stone drop structure	Each	1	8,000	8,000	
7	0+228 to 0+391	Excavate 0.6m deep, 1:1 side slopes and 3m top width.	m	163	9	1,600	
8	0+228 to 0+391	Hauling Spoil	L.S.	1	20,000	20,000	
9	0+120 to 0+391	Planting of trees by owner	--	0	0	0	
10	0+228 to 0+391	Place 120m² of round cobbles along the water level of the pools	m²	120	65	7,800	
11	0+315	Construct stone drop structure	Each	1	8,000	8,000	
		Sub Total Part i)				50,600	
ii) Contingencies							
12		Lump sum contingency allowance	L.S.	1	5,200	5,200	
		Net HST (1.76%)				980	
TOTAL CONSTRUCTION COST ESTIMATE:							**$56,780**
ENGINEERING COST ESTIMATE							
		Report Preparation				34,600	
		Consideration of Report Meeting				1,200	
		Court of Revision				1,200	
		Construction Phase Services				9,000	
		Net HST (1.76%)				810	
TOTAL ENGINEERING COST ESTIMATE:							**46,810**
SECTION 73 (OTHER) COST ESTIMATE							
		Printing of reports				500	
		Printing of tender documents				200	
		Agencies Permit Fee				1,200	
		Unforeseen costs				2,100	

DESCRIPTION		TOTAL COST
Net HST (1.76%)	70	
TOTAL SECTION 73 (OTHER) COST ESTIMATE:		**4,070**
TOTAL ESTIMATED COST:		**$108,160**

13 ASSESSMENTS

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

13.1 Calculation of Assessments

The method of calculating the assessments for the Drain is illustrated in Appendix A which has been included with this report. The first step in the assessment calculation is to determine the benefit assessment to the affected lands and roads, then special assessments to roads and utilities are determined, where applicable. After deducting the total benefit and special assessments from the total cost the balance of the cost is then assessed as outlet liability on a per hectare basis to all lands and roads in the watershed.

13.2 Benefit Assessments (Section 22 and 24)

Section 22 benefits were determined based on the estimated value the drain provides to the property and are not proportional to the watershed area.

Section 24 special benefit is assessed to lands where additional work or features are requested that have no effect on the function of the drain. Special benefit examples include hauling spoil offsite, aesthetic features and installing lateral drains. Non-grantable benefits relate to work that is not eligible for Grant according to the current OMAFRA policy. Non-proratable benefits are not used to determine the actual cost factor for the final cost levy. Some examples would be lateral drains, culverts or hauling of spoil. Columns with non-grantable and non-proratable are used to complete the final assessment. Table 13.2-1 – Benefit Assessments provides a summary of the benefit assessments.

The Section 24 benefit is the cost for hauling the spoil off-site in lieu of damaging vineyards. The estimated cost of vineyard damage is 20% of the cost for hauling, 20% of the hauling cost is grant eligible.

Table 13.2-1 - Benefit Assessments

Roll Number (Owner)	Section 22	Section 24	Total Benefit	Non-grantable	Non-proratable
011-01301	80,500	22,600	102,800	18,080	22,600

13.3 Outlet Liability Assessments (Section 23)

Section 23(3) of the Drainage Act states that outlet liability assessment is to be based on the volume and rate of flow of the water artificially caused to flow. To satisfy this requirement, the lands and roads in the watershed are assessed on a per hectare basis, with adjustments made to recognize the different amount of runoff generated by different land uses. The basis for the adjustments is 1 hectare of cleared agricultural land contributing both surface and subsurface water to the drain. Land uses with a different runoff rate are adjusted by the factors given in Table 13.3-1.

Table 13.3-1 - Runoff Factors Table

Land Use	Runoff factor
Agricultural	1
Forest	0.5
Built-up	1.5
Gravel Road	2
Unopened Road	1

13.4 Assessment Schedules

13.4.1 Schedule A- Schedule of Assessments

The estimated cost for the drainage works in this report is distributed among lands, roads and utilities as shown in Schedule A, the Schedule of Assessments. In Schedule A each parcel of land assessed has been identified by the municipal assessment roll number at the time of the preparation of this report. The size of each parcel was established using the assessment roll information. For convenience only, each parcel is also identified by the owner name(s) from the last revised assessment roll.

13.4.2 Schedule B -Schedule of Assessments for Maintenance

In accordance with Section 74 of the Act, the Drain shall be maintained by the municipality and the cost of maintenance shall be assessed to lands and roads upstream of the maintenance location, prorata with the amounts in Schedule B. The amounts in Schedule B are derived from the cost distribution shown in Appendix B, which has been included with this report and will not be levied with the final cost of the drainage works.

Roll numbers are per the Municipality's last revised assessment roll, names included for convenience. Amounts are not payable at this time, they determine the share of future maintenance cost. Eligibility for the agricultural grant will be determined at the time of maintenance cost levy. Landowners are responsible for ensuring that their property is listed as eligible for the agricultural grant in the assessment schedule.

The percentages shown in Schedule B determine the share of future maintenance to be levied to property or road. For example, a $1,000 beaver dam removal or culvert/pipe repair will result in a $50 assessment to a property with a 5% maintenance assessment.

A minimum assessment of 0.01% is to be applied to all future small lots in the watershed.

13.4.3 Schedule C – Schedule for Actual Cost Bylaw

After the construction of the drain is certified complete by the Engineer the municipality will determine the actual cost of the drain. Actual assessments will be determined by prorating the actual cost of the drain using Schedule C. Schedule C illustrates the estimated net assessments after deducting allowances and grants from the total assessments shown in Schedule A. Eligibility for the grant will be confirmed by the municipality at the time the actual cost is levied. Actual assessments in Schedule C will be levied to the owner of the identified parcel at the time the Actual Cost Bylaw is passed. Roll numbers are per the Municipality's last revised assessment roll, names included for convenience.

14 GRANT

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

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

The cost of the portion of the drainage works which is not eligible for the grant has been separately identified in this report.

15 PRIVACY OF LANDS

Although a municipal drain is situated on the property of various landowners, one landowner may not enter another landowner's property by means of the drain. Persons authorized to enter private lands to carry out duties authorized under the Act include Engineers (or their assistants), Contractors (or their assistants) and the appointed Drainage Superintendents (or their assistants).

16 MAINTENANCE

16.1 General

Section 74 of the Act requires the Epp Drain (Peller Estates), as outlined in this report, to be maintained by the Municipality, and the cost of maintenance to be assessed to the upstream lands and roads prorata with the assessments in the maintenance schedule, which is Schedule B in this report.

It is recommended that a new Schedule of Assessment for Future Maintenance should be prepared for all of the Epp Drain in the future.

The Epp Drain consists of the works described in the 1994 and 2016 reports downstream of the works of this 2019 report, the works in this 2019 report and the works described in the 1994 report upstream of the works of this 2019 report.

All parties affected by the Epp Drain, are encouraged to periodically inspect the drain and report any visible or suspected problems to Municipality.

A 6m wide right-of-way along both sides of the open drain and as per the access routes to the drain exist for the Municipality to maintain the drain. The right-of-way for the drain as described in the 1994 report shall remain free of obstructions. The cost of removing obstructions is the responsibility of the owner of the land where the obstructions are located.

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

The discharge of anything but clean, unpolluted water into a drain is regulated by other provincial legislation. Any non-compliance will be reported to the appropriate environmental agency. The costs incurred by the Town of Niagara-on-the-Lake associated with containing and cleaning up spills or other pollution of the drain will be charged to the person(s) responsible for the pollution.

A 3m wide buffer strip along both sides of the drain shall be maintained in accordance with Section 5.1 of the 1994 Engineer's report on the Epp Municipal Drain prepared by

the Wiebe Engineering Group which states "Landowners abutting the drain are to leave at least 3m of the working space on both sides of the drain vegetated, but uncultivated. This buffer-strip provides sediment and nutrient traps which improve water quality and promotes ditch bank stability."

The landowner may plant trees along the drain but there must be a minimum of 10m between trees so they are deemed to not be an obstruction to the drain.

Spoil generated from maintenance activities hauled off-site shall be assessed to the adjacent landowner(s) unless there is a Town by-law stating otherwise. The assessment for hauling spoil shall be shared between adjacent landowners based on the length of the drain.

A bubbler may be added to the pools, with notice to the Drainage Superintendent, to prevent algae formation in the pool.

16.2 Updating Future Maintenance Schedules

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

17 BYLAW

This report including the drawings and specifications, assessment schedules and appendices, when adopted by bylaw in accordance with the Act, provides the basis for construction and maintenance of the Drain. The 1994 and 2016 reports shall govern the Epp Drain, grades, slopes and specifications upstream and downstream of the works proposed in this 2019 report.

All of which is respectfully submitted,

K. SMART ASSOCIATES LTD.

Neal Morris

REGISTERED PROFESSIONAL ENGINEER
Sept. 30 2019
N. W. MORRIS
100109137
PROVINCE OF ONTARIO

N. Morris, P. Eng. mw

SCHEDULE A - SCHEDULE OF ASSESSMENTS
EPP DRAIN (PELLER ESTATES)
Town of Niagara-on-the-Lake

Conc./ Plan	Lot	Roll No.	Owner	Total Ha Affected	Benefit ($)	Outlet ($)	Total ($)
		(26-27-020-)	(Geographic Twp of Newark)				
M11	Pt 4	011-00520	R. & S. Jain	0.73	-	42	42
M11	Pt 4	011-00605	M. Kalman & P. Crabtree	0.40	-	23	23
M11	1	011-00700	Del Ben Investments Inc.	6.71	-	254	254
M11	2	011-00800	1019585 Ontario Limited	9.54	-	361	361
327	1	011-00805	E. Kurtz	0.14	-	8	8
327	2	011-00810	A. Just	0.14	-	8	8
327	3	011-00815	E. Kurtz	0.14	-	8	8
327	4	011-00820	A. Just	0.14	-	8	8
327	5	011-00825	E. Kurtz	0.14	-	8	8
327	6	011-00830	A. Just	0.14	-	8	8
327	7	011-00835	E. Kurtz	0.14	-	8	8
M11	3	011-00900	954521 Ontario Ltd.	5.37	-	203	203
M11	7	011-01100	M. Freel	0.42	-	24	24
M11	Pt 5	011-01200	M. & L. Freel	0.59	-	34	34
M11	Pt 8	011-01300	R. Teather	0.98	-	56	56
M11	6, Pts 4&5	011-01301	Peller Estates	13.76	102,800	520	103,320
M11	Pt 8	011-01350	Nutri-Botanicals Corp.	2.70	-	102	102
M11	9	011-01400	E. & E. Morkunas	0.40	-	23	23
	Pt 23	011-01700	G. & I. Reimer	20.65	-	528	528
	Pt 23	011-01800	D. & D. Lailey	4.67	-	177	177
	Pt 22	011-02100	Abe Epp & Family Inc.	4.04	-	153	153
	Pt 22	011-02300	J. Wiebe	7.77	-	294	294
	Pt 22	011-02801	H. & R. Neufeld	3.40	-	129	129
	Pt 21	011-03000	J. & D. Zabek	0.70	-	26	26
	Pt 24	011-06400	1692712 Ontario Inc.	10.20	-	386	386
	Pt 25	011-06500	517232 Ontario Limited	14.16	-	535	535
	Pt 25	011-06600	E. & D. Wiens	2.80	-	85	85
	Pt 24	011-07220	J. & M. Saczkowski	5.81	-	220	220
	Pt 24	011-07300	P. Wilkie & J. Rigg	3.46	-	131	131
	Pt 24	011-07400	F. & P. Connolly	0.40	-	23	23
	Pt 26	011-07700	A. Debont & T. Taylor-Debont	0.40	-	23	23
	Pt 26	011-07800	G. & L. Johansen	0.40	-	23	23
	Pt 26	011-07900	K. J. Watson Farms Limited	1.90	-	36	36
		(26-27-010-) 002-00400	Two Sisters Vineyards	3.80	-	144	144
Sub-total (Lands):				**127.14**	**102,800**	**4,606**	**107,406**
Concession 1 Rd.			Town of Niagara-On-The-Lake	5.20	-	393	393
Line 1 Rd.			Town of Niagara-On-The-Lake	0.83	-	63	63
East and West Line			Town of Niagara-On-The-Lake	1.69	-	128	128
Upper Canada Heritage Trail			Town of Niagara-On-The-Lake	1.89	-	71	71
John Street East			Town of Niagara-On-The-Lake	1.30	-	98	98
Sub-Total (Roads):				**10.91**	**-**	**754**	**754**
TOTAL ASSESSMENTS FOR EPP DRAIN (PELLER ESTATES):				**138.05**	**102,800**	**5,360**	**108,160**

Note:
Roll numbers are per the Municipality's last revised assessment roll. Names included for convenience.

SCHEDULE B - SCHEDULE OF ASSESSMENTS FOR FUTURE MAINTENANCE
EPP DRAIN (PELLER ESTATES), Town of Niagara-on-the-Lake

Conc.	Lot	Roll No.	Owner	0+000 to 0+391 Assess. ($)	%
		(26-27-020-)	(Geographic Twp of Newark)		
M11	Pt 4	011-00520	R. & S. Jain	876	17.52
M11	Pt 4	011-00605	M. Kalman & P. Crabtree	8	0.16
M11	1	011-00700	Del Ben Investments Inc.	95	1.90
M11	2	011-00800	1019585 Ontario Limited	135	2.70
327	1	011-00805	E. Kurtz	3	0.06
327	2	011-00810	A. Just	3	0.06
327	3	011-00815	E. Kurtz	3	0.06
327	4	011-00820	A. Just	3	0.06
327	5	011-00825	E. Kurtz	3	0.06
327	6	011-00830	A. Just	3	0.06
327	7	011-00835	E. Kurtz	3	0.06
M11	3	011-00900	954521 Ontario Ltd.	76	1.52
M11	7	011-01100	M. Freel	9	0.18
M11	Pt 5	011-01200	M. & L. Freel	13	0.26
M11	Pt 8	011-01300	R. Teather	21	0.42
M11	6, Pts 4&5	011-01301	Peller Estates	1,874	37.48
M11	Pt 8	011-01350	Nutri-Botanicals Corp.	38	0.76
M11	9	011-01400	E. & E. Morkunas	8	0.16
	Pt 23	011-01700	G. & I. Reimer	197	3.94
	Pt 23	011-01800	D. & D. Lailey	66	1.32
	Pt 22	011-02100	Abe Epp & Family Inc.	57	1.14
	Pt 22	011-02300	J. Wiebe	110	2.20
	Pt 22	011-02801	H. & R. Neufeld	48	0.96
	Pt 21	011-03000	J. & D. Zabek	10	0.20
	Pt 24	011-06400	1692712 Ontario Inc.	144	2.88
	Pt 25	011-06500	517232 Ontario Limited	200	4.00
	Pt 25	011-06600	E. & D. Wiens	32	0.64
	Pt 24	011-07220	J. & M. Saczkowski	82	1.64
	Pt 24	011-07300	P. Wilkie & J. Rigg	49	0.98
	Pt 24	011-07400	F. & P. Connolly	8	0.16
	Pt 26	011-07700	A. Debont & T. Taylor-Debont	8	0.16
	Pt 26	011-07800	G. & L. Johansen	8	0.16
	Pt 26	011-07900	K. J. Watson Farms Limited	13	0.26
		(26-27-010-) 002-00400	Two Sisters Vineyards	284	5.68
Sub-total (Lands):				**4,490**	**89.80**
Concession 1 Rd.			Town of Niagara-On-The-Lake	146	2.92
Line 1 Rd.			Town of Niagara-On-The-Lake	23	0.46
East and West Line			Town of Niagara-On-The-Lake	48	0.96
Upper Canada Heritage Trail			Town of Niagara-On-The-Lake	257	5.14
John Street East			Town of Niagara-On-The-Lake	36	0.72
Sub-Total (Roads):				**510**	**10.20**
TOTAL ASSESSMENTS FOR EPP DRAIN (PELLER ESTATES):				**5,000**	**100.00**

Notes:

1. The dollar amounts shown are not amounts to be paid at this time. These amounts are only to be used to create the percentages or portion that each property (parcel) and road will pay for any future maintenance repair or maintenance costs.
2. Grant eligibility to be determined at the time of maintenance cost levy.

SCHEDULE C - SCHEDULE FOR ACTUAL COST BYLAW
EPP DRAIN (PELLER ESTATES)
Town of Niagara-on-the-Lake

	Conc./ Plan	Lot	Roll No.	Owner	Gross Total ($)	Non-Grantable ($)	1/3 Grant ($)	Allowance ($)	NET ($)
			(26-27-020-)	(Geographic Twp of Newark)					
	M11	Pt 4	011-00520	R. & S. Jain	42		-	-	42
	M11	Pt 4	011-00605	M. Kalman & P. Crabtree	23		-	-	23
F	M11	1	011-00700	Del Ben Investments Inc.	254		85	-	169
F	M11	2	011-00800	1019585 Ontario Limited	361		120	-	241
	327	1	011-00805	E. Kurtz	8		-	-	8
	327	2	011-00810	A. Just	8		-	-	8
	327	3	011-00815	E. Kurtz	8		-	-	8
	327	4	011-00820	A. Just	8		-	-	8
	327	5	011-00825	E. Kurtz	8		-	-	8
	327	6	011-00830	A. Just	8		-	-	8
	327	7	011-00835	E. Kurtz	8		-	-	8
F	M11	3	011-00900	954521 Ontario Ltd.	203		68	-	135
	M11	7	011-01100	M. Freel	24		-	-	24
	M11	Pt 5	011-01200	M. & L. Freel	34		-	-	34
F	M11	Pt 8	011-01300	R. Teather	56		19	-	37
F	M11	6, Pts 4&5	011-01301	Peller Estates	103,320	18,080	28,413	500	74,407
	M11	Pt 8	011-01350	Nutri-Botanicals Corp.	102		-	-	102
	M11	9	011-01400	E. & E. Morkunas	23		-	-	23
F		Pt 23	011-01700	G. & I. Reimer	528		176	-	352
F		Pt 23	011-01800	D. & D. Lailey	177		59	-	118
F		Pt 22	011-02100	Abe Epp & Family Inc.	153		51	-	102
		Pt 22	011-02300	J. Wiebe	294		-	-	294
F		Pt 22	011-02801	H. & R. Neufeld	129		43	-	86
F		Pt 21	011-03000	J. & D. Zabek	26		9	-	17
F		Pt 24	011-06400	1692712 Ontario Inc.	386		129	-	257
F		Pt 25	011-06500	517232 Ontario Limited	535		178	-	357
F		Pt 25	011-06600	E. & D. Wiens	85		28	-	57
F		Pt 24	011-07220	J. & M. Saczkowski	220		73	-	147
		Pt 24	011-07300	P. Wilkie & J. Rigg	131		-	-	131
		Pt 24	011-07400	F. & P. Connolly	23		-	-	23
		Pt 26	011-07700	A. Debont & T. Taylor-Debont	23		-	-	23
		Pt 26	011-07800	G. & L. Johansen	23		-	-	23
F		Pt 26	011-07900	K. J. Watson Farms Limited	36		12	-	24
			(26-27-010-) 002-00400	Two Sisters Vineyards	144		-	-	144
	Sub-total (Lands):				**107,406**	**18,080**	**29,463**	**500**	**77,443**
	Concession 1 Rd.			Town of Niagara-On-The-Lake	393		-	-	393
	Line 1 Rd.			Town of Niagara-On-The-Lake	63		-	-	63
	East and West Line			Town of Niagara-On-The-Lake	128		-	-	128
	Upper Canada Heritage Trail			Town of Niagara-On-The-Lake	71		-	-	71
	John Street East			Town of Niagara-On-The-Lake	98		-	-	98
	Sub-Total (Roads):				**754**	-	-	-	**754**
	TOTAL ASSESSMENTS FOR EPP DRAIN (PELLER ESTATES):				**108,160**	**18,080**	**29,463**	**500**	**78,197**

Notes:

1. Roll numbers are per the Municipality's last revised assessment roll. Names included for convenience.
2. "F" denotes lands with current Farm Proeprty Tax Class designation that may qualify for grant.
3. Net assessment is leveied to the owner at the time of actual cost levy.
4. Grant eligibility subject to Farm Property Tax Class at the time of actual cost levy.

APPENDIX A - CALCULATION OF ESTIMATED COSTS FOR SCHEDULE A
EPP DRAIN (PELLER ESTATES)
Town of Niagara-on-the-Lake

						Interval 1		
		COST ESTIMATE						
		Allowances:				$ 500		
		Construction:				$ 56,780		
		Engineering:				$ 46,810		
		Administration				$ 4,070		
		TOTAL COST ESTIMATE:				**$ 108,160**		
Conc./ Plan	**Lot**	**Roll No.**	**Owner**	**Affected Area (Ha)**	**Adjusted Area (Ha)**	**Benefit ($)**	**Adjusted Area (Ha)**	**Outlet ($)**
		(26-27-020-)						
M11	Pt 4	011-00520	R. & S. Jain	0.73	1.10		1.10	42
M11	Pt 4	011-00605	M. Kalman & P. Crabtree	0.40	0.60		0.60	23
M11	1	011-00700	Del Ben Investments Inc.	6.71	6.71		6.71	254
M11	2	011-00800	1019585 Ontario Limited	9.54	9.54		9.54	361
327	1	011-00805	E. Kurtz	0.14	0.21		0.21	8
327	2	011-00810	A. Just	0.14	0.21		0.21	8
327	3	011-00815	E. Kurtz	0.14	0.21		0.21	8
327	4	011-00820	A. Just	0.14	0.21		0.21	8
327	5	011-00825	E. Kurtz	0.14	0.21		0.21	8
327	6	011-00830	A. Just	0.14	0.21		0.21	8
327	7	011-00835	E. Kurtz	0.14	0.21		0.21	8
M11	3	011-00900	954521 Ontario Ltd.	5.37	5.37		5.37	203
M11	7	011-01100	M. Freel	0.42	0.63		0.63	24
M11	Pt 5	011-01200	M. & L. Freel	0.59	0.89		0.89	34
M11	Pt 8	011-01300	R. Teather	0.98	1.47		1.47	56
M11	6, Pts 4&5	011-01301	Peller Estates	13.76	13.76	102,800	13.76	520
M11	Pt 8	011-01350	Nutri-Botanicals Corp.	2.70	2.70		2.70	102
M11	9	011-01400	E. & E. Morkunas	0.40	0.60		0.60	23
	Pt 23	011-01700	G. & I. Reimer	20.65	13.96		13.96	528
	Pt 23	011-01800	D. & D. Lailey	4.67	4.67		4.67	177
	Pt 22	011-02100	Abe Epp & Family Inc.	4.04	4.04		4.04	153
	Pt 22	011-02300	J. Wiebe	7.77	7.77		7.77	294
	Pt 22	011-02801	H. & R. Neufeld	3.40	3.40		3.40	129
	Pt 21	011-03000	J. & D. Zabek	0.70	0.70		0.70	26
	Pt 24	011-06400	1692712 Ontario Inc.	10.20	10.20		10.20	386
	Pt 25	011-06500	517232 Ontario Limited	14.16	14.16		14.16	535
	Pt 25	011-06600	E. & D. Wiens	2.80	2.25		2.25	85
	Pt 24	011-07220	J. & M. Saczkowski	5.81	5.81		5.81	220
	Pt 24	011-07300	P. Wilkie & J. Rigg	3.46	3.46		3.46	131
	Pt 24	011-07400	F. & P. Connolly	0.40	0.60		0.60	23
	Pt 26	011-07700	A. Debont & T. Taylor-Debont	0.40	0.60		0.60	23
	Pt 26	011-07800	G. & L. Johansen	0.40	0.60		0.60	23
	Pt 26	011-07900	K. J. Watson Farms Limited	1.90	0.95		0.95	36
		(26-27-010-)						
		002-00400	Two Sisters Vineyards	3.80	3.80	0	3.80	144
		Sub-Total (Lands):		127.14	121.81	102,800	121.81	4,606
	Concession 1 Rd.		Town of Niagara-On-The-Lake	5.20	10.40		10.40	393
	Line 1 Rd.		Town of Niagara-On-The-Lake	0.83	1.66		1.66	63
	East and West Line		Town of Niagara-On-The-Lake	1.69	3.38		3.38	128
	Upper Canada Heritage Trail		Town of Niagara-On-The-Lake	1.89	1.89		1.89	71
	John Street East		Town of Niagara-On-The-Lake	1.30	2.60		2.60	98
		Sub-Total (Roads):		10.91	19.93	0	19.93	754
TOTAL ASSESSMENTS FOR EPP DRAIN (PELLER ESTATES):				138.05	141.74	102,800	141.74	5,360

APPENDIX B - CALCULATION OF ESTIMATED COSTS FOR FUTURE MAINTENANCE
EPP DRAIN (PELLER ESTATES), Town of Niagara-on-the-Lake

TOTAL COST ESTIMATE:				0+000 to 0+391			
				$ 5,000	Flat Rate for Ditch Cleanout		
Conc./ Plan	Lot	Roll No.	Owner	Benefit ($)	Adjusted Area (Ha)	Outlet ($)	%
		(26-27-020-)					
M11	Pt 4	011-00520	R. & S. Jain	860	1.10	16	17.52
M11	Pt 4	011-00605	M. Kalman & P. Crabtree		0.60	8	0.16
M11	1	011-00700	Del Ben Investments Inc.		6.71	95	1.90
M11	2	011-00800	1019585 Ontario Limited		9.54	135	2.70
327	1	011-00805	E. Kurtz		0.21	3	0.06
327	2	011-00810	A. Just		0.21	3	0.06
327	3	011-00815	E. Kurtz		0.21	3	0.06
327	4	011-00820	A. Just		0.21	3	0.06
327	5	011-00825	E. Kurtz		0.21	3	0.06
327	6	011-00830	A. Just		0.21	3	0.06
327	7	011-00835	E. Kurtz		0.21	3	0.06
M11	3	011-00900	954521 Ontario Ltd.		5.37	76	1.52
M11	7	011-01100	M. Freel		0.63	9	0.18
M11	Pt 5	011-01200	M. & L. Freel		0.89	13	0.26
M11	Pt 8	011-01300	R. Teather		1.47	21	0.42
M11	6, Pts 4&5	011-01301	Peller Estates	1,680	13.76	194	37.48
M11	Pt 8	011-01350	Nutri-Botanicals Corp.		2.70	38	0.76
M11	9	011-01400	E. & E. Morkunas		0.60	8	0.16
	Pt 23	011-01700	G. & I. Reimer		13.96	197	3.94
	Pt 23	011-01800	D. & D. Lailey		4.67	66	1.32
	Pt 22	011-02100	Abe Epp & Family Inc.		4.04	57	1.14
	Pt 22	011-02300	J. Wiebe		7.77	110	2.20
	Pt 22	011-02801	H. & R. Neufeld		3.40	48	0.96
	Pt 21	011-03000	J. & D. Zabek		0.70	10	0.20
	Pt 24	011-06400	1692712 Ontario Inc.		10.20	144	2.88
	Pt 25	011-06500	517232 Ontario Limited		14.16	200	4.00
	Pt 25	011-06600	E. & D. Wiens		2.25	32	0.64
	Pt 24	011-07220	J. & M. Saczkowski		5.81	82	1.64
	Pt 24	011-07300	P. Wilkie & J. Rigg		3.46	49	0.98
	Pt 24	011-07400	F. & P. Connolly		0.60	8	0.16
	Pt 26	011-07700	A. Debont & T. Taylor-Debont		0.60	8	0.16
	Pt 26	011-07800	G. & L. Johansen		0.60	8	0.16
	Pt 26	011-07900	K. J. Watson Farms Limited		0.95	13	0.26
		(26-27-010-)					
		002-00400	Two Sisters Vineyards	230	3.80	54	5.68
Sub-Total (Lands):				2,770	121.81	1,720	89.80
			Roads				
Concession 1 Rd.			Town of Niagara-On-The-Lake		10.40	146	2.92
Line 1 Rd.			Town of Niagara-On-The-Lake		1.66	23	0.46
East and West Line			Town of Niagara-On-The-Lake		3.38	48	0.96
Upper Canada Heritage Trail			Town of Niagara-On-The-Lake	230	1.89	27	5.14
John Street East			Town of Niagara-On-The-Lake		2.60	36	0.72
Sub-Total (Roads):				230	19.93	280	10.20
TOTAL ASSESSMENTS FOR EPP DRAIN (PELLER ESTATES):				3,000	141.74	2,000	100.00

200 **GENERAL CONDITIONS**

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200 GENERAL CONDITIONS

200.1 SCOPE

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

200.2 ORDER OF PRECEDENCE

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

200.3 MUNICIPALITY

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

200.4 TENDERS

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

200.5 EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

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

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

200.6 COMMENCEMENT AND COMPLETION OF WORK

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

200.7 NOTICES RE COMMENCEMENT OF WORK

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

200.8 PERMITS, NOTICES, LAWS AND RULES

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

200.9 HEALTH AND SAFETY

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

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

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

200.10 LIMITATIONS OF OPERATIONS

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

200.11 SUPERVISION

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

200.12 CHARACTER AND EMPLOYMENT OF WORKERS

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

200.13 SUB-CONTRACTORS

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

200.14 PAYMENT

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

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

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

200.15 TERMINATION OF CONTRACT BY THE MUNICIPALITY

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

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

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

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

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

200.16 LIQUIDATED DAMAGES

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

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

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

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

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

200.17 CONTRACTOR'S LIABILITY

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

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

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

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

Nothing herein contained shall be construed as in any way restricting or limiting the liability of the Contractor under the laws of the country, province or locality in which the work is being done. Neither the Completion Certificate nor final payment thereunder, nor any provision in the Contract Document shall relieve the Contractor from this liability.

200.18 LIABILITY INSURANCE

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

200.19 LOSSES DUE TO ACTS OF NATURE, ETC.

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

400 STANDARD SPECIFICATIONS FOR CONSTRUCTION OF DRAINS

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400 STANDARD SPECIFICATIONS FOR CONSTRUCTION OF DRAINS

400.1 ABBREVIATIONS

i) M.T.O. means the Ministry of Transportation of Ontario.
ii) A.S.T.M. means the American Society for Testing Materials.
iii) C.S.A. means the Canadian Standard Association.
iv) O.P.S.D. means Ontario Provincial Standard Drawings
v) O.P.S.S. means Ontario Provincial Standard Specifications
vi) DFO means Fisheries and Oceans Canada
vii) MNRF means Ministry of Natural Resources and Forestry
viii) MECP means Ministry of Environment, Conservation and Parks

400.2 PRE CONSTRUCTION MEETING

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

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

400.3 COLD WEATHER

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

400.4 WORKING AREA

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

400.5 ACCESS

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

400.6 ACCESS TO PROPERTIES ADJOINING THE WORK

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

400.7 DRAINAGE SUPERINTENDENT

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

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

400.8 ALTERATIONS TO WORK

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

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

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

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

400.9 ERRORS AND UNUSUAL CONDITIONS

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

400.10 TESTS

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

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

400.11 BENCHMARKS AND STAKES

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

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

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

400.12 OPENING UP OF FINISHED WORK

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

400.13 FINAL INSPECTION

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

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

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

400.14 WARRANTY

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

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

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

400.15 MATERIALS

400.15.1 Concrete Drain Tile

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

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

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

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

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

400.15.2 Corrugated Plastic Tubing

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

400.15.3 Corrugated Steel Pipe

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

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

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

400.15.4 Plastic Pipe

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

A minimum stiffness of 320 KPa at 5% deflection

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

400.15.5 Concrete Sewer Pipe

Concrete sewer pipe shall be in accordance with OPSS 1820.

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

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

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

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

400.16 RIPRAP

All riprap is to be placed on a geotextile underlay (Terrafix 360R or equal) unless directed otherwise in the specific construction notes. The riprap is to be graded heavy angular stone (quarry stone is recommended) with particles averaging in size from 225mm to 300mm and is to be placed at 300mm thickness. Fine particles may be included to fill voids. Along upstream edges of riprap, where surface water will enter, underlay is to extend a minimum of 300mm upstream from riprap and then be keyed down a minimum of 300mm. Wherever riprap is placed, the area is to be over-dug so that finished top of riprap is at design cross-section, at design elevation or flush with existing ground.

400.17 GEOTEXTILE

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

400.18 DISPOSAL OF MATERIALS

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

400.19 NOTIFICATION OF RAILROADS, ROAD AUTHORITIES AND UTILITIES

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

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

400.20 WORKING IN ROAD ALLOWANCES

400.20.1 General

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

400.20.2 Road Crossings

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

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

400.20.3 Maintenance of Traffic

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

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

400.21 LOCATIONS OF EXISTING UTILITIES

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

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

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

400.22 LANEWAYS

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

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

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

400.23 EXISTING CROSSING CLEANOUT

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

400.24 FENCES

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

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

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

No excavated or cleared material shall be placed against fences.

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

400.25 LIVESTOCK

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

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

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

400.26 STANDING CROPS

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

400.27 CLEARING VEGETATION

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

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

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

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

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

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

400.27.7 Disposal of Cleared Vegetation

400.27.7.1 *In Bush Areas*

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

400.27.7.2 *In Field Areas*

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

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

400.27.8 Landowner Requested Salvage

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

400.27.9 Clearing by Landowner

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

400.28 ROCK REMOVAL

400.28.1 General

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

400.28.2 Blasting Requirements

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

400.28.3 Typical Sections and Pay Limits

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

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

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

400.28.4 Disposal of Rock

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

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

400.29 SEEDING

400.29.1 General

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

400.29.2 Drainage Works and Road Allowances

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

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

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

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

400.29.3 Hydroseeding

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

400.29.4 Seeding Lawns

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

400.29.5 Sod

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

400.30 EROSION CONTROL BLANKETS

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

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

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

400.31 SEDIMENT CONTROL

400.31.1 General

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

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

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

400.31.2 Flow Check Dams

400.31.2.1 *Temporary Straw Bale Flow Check Dam*

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

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

400.31.2.2 *Temporary Rock Flow Check Dam*

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

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

400.31.2.3 *Permanent Rock Flow Check Dam*

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

400.31.3 Sediment Traps

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

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

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

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

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

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

400.31.4 Turbidity Curtains

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

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

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

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

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

400.31.5 Silt Fence

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

400.32 GRASSED WATERWAYS AND OVERFLOW SWALES

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

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

Overflow swales may be cropped using conventional farming practice.

400.33 BUFFER STRIPS

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

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

400.34 MAINTENANCE CORRIDOR

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

400.35 POLLUTION

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

400.36 SPECIES AT RISK

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

410 STANDARD SPECIFICATIONS

FOR

OPEN DRAINS

TABLE OF CONTENTS

410.1 DESCRIPTION

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

410.2 MATERIALS

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

410.3 CONSTRUCTION

410.3.1 Excavation

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

410.3.2 Low Flow Channels

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

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

410.3.3 Line

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

410.3.4 Grade Control

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

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

410.3.5 Variation from Design Grade

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

410.3.6 Excavated Material

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

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

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

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

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

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

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

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

410.3.7 Excavation at Existing Bridge and Culvert Sites

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

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

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

410.3.8 Bridges and Culverts

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

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

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

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

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

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

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

410.3.9 Obstructions

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

410.3.10 Tile Outlets

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

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

410.3.11 Completion

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

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

RIVER FLOW DIRECTION

EPP DRAIN OUTLET 2016

NIAGARA RIVER

BM#1

NIAGARA RIVER PARKWAY/ RICARDO STREET

NIAGARA RIVER PARKWAY

PARKS CANADA

001-09400

"FORT GEORGE"

001-09500

EPP DRAIN (1994)

QUEEN'S PARADE

001-16200

JOHN STREET EAST

BM#3

BM#2

BM#4

EPP DRAIN (1994)

SITE PLAN (SEE DRAWING 2)

002-00400

011-00700

011-00800

011-00900

011-00605

011-00810

011-00815

011-00820

011-00825

011-00830

011-00835

011-00605

011-b0520

011-01301

011-01100

011-01200

011-01300

011-01350

011-01400

EAST AND WEST LINE

011-01700

011-01800

011-02100

011-02300

011-02801

THIS AREA IS TILED OUT OF THE WATERSHED AND IS ASSESSED AT HALF RATE

011-030

UPPER CANADA HERITAGE TRAIL

CONCESSION 1 ROAD

011-07400

011-07300

011-06400

011-07220

011-06500

011-07700

011-07800

011-08000

011-07900

011-06600

LINE 1 ROAD

HARRISON DRAIN NO. 1

HARRISON DRAIN NO. 6

PLAN LEGEND

- MAJOR WATERSHED
- PROPOSED WORK
- EXISTING MUNICIPAL DRAIN
- EXISTING WATERCOURSE
- ACCESS ROUTE
- 011-06400 — ASSESSMENT ROLL NUMBER
- BUSH (FOREST)
- (1.30) — HECTARES AFFECTED

BM#1
SE OF PARKING LOT FOR NAVY HALL
16.5m NE OF C/L ROAD BOLT FACING MUSEUM
ELEV. 79.760m

BM#2
TOP NORTH CORNER 0.5mx0.5m CONCRETE ACCESS LID FOR SEPTIC TANK
15m WEST OF DOWNSTREAM LANE CULVERT
ELEV. 91.081m

BM#3
TOP SPINDLE FIRE HYDRANT
20m NORTH OF ROAD CROSSING
ELEV. 91.081m

BM#4
TOP NE CORNER CONCRETE BASE FOR HYDRO VAULT
ELEV. 92.527m

GEOGRAPHIC TOWNSHIP OF NEWARK

EPP DRAIN (PELLER ESTATES)

TOWN OF NIAGARA-ON-THE-LAKE

WATERSHED PLAN

SEPT. 30, 2019

DESIGNED BY:	N.W.M.
CHECKED BY:	H.A.W.
DRAWN BY:	D.C.P.
CHECKED BY:	N.W.M.

REGISTERED PROFESSIONAL ENGINEER — N. W. MORRIS — 100109137 — PROVINCE OF ONTARIO

SCALE: 0 100 200m (1:10,000 ON 11"x17")

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

REVISED:
JOB NUMBER: 18-160
DRAWING 1 OF 5

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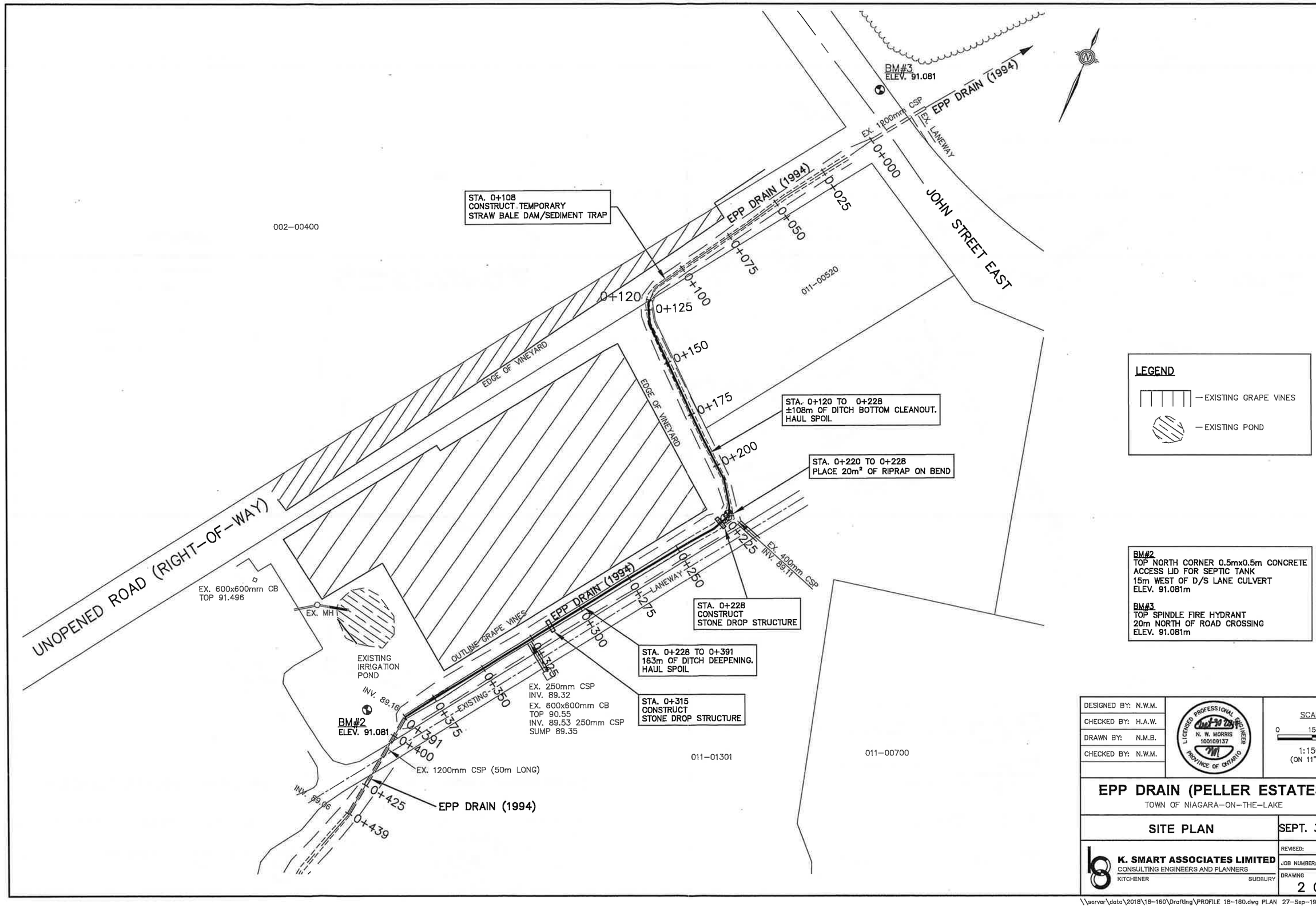

DESIGNED BY:	N.W.M.
CHECKED BY:	H.A.W.
DRAWN BY:	N.M.B.
CHECKED BY:	N.W.M.

LICENSED PROFESSIONAL ENGINEER
N. W. MORRIS
100109137
PROVINCE OF ONTARIO

SCALE
0 15 30m
1:1500
(ON 11"x17")

EPP DRAIN (PELLER ESTATES)

TOWN OF NIAGARA-ON-THE-LAKE

SITE PLAN

SEPT. 30, 2019

REVISED:

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER: 18-160

DRAWING
2 OF 5

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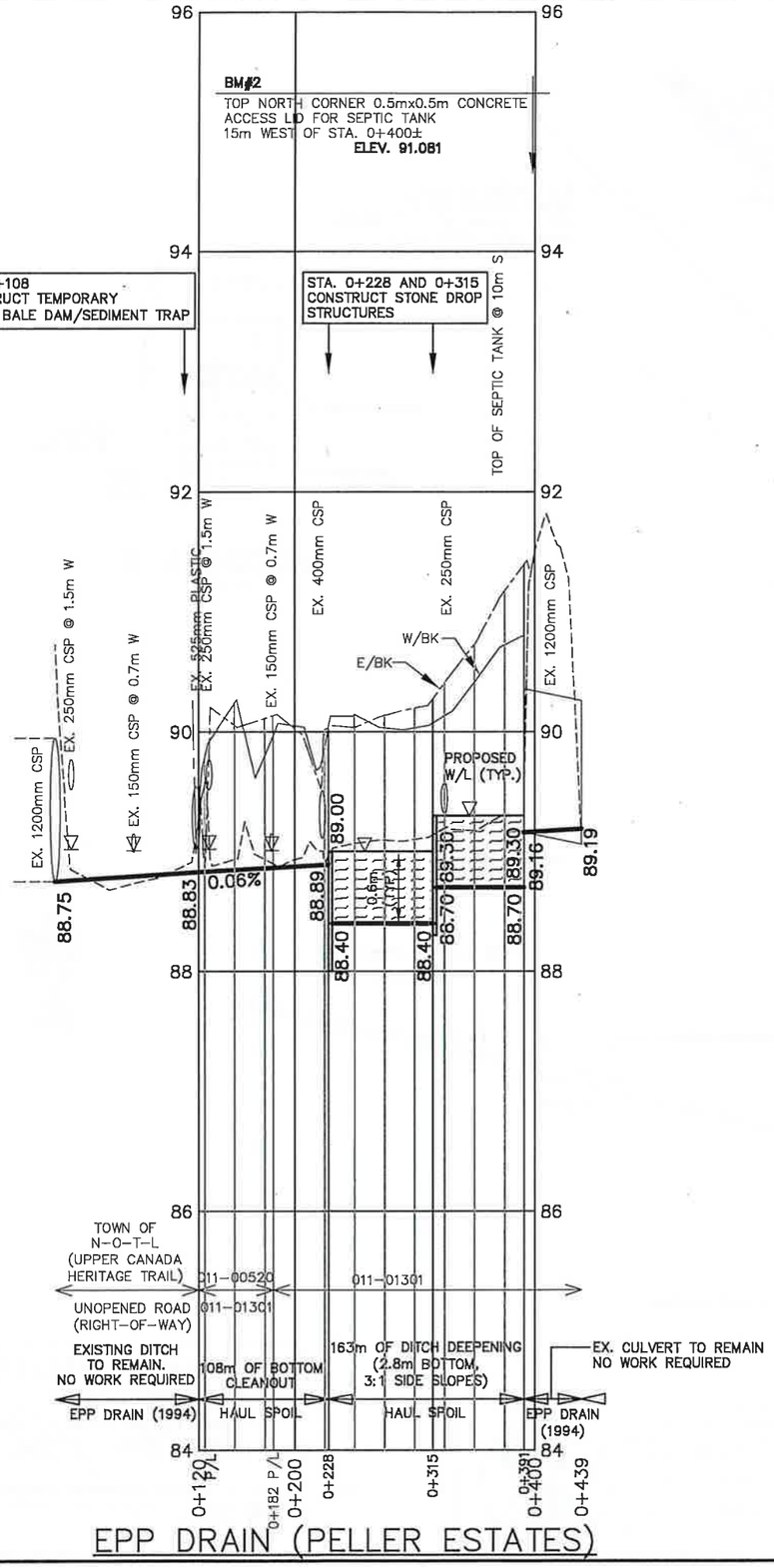


EPP DRAIN (PELLER ESTATES)

STONE DROP STRUCTURE
(WEIR DETAIL TYPICAL)
N.T.S.

SEE DRAWING 4 FOR DETAILS

DESIGNED BY:	N.W.M.
CHECKED BY:	H.A.W.
DRAWN BY:	N.M.B.
CHECKED BY:	N.W.M.

LICENSED PROFESSIONAL ENGINEER
N. W. MORRIS
100109137
PROVINCE OF ONTARIO

SCALE
0 50 100m
(SCALE 1 : 5000)
HORZ.
0 0.5 1m
(SCALE 1 : 50)
VERT.
(ON 11"x17")

EPP DRAIN (PELLER ESTATES)

TOWN OF NIAGARA-ON-THE-LAKE

PROFILE AND WEIR

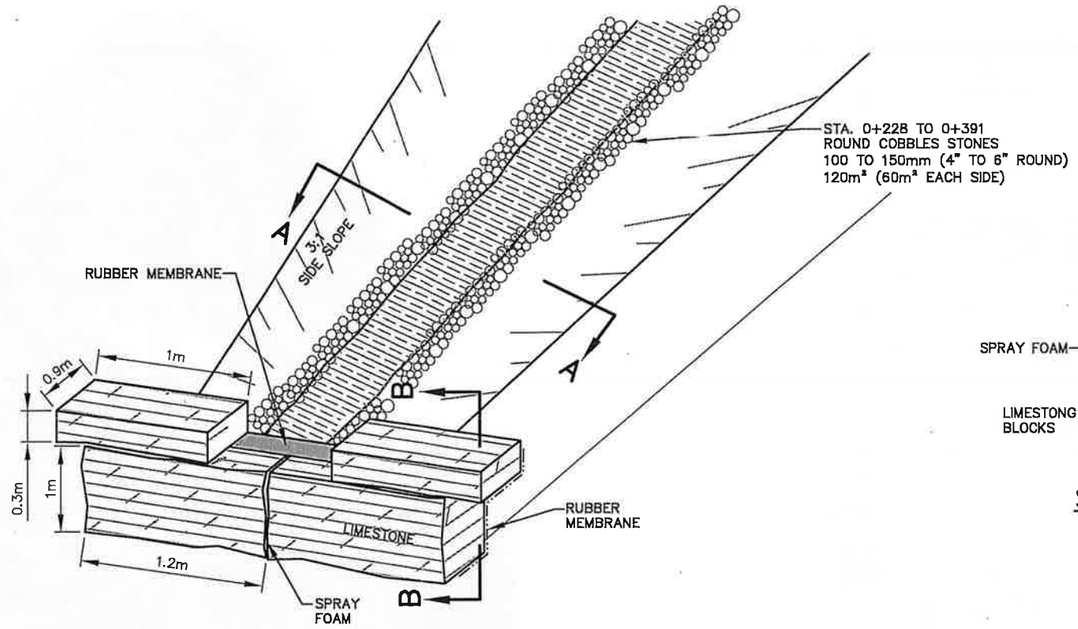
SEPT. 30, 2019

REVISED:

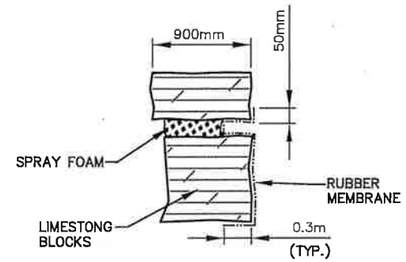
JOB NUMBER: 18-160

DRAWING 3 OF 5

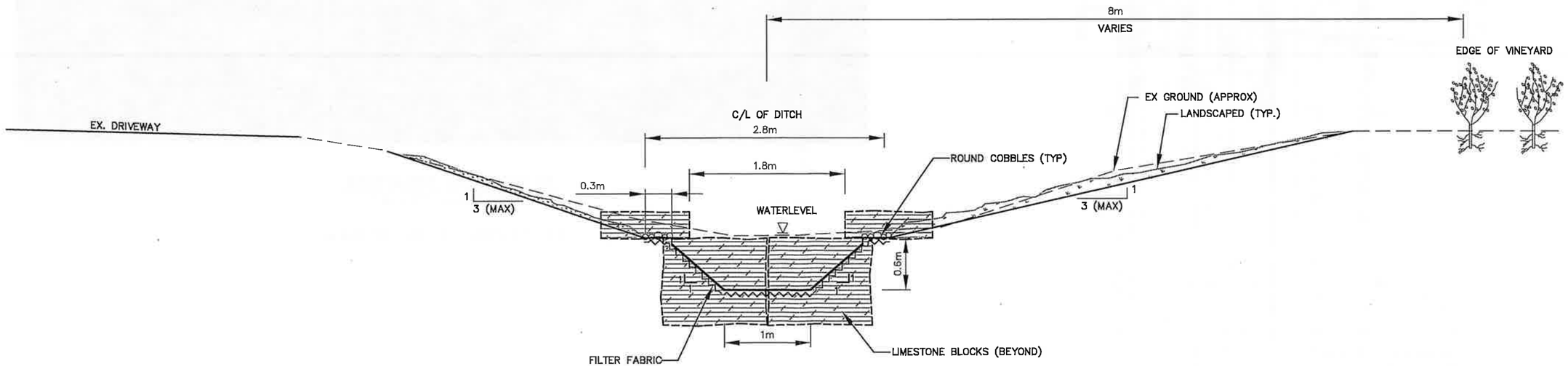
K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY



PLAN VIEW
SCALE 1:400



SECTION B–B
N.T.S.



SECTION A–A
SCALE 1:50

EPP DRAIN (PELLER ESTATES)

TOWN OF NIAGARA–ON–THE–LAKE

STONE DROP STRUCTURE (WEIR DETAIL TYPICAL)

SEPT. 30, 2019

DESIGNED BY:	N.W.M.
CHECKED BY:	H.A.W.
DRAWN BY:	N.M.B.
CHECKED BY:	N.W.M.

LICENSED PROFESSIONAL ENGINEER
N. W. MORRIS
100109137
PROVINCE OF ONTARIO

SCALE AS SHOWN

REVISED:

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY

JOB NUMBER: 18–160

DRAWING 4 OF 5

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300) CONSTRUCTION NOTES (SPECIAL PROVISIONS)

300.1) SPECIFIC NOTES

Sta.	Description
Peller Estates (Roll No. 011-01301)	
0+108	- Construct temporary straw bale dam/sediment trap
0+120 to 0+228	- 108m of ditch bottom cleanout. - Haul spoil off-site as per 400.18 of the standard specifications.
0+223 to 0+228	- Place 20m² of riprap at the bend
0+228 & 0+315	- Construct two stone drop structures
0+228 to 0+391	- Excavate 0.6m deep ditch with 1:1 side slopes and a 3m top width - Haul spoil off-site as per 400.18 of the standard specifications. - Place 120m² of round cobbles (60m² each side) along the water level of the pools

300.2) PROJECT NOTES

300.2.1) Working Area

For work for the drain on the Peller Estates property (Roll No. 011-01301), the working area is to be as shown on Drawing 2. Refer to Section 400.4 of Standard Specifications for Construction of Drains for exceptions.

300.2.2) Access

The Contractor shall have access to the drain along the routes if any, shown on Drawing 1. The access routes shall be along existing laneways or paths or where none exist, along a 6m wide (maximum) path. No other access routes shall be used unless first approved by the Engineer and affected landowner. The contractor shall also contact each owner prior to using designated accesses. Refer to Section 400.5 of the Standard Specifications for the Construction of Drains.

Telephone numbers for contact are:

011-00520 R. & S. Jain	To be Supplied at
011-01301 Peller Estates Winery	Time of Tendering)
Neal Morris, P.Eng. (K. Smart Associates Limited)	519-748-1199 ext. 240
Niagara On-The-Lake Hydro (Kevin Sidey)	905-468-1285 ext. 530
Niagara On-The-Lake (Brett Ruck, Drainage Superintendent)	905-468-3278 ext. 255
One Call Centre	1-800-400-2055

300.2.3) Soils Considerations

The Region of Niagara soils mapping for this area indicates that the soils adjacent to this Drain are primarily Maplewood reddish-hued fine sandy loamy textures overlying silty clay or clay loam till which is smooth basin to level and has imperfect drainage.

If sandy soils are encountered, erosion control (biodegradable Terrafix SC 200, Nilex SC 32 or equal) blankets shall be installed to reinforce the ditch side slopes.

Based on available information, no adverse subsurface conditions are expected on this project and the use of conventional construction equipment is anticipated. Refer to the Standard Specifications for drain construction procedures when adverse subsurface conditions are encountered.

300.2.4) Environmental

The following agencies have been notified of the project:

- Applications to NPCA, MNRF and DFO have been submitted in regards to Species at Risk and in regards to working in water, watercourse alterations and associated permits dated August 2018
- A letter of authorization was given for this project from the DFO stating the proposed works are not likely to result in serious harm to fish or prohibited effects on listed aquatic species at risk.
- The work will require a Dart permit from the NPCA.

300.2.5) Stone Drop Structure

The stones shall be large single blocks of limestone armour stone.
A rubber membrane, Firestone GeoGard 1.5mm rubber liners ethylene proplyene diene terpolymer (EPDM), 900N puncture resistance, 10N/mm² shear strength or equivalent. Shall be placed upstream of the armour and folded under the stone by 300mm and pinched between the blocks by 300mm. The rubber shall be fish-friendly, flexible, UV resistant, and low temperature stable.
Landscaping spray foam shall be used to fill in gaps between blocks. The spray foam shall be UV-resistant, fish-friendly, grey or black, and 1" extending.

LICENSED PROFESSIONAL ENGINEER
Sept. 30, 2019
N. W. MORRIS
100109137
PROVINCE OF ONTARIO

EPP DRAIN (PELLER ESTATES)
Town of Niagara-on-the-Lake
File No. 18-160 September 30, 2019
Drawing 5 of 5