Engineers Report

Curtin Municipal Drain
Cameron, Ontario

City of Kawartha Lakes
Geographic Township of Fenelon

D.M. Wills Project Number 21-5508

D.M. Wills Associates Limited
Partners in Engineering, Planning and Environmental Services
Peterborough

January 31, 2023

Prepared for:
City of Kawartha Lakes

Submissions Summary

Submission No.	Submission Title	Date of Release	Submissions Summary
1	Draft – Engineers Report	January 2023	1st Submission to the City of Kawartha Lakes
2	Draft – Engineers Report	January 31, 2023	1st Submission to Kawartha Conservation
3	Final - Engineers Report	August 9 2023	Final Submission to the City of Kawartha Lakes

This report/proposal has been formatted considering the requirements of the Accessibility for Ontarians with Disabilities Act.

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1.0 Introduction

1.1 Summary of Petition

As per Section 4.0 of the Drainage Act (the Act) and following the receipt of a petition for drainage works from property owners in the City of Kawartha Lakes (City), the council have appointed D.M. Wills Associates Limited (Wills) as the Drainage Engineer to establish a new municipal drain north of the intersection of Cambray Road and Killarney Bay Road, near Lindsay Ontario.

The following property owners in the City have petitioned under Section 4 of the Drainage Act for a new Municipal Drain:

- Michael Curtin
  Lot 8, Con. 3 CKL
  ARN: 16512100101040000000
- Ryan Parish
  Lot 7, Con. 3 CKL
  ARN: 16512100101030000000

On December 2, 2021, the City's Clerks Department received a petition for drainage works by owner (Form 1) from Michael Curtin, owner of the property at 168 Halls Road, City of Kawartha Lakes. The property is located at Concession 3, Pt Lot 8, Geographic Township of Fenelon.

The original petition did not include property owner Ryan Parish. However, after the on-site meeting held in April 2022 (as discussed in further detail below) a petition was submitted by Parish to include the lands in Lot 7, Con. 3.

Through this process, the validity of the petition will be reviewed, and opportunities may exist to adjust the petitioners or recommend a new petition, if required, to achieve the validation criteria as per Section 4 of the Act.

1.2 Report Objectives

The work involved with the preparation of this report has followed the procedures of the Drainage Act to achieve the following key objectives:

- Conduct an on-site meeting as per Section 9 of the Act to determine the area requiring drainage, and to provide a forum for property owners and agencies to present the goals, objectives, and constraints of the project to the engineer.
- Provide notification to council regarding the validity of the petition.
- Complete a field review of the site, undertake topographic survey and various technical studies as required to provide a design that adequately conveys drainage to a sufficient outlet.

- Develop a cost estimate, supported by applicable construction drawings and specifications.
- Complete an assessment schedule to allocate all applicable allowances and costs over the lands and roads of the project.
- Communicate and provide a clear record of the above technical findings and assessment processes for submission to council and for the review of the watershed community.

2.0 Project Objective and Background

The purpose of this application is to provide, formalize, and protect an outlet for runoff from the agricultural properties noted in the petitions and located in Lots 7 and 8, Con. 3. The landowners initial plan was to tile to the existing watercourse and to deepen and widen the watercourse downstream through the adjacent landowner's properties. Property owners of 168 and 140 Halls Road both sought out to achieve a sufficient outlet for their drainage through the property known as 255 Killarney Bay Road, however, they were unable to come to terms with the landowner of 255 Killarney Bay Road to come to an agreement through a mutual drain under the Ontario Drainage Act.

3.0 The Drainage Act

The Drainage Act is a piece of legislation that allows for the construction and maintenance of drainage features that may span multiple properties, with funds raised by local assessments. The cost of the drainage works is assessed in varying proportions to lands within the watershed, levied above and beyond municipal taxes.

This engineers report is one component of the overall process in the development of a municipal drain. The process is not complete until the levying and collection of assessments occurs after the construction of the municipal drain. A general overview of the process is provided below:

Steps completed to date:

1. Submission of a Petition under Section 4 of the Act and consideration by council;
2. Notice sent to local agencies;
3. Council appoints a Drainage Engineer;
4. Engineer holds On-Site Meeting as Per Section 9(1) of the Act;
5. Engineering team completes topographic survey work;
6. The project team holds internal design meetings and agency consultation; and
7. Engineer prepares the Engineer Report.

Next Steps:

1. City Clerk sends a notice of a Meeting to Consider the final report, along with a copy of the report to all prescribed persons;
2. Meeting to Consider the report held at City's Drainage Board with recommendations to Council;
3. Council provisionally adopts the report and a Provisional by-law is passed with first and second reading;
4. City Clerk sends a copy of the provisional by-law and notice of a Court of Revision Meeting to all prescribed persons;
5. Court of Revision held at City's Drainage Board with recommendations to Council;
6. If appeals are filed, Appeal to Tribunal and referee;
7. After all appeals have been heard or time for appealing has expired, Council gives the provisional by-law a third reading;
8. Tendering for construction occurs and the drain is constructed;
9. The provisional by-law is amended to reflect actual construction costs, grants are applied for, assessments are levied per the schedule of assessment and the by-law is registered.
10. The project is now complete and maintenance to occur by the Municipality as per the drainage act going forward.

4.0 Meetings

4.1 On-Site Meeting

In accordance with Section 9(1) of the Drainage Act, an on-site meeting was held on April 12, 2022, at 11:00 a.m. The meeting was held in the field entrance at the rear of 168 Halls Road, across from 348 Killarney Bay Road. Persons in attendance were:

Engineers and City

- Ken Smith, Project Manager, Wills
- Mark Hoar, Project Engineer, Wills
- James Chambers, Project Designer, Wills
- Richard Monaghan, Drainage Superintendent, City
- David Blanchard, Roads Supervisor, City

Parties Present and Properties (by Roll No.) Represented:

- Michael Curtin, Petitioner (16512100101040000000)
- Ryan Parish, Petitioner (16512100101030000000)

- Donald Mashinter, Local Resident, (16512100101020000000)
- Kevin Leach, Representative for Donald Mashinter

4.1.1 The On-Site Meeting

The Engineers started the meeting by explaining the purpose of the meeting. It was explained that this on-site meeting is required to satisfy Section 9(1) and 9(2) of the Drainage Act for the Curtin Municipal Drain project.

The Wills project team explained that the drainage petition, brought forward by Mr. Curtin, would be discussed, and evaluated for sufficiency. The meeting was also explained to be for information gathering purposes. The Engineers indicated they wished to hear about the drainage issues in the watershed, and to obtain input to help define the Area Requiring Drainage and to ensure that runoff would be conveyed to a sufficient outlet.

All of those in attendance were then asked to introduce themselves and identify which property they represent in the watershed. They were also asked to speak about any drainage issues that they may have.

A brief overview of the Drainage Act was provided; the overall goal is to provide a legal means to facilitate drainage for a property or properties that require drainage. Wills confirmed that once the engineer confirms the Area Requiring Drainage, an engineer's report will be prepared for the detailed design of the proposed municipal drain. The City indicated that if local residents require additional information on the Municipal Drain Process, the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) website are excellent resources.

4.1.2 Questions Asked During the Meeting

- The project team and residents discussed the depth of bedrock and its influence on the design on the project.
    - A Geotechnical Investigation might be required to confirm the location of the bedrock.
- The project team discussed the status of the downstream lands, noting that some Environmental Protection Designations may exist.
    - A meeting with the Conservation Authority will be required. The meeting will confirm the environmental constraints for the site.
- What is the project timeline?
    - Wills and City staff estimated that 2023 construction season is possible.

4.2 Area Requiring Drainage and Sufficiency of Petition

The area requiring drainage includes the easterly low-lying 19.8 ha of Lot 8, Con. 3 (16512100101040000000) City owned by Michael Curtin and the easterly low-lying 8.6 ha of Lot 7, Con. 3 (16512100101030000000) City owned by Ryan Parish.

In order to satisfy Section 4 (1) of the Drainage Act, the engineer must evaluate the Validity of the Petition based on four criteria. The petition is determined to be valid if the Area Requiring Drainage is supported by any one of the following criteria:

- The majority in number of the owners, as shown by the last revised assessment roll of lands in the area, including the owners of any roads in the area;
- The owner or owners, as shown by the last revised assessment roll, of lands in the area representing at least 60 per cent of the hectarage in the area;
- Where a drainage works is required for a road or part thereof, the engineer, road superintendent or person having jurisdiction over such road or part, despite Subsection 61 (5); or
- Where a drainage works is required for the drainage of lands used for agricultural purposes, the Director. R.S.O. 1990, c. D.17, s. 4 (1).

Section 4(1)(a) – Within the Area Requiring Drainage there are two property owners, both of which have sign petitioners, or 100%. Therefore, Section 4(1)(a) is satisfied.
Section 4(1)(b) – The Area Requiring Drainage was estimated at 28.4 ha in size. The area of the landowner by the signed petitioners was estimated at 28.4 ha, or 100%. Therefore, Section 4(1)(b) is satisfied.

5.0 Design Considerations

5.1 Description of the Watershed

The catchment area for the proposed drain was determined to be approximately 128.5 ha, considering all lands that drain to the point that was identified to be the adequate outlet for the drain. The topography of the site is split between flat and generally unvarying upstream agricultural lands to steeper sections with bedrock outcroppings along the roadway limits. The upper reach of the watershed is bordered to the west by a treed ridge approximately 10 m high with agricultural lands on top. The downstream limit of the catchment is comprised of a low-lying bush/wetland area. The site consists primarily of agricultural lands with some developed areas.

The Soil types within the catchment are comprised of Smithfield Clay Loam, Farmington Loam, Emily Loam, Otonabee Loam and Lyons Loam. The clay loam soils represent the upper west sections of the watershed while the Farmington Loam is generally located in the central section of the watershed where the work will occur.

5.2 Topographic Survey

A topographic survey of the site was completed by Wills on May 12, 2022. This survey was used to determine elevations and locations of existing site features, determine drainage patterns to establish the proposed grades, and set local benchmarks.

5.2.1 Drainage Problem/Opportunity

Currently water from the property 16512100101040000000 flows through a poorly defined low, wet area southerly onto and through the property 16512100101030000000. Water continues onto property 16512100101020000000 property and flows through a slightly more defined channel before discharging into a road ditch parallel to Halls Road. Under current conditions upstream lands do not have an outlet for water or sufficient depth to install tile drainage on the properties. Converting the existing drainage course into a Municipal Drain will formalize the status of the drainage channel and allow for improved drainage of property 16512100101040000000 and 16512100101030000000 and provide a legal outlet for water through downstream lands.

5.3 Design Criteria and Considerations

The goal of the municipal drain will be to provide a sustainable, maintainable, and adequate outlet for the watershed through a series of ditches and pipes.

5.3.1 Options Considered during design

Two options were considered for the proposed municipal drain:

- Option 1 - Open channel located on property16512100101030000000 and property 16512100101020000000 to convey surface runoff to the Killarney Bay Road ditch.
- Option 2 - Closed pipe located on property16512100101030000000 and open channel property 16512100101020000000 to convey surface runoff to the Killarney Bay Road ditch.

We anticipated that the relative cost between option 1 and option 2 to be in excess of $440,000, with option 2 being the more expensive alternative. With property owner of 16512100101030000000 requesting the piped options, the relative difference would hence be applied to property 16512100101033000000 as a special provision. The property owner of 16512100101030000000 was informed of the expense of the special provision and has elected to not move forward with this option.

On the weight of evidence discussed above, Option 1 was selected as the preferred alternative.

5.3.2 Design Criteria

A Guide for Engineers working under the Drainage Act in Ontario – Publication 852, (The Guide) prepared by the Ministry of Agriculture, Food and Rural Affairs Ontario, was used to establish the criteria for the drainage assessment.

The MTO Drainage Management Manual and the MTO Highway Drainage Design Standards (HDDS) were used to establish the design criteria for the entrance crossing along Killarney Bay Road.

The culverts were assessed based on the criteria for a Lower-Tier Municipal Road.

Table B2-2 of the Guide, states:

- The design storm for a Rural/Agricultural Channel is the 2-year event.
- The design storm for a Field Crossings is the 2 – 5 year event.
- The design storm for a Lower-Tier Municipal Road is the 5 – 10 year event.
- The design storm for an Upper-Tier Municipal Road is the 10 – 25 year event.

Notwithstanding the above design criteria, the proposed culverts were considered with respect to long-term stability and performance during the 100-year event.

5.3.3 Environmental Approval

The drain will be subject to the review of the Kawartha Region Consecration Authority, Department of Fisheries and Oceans (DFO) and consideration under the Species-at-Risk Act. Although the exact views of these agencies cannot be known in advance, the environmental impacts are expected to be appropriately mitigated through use of temporary erosion and sediment controls during construction and by facilitating construction during a seasonal in-water working window.

This project is anticipated to have no permanent adverse impact on any species-at-risk as it intends to maintain the existing drainage feature and to continue to support the existing land use within the watershed.

6.0 Recommendations for the Curtin Municipal Drain

6.1 Recommendations

The proposed drain will consist of one main branch that includes both open ditch and pipe sections.

It is our recommendation that:

Station 1+000	Upstream end of the Drain property limit between property 65121001010400000000 and property 16512100101030000000.
Station 1+000 to 1+307	Excavate new open channel with 1.5 m flat bottom, 0.70 m deep and 3:1 (H:V) side slopes. Slope of channel to range from 0.20% to 0.35%.
Station 1+200	Install new field culvert designed to convey the 5-year event and to be stable during the 100-year event. The proposed culvert is recommended to be a twin 450 mm CSP pipes. The driveway over the culverts will be mounded up above the channel to ensure minimum cover is achieved.
Station 1+307 to 1+678	Excavate new open channel with 1.5 m flat bottom, 0.70 m deep and 3:1 (H:V) side slopes. Slope of channel to range from 0.20% to 0.82%.
Station 1+575	Install new field culvert designed to convey the 5-year event and to be stable during the 100-year event. The proposed culvert is recommended to be a twin 450 mm CSP pipes. The driveway over the culverts will be mounded up above the channel to ensure minimum cover is achieved.
Station 1+678 to 1+721	Excavate within open channel with 1.5 m flat bottom, 0.75 m deep and 1:1 (H:V) side slopes. Slope of channel to be 0.20%.
Station 1+687	Install new entrance culvert designed to convey the 5-year event and to be stable during the 100-year event. The proposed culvert is recommended to be a 900 mm CSP pipe. The inverts of the culvert will be lowered to match the proposed ditch grade.
Station 1+721 to 2+060	Provide earth ditch cleanout within the existing road ditch to as required provide positive drainage.
Station 2+064	Cleanout Twin 750 mm diameter CSP culverts.
Station 2+069 to 2+490	Provide earth ditch cleanout within the existing road ditch at a 0.20% grade to provide positive drainage.

6.2 Working Area

The width of the working area for construction purposes shall be a maximum of 20 m. The width of the working area for maintenance shall be 10 m on the west side of the drain. Each landowner on whose property the drainage works is to be constructed shall designate access to and from the working area at the time of construction or upon failure to do so, the engineer or Drainage Superintendent shall designate access as identified on the detailed design drawings.

7.0 Cost Estimate

The general principle of the Drainage Act is that the project costs, incurred from both design and construction activities, along with any funds owed to landowners for various impacts and inconveniences, future maintenance cost, and are distributed fairly to all lands and roads within the contributing area. The cost estimate on this project consists of:

- The allowances recommended to be made to those owners having work on their properties or other detrimental impacts;
- The construction cost estimate;
- The engineering cost estimate;
- The construction supervision and eligible administration costs which include financing, applications, and miscellaneous costs; and,
- Contingency items, as required.

As per Section 59 (1) of the Act, in the case where tender prices are 33% higher than the engineer's estimate of the contract price, then another meeting to consider the price must be held before the work can proceed.

7.1 Allowances

Various allowances are considered part of a Municipal Drain and are intended to provide appropriate compensation to landowners who are negatively impacted by the construction of the drain as well as future maintenance cost. The drainage act states in Section 29 to 33 that the Engineer is to allow for the value of several items, as follows:

7.1.1 Section 29 – Allowance for Right-of-Way

Allowances under this section are provided for lands taken out of production permanently because of the construction or improvement of a drain.

The allowance recognizes the funds owed to a landowner to secure Right-of-Way (ROW) access to lands for both construction and future maintenance activities. These ROWs are not required to be taken out of production but are to always be available for maintenance activities.

7.1.1.1 Allowance for Land Taken Permanently out of Production

The drainage engineer is to provide for an allowance to be paid to the landowner whose lands is proposed to be used for construction of the new drain. This includes the top width of the new channel; lands designated as a permanent buffer or vegetated berm.

Allowance rates for lands taken permanently out of production were provided as follows:

- Rural/Regulated Land taken for Drain: $25,121/ha ($10,166/acre)

For the proposed drain, the lands designated as a permanent buffer were based on the design top width of the channel of 7.5 m with a 0.5 m vegetated buffer on either side of the channel.

7.1.1.2 Allowance for Land Used Periodically

The drainage engineer is to provide for an allowance to be paid to the landowner whose land is proposed to be used periodically for the equipment used to construct and maintain the drain. Typically, this section refers to agricultural crops; however, it also applies to lawns, ornamental trees, and fences.

The calculated value for the initial construction is based on the 3-year composite annual average of all crop types (not including high-value crops) and was determined to be $2,051/ha ($830/acre).

Additionally, every time there is drain maintenance, the owner should be compensated. Assuming a 50-year design service life, with maintenance performed every 10 years and a reasonable interest rate of 4% the allowance paid today to compensate for future maintenance is 2,79 times the annual average rate.

Therefore, the total compensation for land used periodically was estimated at $5,721/ha.

For the proposed drain construction and future maintenance, the lands designated for periodic impacts are based on a 10 m wide working area.

7.1.2 Section 30 – Amount for Damages

The drainage engineer is to provide for allowances to be paid to the landowner for damages to crops caused by the disposal of material removed from the drainage system. The damage allowance should compensate for the long-term effect on the land that would reduce crop production over the next few years.

Crop damage allowance uses the following formula: Crop Damage ($) = Crop Value ($/ha) * Area Affected (ha) * Thickness Factor (m) * Quality Factor.

The 3-year composite annual average of all crop types (not including high-value crops) was determined to be $2,051/ha ($830/acre). The spreading of excavated material is estimated at a maximum depth of 0.15 m, resulting in a thickness factor of 1.0. The duration of crop damage was estimated on a 5-year decline basis, resulting in a Duration Factor of 3.0. The quality of the spread material was estimated to be Fair, resulting in a Quality Factor of 0.75.

7.1.3 Section 31 – Allowance for Existing Drain

The proposed work does not involve incorporating an existing private drain into the Curtin Municipal Drain. Therefore, no allowances for this section have been provided.

7.1.4 Section 32 – Allowance for Damages due to Insufficient Outlet

A sufficient outlet has been confirmed. Therefore, no allowances for this section have been provided.

7.1.5 Section 33 – Allowance for Loss of Access

Crossings are to be provided at each property, where they were originally provided. Therefore, no allowances for this section have been provided.

7.1.6 Summary

The allowances payable to the owners entitled thereto on this project are documented in **Table 1**.

Table 1 – Allowances

Roll Number	Con	Lot	Section 29		Section 30
			Land Taken Permanently Out of Production	Lands Taken Periodically Out of Production	Land Used Periodically
16512100101020000000	3	7	$ 7,238.65	$ 1,321.50	$ 3,159.57
16512100101020100000	3	7	-	-	-
16512100101030000000	3	8	$ 7,153.23	$ 1,916.47	$ 2,661.17
16512100101030100000	3	8	-	-	-
16512100101040000000	3	8	-	-	-
16512100101050000000	3	9	-	-	-
16512100101060000000	3	9	-	-	-
City	3	7	-	-	-

The net amount owed to or from a landowner is the difference between their assessments, as per **Section 8.0** of this report, and the above allowances. The

allowances are generally less than the assessment to the properties, resulting in the property owners being billed the difference when the project is complete.

7.2 Construction Cost Estimate

The estimated cost of Labour, Equipment and Materials to construct the proposed drain is outlined in the following section. The final cost of the drain construction cannot be established until the construction is complete. The contractor is to supply all labour, equipment and materials to construct are documented in **Table 2**.

Table 2 – Cost Estimate

Item No.	Description	Total
101	Bonding and Insurance	$ 5,000
102	Mobilization and Demobilization	$ 5,000
103	Temporary Traffic Controls	$ 1,000
104	Erosion and Sediment Controls	
a)	Light Duty Silt Fence	$ 500
b)	Staw Bale Check Dam [SiltSoxx]	$ 600
105	Excavation and Grading (Native)	$ 37,400
106	Excavation and Grading (Rock Excavation)	$ 18,725
107	Seed and Cover	$ 10,250
201	Gravel Removals	$ 100
202	Clearing and Grubbing	$ 15,000
203	Removal of CSP Pipe and Culverts (Field Entrance)	$ 300
301	Install 900 mm CSP Culvert. (Field Entrance)	$ 10,000
302	Install 2 x 450 mm CSP Culvert (Field Crossing)	$ 36,000
303	Rip Rap on Filter Cloth	$ 1,000
401	Granular A	$ 400
	Contingency (15%)	$ 21,191
	SUM	**$ 162,466**

7.3 Engineering Cost Estimate

The Engineering Cost Estimate is intended to provide for the work involved with generating background information to prepare for and attend on-site meetings; field survey; the preparation of plans, profiles, cross sections, drawings, and details; the design of the municipal drain features; conducting discussions with affected land owners and authorities; evaluating alternatives; preparing cost estimates, allowance tables, assessment schedules and future maintenance schedules; preparing specifications; report writing; and attending public meetings.

The Engineering Cost Estimate for the Curtin Municipal Drain is summarized as follows:

- Report Preparation ..... $ 35,140
- Geotechnical Investigation ..... $ 5,540
- Consideration / Court of Revisions..... $ 1,800
- **Sum..... $ 42,480**

The cost of the report preparation is usually not altered at the conclusion of a project unless the report is referred back to the engineer following significant input or a change in the project circumstances, or the report is appealed, both of which would involve additional cost.

The estimates provided above for Consideration and Court of Revision are typical costs only and would only be exceeded in the case of lengthy or unusual meetings, uncommon report preparation costs, appeals, or other cases where additional input or services are required from the Engineer.

7.4 Construction Supervision and Eligible Administration Cost Estimate

7.4.1 Construction Supervision

The cost estimate for construction supervision typically includes work to prepare tender documents, facilitate the award of contracts, attend pre-construction meetings, perform construction inspection, facilitate contractor payment, complete all required final inspections, attend, and facilitate meetings, conduct post construction follow-up, and to assist with preparation of grant applications.

- Construction Supervision $ 10,000

7.4.2 Eligible Administration Cost

It is appropriate to assess various other administration costs incurred by the municipality and the engineer to the project. Section 73(1) of the Drainage Act states that "Except where otherwise provided in this Act or by a decision on an appeal, the cost of any application, reference or appeal and the cost of temporary financing for the construction, improvement, repair and maintenance of a drainage works, shall form part of the cost of the drainage works."

The Eligible Administration Cost Estimate for the Curtin Municipal Drain is summarized as follows:

- Eligible Administration Cost (excluding HST) .....$ 3,000
- Allowance for Report Reproduction .....$ 1,000
- **Sum.....$ 4,000**

7.5 Estimated Cost Summary

The total estimated cost for the Curtin Municipal Drain is summarized as follows:

- Allowances .....$ 23,451
- Construction Cost Estimate .....$ 162,466
- Engineering Cost Estimate.....$ 42,480
- Construction Supervision and Eligible Administration Cost Estimate .$ 14.000
- **Total Estimated Cost.....$ 242,397**

8.0 Cost Assessments Principles

Section 21 of the Drainage Act requires that the Engineer "shall assess for benefit, outlet liability and injuring liability, and **shall** insert in an assessment schedule, in separate columns, the sums assessed for each, opposite each parcel of land and road liable therefor." The intention of the assessment schedule is to determine and communicate the proportional costs that are to be levied to each landowner or agency that benefit and/or contribute runoff to the drain.

8.1 Cost Assessment

8.1.1 Assessment of Benefit

Section 22 of the Drainage Act states that "Lands, roads, buildings, utilities or other structures that are increased in value or are more easily maintained as a result of the construction, improvement, maintenance or repair of a drainage works may be assessed for benefit." The intention of this component of the assessment schedule is to recognize particular landowners or agencies for whom the drain will provide a significant drainage improvement, and to ensure that appropriate additional costs are assessed to those parties.

Benefits to landowners can include higher market value for the property, improved appearance, better control of surface or subsurface water, or any other advantage relating to the betterment of lands, roads, buildings or structures.

The Benefit for Better Surface Water Drainage was estimated based on improved crop yield within a 20 m swath of the drain. The calculated value for the initial construction is based on the 3-year composite annual average of all crop types (not including high-

value crops) and was determined to be $2,051/ha ($830/acre). The estimate assumed the 20 m swath on either side of the drain would have experienced a 50% crop failure three times every 10 years. As a result, the average annual benefit value was estimated at $308/ha/year. Assuming a 50-year design service life and a reasonable interest rate of 4% the future benefit is $6,609/ha.

The Benefit for Direct Connection was estimated based on the assumed cost for a property to construct a private drain to reach an adequate outlet. The assumed cost to connect a typical private drain is estimated at $15/m (cost to install a 150 mm diameter drain).

The Benefit for Increased Market Value was estimated based on a 40% premium for rural land converted to developable land. The value of rural land was estimated at $25,121/ha ($10,166/acre) with the value of developed land $35,170/ha ($14,233/acre). The cost to install private subsurface drainage was estimated at $4,000/ha. The Net Benefit Value as estimated at $6,048/ha.

8.1.2 Assessment of Outlet Liability

Section 23(1) of the Drainage Act states that "Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or indirectly through the medium of any other drainage works or of a swale, ravine, creek or watercourse, may be assessed for outlet liability." The intention of this component of the assessment schedule is to recognize the lands that have no right of drainage, but still function as the 'source' of the surface runoff; that is, lands which contribute runoff via sheet flow or other artificially constructed means to the drain.

The assessments of outlet liabilities within the Curtin Municipal Drain were determined using the equivalent areas method, a technique used to simplify the process of calculating the outlet liability assessments. The liability assessment on a parcel of land is based on the "volume and rate of flow of water artificially caused to flow", which varies with factors related to land use, soil type and surface conditions.

8.1.3 Assessment of Injuring Liability

Section 23(2) of the Drainage Act states that "If, from any land or road, water is artificially caused by any means to flow upon and injure any other land or road, the land or road from which the water is caused to flow may be assessed for injuring liability with respect to a drainage works to relieve the injury so caused to such other land or road." The intention of this component of the assessment schedule is similar to Outlet Liability, as above, and recognizes flows that are artificially collected and result in specific negative downstream impacts.

There were no specific injuring liabilities that were identified within the Curtin Municipal Drain; the general impacts of surface runoff to the drain were captured and assessed within the assessment for outlet liability, as per Section 8.1.2.

8.1.4 Assessment of Special Benefit

Section 24 of the Drainage Act states that "The engineer may assess for special benefit any lands for which special benefits have been provided by the drainage works." Defined as additional works of features included in the construction, repair, or improvement of drainage works that has no effect on the function of the drainage works." The intention of this component of the assessment schedule is to recognize lands and agencies that receive additional, unique, and specific benefits that are not related to general improvements to drainage.

No Special Benefits have been applied to any of the private properties within the watershed.

The City has been assessed a special benefit of $27,924 for works within the municipal ROW. This includes the proposed entrance culvert and roadside grading.

8.1.5 Increased Cost, How Borne

Section 26 of the Drainage Act states that "In addition to all other sums lawfully assessed against the property of a public utility or road authority under this Act, and despite the fact that the public utility or road authority is not otherwise assessable under this Act, the public utility or road authority shall be assessed for and shall pay all the increase of cost of such drainage works caused by the existence of the works of the public utility or road authority."

As described in Section 8.1.4, the costs associated within the road ROW will be fully assessed to the City. This assessment will consist primarily of the costs associated with entrance culverts and earth ditch cleanout on municipal lands.

The City will have the option of either performing the work of installing road entrance culvert or elect to have work completed by a general contractor. If the City completes this work at their expense, no Section 26 assessment shall apply. However done, the future maintenance, replacement or maintenance of entrance culvert on Killarney Bay Road shall be the responsibility of the City.

8.1.6 Assessment Summary

The benefit assessed for each owner in the watershed are summarized in **Table 3**.

The assessment summary for the Curtin Municipal Drain is shown in detail within **Schedule A**, located in **Appendix A**.

Schedule A will be used to assess the final costs of the drain, which may vary depending on final engineering, construction administration, and eligible administration costs. Final costs will be prorated, with the exception of Special Assessment, which is to be based on actual costs. **Schedule B** will be used to prorate the future drain repair and maintenance costs.

Table 3 – Assessment

Roll Number	Con	Lot	Section 22		Section 23	Section 24
			Direct Connection	Increase Market Value	Outlet Liability	Special Benefit
16512100101020000000	3	7	-	-	$ 2,146.01	-
16512100101020100000	3	7	-	-	$ 42.20	-
16512100101030000000	3	8	$ 5,850.00	$ 51,351.27	$ 1,594.95	-
16512100101030100000	3	8	$ 5,850.00	$ 7,330.71	$ 117.21	-
16512100101040000000	3	8	$ 10,875.00	$118,851.88	$ 4,871.00	-
16512100101050000000	3	9	-	-	$ 3,255.57	-
16512100101060000000	3	9	-	-	$ 626.72	-
City	-	-	-	-	-	$ 29,077.75

9.0 Future Maintenance and Repair Provisions

After the construction of the Curtin Municipal Drain is complete, as described in this report, the City, at the expense of the lands, shall maintain the drain and all associated features and roads as assessed and, in the proportions, set out in the By-Law, which adopts this Report. The cost of all maintenance is to be assessed to the upstream lands and roads on a prorated basis in keeping with the percentages in **Schedule B**.

Future costs for maintenance of the road crossings are to be fully assessed to the City.

The Curtin Municipal Drain shall be maintained using the specification, plans and profiles as contained in this Report.

At each time of maintenance, ditch banks are to be seeded. Over-seeding is recommended. Rates of application and use of fertilizer and mulch is to be as per supplier's recommendations.

Ditch culverts, below farm entrances along the drain, may be replaced in the future and up to equivalent metres in length with the same size (dia.) or opening as the proposed culvert; the costs of the work is to be split evenly, with 50% assessed to the abutting property and 50% assessed to the upstream lands and roads at the time of the replacement.

The drain should be inspected for maintenance purposes at a minimum once every 10-years.

10.0 General Instructions to Property Owners

Once the drainage system is constructed, it is the municipality's responsibility to manage it. The drainage system becomes part of the municipal infrastructure and is to be repaired and maintained by the City, not by the property owners.

Landowners should note that there is responsibility for landowners to not damage or obstruct the flow in the municipal drain. Section 80(1) of the Drainage act states that "When a drainage works becomes obstructed by a dam, low bridge, fence, washing out of a private drain, or other obstruction, for which the owner or occupant of the land adjoining the drainage works is responsible, so that the free flow of the water is impeded thereby, the persons owning or occupying the land shall, upon reasonable notice sent by the council of the local municipality whose duty it is to maintain and repair the drainage works or by a drainage superintendent appointed by the council, remove such obstruction and, if it is not so removed within the time specified in the notice, the council or the drainage superintendent shall forthwith cause it to be removed, and the cost thereof is payable to the municipality by the owner or occupant of the land."

Section 82 (1) of the Drainage act states that "A municipality in which a drainage works or part thereof is situate may bring an action for damages against any person who destroys or injures in any way a drainage works, including any bench mark or permanent level, and any damages ordered by the referee to be paid shall be paid to the municipality and used for the construction, improvement, maintenance or repair of the drainage works."

When the drainage superintendent is required to perform any necessary maintenance, the property owners are to provide access to the drain. Section 74(1) of the Drainage Act states "Any drainage works constructed under a by-law passed under this Act or any predecessor of this Act, relating to the construction or improvement of a drainage works by local assessment, shall be maintained and repaired by each local municipality through which it passes, to the extent that such drainage works lies within the limits of such municipality, at the expense of all the upstream lands and roads in any way assessed for the construction or improvement of the drainage works and in the proportion determined by the then current by-law pertaining thereto until, in the case of each municipality, such provision for maintenance or repair is varied or otherwise determined by an engineer in a report or on appeal therefrom."

Future connections to the municipal drainage system require permission from the Township of Laurentian Valley. Section 65(5) of the Drainage Act states that "No person shall connect to or disconnect from drainage works without the approval of the council of the municipality."

The drain is designed based on land use and management. Municipal Approval is required if land use is changed such that the drain is impacted. Section 65(3) of the Drainage Act states "If an owner of land that is not assessed for a drainage works subsequently connects the land with the drainage works for the purpose of drainage, or if the nature or extent of the use of a drainage works by land assessed for the drainage

works is subsequently altered, the clerk of the local municipality in which the land is situate shall instruct an engineer in writing to inspect the land and assess it for a just proportion of the drainage works, taking into account any compensation paid to the owner of the land in respect of the drainage works."

It is the landowner's responsibility to identify/mark existing tile drains along the proposed drain. Marked outlets that are damaged by the contractors during construction will be required to repair or replace damaged tile.

It is the landowner's responsibility not to plant trees or any permanent feature within the working corridor of the municipal drain.

No material that can impair water quality should be discharged into the drainage system.

A permit to take water is required if more than 50,000 L/day of water is taken from the drain, subject to the provisions of Section 34 of the Water Resource Act.

It is recommended that each abutting owner conduct work no closer than 1.0 m to any ditch bank. Such area does not have to be grassed but it should not be cultivated.

11.0 Grants

As per Section 85 of the Drainage Act and OMAFRA's ADIP policies, a grant not exceeding 1/3 (33.3%) may be available on the assessments against privately owned parcels of land which are used for agricultural purposes and are eligible for the Farm Property Class Tax Rate (F.P.C.T.R.).

Section 88(1) of the Drainage Act states that "Upon the practical completion of the drainage works and after the time for appealing against assessments has expired and there are no appeals or after all appeals against assessments have been decided, the council of the initiating municipality shall forward to the Director an application for a grant in such form as is provided by the Director.

If an assessed owner not shown as having the Farm Property Class Tax Rate feels that their property should be eligible for the grant, and they can provide proof to the Municipality of this eligibility as noted prior to the final cost levy, then the property could have the 1/3 (33.3%) grant deducted from the final cost levy. It is to be noted that OMAFRA retains the final right to determine eligibility under the grant program, regardless of designation herein.

12.0 Engineers Seal and Signatures

Respectfully submitted,

Mark Hoar, P.Eng.
Senior Water Resources Engineer

Ken Smith, P.Eng.,
Manager, Water Resources Engineer

MH/KS/af

Appendix A

Schedule of Estimated Assessment for Construction

SCHEDULE A
CONSTRUCTION ASSESSMENT SCHEDULES
CURTIN MUNICIPAL DRAIN

Roll Number	Concession	Lot or Part	Approximate Area Affected (ha)	Equivalent Area	Assessment				Allowance	Farm Tax Rate Parcel 2021	Cash Settlements
					Outlet	Benefit	Special	Total			
16512100101020000000	3	7	20.27	15.89	$ 2,146.01	$ -	$ -	$ 2,146.01	$ 11,719.72	No	$ (9,573.71)
16512100101020100000	3	7	0.44	0.31	$ 42.20	$ -	$ -	$ 42.20	$ -	No	$ 42.20
16512100101030000000	3	8	16.61	11.81	$ 1,594.95	$ 57,201.27	$ -	$ 58,796.22	$ 11,730.87	Yes	$ 47,065.35
16512100101030100000	3	8	1.21	0.87	$ 117.21	$ 13,180.71	$ -	$ 13,297.93	$ -	**No**	$ 13,297.93
16512100101040000000	3	8	40.91	36.06	$ 4,871.00	$ 129,726.88	$ -	$ 134,597.87	$ -	**Yes**	$ 134,597.87
16512100101050000000	3	9	27.54	24.10	$ 3,255.57	$ -	$ -	$ 3,255.57	$ -	**No**	$ 3,255.57
16512100101060000000	3	9	17.99	4.64	$ 626.72	$ -	$ -	$ 626.72	$ -	**Yes**	$ 626.72
Total Lands			125.0	93.7	$ 12,653.67	$ 200,108.86	$ -	$ 212,762.53	$ 23,450.59		$ 189,311.94
CKL			3.54	4.1	$ 556.56	$ -	$ 29,077.75	$ 29,634.31	$ -	**No**	$ 29,634.31
Total Roads			3.54	4.1	$ 556.56	$ -	$ 29,077.75	$ 29,634.31	$ -		$ 29,634.31
TOTAL			**128.5**	**97.8**	**$ 13,210.23**	**$ 200,108.86**	**$ 29,077.75**	**$ 242,396.84**	**$ 23,450.59**		**$ 218,946.25**

Appendix B

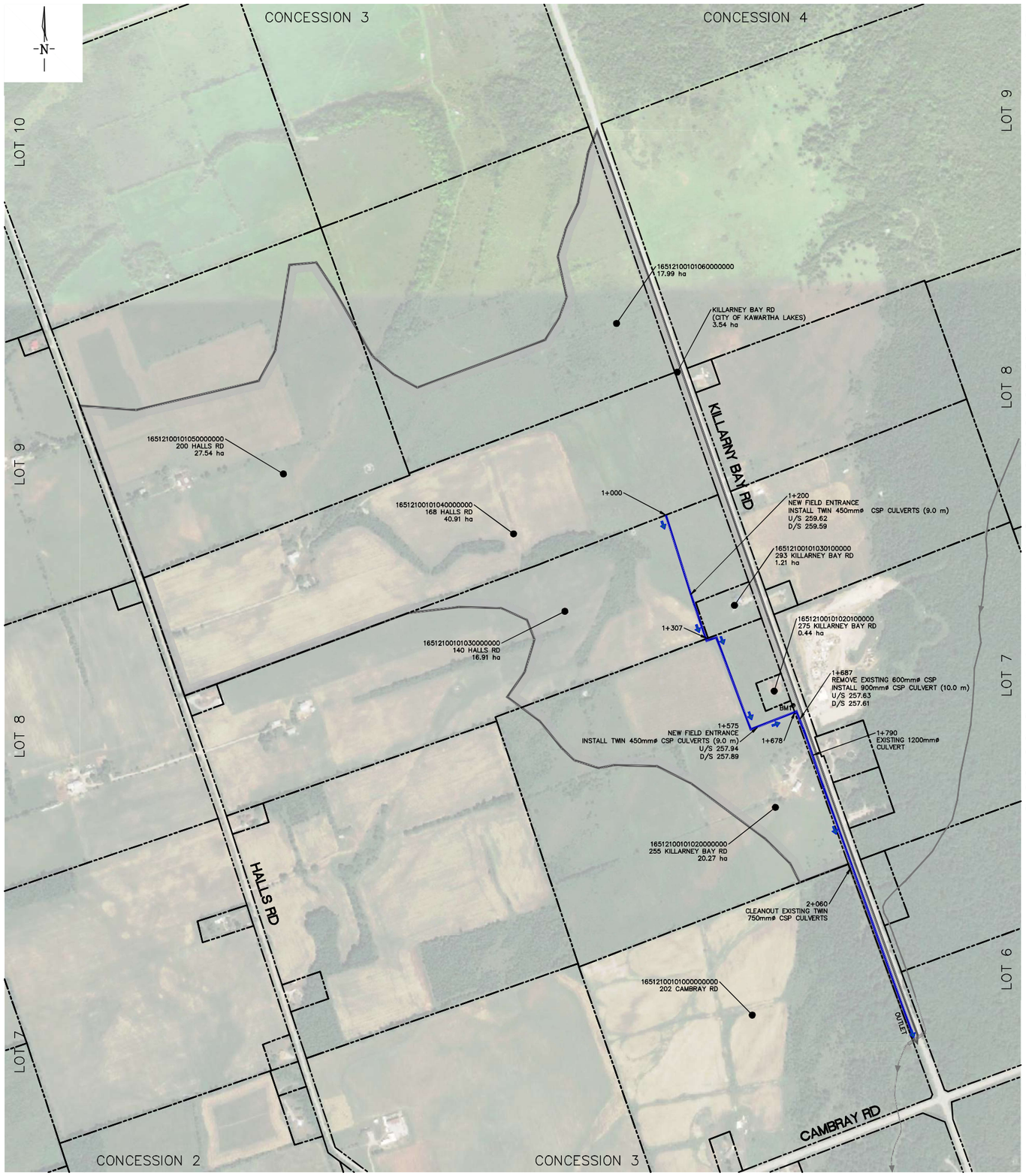
Schedule of Assessment for Future Maintenance

SCHEDULE B
MAINTENANCE ASSESSMENT SCHEDULES
CURTIN MUNICIPAL DRAIN

Roll Number	Owner (Hidden)	Concession	Lot or Part	Approximate Area Affected (ha)	Equivalent Area	Assessment				Allowance	Farm Tax Rate Parcel 2021	Cash Settlements
						Outlet	Benefit	Special	Total			
165121001010200	MASHINTER DONALD HOWARD	3	7	20.27	15.89	$ 9,343.72	$ -	$ -	$ 9,343.72	$ -	No	$ 9,343.72
165121001010201	WELLS HEATHER EVELYN MARIE	3	7	0.44	0.31	$ 183.76	$ -	$ -	$ 183.76	$ -	No	$ 183.76
165121001010300	PARISH RYAN WILLIAM	3	8	16.61	11.81	$ 6,944.44	$ -	$ -	$ 6,944.44	$ -	Yes	$ 6,944.44
165121001010301	MACMINN GORDON JOSEPH	3	8	1.21	0.87	$ 510.35	$ -	$ -	$ 510.35	$ -	**No**	$ 510.35
165121001010400	CURTIN MICHAEL GERARD	3	8	40.91	36.06	$ 21,208.35	$ -	$ -	$ 21,208.35	$ -	**Yes**	$ 21,208.35
165121001010500	MCNEELY BRENDA LEE	3	9	27.54	24.10	$ 14,174.77	$ -	$ -	$ 14,174.77	$ -	**No**	$ 14,174.77
165121001010600	PEEVER DENYSE DIANNE	3	9	17.99	4.64	$ 2,728.76	$ -	$ -	$ 2,728.76	$ -	**Yes**	$ 2,728.76
Total Lands				125.0	93.7	$ 55,094.16	$ -	$ -	$ 55,094.16	$ -		$ 55,094.16
CKL				3.5	4.1	$ 2,423.28	$ -	$ 14,339.93	$ 16,763.21	$ -	**No**	$ 16,763.21
Total Roads				3.5	4.1	$ 2,423.28	$ -	$ 14,339.93	$ 16,763.21	$ -		$ 16,763.21
TOTAL				**128.5**	**97.8**	**$ 57,517.43**	**$ -**	**$ 14,339.93**	**$ 71,857.36**	**$ -**		**$ 71,857.36**

Appendix C

Drawings



NOTES

1.0 GENERAL – CONSTRUCTION

1. ALL CONSTRUCTION WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION AND REMOVAL OF ALL NECESSARY SIGNAGE, DELINEATORS, MARKERS, AND BARRIERS. ALL SIGNS SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS IN THE ONTARIO TRAFFIC MANUAL, BOOK 7, TEMPORARY CONDITIONS. A TCP SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR REVIEW.
3. THE CONTRACTOR WILL MAINTAIN ACCESS TO PRIVATE PROPERTIES FOR VEHICULAR AND PEDESTRIAN ACCESS.
4. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS).
5. GENERAL CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND HAVING ON SITE, A COPY OF THE ONTARIO PROVINCIAL SPECIFICATIONS.
6. THE DETAILS IN THESE DRAWINGS SHALL TAKE PRECEDENCE OVER THE LATEST OPSD DETAILS WHERE APPLICABLE.
7. THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE PROJECT AND REPORT ANY DISCREPANCY TO THE CONTRACT ADMINISTRATOR BEFORE PROCEEDING WITH THE WORKS.
8. THE APPROVAL OF THE PLANS DOES NOT EXEMPT THE CONTRACTOR FROM OBTAINING, BUT NOT LIMITED TO THE FOLLOWING PERMITS: ROAD CUT, SEWER PERMIT, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH PERMITS, ETC.
9. ALL DIMENSIONS ARE PROVIDED IN METRIC UNITS, UNLESS SPECIFIED OTHERWISE.
10. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION, AND ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE CONTRACT ADMINISTRATOR.
11. ALL PROPERTY BARS TO BE PRESERVED AND REPLACED BY AN O.L.S. AT THE CONTRACTORS EXPENSE IF REMOVED AND/OR DAMAGED DURING CONSTRUCTION.
12. THE LOCATION OF THE EXISTING UTILITIES SHOWN ON THESE DRAWINGS IS APPROXIMATE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ARRANGE FOR THE FIELD LOCATION OF ALL UTILITIES PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR IS TO CONFIRM THE LOCATION OF EXISTING UTILITIES AND ANY DISCREPANCIES ARE TO BE REPORTED TO THE CONTRACT ADMINISTRATOR.
13. THE CONTRACTOR IS RESPONSIBLE FOR PRESERVATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES FOR ALL UTILITY RELOCATIONS ACCORDINGLY. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE THEIR ACTIVITIES SO AS NOT TO CONFLICT WITH THE UTILITY COMPANIES.
14. IF ANY EXCAVATION OR TRENCHING IS WITHIN 1.50m OF UTILITY POLES OR ANCHORS THE CONTRACTOR SHALL BE RESPONSIBLE FOR HAVING POLES BRACED TO THE SATISFACTION OF THE APPROPRIATE UTILITY. ALL COSTS ASSOCIATED WITH THE BRACING OF POLES SHALL BE CARRIED BY THE CONTRACTOR.
15. ANY EXISTING SIGNAGE THAT IS IN CONFLICT WITH THE PROPOSED CONSTRUCTION IS TO BE REMOVED AND STORED, AS CONSTRUCTION PERMITS, SIGNAGE IS TO BE REINSTATED IN THE APPROPRIATE LOCATION OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR.
16. IT IS THE LAND OWNER'S RESPONSIBILITY TO IDENTIFY / MARK EXISTING TILE DRAINS ALONG THE PROPOSED DRAIN. MARKED OUTLETS THAT ARE DAMAGED BY THE CONTRACTORS DURING CONSTRUCTION WILL BE REQUIRED TO REPAIR OR REPLACE DAMAGED TILE.
17. ALL DISTURBED AREAS TO BE REINSTATED TO PRE-CONSTRUCTION CONDITION OR BETTER IN ACCORDANCE WITH OPSS 492.
18. TO AVOID IMPACTS TO BREEDING FISH, WORK SHOULD BE COMPLETED OUTSIDE OF THE FISH BREEDING WINDOW WHICH EXTENDS FROM MARCH 15 TO JULY 15.
19. TO COMPLY WITH THE MIGRATORY BIRDS CONVENTION ACT, 1994, AND TO AVOID IMPACTS TO BREEDING BIRDS, VEGETATION CLEARING SHOULD BE COMPLETED OUTSIDE OF THE BIRD BREEDING WINDOW WHICH EXTENDS FROM APRIL 1 TO AUGUST 31. SHOULD CLEARING ACTIVITIES DURING THIS TIMING WINDOW BY UNAVOIDABLE, A SURVEY BY A QUALIFIED PROFESSIONAL SHOULD BE COMPLETED WITHIN 48 HOURS OF THE SCHEDULED REMOVALS.

2.0 EROSION AND SEDIMENT CONTROL NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROLS SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/ha.
6. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
7. FILTREXX SILTSOXX OR APPROVED EQUIVALENT TO BE INSTALLED AT MINIMUM 60 m INTERVALS BETWEEN 1+000 TO 1+678 AND 2+050 TO 2+490 AT A MINIMUM HEIGHT OF 300mm.
8. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
9. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR AT LEAST 30m FROM ANY WATERCOURSE.
10. REFUELING IS TO TAKE PLACE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
11. AN APPROVED SPILLS MANAGEMENT PLAN IS TO BE KEPT ON SITE.
12. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
13. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE MOECC SPILLS ACTION CENTRE AT 1-800-268-6060.
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
15. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AS SITE CONDITIONS CHANGE, AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.

OPSS/OPSD LIST

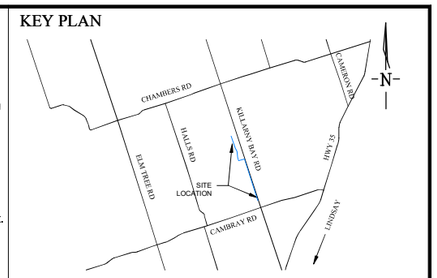
OPSS LIST

No.	DESCRIPTION	REVISION DATE
180	MANAGEMENT OF EXCESS MATERIALS	NOVEMBER 2016
206	CONSTRUCTION SPECIFICATION FOR GRADING	APRIL 2019
314	UNTREATED SUBBASE, BASE, SURFACE, SHOULDER, STOCKPILING	NOVEMBER 2019
401	CONSTRUCTION SPECIFICATION FOR TRENCHING, BACKFILLING, AND COMPACTING	NOVEMBER 2015
410	CONSTRUCTION SPECIFICATION FOR PIPE SEWER INSTALLATION IN OPEN CUT	NOVEMBER 2015
421	PIPE CULVERT INSTALLATION IN OPEN CUT	NOVEMBER 2018
506	DUST SUPPRESSANTS	NOVEMBER 2017
510	CONSTRUCTION SPECIFICATION FOR REMOVAL	NOVEMBER 2014
511	RIP-RAP, ROCK PROTECTION, AND GRANULAR SHEETING	NOVEMBER 2019
706	TEMPORARY TRAFFIC CONTROL DEVICES	APRIL 2018
802	CONSTRUCTION SPECIFICATION FOR TOPSOIL	NOVEMBER 2019
803	SODDING	APRIL 2018
804	SEED AND COVER	NOVEMBER 2014
805	CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES	NOVEMBER 2018
1010	AGGREGATES, BASE, SUBBASE, SELECT SUBGRADE, BACKFILL	NOVEMBER 2013

OPSD LIST

No.	REV.	DESCRIPTION	REVISION DATE
802.010 (MODIFIED)	3	FLEXIBLE PIPE EMBEDMENT MODIFICATION AND BACKFILL, EARTH EXCAVATION	APRIL 2015

KEY PLAN



NOTES:
-

LEGEND

- PROPERTY LINE
- EXISTING DITCH
- PROPOSED MUNICIPAL DRAIN
- MUNICIPAL DRAIN FLOW DIRECTION
- CATCHMENT BOUNDARY

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTG U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. THE CKL AND CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

REVIEWED BY

_____ P. Eng ( ) C.E.T./C.Tech ( ) OTHER ( )

PUBLIC WORKS/ENGINEERING DEPARTMENT

DATE: _____

BENCHMARK

LOCAL BM1 NAIL IN THE BOTTOM OF HYDROPOLE	ELEVATION: 259.14m NORTHING: 17T - 4921513.78 EASTING: 674719.76	
LOCAL BM2	ELEVATION: NORTHING: EASTING:	
LOCAL BM3	ELEVATION: NORTHING: EASTING:	
LOCAL BM4	ELEVATION: NORTHING: EASTING:	

No.	REVISION	DATE	BY	APPROVED
1.	DRAFT SUBMISSION	01/23	MJH	
2.	SUBMISSION TO KAWARTHA CONSERVATION	01/23	MJH	
3.				
4.				
5.				
6.				

Kawartha Lakes

ENGINEERING AND CORPORATE ASSETS INFRASTRUCTURE DESIGN AND CONSTRUCTION

12 PEEL STREET
LINDSAY, ONTARIO
K9V 5R8

(705) 324-9411

ENGINEER'S STAMP

CONSULTANT

D.M. Wills Associates Limited
160 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

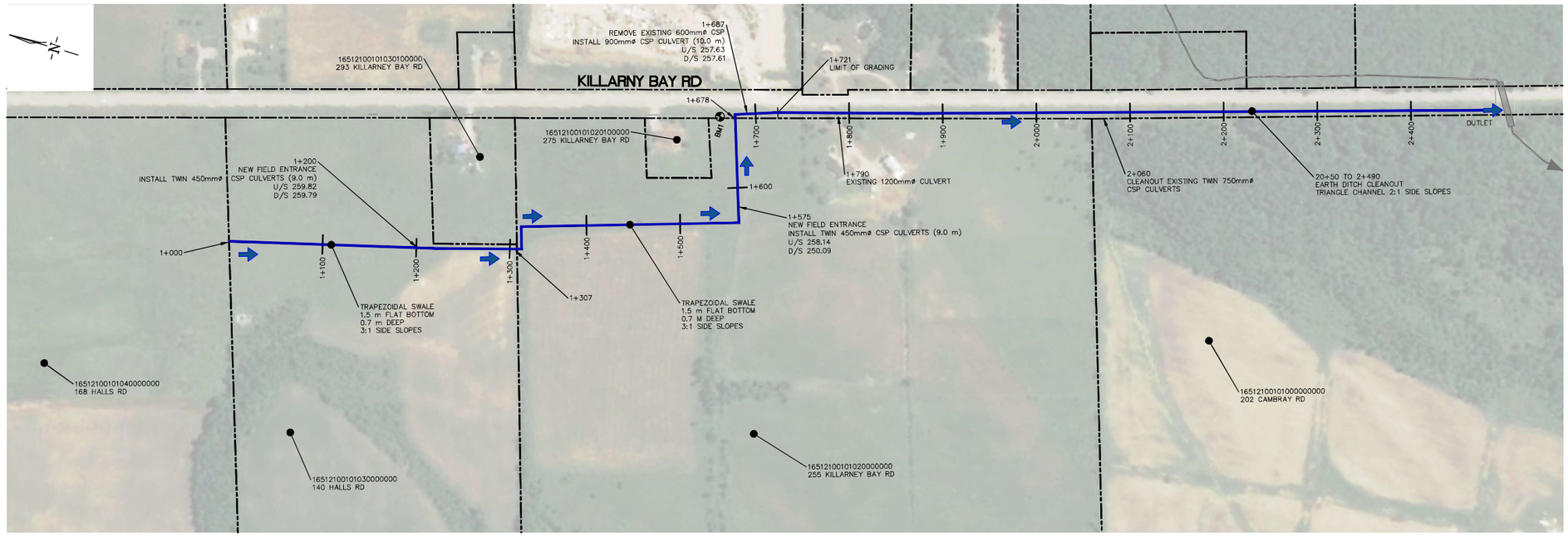
T. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

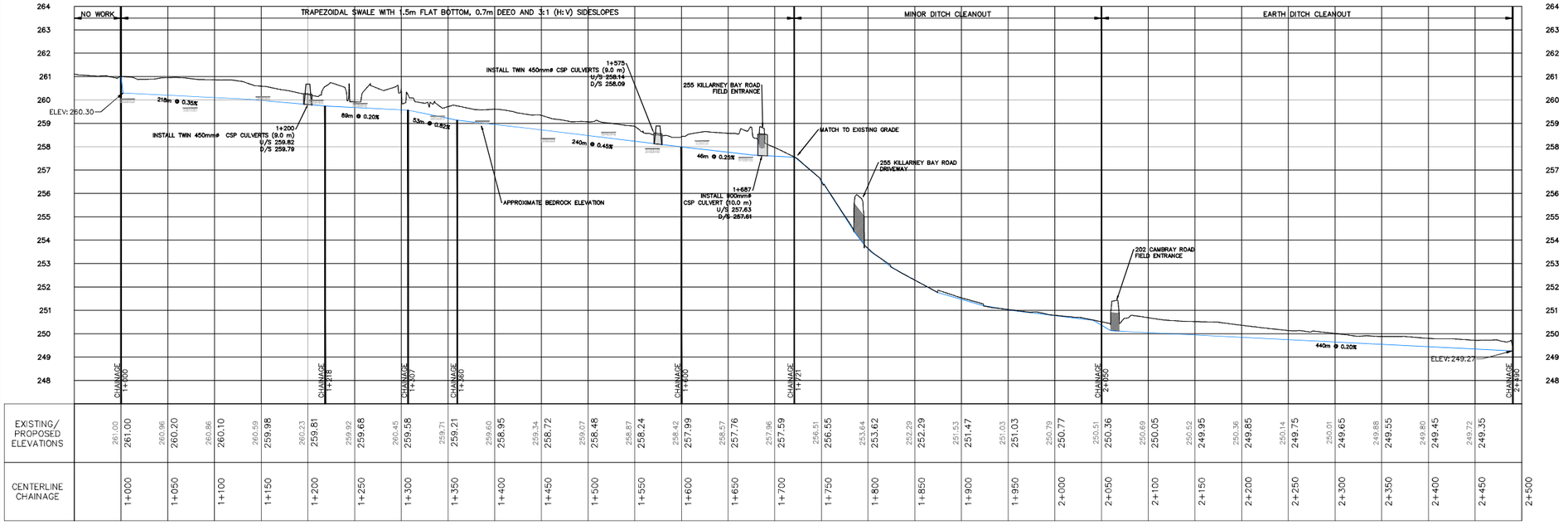
Curtin Municipal Drain

WATERSHED PLAN

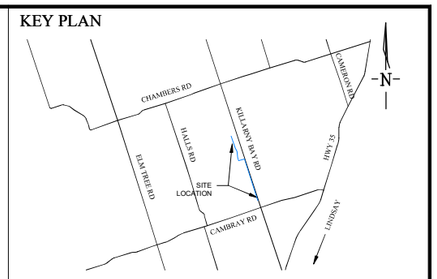
DESIGNED BY: MH	SCALES	PROJECT No: 22-5508
CHECKED BY: MH	HORIZONTAL: 1:5000	DRAWING: 5508_MD
DRAWN BY: GB	VERTICAL:	SHEET No: 101
DATE: JANUARY 2023	0 100 200 300 1:5000	

NOT FOR CONSTRUCTION





KEY PLAN



NOTES:

-

LEGEND

- PROPERTY LINE
- EXISTING DITCH
- PROPOSED MUNICIPAL DRAIN
- MUNICIPAL DRAIN FLOW DIRECTION
- APPROXIMATE BEDROCK ELEVATION

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTG U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. THE CKL AND CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

REVIEWED BY

_____ P. Eng ( ) C.E.T./C.Tech ( ) OTHER ( )

PUBLIC WORKS/ENGINEERING DEPARTMENT

DATE: _____

BENCHMARK

LOCAL BM1 NAIL IN THE BOTTOM OF HYDROPOLE	ELEVATION: 259.14m NORTHING: 17T - 4921513.78 EASTING: 674719.76
LOCAL BM2	ELEVATION: NORTHING: EASTING:
LOCAL BM3	ELEVATION: NORTHING: EASTING:
LOCAL BM4	ELEVATION: NORTHING: EASTING:

No.	REVISION	DATE	BY	APPROVED
1.	DRAFT SUBMISSION	01/23	MJH	
2.	SUBMISSION TO KAWARTHA CONSERVATION	01/23	MJH	
3.				
4.				
5.				
6.				

Kawartha Lakes

ENGINEERING AND CORPORATE ASSETS INFRASTRUCTURE DESIGN AND CONSTRUCTION

12 PEEL STREET
LINDSAY, ONTARIO
K9V 5R8

(705) 324-9411

ENGINEER'S STAMP

CONSULTANT

WILLS

D.M. Wills Associates Limited
160 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

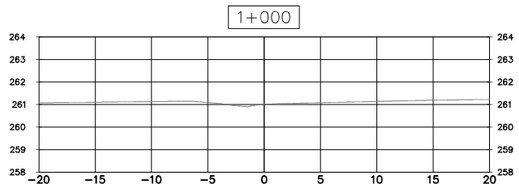
T. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

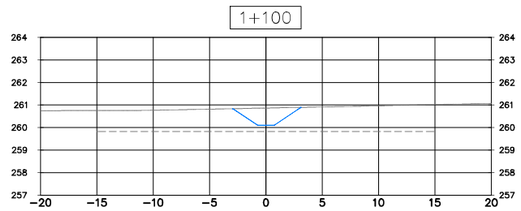
Curtin Municipal Drain

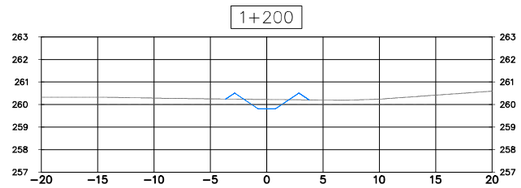
PLAN AND PROFILE

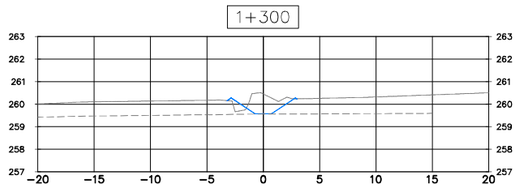
DESIGNED BY: MH	SCALES	PROJECT No: 22-5508
CHECKED BY: MH	HORIZONTAL: 1:2500	DRAWING: 5508_MD
DRAWN BY: GB	VERTICAL: 1:100	SHEET No: 201
DATE: JANUARY 2023	0 100 200 300 1:5000	

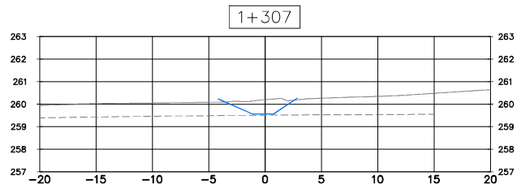
NOT FOR CONSTRUCTION

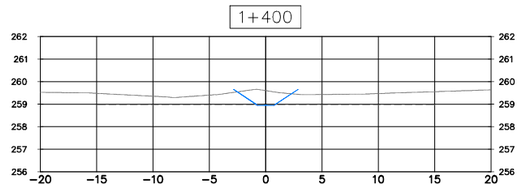


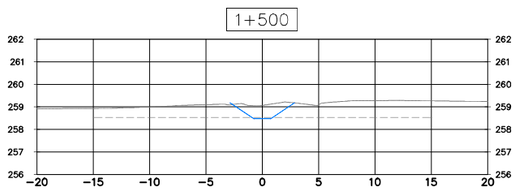


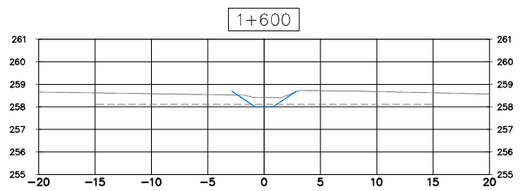


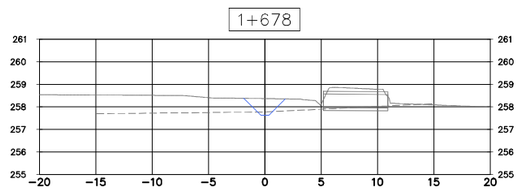


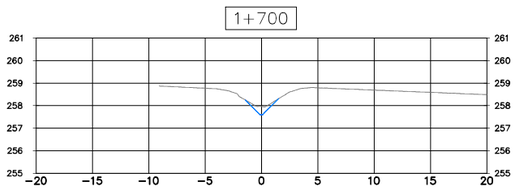


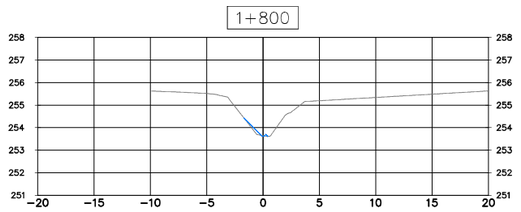


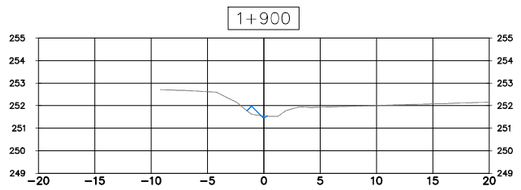


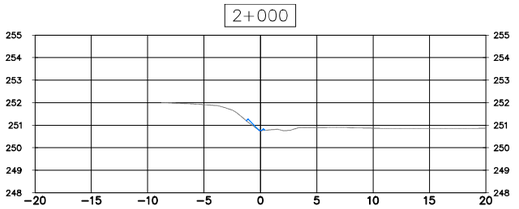


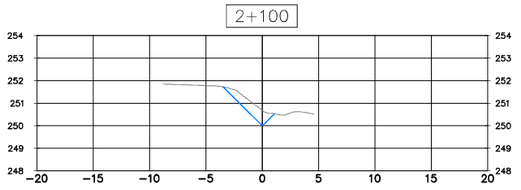


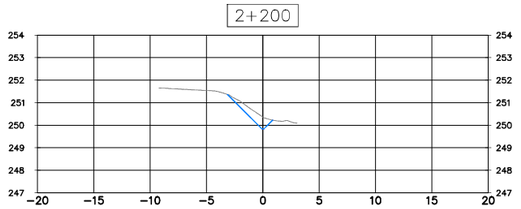


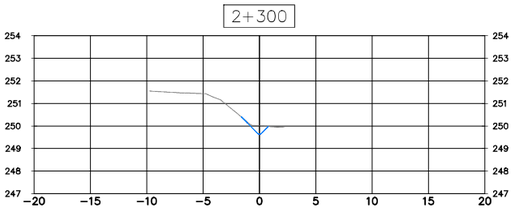


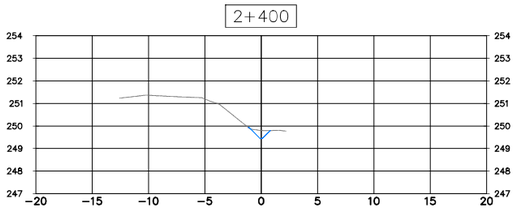




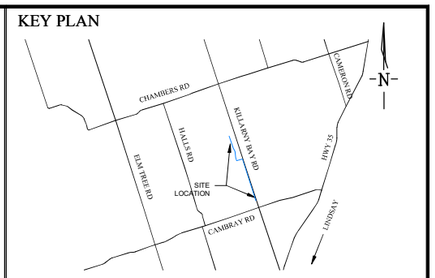








KEY PLAN



NOTES:
-

LEGEND

EXISTING GROUND
PROPOSED SWALE
APPROXIMATE BEDROCK ELEVATION

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTG U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. THE CKL AND CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

REVIEWED BY

_____ P. Eng ( ) C.E.T./C.Tech ( ) OTHER ( )

PUBLIC WORKS/ENGINEERING DEPARTMENT

DATE: _____

BENCHMARK

LOCAL BM1 NAIL IN THE BOTTOM OF HYDROPOLE	ELEVATION: 259.14m NORTHING: 17T - 4921513.78 EASTING: 674719.76
LOCAL BM2	ELEVATION: NORTHING: EASTING:
LOCAL BM3	ELEVATION: NORTHING: EASTING:
LOCAL BM4	ELEVATION: NORTHING: EASTING:

No.	REVISION	DATE	BY	APPROVED
1.	DRAFT SUBMISSION	01/23	MJH	
2.	SUBMISSION TO KAWARTHA CONSERVATION	01/23	MJH	
3.				
4.				
5.				
6.				

Kawartha Lakes

ENGINEERING AND CORPORATE ASSETS
INFRASTRUCTURE DESIGN AND CONSTRUCTION

12 PEEL STREET
LINDSAY, ONTARIO
K9V 5R8

(705) 324-9411

ENGINEER'S STAMP

CONSULTANT

WILLS

D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Curtin Municipal Drain

CROSS SECTIONS

DESIGNED BY: MH	SCALES	PROJECT No: 22-5508
CHECKED BY: MH	HORIZONTAL: 1:250	DRAWING: 5508_MD
DRAWN BY: GB	VERTICAL: 1:125	SHEET No: 301
DATE: JANUARY 2023	0 100 200 300 1:5000	

NOT FOR CONSTRUCTION

Appendix D

Special Provisions

Special Provisions

For the Construction of the

Curtin Municipal Drain

D.M. Wills Project Number 21-5508

D.M. Wills Associates Limited
Partners in Engineering, Planning and
Environmental Services
Peterborough

December 2022

Prepared for:
City of Kawartha Lakes

Table of Contents

SPW 001 - Bonding

Performance and Warranty Bond

The Contractor is required to provide a Performance Bond in an amount equal to 50% of the contract price as accepted, for due and proper fulfillment of the Contract and shall remain valid until Completion of the project.

The Bond shall be with a satisfactory Guarantee Surety Company, resident in Canada or authorized to carry on business in Canada.

Labour and Materials Bond

The Contractor is required to provide a Labour and Materials Bond in an amount equal to 50% of the contract price as accepted, for payment of all monies due to the Contractor's suppliers and subcontractors, for materials, equipment, and labour supplied under this Contract for a period of two (2) years after the Substantial Performance of the Contract.

The Surety shall remain liable for a default occurring up to the date of expiry of this bond but shall not be liable for a default occurring subsequent to such expiry date. Notwithstanding the terms of the Contract, non-renewal of the bond shall not be considered a default hereunder.

The Bond shall be with a satisfactory Guarantee Surety Company, resident in Canada or authorized to carry out business within Canada.

SPW 002 - Mobilization and Demobilization

The work consists of the mobilization and demobilization of the Contractor's forces and equipment necessary for performing the work required under the Contract.

Mobilization shall include all activities and associated costs for transportation of Contractor's personnel, equipment, and operating supplies to the site; establishment of field offices, storage facilities, and other necessary general facilities for the contractor's operations at the site.

Security protection of the Contractors field office, equipment and stored materials during the course of the Contract.

Maintenance and repair of all necessary access to the project including haul roads as required and the restoration of the surfaces to the original condition after the haul roads are removed.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the Contract from the site; including the disassembly, removal, and site cleanup of field offices, storage areas, and

other facilities assembled on the site specifically for project construction to original site conditions.

Upon site mobilization 30% of fees shall be paid. Partial release for maintenance works will be at the discretion of the Contract Administrator. Upon demobilization and achievement of Substantial Performance, to the satisfaction of the Contract Administrator, the remaining fees shall be released.

SPW 005 - Removal, Transportation and Disposal of Contaminated Earth Excavation Material (Provisional)

The Contractor shall understand that this item is provisional and shall only apply when site conditions warrant and only to the extent of work involved as determined by the Contract Administrator.

Contaminated earth excavation material may be encountered in the performance of this contract. The contractor shall take the necessary precautions to ensure personal protection under the appropriate governing regulations and the Occupational Health and Safety Act regulations.

The name of the disposal company and disposal destination, as well as, proof of all licensing and certification as required by the Ministry of the Environment and the waste management sites for transportation and disposal and the license plate numbers of all haul trucks shall be provided to the City of Kawartha Lakes a minimum of 24 hours prior to transporting disposable material

The contractor is required to submit copies of all bills of lading from disposal facilities and transfer stations to the contract administrator as proof of compliance.

All soil/earth within or immediately adjacent to the public right-of-way shall be assumed to have levels of Sodium Absorption Ratio (SAR) and Electrical Conductivity (EC) that exceeds the acceptable limits. Therefore, earth excavation material within or adjacent to the right-of-way shall not be considered to be contaminated if the SAR and/or EC limits are exceeded.

Tipping fees for waste management sites are to be included in the unit price bid for the item.

Measurement for Payment - in cubic meters.

Basis of Payment - Payment at the Contract unit price shall be compensation in full for the supply of all labour, equipment, and materials required to completely remove, transport and dispose of any or all contaminated earth excavation material, including any permits, fees or other charges incidental to this item to the satisfaction of the Contract Administrator.

SP 201 - Clearing and Grubbing

Reference: OPSS 201

Work under this item shall conform to OPSS 201. The Contractor shall include in the price bid for this item, all labour, equipment and materials required to remove all trees and shrubs in the work area which are designated for removal as indicated on the drawings or by the Contract Administrator. The Contractor shall carefully cut and trim trees and shrubs as necessary to eliminate any conflicts or damage to existing above ground and underground utilities and nearby structures. All stumps shall be completely removed by the Contractor. All material shall be disposed of by the Contractor. No on site burning will be allowed.

Measurement for payment - Lump Sum.

Basis of Payment - Payment for this item will be a percentage based upon the actual work completed.

SP 206 - Excavation and Grading (Local Disposal)

Reference: OPSS 180, 206 & 510

The contract quantities for earth excavation have been determined from existing ground cross-sections and theoretical design sections. No further measurement for payment will be made unless the Contract Administrator requires a change in grade or removal of additional material. Should this occur, additional payment shall be made as additional quantity over the planned quantity.

The contract unit prices shall include the removal and disposal off-site of all concrete, wood, abandoned services, utilities, and other debris encountered during the course of excavation. All materials to be disposed off-site are to be hauled off-site to a location arranged for by the Contractor and approved by the Contract Administrator. Removal of such materials shall include all plant, equipment and labour to complete the required works.

The Contract unit prices shall include the removal and stockpiling of all surplus material, boulders, and rock slabs up to and including one (1) cubic meter in size to the designated areas as shown on the contract drawings.

The subgrade (Palestine Road) shall be proof rolled, inspected and approved by the City / Contract Administrator's geotechnical engineer prior to the placement of granular materials.

Grading limits and proposed works on private property are subject to the Curtin Municipal Drain Engineering Report, to which both the City of Kawartha Lakes and the property owners are parties. No adjustments to these works are to be undertaken without prior approval from the Contract Administrator. Spot checks will be taken on the subgrade elevation by the Contract Administrator at regular intervals to

substantiate compliance with the theoretical cross-sections. Work under this item shall also include the following:

- Excavation quantities all cut and cut to fill requirements as indicated on the plan, profile and cross-section drawings.
- Fill quantities include all earth material required to meet the levels, grades and contours of those items noted above, and all other fill requirements as indicated on the plan, profile and cross-section drawings.
- Quantities do not include surplus material from sewer trenches that must also be disposed at location approved by the City of Kawartha Lakes. Payment for disposal of such surplus blow-up material shall be included in the unit rate bid under the appropriate pipe items.
- The unit price for this item shall include all plant, equipment, labour and material to grade ditches to provide positive drainage. The unit price shall be full compensation for all work associated with the grading of ditches, and swales. All work shall be done to the satisfaction of the City of Kawartha Lakes.

Measurement for Payment

1. Volumes have been computed in cubic meters by average theoretical end area method.
2. Theoretical quantity is the basis of final quantity payment with
    a. slope tolerance of 300mm, and
    b. grade tolerance of 30mm.
3. No additions or reductions are to be applied within tolerances of 0.2m above or below theoretical.
4. Overcuts outside the 0.2 m tolerance ordered by the City will be computed and paid extra over the planned quantity.
5. Undercuts outside the 0.2 m tolerance either ordered by the City or undertaken by the Contractor as his responsibility will be computed and deducted from the planned quantity.

Basis of Payment: The Contractor shall include provision for all associated costs to perform the works identified above, **including** disposal of surplus material off site.

Cross-sections showing both the original ground surface and the proposed construction are included in the contract drawings.

All soil/earth within the public right-of-way shall be assumed to have levels of Sodium Absorption Ratio (SAR) and Electrical Conductivity (EC) that exceeds the acceptable limits. Therefore, earth excavation material within the right-of-way shall not be considered to be contaminated if the SAR and/or EC limits are exceeded. It is the Contractor's responsibility to find a suitable/approved disposal site and no additional claims will be entertained as a result of these elevated levels.

Unsuitable Earth Excavation and Backfill (Provisional)

OPSS 180, 206, 314, 1010

The Contractor shall understand that this item is provisional and shall only apply when site conditions warrant and only to the extent of work involved as determined by the Contract Administrator.

Where soft spots are identified and are local/dry in nature, the Contract Administrator shall instruct the Contractor to sub-excavate such areas to depths and limits as determined by the Contract Administrator or his agent, and to supply and place approved backfill as directed. All costs associated with the sub-excavation, supply, placement, and compaction of granulars, and any disposal of surplus material shall be included in this item.

SP 403 - Rock Excavation

Reference: OPSS 403

The Contractor shall understand that this item is provisional and shall only apply when site conditions warrant and only to the extent of work involved as determined by the Contract Administrator.

This item will only apply when rock is fractured by mechanical means (Blasting will not be permitted). Rock shatter, over-break or item overlap will not be considered for payment. Weathered rock that can be removed by excavation equipment will not be considered for payment.

All rock and large boulders excavated shall be kept onsite.

Rock shall be considered rock under this item regardless of the hardness. No extra payments will be made for the hardness of rock.

Boulders with a volume in excess of 1.0 m3 that are excavated from the trench or road subgrade shall be included in the calculation for payment under this item. No measurement shall be made for boulders less than 1.0 m^3.

Measurement of payment as per OPSS MUNI 403.

Basis of Payment – payment at the unit price shall be compensated in full for the removal and disposal of bedrock and large boulders (>1.0m3) that are excavated and removed from the trench or road excavation.

SP 421 - Pipe Culvert Installation in Open Cut

Reference: OPSS 421

All driveway culverts are to be circular galvanized steel with a 2.0 mm thickness and provided with bolt and angle fasteners.

The unit price shall include for the following:

- Excavation for culverts in accordance with OPSS 421 at the locations as indicated on the Contract Drawings.
- Disposal of excavated material to the designated locations shown on the contract drawings, and supply and placement of Granular 'A' pipe embedment and Granular 'A' backfill.

Measurement for Payment – actual quantity of pipe culvert placed in meters.

SP 506 - Dust Control (Provisional)

Reference: OPSS 506

The Contractor shall understand that this item is provisional and shall only apply when site conditions warrant and only to the extent of work involved as determined by the Contract Administrator.

The Contractor shall take such steps as may be required to prevent dust nuisance resulting from his operations either within the right of way or elsewhere or by public traffic where it is the Contractor's responsibility to maintain a roadway through the work.

Where the work requires the sawing of asphalt or the sawing or grinding of concrete, blades and grinders of the wet type shall be used together with sufficient water to prevent the incidence of dust, wherever dust would affect traffic or wherever dust would be a nuisance to residents of the area where the work is being carried out.

The Contractor shall spread Calcium Chloride in a uniform manner to reduce waste.

Measurement for Payment – Payment for Calcium Chloride shall be in kilograms. There will be no payment made for water. There will be no payment for calcium placed on pulverized road.

Basis of Payment – Payment at contract prices shall include all labour, equipment and materials for the supply and application of flaked calcium chloride for dust control as required for trench backfill areas, or directed by the contract administrator.

SP 510 – Removals

Reference: OPSS 510

Work under these items shall also include the following:

- All materials removed that are not specified for salvage, stockpiling, reinstallation and/or relocation, including asphalt, culverts and curb & gutter, manholes,

watermains and sewers, as specified on the Removal Drawings are to be hauled off site to a location arranged for by the Contractor and approved by the Authority. Removal of such materials shall include all labour and equipment to complete the required works.

- Removal of multiple layers of asphalt and concrete including all buried asphalt and concrete.
- Removal, disposal, stockpile, store, separate and reuse existing road granular material for trench backfill (at the Contract Administrators approval).
- All materials to be salvaged are to be stored in a secure location. Salvaged materials that have been damaged due to carelessness by the Contractor are to be replaced by the Contractor at no expense to the The City of Kawartha Lakes.
- Any additional costs needed to remove asphalt using a grinding machine (cold planer) shall be included.
- The Contractor is to use extreme care when removing asphalt and granulars at the project limits to prevent uplifting of the adjacent pavement and curb and gutter. Damage to adjacent pavement and curb and gutter due to carelessness by the Contractor, as determined by the Contract Administrator, will be repaired at the Contractors expense.
- Removal of existing drainage pipes sewer pipes as indicated on the Contract Drawings or as directed by the Contract Administrator.
- The Contractor shall saw-cut all asphalt pavement to be removed in order to provide a clean joint.

Basis of Payment - Based on estimated percentage complete, as determined by the Contract Administrator.

SP 511 – Rip-Rap Stone on Filter Cloth (Provisional)

Reference: OPSS 511, 1004, OPSD 810.010 Type "B"

The Contractor shall understand that this item is provisional and shall only apply when site conditions warrant and only to the extent of work involved as determined by the Contract Administrator.

Work under these items shall also include the following:

- Excavation and disposal of the excavated materials.
- Class 1 Geotextile Filter Fabric (Terrafix 360–R or equivalent) supplied and installed in place.
- Supply and place rip-rap stone (100 mm to 150 mm). Note, placement of material shall be completed by hand in such a manner that the surface of the finished river run stone shall have a uniform appearance and be without segregation.

SP 706 - Temporary Traffic Control

Reference: OPSS 706; OTM Book 7. Section H - General Provisions

The Contractor shall include in the Lump Sum (L.S.) price bid for this item, all labour, equipment and materials required to supply, place and maintain all traffic control measures, signing and Traffic Control Person's (TCP's), in conformance with OPSS 706, the Ontario Traffic Manual (OTM), Book 7, "Temporary Conditions", MTO requirements, and the Occupational Health & Safety Act (OHSA), Regulations 213/91 and 145/00.

The Contractor is to submit a traffic management plan that conforms to the above, to the Contract Administrator for review prior to the commencement of work. The traffic control plan shall be submitted a minimum of two (2) weeks prior to any work taking place.

The Contractor must maintain vehicular access to all businesses, residences, etc., at all times and must be 100% accessible at the end of each construction day.

Maintaining access to all properties and their parking areas may involve constructing temporary entrances, temporary ramping, blocking only one (1) driveway at a time, or carrying out such Work as may be required to provide the minimum amount of disruption.

The Contractor may be permitted to temporarily block normal vehicular access to the properties and respective parking areas, as approved, if the Contractor can either provide alternative or limited access which is acceptable to the respective property owners. All such arrangements and provisions must be approved by the Contract Administrator in writing.

All pedestrian traffic within the Contract limits must be maintained at all times during construction. The Contractor shall supply and place ramps to provide access for pedestrians to houses, and other locations as required, if normal access has been blocked as a result of construction.

The Contractor shall be responsible for maintaining all road cuts and disturbed areas during evenings and weekends including supply and place cold mix asphalt or hot mix asphalt on road cuts as directed by the Contract Administrator throughout the full duration of construction.

At all times the Contractor shall maintain one (1) lane of vehicular traffic during working hours and two (2) lanes of vehicular traffic during non-working hours. Traffic shall be under control of qualified Traffic Control Persons during all traffic restrictions.

Any remedial work shall be completed by the Contractor within 24 hours of being notified. Should the Contractor fail to comply, The City of Kawartha Lakes will arrange to have the works completed and deduct all associated costs from the Contractor's payment.

Measurement for Payment - Lump Sum.

Basis of Payment – Per OPSS 706.10.02

SP 804 - Seed and Cover

Reference: OPSS 804

Work under this item shall include the following:

- Supply and placement of seed and mulch as per the drawings or as directed by the Contract Administrator.
- Seed shall be MTO mix seed.

Measurement for Payment – per square meter (m2)

Basis for Payment – 50% upon successful supply and placement. 50% upon established full growth.

SP 805 - Erosion and Sediment Control

Reference: OPSS 805. OPSD 219.110 and 219.100

Light Duty Silt Fence

The unit price for this item shall include all plant, equipment, labour and material to supply, install, maintain and remove the siltation control fence system as shown on the drawings or as directed by the Contract Administrator, prior to the commencement of earthworks and underground servicing.

The Contractor shall, at all times, prevent sediment from entering private property. The Contractor shall advise the City / Contract Administrator of any locations where siltation control fence may be required, for approval prior to installation.

The siltation fence shall be Dominion Textile (Envirofence), or an approved equivalent.

The scope of work includes:

- Excavation to facilitate installation of silt fence prior to any construction commencement at locations shown on Contract Drawings and around stockpiles or as indicated by the Contract Administrator.
- Maintenance of silt fence and reinstatement as required during construction or as indicated by the Contract Administrator.
- Removal of all material related to the above work offsite upon successful restoration as determined by the Contract Administrator.
- Restore ground surface to original state once silt fence has been removed.

Measurement for payment - per meter (m) of silt fence installed.

Basis of Payment - Per OPSS 805.10.01

Terrifix Silt Sock

Terrifix Silt Sock shall be installed as detailed on the plans or as directed by the Contract Administrator, and shall be installed at the locations noted on the plans. The Contractor shall include in the price bid for this item, all labour, equipment and materials required to install, maintain until all surfaces are stabilized and removal. The Contractor shall include all costs for disposal of all materials off-site. The Terrifix Silt Sock shall be installed in accordance with the manufacturer's recommendations.

Measurement for payment – per meter (m) of silt sock installed.

Basis of Payment: Per OPSS 805.10.01

SP 1010 – Aggregates – Base, Subbase, Select Subgrade and Backfill Material

Granular B

Reference: OPSS 314, 501, and 1010

The scope of work shall include:

- Preparing and proof rolling of road subgrade to the satisfaction of the Contract Administrator prior to placement of any Granular 'B' Type I or approved equivalent.
- Supply, place, fine grade and compact Granular "B" Type I to 100% of material's Standard Proctor Maximum Dry Density (SPMDD).
- Application of water and/or calcium chloride for compaction and/or dust control.

The Contractor shall submit a representative sample and a gradation of the proposed Granular 'B' material two (2) weeks prior to placing. If the gradation analysis fails, the Contractor shall stop operations immediately and pay for all subsequent testing until an acceptable result sample is achieved.

Granular 'B' that becomes contaminated due to Contractor's activity shall be removed and replaced at the Contractor's expense.

No additional payment will be made for the supply of water required for compaction and/or dust control.

Measurement for payment will be actual quantity installed and the unit of measurement is square metres.

Payment at the Contract unit price shall be full compensation for all labour, equipment and material required to perform the work.

Granular A

Reference: OPSS 314, 501, and 1010

The scope of work shall include:

- Preparing and proof-rolling of Granular "B" in Roadway and/or Subgrade in Driveways to the satisfaction of the Contract Administrator prior to placement of any Granular "A".
- Supply, place, fine grade and compact 150 mm of Granular "A" in Roadway compacted to 100% of materials SPMDD.
- Application of water and/or calcium chloride for compaction and/or dust control.

Work to be in accordance with OPSS 314.

The Contractor shall submit a representative sample and a gradation of the proposed Granular "A" material two (2) weeks prior to placing. If the gradation analysis fails, the contractor shall stop operations immediately and pay for all subsequent testing until an acceptable result sample is achieved.

Granular "A" that becomes contaminated due to Contractor's activity, shall be removed and replaced at the contractors expense.

No additional payment will be made for the supply of water required for compaction and/or dust control.

Measurement for payment will be actual quantity installed and the unit of measurement is square metres.

Payment at the Contract unit price shall be full compensation for all labour, equipment and material required to perform the work.

Gravel Driveway

Reference: OPSS 301, 314, 501, and 1010

Residential or commercial driveways having existing gravel access shall be restored to a state similar or better than pre-construction conditions and shall remain gravel unless otherwise agreed.

Excavate, supply, place, fine grade and compact 150 mm of Granular "A" in Residential Gravel Driveways compacted to 100% of materials where existing driveways have been disturbed.

Measurement for payment – actual quantity of granular A placed and the unit of measurement is square meters (m^2).

Basis of payment – All labour, equipment and material required to excavate and dispose of surplus material and supply, place, grade and compact 150 mm imported.

Appendix E

Construction Specifications

Specification for the Construction of

Municipal Drain Works

D.M. Wills Project Number 21-5508

D.M. Wills Associates Limited
Partners in Engineering, Planning and
Environmental Services
Peterborough

December 2022

Prepared for:
City of Kawartha Lakes

Table of Contents

Section A General

A.1 Scope

The work to be done under this specification consists of supplying all labour, materials and equipment to construct the work as outlined on the drawing(s). In some Municipalities, the Contractor shall supply all materials while in other Municipalities, they shall supply only certain materials, the form of Tender and Agreement lists which materials are to be supplied by the Contractor.

A.2 Tender

Tenders are to be submitted on a lump sum basis for the complete works or a portion thereof, as set out in the Form of Tender and Agreement.

A.3 Drawings and Specifications

The tenderer must satisfy himself that he understands the meaning and Intent of the drawings and specifications before submission of his tender. The standard specifications have been separated into sections for reference purpose only. They shall be considered complementary and, where a project is controlled under one of the sections, the remaining sections will still apply for miscellaneous works. In case of any inconsistency or conflict in the Tender Documents, the following order of precedence shall apply:

Contract Drawings
Form of Tender and Agreement
General Conditions
Standard Specifications (Open Drain, Tile Drain, Specifications for Municipal Drain Crossing County Roads)
Standard Drawings

A.4 Errors and Unusual Conditions

The Contractor shall notify the Engineer immediately of any error or unusual condition which may be found. Any attempt by the Contractor to make changes because of the error or unusual condition on his own shall be done at their own risk. Any additional cost incurred by the Contractor to remedy a wrong decision on their part shall be borne by the Contractor.

The Engineer shall make the alteration necessary to correct errors or to adjust for unusual conditions during which time it will be the Contractor's responsibility to keep their workers and equipment gainfully employed elsewhere on the project. The contract amount shall be adjusted in accordance with a faire valuation of the work added or deleted.

A.5 Payment

1. Except as herein provided, payments under this Contract will be made in accordance with GC8.02.04.
2. The Contractor shall submit a draft invoice for each progress payment application five (5) days prior to the first (1st) day of each month for review and approval by the Contract Administrator.
3. A proper invoice shall be submitted to the Contract Administrator within two (2) days of the approval of the draft invoice, and shall be in accordance with the Construction Act Part I.1 (s 6.1). A proper invoice shall only be considered when the following conditions have been met;
    a. The Contract Administrator has agreed to the draft invoice, and the date on the proper invoice is current with the date the draft invoice was agreed upon.
    b. A current WSIB Clearance Certificate has been received.
    c. A Statutory Declaration has been received.
    d. An updated construction Schedule identifying the critical path of the project has been received.
4. Should the Contract Administrator disagree with any part of the proper invoice for any reason, a Notice of Dispute will be submitted to the Contractor within two (2) days of the receipt of a proper invoice in accordance with the Construction Act (s 6.4).
5. All interim monthly certificates are not conclusive as to the value or quality of services provided and payment certificates are subject to reopening and readjustment.
6. The Owner shall have the right to withhold from any sum otherwise payable to the Contractor such amount as may be sufficient to remedy any defect or deficiency in the work pending correction of it.

A.6 Warranty Holdback and Payment

1. GC7.16.02, is hereby revised by the addition of the following, "…the Contractor shall correct promptly, within 48 hrs of written notification, at no additional cost to the Owner,…"
2. A holdback, the Warranty Holdback, will be applied to the contract amount that is separate from the Statutory Holdback amounts under the Construction Act and without prejudice to any other rights the Owner may have at law, in equity or in contract. Beginning with and continuing for all amounts in excess of 97% of the final Contract Amount, the Owner will retain from payment an amount equal to 3% of the Contract Amount. This amount shall be held by the Owner as a surety for the timely and complete correction by the Contractor, defects identified by the Owner during the period associated with the Warranty as described in GC 7.16.

3. In the event the Contractor fails to comply promptly with GC 7.16 or any other obligations under the Contract, the Owner may make arrangements for the performance of any necessary work in relation to the Contractor's obligations under the Contract, and may recover the costs from the Warranty Holdback funds.
4. The Warranty Holdback, less any deductions made therefrom as required, will be paid to the Contractor upon the expiration of the later of the Warranty Period and Final Acceptance. Interest upon retained amounts shall accrue to the benefit of the Owner.

A.7 Superintendent

The word "Superintendent", as used hereinafter in these specifications, shall refer to a Drainage Superintendent, appointed by the Municipality. The Superintendent will act as the Engineer's representative. The Superintendent shall have the power to direct the execution of the work and to make any necessary minor adjustments. Adjustments in tile sizes or gradients shall not be made without the approval of the Engineer. Any Instructions given by the Superintendent, which changes considerably the proposed work or with which the Contractor does not agree, shall be referred to the Engineer for his decision.

A.8 Commencement and Completion of Work

The work must commence immediately after the Contractor is notified of the acceptance of his tender or at a later date, if set out as a condition of the tender. If weather creates poor ground or working conditions the Contractor may be required, at the discretion of the Engineer, to postpone or halt work until conditions become acceptable.

The contractor must arrange for a preconstruction meeting to be held on the site with the Contractor and affected owners attending to review in detail the construction scheduling, access and other pertinent details. The Contractor's costs for attending this meeting shall be included in his lump sum tender price. If the Contractor leaves the job site for a period of time after initiation of work, he shall give the Engineer and the Superintendent a minimum of 24 hours' notice prior to returning to the project.

The work must be proceeded with in such a manner as to ensure its completion at the earliest possible date and within the time limit set out in the tender or in the contract documents.

A.9 Working Area and Access

The working area available to the Contractor to construct the drain and related works including an access route to the drain shall be as specified on the drawings.

Should the specified widths become inadequate due to unusual conditions, the Contractor shall notify the Engineer immediately in order that negotiations with the affected owners can take place.

Where a Contractor exceeds the specified widths due to the nature of their operations and without authorization, they shall be held responsible for the costs of all additional damages and the amount shall be deducted from their contract price and paid to the affected owners by the Municipality.

A.10 Inspection

Final inspection by the Engineer will be made within 20 days after they have received notice in writing from the Contractor that the work is complete.

Periodic inspections by the Engineer or Superintendent will be made during the performance of the work. These interim inspections are required to check such items as location of drainage course and structures, tile grades prior to backfilling, backfilling and miscellaneous work items

A.11 Alterations and Additions

The Engineer shall have the power to make alterations in the work shown or described in the drawings or specifications and the Contractor shall proceed to make such changes without causing delay. In every such case, the price agreed to be paid for the work under the contract shall be increased or decreased as the case may require according to a fair and reasonable valuation of the work added or deleted. The valuation shall be determined as a result of negotiations between the Superintendent, the Contractor, and the Engineer, but in all cases, the Engineer shall maintain the final responsibility for the decision. Such alterations and variations shall in no way render void the contract. No claim for variations or alterations in the increased or decreased price shall be valid unless done in pursuance of an order from the Engineer and/or Superintendent and notice of such claims made in writing before commencement of such work. In no case shall the Contractor commence work which he considers to be extra work before receiving the Engineer's and/or Superintendent's approval in writing.

A.12 Maintenance

The Contractor shall repair and make good any damages or faults in the drain that may appear within one (1) year after its completion (as dated on the final completion certificate) as the result of imperfect or defective work done or materials furnished by the Contractor. 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.

A.13 Insurance

1. As per GC 6.03.01, the Contractor shall provide Commercial General Liability and Automobile Insurance.
2. The Contractor shall provide proof of insurance within 10 business days after Contract execution.

3. The Contractor shall provide Commercial General Liability Insurance on an occurrence basis for third party bodily injury, personal injury, and property damage with a minimum inclusive limit of $5,000,000.00 per occurrence with $2,000,000.00 products and completed operations aggregate.
4. The Contractor shall name the following as additional insured under the General Liability policy;
    a. The City of Kawartha Lakes
    b. D.M. Wills Associates Limited

A.14 Permits, Notices, Laws and Rules

The Contractor shall ensure that all necessary permits or licenses required for the execution of the work have been obtained (but this shall not include MTO encroachment permits, County Road Permit, permanent easements or rights of servitude). The Contractor shall give all necessary notices and pay all fees required by law and comply with all laws, ordinances, rules and regulations (including the Occupational Health and Safety Act) 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 expenses incurred by the Contractor shall constitute an addition to the contract price.

A.15 Road Crossings

General

1. Scope: These specifications apply to all road crossings - Municipal, County, Regional, or Highway Roads. Where the word "Authority" is used, it shall be deemed to apply to the appropriate owning authority. These specifications in no way limit the Authority's Specifications and Regulations governing the construction of drains on their Road Allowance. The Authority will supply no labour, equipment or materials for the construction of the road crossing unless otherwise noted on the drawings.
2. Road Occupancy Permit: Where applicable the Contractor must submit an Application for a Road Occupancy Permit to the Authority and allow a minimum of five (5) working days (exclusive of holidays) for its review and issuance.
3. Road Closure Request and Construction Notification: The Contractor shall submit written notification of construction and request for road closure (if applicable) to the Road Authority/Public Works Manager and the Drainage Engineer or Superintendent for review and approval a minimum of five (5) working days (exclusive of holidays) prior to proceeding with any work on road allowance. It shall be the Road Authority's responsibility to notify all the applicable emergency services, schools, etc. of the road closure or construction taking place.
4. Traffic Control: Where the Contractor is permitted to close the road to through traffic, the Contractor shall provide for and adequately sign the detour route to the satisfaction of the Road Authority. Otherwise, the Contractor shall keep the road

open to traffic at all times. The Contractor shall provide, for the supply, erection and maintenance, suitable warning signs and/or flagmen in accordance with the Manual of Uniform Traffic Control Devices and to the satisfaction of the Road Authority to notify the motorists of work on the road ahead.

5. Site Meeting/Inspection: A site meeting shall be held with the affected parties to review in detail the crossing and/or its related works. The Authority's Inspector and/or the Drainage Engineer will inspect the work while in progress to ensure that the work is done in strict accordance with the specifications.
6. Weather: No construction shall take place during inclement weather or periods of poor visibility.
7. Equipment: No construction material and/or equipment is to be left within three (3) metres of the edge of pavement overnight or during periods of inclement weather.

Open Cut

1. Material: The culvert or sub-drain crossing pipe material shall be specified on the drawings.
2. Site Preparation and Excavation: Where necessary, fences shall be carefully taken down as specified in the general conditions. Prior to any excavation taking place, the areas which will be disturbed shall be stripped of topsoil. The topsoil is to be stockpiled in locations away from the construction area.
3. Installation: The pipe shall be installed using bedding and cover material in accordance with detailed design drawings or detail provided on drawings.
4. Unstable Soil or Rock: The Contractor shall contact the Engineer immediately should unstable soil be encountered or if boulders of sufficient size and number to warrant concern are encountered.
5. Tile Connections: Prior to commencement of backfilling, all tiles encountered in excavations shall be reconnected using material of a size comparable to the existing material. Where the excavation is below the tile grade, a compacted granular base is to be placed prior to laying the tile. Payment for connections not shown on the drawings shall be an extra to the contract.
6. Backfill: Backfill from the top of the cover material up to the underside of road base shall meet the requirements for MTO Granular "B". The backfill shall be placed in lifts not exceeding 300 mm in thickness and each lift shall be thoroughly compacted to produce a density of 98% Standard Proctor. Granular "B" road base for County Roads and Highways shall be placed to a 450 mm thickness and Granular "A" shall be placed to a thickness of 200 mm, both meeting MTO requirements. Granular road base materials shall be thoroughly compacted to produce a density of 100% Standard Proctor.

   Where the road surface is paved, the Contractor shall be responsible for placing an HL-4 Hot Mix Asphalt patch of the same thickness as the existing pavement. The asphalt patch shall be flush with the existing roadway on each side and not overlap. If specified, the asphalt patch shall not be placed immediately over the road base and the Granular "A" shall be brought up flush with the existing asphalt

and a liberal amount of calcium chloride shall be spread on the gravel surface. The asphalt patch must be completed within the time period set out on the drawing.

The excavated material from the trench beyond a point 2.5 metres from the travelled portion or beyond the outside edge of the gravel shoulder, may be used as backfill in the trench in the case of covered drains. This material should be compacted in layers not exceeding 600 mm.

A.16 Surplus Excavated Material and Gravel

Excess excavated material from open cut installation through roads, railways, laneways and lawn/grass areas, shall be disposed of on-site by the Contractor as part of their lump sum installation price. If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used in the construction of the works, the Contractor shall haul away such surplus gravel or stone unless otherwise approved.

A.17 Fences

No earth shall be placed against fences and all fences removed by the Contractor are to be replaced by him in as good condition as found. In general, the Contractor will not be allowed to cut existing fences but shall disconnect existing fences at the nearest anchor post or other such fixed joint and shall carefully roll it back out of the way. Where the distance to the closest anchor post or fixed joint exceeds 50 metres, the Contractor will be allowed to cut and splice in accordance with accepted methods and to the satisfaction of the owner and the Engineer or Superintendent. Where existing fences are deteriorated to the extent that existing materials are not salvageable for replacement, the Contractor shall notify the Engineer or the Superintendent prior to dismantling. Fences damaged beyond salvaging by the Contractor's negligence shall be replaced with new materials, similar to those existing, at the Contractor's expense. The replacement of the fences shall be done to the satisfaction of the owner and the Engineer or Superintendent. The site examination should indicate to the Contractor such work, if any, and an allowance should be made in the tendered price. The Contractor shall not leave any fence open when he is not at work in the immediate vicinity.

A.18 Livestock

The Contractor shall provide each property owner with 48 hours' notice prior to removing any fences along fields which could possibly contain livestock. Thereafter, the property owner shall be responsible to keep all livestock clear of the construction areas until further notified. Where necessary, the Contractor will be directed to erect temporary fences. The Contractor shall be held responsible for loss or injury to livestock or damage caused by livestock, where the injury or damage is caused by his failure to notify the property owner or through negligence or carelessness on the part of the Contractor.

The Contractor constructing a tile drain shall not be held responsible for damages or injury to livestock occasioned by leaving trenches open for inspection by the Engineer if he notifies the owner at least 48 hours prior to commencement of the work on that portion. The Contractor will be held liable for such damages or injury if the backfilling of such trenches is delayed more than one (1) day after acceptance by the Engineer.

A.19 Standing Crops

The Contractor shall not be held responsible for damages to standing crops within the working area available and the access route provided if he notifies the owner thereof at least 48 hours prior to commencement of the work on that portion.

A.20 Surplus Gravel

If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used in the construction of the works, the Contractor shall haul away such surplus gravel or stone unless otherwise approved.

A.21 Railways, Highways, Utilities

A minimum of 48 hours' notice to Railways, Highways and Utilities, exclusive of Saturdays, Sundays and Holidays, shall be required by the Contractor prior to any work being performed and in the case of a pipe being installed by open cutting or boring under a Highway or Railway, a minimum of 72 hours' notice is required.

A.22 Utilities

The attention of the Contractor is drawn to the presence of utilities along the course of the drain. The Contractor will be responsible for determining the location of all utilities and will be held liable for any damage to all utilities caused by his operations. The Contractor shall co-operate with all authorities to ensure that all utilities are protected from damage during the performance of the work. The cost of any necessary relocation work shall be borne by the utility. No allowance or claims of any nature will be allowed on account for delays or inconveniences due to utilities relocation, or for inconveniences and delays caused by working around or with existing utilities not relocated

A.23 Iron Bars

The Contractor shall be held liable for the cost of an Ontario Land Surveyor to replace any iron bars destroyed during the course of construction.

A.24 Stakes

At the time of the survey, stakes are set along the course of the drain at intervals of 50 metres. The Contractor shall ensure that the stakes are not disturbed unless approval is obtained from the Engineer. Any stakes removed by the Contractor without the authority of the Engineer, shall be replaced at the expense of the Contractor. At the

request of the Contractor, any stakes which are removed or disturbed by others or by livestock, shall be replaced at the expense of the drain.

A.25 RIP-RAP

Rip-rap shall be specified on the drawings and shall conform to the following:

1. Quarry Stone: shall range in size from 150 mm to 300 mm evenly distributed and shall be placed to a 300 mm thickness on a filter blanket at a 1.5 to 1 slope unless otherwise noted. Filter blanket to be Terrafix 270R or approved equal.

A.26 Restoration of Lawns

1. General: Areas noted on the drawings to be restored with seeding or sodding shall conform to this specification, and the Contractor shall allow for all costs in his lump sum bid for the following works.
2. Topsoil: Prior to excavation, the working area shall be stripped of existing topsoil. The topsoil stockpile shall be located so as to prevent contamination with material excavated from the trench. Upon completion of backfilling operations, topsoil shall be spread over the working area to a depth equal to that which previously existed but not less than the following:
    a. Seeding and sodding - minimum depth of 100 mm
    b. Gardens - minimum depth of 300 mm

    In all cases where a shortfall of topsoil occurs, whether due to lack of sufficient original depth or rejection of stockpiled material due to Contractor's operations, imported topsoil from acceptable sources shall be imported at the Contractor's expense to provide the specified depths. Topsoil shall be uniformly spread, graded, and cultivated prior to seeding or sodding. All clods or lumps shall be pulverized, and any roots or foreign matter shall be raked up and removed as directed.
3. Sodding .
    a. Materials: Nursery sod to be supplied by the Contractor shall meet the current requirements of the Ontario Sod Growers Association for No. 1 Bluegrass Fescue Sod.
    b. Fertilizer: Prior to sod placement, approved fertilizer shall be spread at the rate of 5 kg/100 m^2 of surface area and shall be incorporated into such surfaces by raking or harrowing. All surfaces on which sod is to be placed shall be loose at the time of placing sod to a depth of 25 mm.
    c. Placing Sod: Sod shall be laid lengthwise across the face of slopes with ends close together. Sod shall be counter sunk along the joints between the existing grade and the new sodding to allow for the free flow of water across the joint. Joints in adjacent rows shall be staggered and all joints shall be pounded and rolled to a uniform surface.

On slopes steeper than 3 to1, and in unstable areas, the Engineer may direct the Contractor to stake sod and/or provide an approved mesh to prevent slippages. In all cases where such additional work is required, it will be deemed an extra to the contract and shall be paid for in accordance with the General Conditions. No sod shall be laid when frozen nor upon frozen ground nor under any other condition not favourable to the growth of the sod. Upon completion of sod laying the Contractor shall thoroughly soak the area with water to a depth of 50 mm. Thereafter it will be the responsibility of the property owner to maintain the area in a manner so as to promote growth.

4. Seeding: Seed to be supplied by the Contractor shall be "high quality grass seed" harvested during the previous year, and shall be supplied to the project in the supplier's original bags on which a tag setting out the following information is affixed:

    a. Year or Harvest recommended rate of application

    b. Type of Mixture fertilizer requirements

    Placement of seed shall be by means of an approved mechanical spreader. All areas on which seed is to be placed shall be loose at the time of placing seed, to a depth of 25 mm. Seed and fertilizer shall be spread in accordance with the supplier's recommendations unless otherwise directed by the Engineer. Thereafter it will be the responsibility of the property owner to maintain the area in a manner so as to promote growth.

5. Settlement: The Contractor shall be responsible during the one (1) -year guarantee period for the necessary repair of restored areas due to trench settlement. Areas where settlement does not exceed 50 mm may be repaired by top dressing with fine topsoil. In areas where settlement exceeds 50 mm, the Contractor will be required to backfill the area with topsoil and restore with seeding and/or sodding as originally specified.

A.27 Restoration of Roads and Laneways

1. Gravel: Restoration shall be in accordance with the applicable standard detailed drawing or as shown on the drawings.

Section B Open Drain

B.1 Profile

The profile drawing shows the depth of cuts from the ground beside the stake to the final invert of the ditch in metres and decimals of a metre and also the approximate depth of cuts from the existing bottom of the ditch to the elevation of the ditch bottom. These cuts are established for the convenience of the Contractor; however, benchmarks will govern the final elevation of the drain. Benchmarks have been established along the course of the drain and their locations and elevations are noted on the profile drawing. A uniform grade shall be maintained between stakes in accordance with the profile drawing.

B.2 Alignment

The drain shall be constructed in a straight line and shall follow the course of the present drain or water run unless otherwise noted on the drawings. Where it is necessary to straighten any bends or irregularities in alignment not noted on the drawings, the Contractor shall contact the Engineer or Drainage Superintendent before commencing the work.

B.3 Clearing and Grubbing

Prior to commencement of work, all trees, scrub, fallen timber and debris shall be removed from the side slopes of the ditch and for such a distance on the working side so as to eliminate any interference with the construction of the drain or the spreading of the spoil. The side slopes shall be neatly cut and cleared flush with slope whether or not they are affected directly by the excavation. With the exception of large stumps causing damage to the drain, the side slope shall not be grubbed. All other cleared areas shall be grubbed and the stumps put into piles for disposal by the owner.

All trees or limbs 150 mm (6") or larger, that it is necessary to remove, shall be considered as logs and shall be cut and trimmed, and left in the working width separate from the brush, for use or disposal by the owner. Trees or limbs less than 150 mm in diameter shall be cut in lengths not greater than 5 metres and placed in separate piles with stumps spaced not less than 75 metres apart in the working width, for the use or disposal of the owner. In all cases, these piles shall be placed clear of excavated materials, and not be piled against standing trees. No windrowing will be permitted. The clearing and grubbing and construction of the drain are to be carried out in two (2) separate operations and not simultaneously at the same location.

B.4 Excavation

The bottom width and the side slopes of the ditch shall be those shown on the profile drawing.

Unless otherwise specified on the drawings, only the existing ditch bottom is to be cleaned out and the side slopes are not to be disturbed. Where existing side slopes

become unstable because of construction, the Contractor shall immediately contact the Engineer or Superintendent. Alternative methods of construction and/or methods of protection will then be determined, prior to continuing the work.

B.5 Excavated Material

Excavated material shall be deposited as shown on the detailed design drawings or as directed by the Engineer or Superintendent. A buffer strip of not less than 3 metres in width through farmed lands and 2 metres in width through bush areas shall be left along the top edges of the drain. The buffer strip shall be seeded and/or incorporated as specified on the drawings. The material shall be deposited beyond the specified buffer strip.

No excavated material shall be placed in tributary drains, depressions, or low areas which direct water into the ditch so that water will be trapped behind the spoil bank. The excavated material shall be placed and levelled to a maximum depth as shown on the detailed design drawings, unless instructed otherwise. The edge of the spoil bank away from the ditch shall be feathered down to the existing ground; the edge of the spoil bank nearest the ditch shall have a maximum slope of 2 to 1. The material shall be levelled such that it may be cultivated with ordinary farm equipment without causing undue hardship on machinery and personnel. No excavated material shall cover any logs, scrub, debris, etc. of any kind.

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

Any stones 150 mm or larger left exposed on top of the levelled excavated material shall be removed and disposed of as an extra to the contract unless otherwise noted on plans.

B.6 Excavation through Bridges and Culverts

The Contractor shall excavate the drain to the full specified depth and width under all bridges. Where the bridge or culvert pipe is located within a road allowance, the excavated material shall be levelled within the road allowance. Care shall be taken not to adversely affect existing drainage patterns. Temporary bridges may be carefully removed and left on the bank of the drain but shall be replaced by the Contractor when the excavation is completed unless otherwise specified. Permanent bridges must be left intact. All necessary care and precautions shall be taken to protect the structure. The Contractor shall notify the Engineer or Superintendent if excavation may cause the structure to undermine or collapse.

B.7 Pipe Culverts

Where specified on the drawings, the existing culvert shall be carefully removed, salvaged and either left at the site for the owner or reinstalled at a new grade or location. The value of any damage caused to the culvert due to the Contractor's negligence in salvage operation will be determined and deducted from the contract price.

B.8 Moving Drains off Roads

Where an open drain is being removed from a road allowance, it must be reconstructed wholly on the adjacent lands with a minimum distance of 1.0 metre between the property line and the top of the bank, unless otherwise noted on the drawings. The excavated material shall be used to fill the existing open ditch and any excess excavated material shall be placed and levelled on the adjacent lands beyond the buffer strip, unless otherwise noted. Any work done on the road allowance, with respect to excavation, disposal of materials, installation of culverts, cleaning under bridges, etc., shall be to the satisfaction of the Road Authority and the Engineer.

B.9 Tributary Outlets

The Contractor shall guard against damaging the outlets of tributary drains. Prior to commencement of excavation on each property the Contractor shall contact the owner and request that all known outlet pipes be marked by the owner. All outlets so marked or visible or as noted on the profile, and subsequently damaged by the Contractor's operations will be repaired by the Contractor at his cost. All outlet pipes repaired by the Contractor under direction of the Drainage Superintendent or Engineer which were not part of the Contract shall be considered an extra to the contract price.

B.10 Temporary Sediment Basins

The Contractor shall excavate sediment basins prior to commencement of upstream work as shown on the plan and profile. The dimension of the basin will be in a parabolic shape with a depth of 450 mm below the proposed ditch bottom and the basin will extend along the drain for a minimum length of 15 metres. A sediment trap 300 mm deep and 5 metres long with silt fence placed across ditch bottom on the downstream end of the trap shall be constructed prior to and maintained during construction, to prevent silt from flushing downstream. The silt fence shall be removed and disposed of after construction.

B.11 Seeding

1. Delivery: The materials shall be delivered to the site in the original unopened containers which shall bear the vendor's guarantee of analysis and seed will have a tag showing the year of harvest.

2. Hydro Seeding: Areas specified on drawings shall be hydro seeded and mulched upon completion of construction in accordance with O.P.S.S. 572 and with the following application rates:

Primary Seed (85 kg/ha.):	50% Creeping Red Fescue 40% Perennial Ryegrass 5% White Clover
Nurse Crop	Italian (Annual) Ryegrass at 25% of Total Weight

   Fertilizer (300 kg/ha.) 8-32-16
   Hydraulic Mulch (2000 kg/ha.) Type "B"
   Water (52,700 litres/ha.)

   Seeding shall not be completed after September 30.

3. Hand Seeding: Hand seeding shall be completed daily with the seed mixture and fertilizer and application rate shown under "Hydro Seeding" above. Placement of the seed shall be by means of an approved mechanical spreader. Seeding shall not be completed after September 30.

Appendix F

Allowances and Assessments

Section 22 - Assessment of Benefit

Project No: 5508
Project Name: Curtin Municipal Drain
Designed/Checked By: MJH / KS
Date: 12/15/2022

Benefit Value for Better Surface Water Drainage

Total Crop Failure	0	times /10 years			
50% Crop Failure	3	times /10 years			
Full Crops	7	times /10 years			
Annual Average 2023	830	$ / Acre		2,051	$ / ha
Average Annual Benefit Value	308	$ / ha / year			
Design Life of Drain	50	Years		4%	Interest Rate
Future Benefit Value Rate	21.5		Benefit Value	6,609	$ / ha

Roll Number	Con	Lot	Channel Dimensions			Benefit Rate ($/ha)	Benefit Value ($)
			Length (m)	Space (m)	Area (ha)		
16512100101040000000	3	8	0	0	0.000	6,609	-
16512100101030000000	3	8	218	40	0.872	6,609	5,763.04
			117	20	0.234	6,609	1,546.50
16512100101030100000	3	8	0	0	0.000	6,609	-
16512100101020000000	3	7	231	40	0.924	6,609	6,106.71
			108	20	0.216	6,609	1,427.54
						Sum	$ 14,844

* Assume Benefit for 25 year service life / future farm conversion

Benefit Value for Subsurface Water Drainage - N/A

Benefit Value for Direct Connection

Cost of 150mm diameter pipe **15** **$ / m**

Roll Number	Con	Lot	Length (m)	Benefit Rate ($/ha)	Benefit Value ($)
16512100101040000000	3	8	725	15	10,875.00
16512100101030000000	3	8	390	15	5,850.00
16512100101030100000	3	8	390	15	5,850.00
16512100101020000000	3	7	0	15	-
				Sum	$ 22,575

Benefit Value for Increased Market Value **40%**

Value of Undrained Farmland	$ 25,121	/ ha	$ 10,166	/ ac
Adjusted Value of Developed Land	$ 35,170	/ ha	$ 14,233	/ ac
Net Difference is Value	$ 10,048	/ ha	$ 4,066	/ ac
Cost to Install Private Subsurface Drainage	$ 4,000	/ ha	$ 1,619	/ ac
Benefit Value	$ 6,048	/ ha	$ 2,448	/ ac

Roll Number	Con	Lot	Area (ha)	Benefit Rate ($/ha)	Benefit ($)
16512100101040000000	3	8	19.65	$ 6,048	$ 118,851.88
16512100101030000000	3	8	8.49	$ 6,048	$ 51,351.27
16512100101030100000	3	8	1.212	$ 6,048	$ 7,330.71
16512100101020000000	3	7	0	$ 6,048	$ -
				Sum	$ 177,533.86

Summation of Section 22

Roll Number	Con	Lot	Section 22		Sum
			Direct Connection	Increase Market Value	
16512100101040000000	3	8	$ 10,875.00	$ 118,851.88	$ 129,726.88
16512100101030000000	3	8	$ 5,850.00	$ 51,351.27	$ 57,201.27
16512100101030100000	3	8	$ 5,850.00	$ 7,330.71	$ 13,180.71
16512100101020000000	3	7	$ -	$ -	$ -
			Sum	**$**	**200,108.86**

Section 29 - Allowances for Land and Right-of-Way

Project No:	5508
Project Name:	Curtin Municipal Drain
Designed/Checked By:	MJH / KS
Date:	12/15/2022

Allowance for Land Taken Permanently Out of Production

Compensation Rates

Farm Land	**$ 25,121**	**/ ha**	**$ 10,166**	**/ ac**
Rural Lands	**$ 25,121**	**/ ha**	**$ 10,166**	**/ ac**

Roll Number	Con	Lot	Channel Dimensions				Compensation Rates ($/ha)	Allowance for Land Taken
			Length (m)	Top Width (m)	Buffer Width (m)	Area (ha)		
16512100101040000000	3	8	0	0.00	0.00	0.000	$ 25,121	$ -
16512100101030000000	3	8	335	7.50	1.00	0.285	$ 25,121	$ 7,153
16512100101030100000	3	8	0	0.00	0.00	0.000	$ 25,121	$ -
16512100101020000000	3	7	339	7.50	1.00	0.288	$ 25,121	$ 7,239
							Sum	$ 14,392

Allowance for Land Used Periodically

Compensation Rates

Annual Average 2023	**830**	**$ / Acre**	**2,051**	**$ / ha**
Interest Rate	**4%**			
Design Life of Drain	**50**	**Years**		
Maintenance to be performed Every	**10**	**Years**		
Allowance Payed today to Compensate for Future Losses	**2.79**			
Allowance Payed today to Compensate for Future Maintenance	**5,721**	**$ / ha**		

Roll Number	Con	Lot	Channel Dimensions			Compensation Rates ($/ha)	Allowance for Land Taken
			Length (m)	Working Space (m)	Area (ha)		
16512100101040000000	3	8	0	0.0	0.000	$ 5,721	$ -
16512100101030000000	3	8	335	10.0	0.34	$ 5,721	$ 1,916
16512100101030100000	3	8	0	0.0	0.00	$ 5,721	$ -
16512100101020000000	3	7	231	10.0	0.23	$ 5,721	$ 1,322
						Sum	$ 3,237.97

Summation of Section 29

Roll Number	Con	Lot	Section 29		
			Allowance for Land Taken	Allowance for Land Used Periodically	Sum
16512100101040000000	3	8	$ -	$ -	$ -
16512100101030000000	3	8	$ 7,153.23	$ 1,916.47	$ 9,069.70
16512100101030100000	3	8	$ -	$ -	$ -
16512100101020000000	3	7	$ 7,238.65	$ 1,321.50	$ 8,560.15
				Sum	**$ 17,629.85**

* A jointly owned property by Judy Plummer, Trudi Nieman, Brian Tousignant, Don and Lorie Trudeau and Rene and Brenda Audette.

Section 30 - Allowances for Crop Damage - N/A

Project No: 5508
Project Name: Curtin Municipal Drain
Designed/Checked By: MJH / KS
Date: 12/15/2022

Allowance for Land Used Periodically

Roll Number	Con	Lot	Excavated Material (m^3)	Area of Spread Material (m^2)		
				150mm	300mm	600mm
16512100101040000000	3	8	0	-	-	-
16512100101030000000	3	8	865	5,766.7	2,883.3	1,441.7
16512100101030100000	3	8	0	-	-	-
16512100101020000000	3	7	1027	6,846.7	3,423.3	1,711.7

Thickness Factor

Soil Depth - 150mm or Less	**1.0**
Soil Depth - 300mm to 150mm	**1.5**
Soil Depth - 600mm to 300mm	**1.75**

Durration Factor

Duration of Crop Damage - 1 Year	**1.0**	100% Crop Loss for 1st Year.
Duration of Crop Damage - 3 Year	**2.0**	Crop Loss for 1st Year, 67% -2nd and 33% -3rd.
Duration of Crop Damage - 5 Year	**3.0**	Crop Loss for 1st Year, 80% -2nd, 60% -3rd, 40% -4th & 20% -5th.

Quality Factor

Poor	**1.00**
Fair	**0.75**
Good	**0.50**

Compensation Rates

Composite Annual Average 2023	**830**	**$ / Acre**	**2,051**	**$ / ha**

Roll Number	Con	Lot	Area (ha)	Factor			Allowance for Land
				Thickness	Durration	Quality	
16512100101040000000	3	8	0.000	1	3	0.75	$ -
16512100101030000000	3	8	0.577	1	3	0.75	$ 2,661.17
16512100101030100000	3	8	0.000	1	3	0.75	$ -
16512100101020000000	3	7	0.685	1	3	0.75	$ 3,159.57
							$ 5,820.74

Summation of Section 30

Roll Number	Con	Lot	Section 30 Allowance for Damages
16512100101040000000	3	8	$ -
16512100101030000000	3	8	$ 2,661.17
16512100101030100000	3	8	$ -
16512100101020000000	3	7	$ 3,159.57
			$ 5,820.74

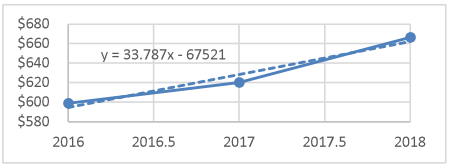
Compensation Rates

Project No: 5508
Project Name: Curtin Municipal Drain
Designed/Checked By: MJH / KS
Date: 12/15/2022

Area, Yield, Production and Farm Value of Specified Field Crops, Ontario, 2015 - 2019

3 Year Composite Annual Average

2018	$	666.41
2017	$	620.03
2016	$	598.84



2018 - 2016 Year Average	**$**	**628.43**	**/ acre**	**1,552.87 $ / hectar**
Estimated 2023 Average	**$**	**830.10**	**/ acre**	**2,051.22 $ / hectar**

2019: Estimated seeded area (Imperial Units)

Crops	Acres Seeded	Acres Harvested	Yield (bu/acre)	Production ('000 bu)	Farm Value per bu. ($)	Total Farm Value ($'000)	Unit Value ($ / Acre)
Winter Wheat	656,100	656,100	76.8	50,356			-
Spring Wheat	95,500	95,000	58.5	5,555			-
Fall Rye	92,700	35,100	48.4	1,697			
Oats	93,100	82,000	82.8	6,790			-
Barley	101,700	97,900	63.0	6,165			-
Mixed Grain	76,900	66,400	68.3	4,535			-
Grain Corn	2,202,500	2,147,500	158.4	340,164			-
Canola	46,600	43,100	43.2	1,862			-
Soybeans	3,114,500	3,089,600	44.1	136,251			-
Dry White Beans	66,800	66,400	18.7	1,244			-
Coloured Beans	81,400	79,000	19.1	1,497			-
(.. Data is not available)		6,458,100				-	$ -

2018: Estimated seeded area (Imperial Units)

Crops	Acres Seeded	Acres Harvested	Yield (bu/acre)	Production ('000 bu)	Farm Value per bu. ($)	Total Farm Value ($'000)	Unit Value ($ / Acre)
Winter Wheat	919,300	**914,000**	83.6	76,409	6.41	489,782	536
Spring Wheat	85,400	**81,500**	54.3	4,426	6.38	28,238	346
Fall Rye	115,500	**55,600**	48.0	2,667		-	
Oats	74,000	**57,300**	74.2	4,252	3.73	15,860	277
Barley	90,000	**82,500**	58.5	4,830	5.13	24,778	300
Mixed Grain	78,000	**61,100**	61.5	3,755	3.63	13,631	223
Grain Corn	2,155,000	**2,080,000**	166.0	345,176	5.10	1,760,398	846
Canola	63,000	**62,400**	47.1	2,940	11.17	32,840	526
Soybeans	3,020,000	**3,005,000**	51.4	154,341	11.99	1,850,549	616
Dry White Beans	55,100	52,300	26.4	1,380	38.06	52,518	1,004
Coloured Beans	69,100	65,200	23.9	1,560	47.66	74,354	1,140
		6,516,900				4,342,946	$ 666.41

2017: Estimated seeded area (Imperial Units)

Crops	Acres Seeded	Acres Harvested	Yield (bu/acre)	Production ('000 bu)	Farm Value per bu. ($)	Total Farm Value ($'000)	Unit Value ($ / Acre)
Winter Wheat	920,000	920,000	87.3	80,300	5.60	449,680	489
Spring Wheat	90,000	90,000	46.7	4,200	6.61	27,762	308
Fall Rye	100,000	46,000	41.1	1,890	..	..	
Oats	70,000	55,000	83.8	4,610	3.51	16,181	294
Barley	80,000	75,000	61.2	4,590	4.73	21,711	289
Mixed Grain	80,000	65,000	61.8	4,020	3.22	12,944	199
Grain Corn	2,120,000	2,060,000	167.0	344,000	4.83	1,661,520	807
Canola	45,000	43,000	46.5	2,000	11.71	23,420	545
Soybeans	3,075,000	3,060,000	45.6	139,500	12.47	1,739,565	568
Dry White Beans	70,000	69,000	20.6	1,421	34.58	49,152	712
Coloured Beans	65,000	61,000	20.4	1,244	44.62	55,525	910
		6,544,000				4,057,460	$ 620.03

WILLS

Project No: 5508
Project Name: Curtin Municipal Drain
Designed/Checked By: MJH / KS
Date: 12/15/2022

2016: Estimated seeded area (Imperial Units)

Crops	Acres Seeded	Acres Harvested	Yield (bu/acre)	Production ('000 bu)	Farm Value per bu. ($)	Total Farm Value ($'000)	Unit Value ($ / Acre)
Winter Wheat	975,000	975,000	90.9	88,600	4.86	430,596	442
Spring Wheat	90,000	90,000	53.3	4,800	5.81	27,888	310
Fall Rye	80,000	48,000	47.9	2,300	..		
Oats	60,000	50,000	84.0	4,200	3.51	14,742	295
Barley	100,000	95,000	63.2	6,000	4.73	28,380	299
Mixed Grain	90,000	70,000	65.7	4,600	3.22	14,812	212
Grain Corn	2,025,000	2,000,000	158.5	317,000	4.83	1,531,110	766
Canola	40,000	39,000	41.9	1,635	11.71	19,146	491
Soybeans	2,710,000	2,700,000	45.9	124,000	12.47	1,546,280	573
Dry White Beans	55,000	55,000	19.5	1,075	39.21	42,151	766
Coloured Beans	60,000	60,000	16.8	1,005	46.68	46,913	782
		6,182,000				3,702,018	$ 598.84

2015: Estimated seeded area (Imperial Units)

Crops	Acres Seeded[a]	Acres Harvested[a]	Yield (bu/acre)[a]	Production ('000 bu)[a]	Farm Value per bu. ($)	Total Farm Value ($'000)	Unit Value ($ / Acre)
Winter Wheat	630,000	625,000	78.4	49,000	7.93	388,570	622
Spring Wheat	125,000	125,000	64.0	8,000	6.07	48,560	388
Fall Rye	60,000	45,000	40.7	1,830		-	
Oats	130,000	115,000	87.0	10,000	3.41	34,100	297
Barley	115,000	110,000	66.4	7,300	3.89	28,397	258
Mixed Grain	100,000	80,000	71.3	5,700	2.81	16,017	200
Grain Corn	2,055,000	2,040,000	170.6	348,000	4.55	1,583,400	776
Canola	35,000	35,000	42.9	1,500	11.16	16,740	478
Soybeans	2,930,000	2,930,000	46.8	137,000	11.91	1,631,670	557
Dry White Beans	65,000	65,000	19.6	1,275.00	28.44	36,261	558
Coloured Beans	65,000	65,000	19.3	1,255.00	44.94	56,400	868
		6,235,000				3,840,115	$ 615.90

x suppressed to meet the confidentiality requirements of the Statistics Act

a Estimated

Note: Estimates for the years 2002 to 2005 have been adjusted, where necessary, to align with the 2006 Census of Agriculture benchmark. Estimates for 2011 are based on the December Field Crop Production Survey.

References:

Statistics Canada. Field Crop Reporting Series

References:

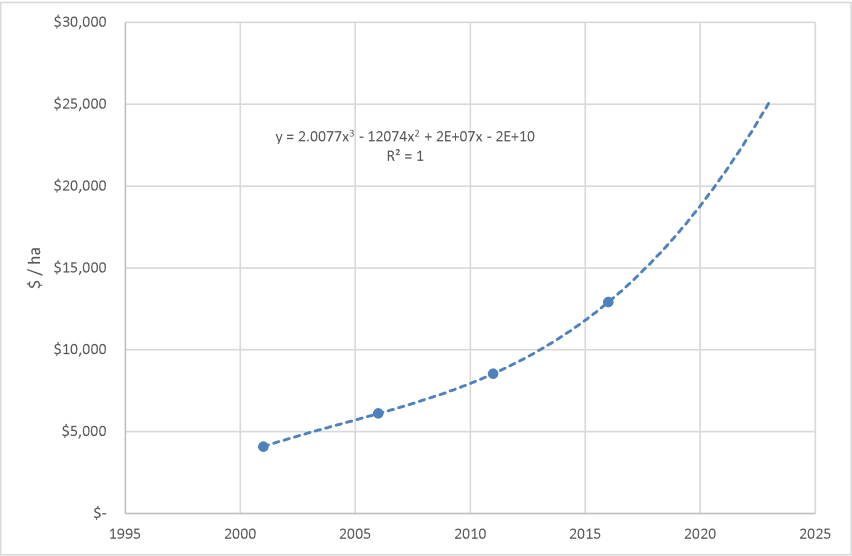
Statistics Canada. Field Crop Reporting Series

29-Jun-20

Project No: 5508
Project Name: Curtin Municipal Drain
Designed/Checked By: MJH / KS
Date: 12/15/2022

Total farm area and value of land and buildings, Canada, Province, CAR, CD, CCS, 2016 - 1991

Geography (English)	Total Farm Area		Total Value of Land and Buildings			
	Farms Reporting	Acres	Farms Reporting	Market value $	$ / Acre	$ / ha
Kawartha Lakes Division - 2001	**1,516**	**360,690**	**1,516**	**595,574,953**	$ 1,651.21	$ 4,080.22
Kawartha Lakes - 2006	**1,537**	**356,946**	**1,537**	**881,085,591**	$ 2,468.40	$ 6,099.54
Kawartha Lakes - 2011	**1,366**	**326,092**	**1,366**	**1,126,897,969**	$ 3,455.77	$ 8,539.37
Kawartha Lakes - 2016	**1,265**	**309,405**	**1,265**	**1,615,919,732**	$ 5,222.67	$ 12,905.47



Future Year 2023
Total Value 2021 $ 25,121 $ / ha

Source: 2016, Census of Agriculture, Statistics Canada
Source: 2011, Census of Agriculture, Statistics Canada
Source: 2006, Census of Agriculture, Statistics Canada