Engineer's Report for Ilderton Municipal Drain No. 2

The Municipality of Middlesex Centre

10227 Ilderton Road

Ilderton, ON N0M 2A0

Submitted by:

GEI Consultants Canada Limited

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February 2025

GEI Project No. 517029

February 7, 2025
GEI Project No. 517029

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

Re: Engineer's Report
Ilderton Municipal Drain No. 2

Dear Mayor DeViet and Members of Council of the Municipality of Middlesex Centre:

We are pleased to present our report on the "Ilderton Municipal Drain No. 2" serving parts of Lots 23 to 25 Concession 10 in the Municipality of Middlesex Centre, County of Middlesex (former Township of London).

Authority to prepare this report was obtained by a resolution of Municipality of Middlesex Centre Council as stated in its June 29, 2017 letter to appoint GM BluePlan Engineering Limited (GMBP) to prepare an Engineer's Report.

We note that GMBP has fully integrated with GEI Consultants, and we are now operating under the name GEI Consultants Canada Limited (GEI).

In accordance with your instructions pursuant to a request received by Council under Section 78 of the Drainage Act, R.S.O. 1990, for the request for drainage works improvements, GEI has held an on-site meeting, undertaken a field survey and prepared for Council's consideration the following Drainage Report, Plan, Profiles and Specifications for this work to be completed on the "Ilderton Municipal Drain No. 2".

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

Yours truly,

GEI Consultants Canada Ltd.
Per:

Brendan Shapton, M.A.Sc., P.Eng
Encl.

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1. Introduction

At the request of a property owner in the Municipality of Middlesex Centre (Municipality), Council has appointed GM BluePlan Engineering Limited (GMBP) under Section 78 of the Drainage Act to investigate drainage improvements to be made to the Ilderton Municipal Drain No. 2 (Ilderton No. 2).

We note that GMBP has fully integrated with GEI Consultants, and we are now operating under the name GEI Consultants Canada Limited (GEI).

The existing Ilderton No. 2 consists of approximately 633m of open drain which outlets into approximately 293m of closed drain, which provides an outlet to rural properties within the watershed, the wastewater treatment facility (WWTF) for the community of Ilderton, the stormwater management facility (SWMF) for the Meadow Creek Subdivision, and properties and roads in the Van Bussel Subdivision on the west side of Hyde Park Road (VBS). The existing Ilderton No. 2 also consists of approximately 165m of closed drain from the intersection of County Road 20 (Hyde Park Road) and County Road 16 (Ilderton Road) downstream to the municipal storm sewer system. A landowner has requested drainage improvements to alleviate flooding and erosion issues on S Pt. Lot 23 Concession 10, which is downstream of the SWMF and WWTF.

The landowner and property represented on the request are:

Laurie Stanton representing Stanton Bros Ltd.	For S Pt. Lot 23	Concession 10	Roll No. 070-024

Based on site observations, previous drainage reports, and residential development reports, three hundred sixty-five properties have been determined as within the drainage area of the Ilderton No. 2 which includes parts of Lots 23 to 25 Concession 10. The drainage area also includes municipal roads in the community of Ilderton (Municipality) and Hyde Park Road (County of Middlesex).

2. History

The Municipality of Middlesex Centre has provided background municipal drain drawings and reports.

The earliest records provided to us for the Ilderton No. 2 was a report dated October 25, 1957, prepared by C.P. Corbett, P.Eng. which provided for the downstream extension of the existing Ilderton No. 2. The 1957 report consisted of approximately 213m of open drain with a catch basin, which outlets to approximately 246m of 300mm diameter field tile, which outlets into the Oxbow Municipal Drain to the south on Lot 23 Concession 10.

As the 1957 report involves an extension to the existing drain, the original Ilderton No. 2 is presumed to pre-date 1957. Based on municipal records, the Ilderton No. 2 prior to 1957 extended from its outlet at

the Oxbow Municipal Drain on Lot 23 Concession 10 upstream to the intersection of what is now County Road 20 (Hyde Park Road) and County Road 16 (Ilderton Road).

Subsequent to the 1957 report, a report was submitted by A.J. DeVos, P.Eng., dated October 10, 1980, for the reconstruction of the Ilderton No. 2. This report stated that the existing open drain had silted up and did not provide a proper outlet for the affected lands. Additionally, the report stated that the existing 300mm diameter field tile downstream of the open drain was undersized by the standards at that time. Work completed under this report included the installation of approximately 256m of 350mm diameter field tile installed adjacent to the existing 300 mm diameter field tile, as well as approximately 732m of open drain excavation. The watershed from the 1980 report encompassed parts of Lots 23 to 25 Concession 10 which includes much of the southern portion of the modern-day community of Ilderton. At the time of the 1980 report submission, the watershed for the Ilderton No. 2 included a total of 24 properties in parts of Lots 23 to 25 Concession 10.

We understand considerable residential development occurred in the community of Ilderton during the 2000s in the watershed of the Ilderton No. 2. As the area developed, upstream portions of Ilderton No. 2 were removed and replaced with a municipal storm sewer system. The portions of the Ilderton No. 2 that are believed to remain today include (1) the northern portion from the intersection of County Road 20 (Hyde Park Road) and County Road 16 (Ilderton Road) downstream to the municipal storm sewer system at the lot line between Municipal Number 196 Martin Drive and Municipal Number 200 Martin Drive and (2) the southern portion from the south extent of the residential lots south of Willow Ridge Road downstream to the outlet into the Oxbow Municipal Drain. The northern portion consists of approximately 165m of closed drain and the southern portion consists of approximately 633m of open drain which outlets into approximately 293m of closed drain (which outlets into the Oxbow Municipal Drain). This open drain provides an outlet to two critical Municipally owned properties containing a SWMF from the Meadow Creek Subdivision in the community of Ilderton and the WWTF for the community of Ilderton.

3. Proceedings Under the Drainage Act

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

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

This Report is one of those proceedings. To aid in the understanding of the process listed below in chronological order are all normal proceedings with the notation “Completed” beside those which have been completed. This listing is a summary of many but not all parts of the Drainage Act and applies to the

ordinary course of events. Further proceedings are available, and for these the Drainage Act should be consulted directly.

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

4. On-Site Meeting

In accordance with Section 9(1) of the Drainage Act, R.S.O. 1990, an on-site meeting was held on December 5, 2017. The meting was scheduled to take place at 9:00 am in the parking lot of the Meadow Creek Soccer Fields north of Meadowcreek Drive, approximately 340m east of Hyde Park Road. Persons in attendance were:

Brad Bunke, P.Eng.	GMBP (GEI)	-
Nick Giunti	GMBP (GEI)	-
Dan Anderson	Drainage Superintendent, Municipality of Middlesex Centre	-
Cari Ramsey	UTRCA	
Laurie Stanton representing Stanton Bros Ltd.	S. Pt. Lot 23 Concession 10	Roll No. 070-024

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

The following comments were provided at the meeting by attendees:

Laurie Stanton stated that he believes the closed drain through his property is undersized. He also stated that occasional blowouts occur along the length of the closed drain. Mr. Stanton stated that the catch basin along the southern tree line of the wooded area, which conveys water from the open drain to the closed drain, frequently clogs with silt and debris, causing water to flood downstream onto his property along the length of the closed drain. He also stated that this flooding causes crop loss each year and has contributed to extensive erosion and damage to his land. Mr. Stanton suggested investigating the possibility of closing in the open drain through the wooded area (from the WWTF outlet to the catch basin at the southern tree line of the wooded area).

Cari Ramsey stated that a close-in of the open drain would have to be reviewed and that typically, the UTRCA does not support a close-in that is greater than 500 metres in length, or within a watershed greater than 125 hectares. Ms. Ramsey noted that the Ilderton No. 2 is rated as Class F by the Department of Fisheries and Oceans (DFO) and stated that UTRCA would need to check for potential wetland pockets within the wooded area. As an alternative, Ms. Ramsey suggested to review a partial close-in of the open drain part way into the wooded area to keep any flooding within this area rather than onto Mr. Stanton's crop field.

5. Design Options and Design Review Meeting No. 1

Based on landowner comments, comments provided by the UTRCA, site investigations, and topographic survey, three draft improvement options were prepared to address the drainage concerns. The general scope of each of the three options is outlined below:

Option No. 1: Clean out the existing open drain while installing a new inlet structure catch basin complete with a berm and rip-rap spillway at the south extent of the wooded area. The new inlet structure would outlet into the downstream closed drain. The downstream closed drain would be removed and replaced with a closed drain of sufficient size by modern standards.

Option No. 2: Clean out the existing open drain while extending the closed drain of the Ilderton No. 2 further upstream into the wooded area. This upstream extension would generally be parallel to the existing open drain. A new inlet structure catch basin including rip-rap spillway would be installed at the south extent of the wooded area. The new inlet structure would outlet into the downstream closed drain. The downstream closed drain would be removed and replaced with a closed drain of sufficient size by modern standards.

Option No. 3: The third option would generally match the scope of Option No. 2 noted above but would also include filling in the portion of open drain adjacent to the upstream extension of the closed drain.

Draft design drawings of these three options were prepared, with associated construction cost estimates and estimated assessment tables. This information was presented as part of a July 4, 2018 design review meeting held at the Municipal office. The intent of this design review meeting was to review the steps taken to date, review the details of the draft improvement options, and select a preferred option to move forward into detailed design and preparation of the municipal drain report. This meeting was attended by representatives from the Stanton property, representatives from GMBP (GEI), representatives from the Municipality and Karen Winfield from UTRCA. Laurie Stanton was not in attendance but provided comments via telephone following the meeting. In reviewing the draft improvement options, the following notes from the design review meeting and follow-up conversations with Mr. Stanton were provided.

Option No. 1: Mr. Stanton expressed concerns with the effectiveness of Option No. 1 as this involves maintaining the drain through the wooded area as an open drain, subjected to continual introduction of debris, silt, leaves, sticks, etc. through surface runoff and causing continuous maintenance issues, even with a larger proposed inlet catch basin. Mr. Stanton also stated that he sees little value in proceeding with this option and has no interest in moving ahead with this option.

Option No. 2 & Option No. 3: Mr. Stanton expressed concerns with the costs of these two options but was supportive of the closed drain through the wooded area. Karen Winfield stated that the UTRCA would not support these options due to the installation of a closed drain through the wooded area. Ms. Winfield continued in stating these options would not be supported by staff and would require approval from the UTRCA board of directions in order to proceed.

6. Design Review Meeting No. 2

Without a clear and agreed upon scope for the drainage improvements, the project largely remained paused until a second design review meeting which was held on September 7, 2022. This meeting was attended by Laurie Stanton representing Stanton Bros Ltd., Dan Anderson (Drainage Superintendent) from the Municipality, and Brad Bunke and Brendan Shapton from GMBP (GEI). During this meeting Mr. Stanton explained that his recent efforts in exploring drainage solutions through private tile contractors were not effective and the flooding, erosion, and crop loss all continue to be an issue. The attendees reviewed options previously presented, including the UTRCA position on Option No. 2 and Option No. 3. Understanding this UTRCA position, the attendees were in general agreement that Option No. 1 may be feasible if the ingress of debris and other unwanted materials into the open drain could be mitigated.

7. UTRCA Design Review Meeting

Based on landowner comments from the second design review meeting, comments previously provided by the UTRCA, site investigations, and topographic survey, a fourth draft improvement option was prepared to address the drainage concerns. The general scope of this fourth option is outlined below:

Option No. 4: Reconstruct the open drain from the WWTF downstream to the south extent of the wooded area, complete with 15.0m wide grassed buffer strips on both sides of the drain. The intent of the buffer strips is to reduce debris and silt ingress into the open drain, as well as facilitating required drain construction access, decreasing soil erosion, and decreasing the frequency of cleanouts. The closed drain of the Ilderton No. 2 would be extended further upstream into the wooded area, with this upstream extension generally being parallel to the existing open drain. A new inlet structure catch basin including rip-rap spillway would be installed at the south extent of the wooded area. The new inlet structure would outlet into the downstream closed drain. The downstream closed drain would be removed and replaced with a closed drain of sufficient size by modern standards.

A design review meeting was held with representatives from UTRCA at the UTRCA office on June 14, 2023. The intent of this UTRCA design review meeting was to review the steps taken to date, review the details of the fourth improvement option, and discuss comments and concerns from the UTRCA for the fourth improvement option in order to move forward into detailed design and preparation of the municipal drain report. This meeting was attended by Karen Winfield, Tommy Kokas, Cari Ramsey and Brad Dryburgh from UTRCA, Dan Anderson (Drainage Superintendent) from the Municipality, and Brad Bunke, Brendan Shapton and Cuirin Cantwell from GMBP (GEI).

The UTRCA stated that they have concerns with the closed drain being extended upstream through the wooded area, the amount of mature tree clearing within the full width of the buffer strips, buffer strips and work occurring on both sides of the drain, and the potential for invasive species growing in the buffer strips without proper grass seed placement.

Through discussion by the attendees, revisions to the fourth improvement option were proposed which included not extending the closed drain upstream through the wooded area, select mature trees to remain within the 15.0m wide grassed buffer strips on both sides of the drain and proper grass seed mix, with input from the UTRCA, be placed on the buffer strips. Following the UTRCA design review meeting, a site walkthrough was completed on September 6, 2023 with GMBP (GEI) representatives, UTRCA representatives and Mr. Stanton where the mature trees to remain within the buffer strips were identified.

8. Design Review Meeting No. 3

A design review meeting was held on June 28, 2024 to review and discuss the draft drain improvements with landowners prior to finalizing the report. The meeting was scheduled to take place at 9:00am at the Ilderton Community Centre at 13168 Ilderton Road, Ilderton, ON. Persons in attendance were:

Brendan Shapton, P.Eng.	GEI	-
Cuirin Cantwell	GEI	-
Dan Anderson	Drainage Superintendent, Municipality of Middlesex Centre	-

Laurie Stanton representing Stanton Bros Ltd.	S. Pt. Lot 23 Concession 10	Roll No. 070-024

A copy of the draft design was distributed to each attendee. GEI reviewed the project history to date and steps taken to reach this stage of the project, and presented the draft design, draft cost estimate, and draft assessments. GEI noted that the draft drainage improvements are based on previously provided landowner comments, comments from the UTRCA Design Review Meeting, the site walkthrough completed with UTRCA representatives, site investigations, and topographic survey.

Attendees provided the following comments:

Mr. Stanton stated that he had no questions or comments regarding the draft drainage improvements but reiterated his previous comments regarding Option No. 2 and Option No. 3.

9. Findings

Based on the information provided at the on-site meeting, subsequent design review meetings and discussions thereafter, we understand that the open drain of Ilderton No. 2 has a build-up of silt and debris throughout its length and that this silt build-up and debris blocks the inlet to the closed drain resulting in overland flooding and erosion on the downstream property (S. Pt. Lot 23 Concession 10, Roll No. 070-024).

Through a site investigation and completion of a topographic survey, areas of silt build-up were identified throughout the open drain. Debris – mostly leaves, sticks, and fallen tree branches – within the drain and at the catch basin located at the south extent of the wooded area were additionally noted on-site.

Based on its current condition, we feel that the existing open drain of the Ilderton No. 2 does not provide sufficient outlet for landowners, the WWTF and the SWMF. Further, we have made an examination of the drainage area and determined that the existing closed drain of the Ilderton No. 2 does not provide a sufficient outlet to portions of the watershed. Regardless of its condition, the closed drain of the Ilderton No. 2 is undersized by modern design standards to accommodate flows from the rural properties within the watershed, the WWTF, the SWMF, and properties and roads in the VBS. If portions of the existing open drain and existing closed drain of the Ilderton No. 2 are improved then overland flow, flooding, erosion, and blowouts can be alleviated by redirecting the water to the improved municipal drain.

10. Basis for Design

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

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

It is noted that the Ilderton No. 2 provides an outlet for the rural properties within the watershed, the WWTF, the SWMF, and properties and roads in the VBS. Therefore, the lderton No. 2 is designed to accommodate the design flows from these properties and facilities as discussed below.

1. The Ilderton No. 2 supports the growing of high value cash crops on agricultural properties within the watershed. Therefore, GEI has selected a 38 mm drainage coefficient for the design flow from rural properties within the watershed.
2. As per the Amended Environmental Compliance Approval (ECA) for the WWTF dated May 1, 2018, the rated capacity of the WWTF which outlets to the Ilderton No. 2 is 1,300m^3/day which is equivalent to 0.015m^3/s. Therefore, GEI has selected a design flow of 0.015m^3/s from the WWTF.
3. As per the Stormwater Management Design Brief for the Meadow Creek Subdivision SWMF in the community of Ilderton prepared by Development Engineering (London) Limited dated April 2, 1997, the maximum discharge rate for the 2-year storm is 432L/s. Therefore, GEI has selected a design flow of 0.432m^3/s from the SWMF.
4. Based on the Meadow Creek Subdivision – Phase 1 Drawings prepared by Development Engineering (London) Limited dated August 11, 1997 and Meadowcreek Condominiums Drawings prepared by Whitney Engineering Inc. dated March 27, 2007 the storm sewer from properties and roads in the VBS which outlets to the Ilderton No. 2 is estimated to have an approximate capacity of 444L/s. Therefore, GEI has selected a design flow of 0.444m^3/s from properties and roads in the VBS.

It should also be noted that the improvements to the open drain are necessary to provide sufficient outlet by addressing silt build-up, providing a reconstruction of the open drain and removing other debris from the open drain. Additionally, to reduce debris and silt ingress into the open drain, facilitate drain construction and maintenance access, decrease soil erosion, and decrease the frequency of cleanouts, grass buffer strips 15.0m in width will be constructed on both sides of the open drain.

11. Environmental Considerations

The Ilderton No. 2 will be subject to the review of the UTRCA, the DFO, and consideration under the Endangered Species Act (ESA).

GEI has reviewed the available DFO mapping tools for aquatic species listed under Species at Risk Act (SARA). Based on this mapping, there is no indication of extirpated, endangered, or threatened aquatic species, special concern aquatic species or critical habitat for extirpated, endangered or threatened aquatic species in the project area. Based on available mapping, Ilderton No. 2 is identified as a DFO Class F Drain and the Oxbow Municipal Drian is identified as a DFO Class D Drain. A copy of the design of the drainage improvements was submitted to DFO for review and to obtain approval for construction. DFO reviewed the design of the drainage improvements and provided a letter of advice. DFO has no concerns

with the drainage improvements provided the avoidance and mitigation measures in the Letter of Advice are implemented including in-water work shall not occur between March 15 and July 15 (inclusive) of any year, sediment and erosion control measures are installed, appropriate dewatering methods are utilized, deleterious substances are prevented from entering the water, and disturbed areas are restored and re-seeded following construction.

GEI has reviewed the available natural heritage mapping tool for species listed under SARA and ESA. Based on this mapping, endangered, threatened, and special concern species were identified as having the potential to be located in the project area. To confirm the presence of these species it is recommended that a qualified biologist be retained to the review the project area and drainage improvements with respect to these species at risk. If the Biologist identifies that the drainage improvements may impact a species at risk, recommendations for avoidance and mitigation measures will be added to the project. If required, a species at risk report will be registered or submitted to the Ministry of Environment, Conservation and Parks (MECP) to obtain approval for construction.

Based on the available natural heritage mapping tool, the subject wooded area is identified as a Woodland but not as Wetland. As a preventative measure to mitigate risk to migratory birds protected under the Migratory Birds Convention Act (1994), it is anticipated that no tree, bush, brush or vegetation removal, clearing, brushing and associated work shall occur between March 15 and August 31 (inclusive) of any given year, unless otherwise approved by a qualified biologist.

GEI has had extensive coordination and consultation with the UTRCA for the drainage improvements. UTRCA comments and concerns have been incorporated into the drainage improvements design, and it is anticipated that UTRCA will provide approval for construction once a permit application is submitted.

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

12. Recommendations for the Ilderton Municipal Drain No. 2

It is our recommendation that:

1. A new closed drain be constructed to replace the existing Ilderton No. 2 as shown on the drawings from Sta. 0+000 at its outlet into the Oxbow Municipal Drain to Sta. 0+293 at the southern extent of the wooded area. The new closed drain shall consist of approximately 143m of twin 750mm diameter concrete field tile and 150m of twin 750mm diameter HDPE pipe. The twin 750mm diameter HDPE pipe shall be the outlet into the Oxbow Municipal Drain, complete with rodent grates and rip-rap on geotextile to control erosion.

2. The existing catch basin located at Sta. 0+293 (south extent of the wooded area) be replaced with two catch basins, complete with bird cage grates, a 450mm diameter HDPE pipe to connect the catch basins, rip-rap, and a berm with a rip-rap spillway, topsoil and grass seed.

3. Excavate and reconstruct the open drain from Sta. 0+293 (south extent of the wooded area) upstream to Sta. 0+689 (WWTF), with the excavated material to be spread within the buffer strips. The reconstructed open drain shall include topsoil, grass seed, erosion control blanket and rip-rap on geotextile to control erosion.

4. Grassed buffer strips, 15.0m in width, be constructed on both sides of the Ilderton No. 2 open drain from Sta. 0+293 (south extent of the wooded area) upstream to Sta. 0+689 (WWTF). The buffer strips will reduce debris and silt ingress into the open drain, as well as facilitating required drain construction and maintenance access, decreasing soil erosion, and decreasing the frequency of cleanouts.

5. Access, 10.0m in width, be constructed from the WWTF to the Ilderton No. 2 open drain in the wooded area. This includes the installation of a gate in the existing chain link fence at the WWTF.

6. Trees and vegetation be cleared and grubbed from the open drain, buffers strips and access, except for the trees marked to be conserved. The trees and vegetation shall be stockpiled at the edge of the buffer strips for removal and disposal by the landowner.

7. The reconstructed open drain, buffer strips and access shall be re-vegetated with an approved grass seed mixture.

8. The existing Ilderton No. 2 open drain from Sta. 0+689 (WWTF) to Sta. 0+926 (south extent of the residential lots south of Willow Ridge Road) shall remain.

9. The existing Ilderton No. 2 closed drain, approximately 165m long, from the intersection of County Road 20 (Hyde Park Road) and County Road 16 (Ilderton Road) downstream to the municipal storm sewer system at the lot line between Municipal Number 196 Martin Drive and Municipal Number 200 Martin Drive shall remain.

10. In accordance with Section 19 of the Drainage Act, the existing Ilderton No. 2 between Sta. 0+926 (south extent of the residential lots south of Willow Ridge Road) and the lot line between Municipal Number 196 Martin Drive and Municipal Number 200 Martin Drive shall be abandoned as this portion of the Ilderton No. 2 has been supplanted by the municipal storm sewer system. The abandoned Ilderton No. 2 shall have no status under the Drainage Act.

11. Where encountered during the construction of the new Ilderton No. 2, the existing Ilderton No. 2 between Sta. 0+000 and Sta. 0+293 along the route shown on the Drawings shall be removed. Should landowners want the existing Ilderton No. 2 to remain, the existing Ilderton No. 2 shall be abandoned in accordance with Section 19 of the Drainage Act. The abandoned existing Ilderton No. 2 shall become private drains with no status under the Drainage Act and landowners whose property the private drains are located on shall be responsible for the private drains.

12. The design flow used for the rural properties within the watershed shall be based on a drainage coefficient of 38mm of rainfall per 24 hours.

13. The design flow used for the outflow from the WWTF shall be 0.015m^3/s as per the Amended ECA for the WWTF dated May 1, 2018.

14. The design flow used for the outflow from the SWMF shall be 0.432m^3/s as per the Stormwater Management Design Brief for the Meadow Creek Subdivision SWMF prepared by Development Engineering (London) Limited dated April 2, 1997.

15. The design flow used for the properties and roads in the VBS shall be 0.444m^3/s based on the VBS storm sewer outlet shown Meadow Creek Subdivision – Phase 1 Drawings prepared by Development Engineering (London) Limited dated August 11, 1997 and Meadowcreek Condominiums Drawings prepared by Whitney Engineering Inc. dated March 27, 2007.

The drawings included with the Report show the extent of the work, land affected, profile of the tile and other details of the work. The plan shown on Drawing No. 1 – Ilderton Municipal Drain No. 2 Overall Plan gives the area considered to be in the drainage area of the work proposed.

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

13. Working Area

The working area for construction purposes for the closed drain shall be a width of 25m centered on the proposed closed drain. The working area for construction purposes for the open drain shall be a width of 40m centred on the proposed open drain. The working areas for maintenance purposes for the closed drain shall be a width of 15m centered on the proposed closed drain. The working area for maintenance purposes for the open drain shall be a width of 40m centered on the proposed open drain.

Access to the Ilderton No. 2 shall be:

1. North from Ten Mile Road along the west side of the Oxbow Municipal Drain to Sta. 0+000; and
2. East from Meadowcreek Drive through the WWTF to Sta. 0+625.

Each landowner on whose property the drainage work is to be constructed may designate access, different from the access discussed above in writing, to and from the working area at the time of construction or upon failure to do so, the Engineer or Drainage Superintendent, as the case may be, shall designate access.

14. Watershed Characteristics

The drainage area comprises approximately 82.40 hectares. Land use within the watershed is primarily residential with sections of agricultural, wooded area, industrial and institutional, and roadway.

Specific land uses within the watershed are as follows:

Agricultural	- 11.23 ha
Wooded Area	- 15.25 ha

Residential	- 42.70 ha
Industrial and Institutional	- 2.04 ha
Roadway	- 11.18 ha

15. Allowances

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

a) Section 29 – Right-of-Way

The Drainage Engineer is to provide for an allowance to be paid to the landowner whose land is proposed to be used for improvements to the open drain and closed drain. While the lands used for the open drain are still legally owned by the landowner on title, they are no longer usable for the landowner. While the lands used for the closed drain are still legally owned by the landowner on title, the Drainage Act creates a "Statutory Easement" which allows for future access for maintenance and repair purposes. The Act requires the landowner to be compensated for the value of the land.

Allowances for Right-of-Way are calculated based on 25% of the land value for the closed drain, buffer strips within the wooded area and open drain access, and 100% of the land value for the open drain, with the land value of $61,010/hectare.

Based on past reports we understand that a 10m Right-of-Way width is present on the existing closed drain of the Ilderton No. 2. To account for the increased size of the twin pipes, an additional 5m Right-of-Way width is required, for a total Right-of-Way width of 15m.

Based on past reports we understand that a 10m Right-of-Way width is present on the existing open drain of the Ilderton No. 2. To account for the increased drain width, buffer strips and access, additional Right-of-Way is required. An additional 3m Right-of-Way width is required for the increased open drain width (provided at 100% of the land value) and an additional 27m Right-of-Way width is required for buffer strips within the wooded area and access (provided at 25% of the land value), for a total Right-of-Way width of 40m.

Based on past reports we understand that Right-of-Way is present on the existing Oxbow Municipal Drain. No additional Right-of-Way is therefore required to provide access from Ten Mile Road along the Oxbow Municipal Drain.

To provide access from Meadowcreek Drive, a 10m Right-of-Way width is required from the WWTF to the Ilderton No. 2 open drain through the wooded area (provided at 25% of the land value).

b) Section 30 - Damages

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

Damage from installing the closed drain is valued at $2,550.00 / hectare and is based on a 25m wide working area. The allowance is calculated on a 5-year declining balance basis, with 100% of the allowance paid for the first year, as total destruction of crop is anticipated. In the following 4 years, a declining allowance is paid based on a 5m width of disturbed ground, with 80% of the allowance paid in year 2, 60% in year 3, 40% in year 4, and 20% in year 5. This is done to reflect the decreased crop yields in the area where the subsoil was disturbed for drain installation.

For example, a parcel of cropland 500m in length that is disturbed for drain installation would be given a damage allowance calculated as follows:

Year 1: 500m x 25m = 1.25 ha x $2,550	= $3,188
Year 2: 500m x 5m = 0.25 ha x $2,550 x 80%	= $510
Year 3: 500m x 5m = 0.25 ha x $2,550 x 60%	= $383
Year 4: 500m x 5m = 0.25 ha x $2,550 x 40%	= $255
Year 5: 500m x 5m = 0.25 ha x $2,550 x 20%	= $127
Total Damage Allowance Paid in Report	= **$4,463**

Damage from reconstructing the open drain is valued at $2,550.00/hectare and is based on a 40m wide working area. Damage allowance is to be provided for the area required for the increased drain width, buffer strips through the wooded area and access for the first year only as these areas are to be maintained as the drain, buffer strips and access, respectively, following the first year. Additionally, damage allowance is not to be provided for the area of the existing open drain, which is approximately 7m in width and therefore the net damage width for the purpose of calculating the damage allowance is 33m.

For example, a parcel of wooded area 500m in length that is disturbed for open drain reconstruction would be given a damage allowance calculated as follows:

Year 1: 500m x 33m = 1.65 ha x $2,550	= $4,208
Total Damage Allowance Paid in Report	= **$4,208**

Damage from providing access from Ten Mile Road, is valued at $2,550.00/hectare, and is based on a 5m wide access area. This damage allowance for access is to be provided for the first year only as total destruction of crop is anticipated, however there is not anticipated to be any disturbed ground.

Damage from providing access from Meadowcreek Drive, is valued at $2,550.00/hectare, and is based on a 10m wide access area. This damage allowance for access is to be provided for the first year only as this area is to be maintained as access following the first year.

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

No damage allowance for future drain maintenance, repair or improvement is to be paid for the removal of any vegetation, fencing or any other obstruction within the Right-Of-Way. Refer to Section 18 for further details.

c) Section 31 – Allowance for Existing Drains

No existing private drains are involved in this project.

d) Section 32 – Allowance for Damage Due to Insufficient Outlet

As sufficient outlet has been confirmed, there is no allowance for insufficient outlet.

e) Section 33 – Allowance for loss of Access

As crossings are provided at each property where crossings were originally provided, no loss of access allowance is considered appropriate.

The allowances are generally less than the assessment to the properties and the property owner is billed the difference when the project is complete. GEI determines the amounts to be paid in allowances to owners as shown in Table 1: Schedule of Right-of-Way Allowances, Table 2: Schedule of Damage Allowances and Table 3: Summary of Allowances. The allowances shall become due and payable according to Section 62 of the Drainage Act.

Table 1: Schedule of Right-of-Way Allowances

Concession	Lot	Owner and Roll No.		Station		Right-of-Way (Section 29)		Total
				Start	End	Cost ($)	Width (m)	
10	S. Pt. Lot 23	Stanton Brothers Ltd.	070-024	0+000 0+293 0+293	0+293 0+489 0+489	$2,230 $3,590 $8,070	5 3 27	$13,890
10	S. Pt. Lot 24 Part 2	1106002 Ontario Ltd.	070-025	0+489 0+489	0+592 0+592	$1,890 $4,240	3 27	$6,130
10	Pt. Lot 24 Part 1	Municipality of Middlesex Centre	080-270-15	0+592 0+592	0+649 0+649 Access	$1,040 $2,350 $80	3 27 10	$3,470

10	Pt. Lot 24 Parts 1 & 2	Municipality of Middlesex Centre	080-270-10	0+649 0+649	0+689 0+689 Access	$730 $1,650 $1,530	3 27 10	$3,910
						Total		**$27,400**

Table 2: Schedule of Damage Allowances

Concession	Lot	Owner and Roll No.		Station		Damages (Section 30)		Total
				Start	End	Cost ($)	Width (m)	
10	S. Pt. Lot 23	Stanton Brothers Ltd.	070-024	0+000 0+293	0+293 0+489 Access	$2,620 $1,650 $240	25 33 5	$4,510
10	S. Pt. Lot 24 Part 2	1106002 Ontario Ltd.	070-025	0+489	0+592 Access	$870 $270	33 5	$1,140
10	Pt. Lot 24 Part 1	Municipality of Middlesex Centre	080-270-15	0+592	0+649 Access	$480 $10	33 10	$490
10	Pt. Lot 24 Parts 1 & 2	Municipality of Middlesex Centre	080-270-10	0+649	0+689 Access	$340 $260	33 10	$600
						Total		**$6,740**

Table 3: Summary of Allowances

Concession	Lot	Owner and Roll No.		Total
10	S. Pt. Lot 23	Stanton Brothers Ltd.	070-024	$18,400
10	S. Pt. Lot 24 Part 2	1106002 Ontario Ltd.	070-025	$7,270
10	Pt. Lot 24 Part 1	Municipality of Middlesex Centre	080-270-15	$3,960
10	Pt. Lot 24 Parts 1 & 2	Municipality of Middlesex Centre	080-270-10	$4,510
			Total	**$34,140**

16. Assessments

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

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

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

Outlet liability for all roads was calculated using the methodology outlined in "*Outlet Liability Assessment Factors for Highway Rights of Way*", as published by the Ontario Ministry of Transportation. This methodology assigns an Equivalent Area Factor to roads based on the percentage of the Right-of-Way that is developed and the adjacent soil runoff coefficient ('C' factor). The Equivalent Area Factors for the roads is summarized in Table 4 below.

Table 4: Equivalent Area Factors for Roads

Road	Owner	Percent Developed	Runoff Coefficient	Equivalent Area Factor
Municipal Roads in the community of Ilderton	Municipality of Middlesex Centre	45%	0.37	2.25
Hyde Park Road	County of Middlesex	45%	0.37	2.25

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

Mr. Stanton representing Stanton Bros Ltd. (S. Pt. Lot 23 Concession 10, Roll No. 070-024) has requested additional works and features that are beyond a typical municipal drain improvement project. These additional works and features include increasing the width of clearing and buffer strips through the wooded area, and the supply and installation of an additional catch basin at the southern tree line of the wooded area. Roll No. 070-024 is assessed a special benefit for these additional works and features.

The Municipality of Middlesex Centre (Pt. Lot 24 Parts 1 & 2 Concession 10, Roll No. 080-270-10) is assessed a special benefit for the supply and installation of the fence gate.

Block Assessments are described in **Section 25** of the Act, which states (1) *"The council of the local municipality may direct the engineer to assess as a block, a built-up area designated by the council, and the sum assessed therefor may be levied against all the rateable properties in the designated area proportionately on the basis of the assessed value of the land and buildings."* and (2) *"Where the engineer makes a block assessment under subsection (1), the engineer shall designate the proportion of the assessment to be charged against the public roads in the designated area."* Block assessments are typically used when it is impractical to assess each property in a built-up area individually by allowing these properties to be assessed together in a block. At a council meeting on August 7, 2024, the Municipality of Middlesex Centre Council

passed a resolution *"that Council direct GM BluePlan, the Engineer appointed to the Ilderton Municipal Drain Improvement under Section 78 of the Drainage Act, to conduct a block assessment of the urban settlement area of Ilderton as permitted by Section 25 of the Drainage Act."*

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

For this report, agricultural land was used as a baseline, with an equivalent area factor of 1.0. Other land types were given a factor to account for surface permeability differences that cause water to flow over the ground surface rather than infiltrate into the ground. A list of the equivalent area factors used in this report is as follows:

Table 5: Equivalent Area Factors

Land Use	Equivalent Area Factor
Agricultural	1.00
Wooded Area	0.50
Residential	1.50
Industrial	1.50
Institutional	2.00
Municipal Roads*	2.25
Hyde Park Road*	2.25
WWTF+	72.75
SWMF – Residential+	1.89
SWMF – Municipal Roads+	2.84
SWMF – Hyde Park Road+	2.84
VBS – Residential+	13.29
VBS – Municipal Roads+	19.94

*As per Table 4.
+These equivalent area factors are discussed further below and are applied instead of the other equivalent area factors in **Table 5.**

In addition to runoff, the Municipality of Middlesex Centre (Pt. Lot 24 Parts 1 & 2 Concession 10, Roll No. 080-270-10) outlets treated sanitary effluent flow from the WWTF to the Ilderton No. 2. This requires the equivalent area factor applied to this property to account for the runoff and this additional flow to the Ilderton No. 2. The equivalent area factor for the WWTF was determined as follows:

1. The WWTF is considered an industrial land use type which, as shown in Table 5 above, has an equivalent area factor of 1.50 to account for runoff from the WWTF.
2. As per the Amended ECA for the WWTF dated May 1, 2018, the rated capacity of the WWTF which outlets to the Ilderton No. 2 is 1,300m^3/day which is equivalent to 0.01505m^3/s or 15.05L/s.

3. The WWTF is located on the Municipality of Middlesex Centre property (Pt. Lot 24 Parts 1 & 2 Concession 10, Roll No. 080-270-10) which has a land area of 1.76 ha.
4. Therefore, the WWTF contributes approximately 8.55L/s/ha of additional flow to the Ilderton No. 2.
5. As per the Ministry of Natural Resources' Ontario Watershed Information Tool, annual precipitation at the WWTF is 1,012mm.
6. It is estimated that approximately 37.5% of precipitation at the WWTF will become runoff, with the remainder infiltrating to the ground or removed due to evapotranspiration. For a one-year period, this results in approximately 0.12L/s/ha of runoff.
7. Therefore, the equivalent area factor for the additional flow from the WWTF to the Ilderton No. 2 is 71.25.
8. Therefore, the equivalent area factor for the runoff and additional flow from the WWTF to the Ilderton No. 2 is 72.75.

The runoff from the properties and roads within the Meadow Creek Subdivision outlets to the SWMF prior to entering the Ilderton No. 2. This requires the equivalent area factor applied to these properties and roads to account for the flow from the SWMF to the Ilderton No. 2. The equivalent area factor for properties and roads which outlet to the SWMF was determined as follows:

1. As per the Stormwater Management Design Brief for the Meadow Creek Subdivision SWMF in the Community of Ilderton prepared by Development Engineering (London) Limited dated April 2, 1997, the maximum discharge rate for the 2-year storm is 432L/s.
2. The residential property area, municipal road area and Hyde Park Road area which outlet to the SWMF is approximately 36.85 ha, 8.14 ha and 1.88 ha, respectively.
3. Applying the equivalent area factors to the areas above which outlet to the SWMF results in a total equivalent area which outlets to the SWMF of approximately 77.83 ha. These equivalent area factors are applied to account for the varying runoff contribution to the SWMF from the different land uses.
4. Using the drainage coefficient of 38mm of rainfall per 24 hours and the total equivalent area, the total flow from these properties and roads to the Ilderton No. 2 would be 342L/s.
5. Therefore, the SWMF outlets approximately 26.2% more flow to the Ilderton No. 2 than the flow from the drainage coefficient calculation. This means the equivalent area factors for properties and roads that outlet to the SWMF need to be increased by 26.2%.
6. Therefore, the equivalent area factors for residential properties, municipal roads and Hyde Park Road area which outlet to the SWMF are 1.89, 2.84 and 2.84, respectively.

The runoff from the properties and roads in the VBS outlet to a storm sewer prior to entering the Ilderton No. 2. This requires the equivalent area factor applied to these properties and roads to account for the flow from the storm sewer to the Ilderton No. 2. The equivalent area factor for properties and roads in the VBS was determined as follows:

1. Based on the Meadow Creek Subdivision – Phase 1 Drawings prepared by Development Engineering (London) Limited dated August 11, 1997 and Meadowcreek Condominiums Drawings

prepared by Whitney Engineering Inc. dated March 27, 2007 the storm sewer from properties and roads in the VBS which outlets to the Ilderton No. 2 is estimated to have an approximate capacity of 444L/s.

2. The residential property area and municipal road area which outlet to the storm sewers is approximately 5.85 ha and 1.16 ha, respectively.
3. Applying the equivalent area factors to the areas above which outlet to the storm sewer results in a total equivalent area which outlets to the storm sewer of approximately 11.39 ha. These equivalent area factors are applied to account for the varying runoff contribution to the SWMF from the different land uses.
4. Using the drainage coefficient of 38mm of rainfall per 24 hours and the total equivalent area, the total flow from these properties and roads to the Ilderton No. 2 would be 50.1L/s.
5. Therefore, the storm sewer outlets approximately 886.3% more flow to the Ilderton No. 2 than the flow from the drainage coefficient calculation. This means the equivalent area factors for properties and roads that outlet to the storm sewer need to be increased by 886.3%.
6. Therefore, the equivalent area factors for residential properties and municipal roads which outlet to the storm sewer are 13.29 and 19.94, respectively.

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

Assessments on agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance. There is no grant should the project not proceed through construction.

17. Cost Estimates

The cost of this municipal drain improvement is estimated as **$605,840** and is raised by assessment from properties within the watershed. A Schedule of Estimated Assessments can be found in **Appendix A**.

GEI estimates the cost of the Ilderton No. 2 as follows:

COST ESTIMATE - Ilderton Municipal Drain No. 2 Municipality of Middlesex Centre			
Allowances			**$ 34,140**
Ilderton Drain No. 2 Construction			
Dye testing prior to construction	$	1,000	
Environmental protection measures	$	2,000	
Supply and install 6.0m wide gate, complete with barbed wire, in existing fence including removal and salvage of existing fence to be removed and connection to the existing fence which remains	$	3,500	
Supply and install 60m^2 of class R-50 rip-rap on geotextile filter material at outlet - STA. 0+000	$	5,300	
Supply 300m of 750mm diameter HDPE pipe c/w rodent grate	$	62,800	
Install 150m of twin 750mm diameter HDPE pipe c/w rodent grate by excavator - STA. 0+000 - STA. 0+150	$	23,400	
Supply and install granular 'B' bedding and backfill (approx. 1,300 tonnes) - STA. 0+000 - STA. 0+150	$	28,600	
Supply 286m of 750mm concrete field tile	$	29,900	
Install 143m of twin 750mm concrete field tile by excavator - STA. 0+150 - STA. 0+293	$	18,500	
Supply and install granular 'B' bedding and haunch support (approx. 350 tonnes) - STA. 0+150 - STA. 0+293	$	7,700	
Supply and install 4 - 450mm x 750mm Inserta Wye, Manufactured Wye, or approved equivalent c/w 450mm diameter HDPE pipe leads (flow equilization)	$	5,600	
Supply and install 1 - 3000mm x 1200mm ditch inlet catch basin c/w bird cage grate and earth berm - STA. 0+293	$	22,000	
Supply and install 60m^2 class R-50 rip-rap at catch basin on geotextile filter material - STA. 0+293	$	5,300	
Supply and install 1 - 1200mm x 900mm ditch inlet catch basin c/w bird cage grate, earth berm, 2m of 450mm diameter HDPE pipe and granular 'B' bedding and backfill for the HDPE pipe - STA. 0+293	$	7,300	
Dewatering	$	8,500	
Reconstruct existing open drain including brush and tree removal, seeding, leveling of excavated material, erosion control blanket and construction of 15m wide buffer strips on both sides of the drain - STA. 0+293 - STA. 0+689 and Access			
Clear, grub, remove and stockpile trees, brush and vegetation from the open drain, 15m buffer strip on both sides of the open drain and for access, including whatever methods are required to protect trees marked as to be conserved	$	33,300	
Excavation, including stripping and stockpiling of topsoil, leveling and placement of excavated material and spoil, including whatever methods are required to protect trees marked as to be conserved (approx. 396m)	$	23,800	
Remove, salvage and reinstall existing erosion protection on geotextile filer material, including whatever methods are required to protect trees marked as to be conserved	$	2,000	
Placement of stripped and stockpiled topsoil and supply and install approved seed mixture, including whatever methods are required to protect trees marked as to be conserved (approx. 16,000m^2)	$	41,600	
Supply and install erosion control blanket including whatever methods are required to protect trees marked as to be conserved (approx. 4,200m^2)	$	21,000	
Allowance for fish rescue services (provisional)	$	3,000	
Allowances for clear stone bedding (provisional)	$	3,400	
Allowances for imported toposil (provisional)	$	2,500	
Allowances for poor soil conditions (provisional)	$	4,600	
Allowance for class R-50 rip-rap on geotextile filter material (provisional)	$	3,600	
Allowances for tile connections (provisional)	$	2,400	
Contingency Fund at approx. 15% of construction	$	55,900	
Total Estimated Drain Construction Cost			**$ 428,500**

Non-Construction Costs			
On Site Meeting, Survey, Plan, Profile, and Report	$	93,400	
Tendering, Construction Review, Contract Administration and Grant Application	$	20,000	
Species at Risk Review Report	$	3,000	
UTRCA Permit Fee	$	1,000	
Carrying Costs (est @ 3% for 1 year) & Net HST (1.76%)	$	25,800	
Total Non-Construction Costs			**$ 143,200**
TOTAL ESTIMATED COST			**$ 605,840**

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

18. Maintenance

As per section 74 of the Act, after construction of the improvements the Ilderton No. 2 as described in this Report shall be maintained by Municipality of Middlesex Centre at the expense of the upstream lands and roads assessed, in the proportions set out in the By-Law which adopts this Report. Any future maintenance or repair costs shall be distributed pro rata in accordance with **Appendix B**, the Schedule of Assessments for Future Maintenance. The Schedule of Assessments for Future Maintenance is based on the equivalent contributing areas for all properties.

Future costs for maintenance due to the existence of a utility or road shall be fully assessed to the public utility or road authority, respectively. The public utility or road have the right under Section 69(1) to maintain or repair the drain upon, along, adjoining, under or across the utility or road, respectively. The Drainage Superintendent should be advised of any works being undertaken.

Any additional costs for future drain maintenance required for and due to the removal of vegetation, fencing or any other obstruction within the Right-Of-Way shall be assessed to the landowner. This does not include removal of vegetation from the Right-of-Way within the wooded area and removal of vegetation from the Right-of-Way within the wooded area shall be considered maintenance for the drain to be distributed pro rata in accordance with **Appendix B**, the Schedule of Assessments for Future Maintenance.

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

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

superintendent shall forthwith cause it to be removed, and the cost thereof is payable to the municipality by the owner or occupant of the land."

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

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

All of which is respectfully submitted.

GEI CONSULTANTS CANADA LTD.

Per:

Brendan Shapton, M.A.Sc., P.Eng

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

Appendix A Schedule of Estimated Assessments for Construction

Schedule of Estimated Assessments
Prepared by GM BluePlan Engineering Limited Feburary 2025
Ilderton Municipal Drain No. 2

Roll No.	Conc	Lot	Owner	Affected Area		Adjusted Area		Benefit (sect. 22)	Outlet (sect. 23)	Section 24/26	TOTAL ASSESSMENT	Allowances	NET ASSESSMENT[1]
				ac.	ha.	ac.	ha.						
Lands													
070-024	10	S. Pt. 23	Stanton Brothers Ltd.	27.03	10.94	23.10	9.35	$ 32,320	$ 5,700	$ 88,940	$ 126,960	$ (18,400)	**$ 108,560**
080-289	10	S. Pt. 23 Parts 2 to 4	Stanton Brothers Ltd.	5.51	2.23	4.23	1.71	$ -	$ 2,020	$ -	$ 2,020	$ -	**$ 2,020**
070-025	10	S. Pt. 24 Part 2	1106002 Ontario Ltd.	26.34	10.66	16.01	6.48	$ 5,000	$ 8,010	$ -	$ 13,010	$ (7,270)	**$ 5,740**
080-270-15	10	Pt. 24 Part 1	Municipality of Middlesex Centre	6.55	2.65	3.29	1.33	$ 2,840	$ 1,820	$ -	$ 4,660	$ (3,960)	**$ 700**
080-270-10	10	Pt. 24 Parts 1 and 2	Municipality of Middlesex Centre	4.35	1.76	316.39	128.04	$ 1,960	$ 175,230	$ 5,620	$ 182,810	$ (4,510)	**$ 178,300**
070-025-02	10	S. Pt. 24 Part 1	Community Bible Church	0.69	0.28	1.38	0.56	$ -	$ 790	$ -	$ 790	$ -	**$ 790**
	10	-	Upstream Residential Lands (Block Assessment)	105.51	42.70	364.23	147.40	$ -	$ 204,040	$ -	$ 204,040	$ -	**$ 204,040**
Total Estimated Assessment - Lands				***175.98***	***71.22***	***728.62***	***294.87***	***$ 42,120***	***$ 397,610***	***$ 94,560***	***$ 534,290***	***$ (34,140)***	***$ 500,150***
Roads and Utilities													
	10	Municipal Roads	Municipality of Middlesex Centre (Block Assessment)	22.98	9.30	114.28	46.25	$ -	$ 64,060	$ -	$ 64,060	$ -	**$ 64,060**
	10	Hyde Park Road	County of Middlesex (Block Assessment)	4.65	1.88	13.20	5.34	$ -	$ 7,490	$ -	$ 7,490	$ -	**$ 7,490**
Total Estimated Assessment - Roads and Utilities				***27.63***	***11.18***	***127.48***	***51.59***	***$ -***	***$ 71,550***	***$ -***	***$ 71,550***	***$ -***	***$ 71,550***
TOTAL ESTIMATED ASSESSMENTS				***203.61***	***82.40***	***856.10***	***346.46***	***$ 42,120***	***$ 469,160***	***$ 94,560***	***$ 605,840***	***$ (34,140)***	***$ 571,700***

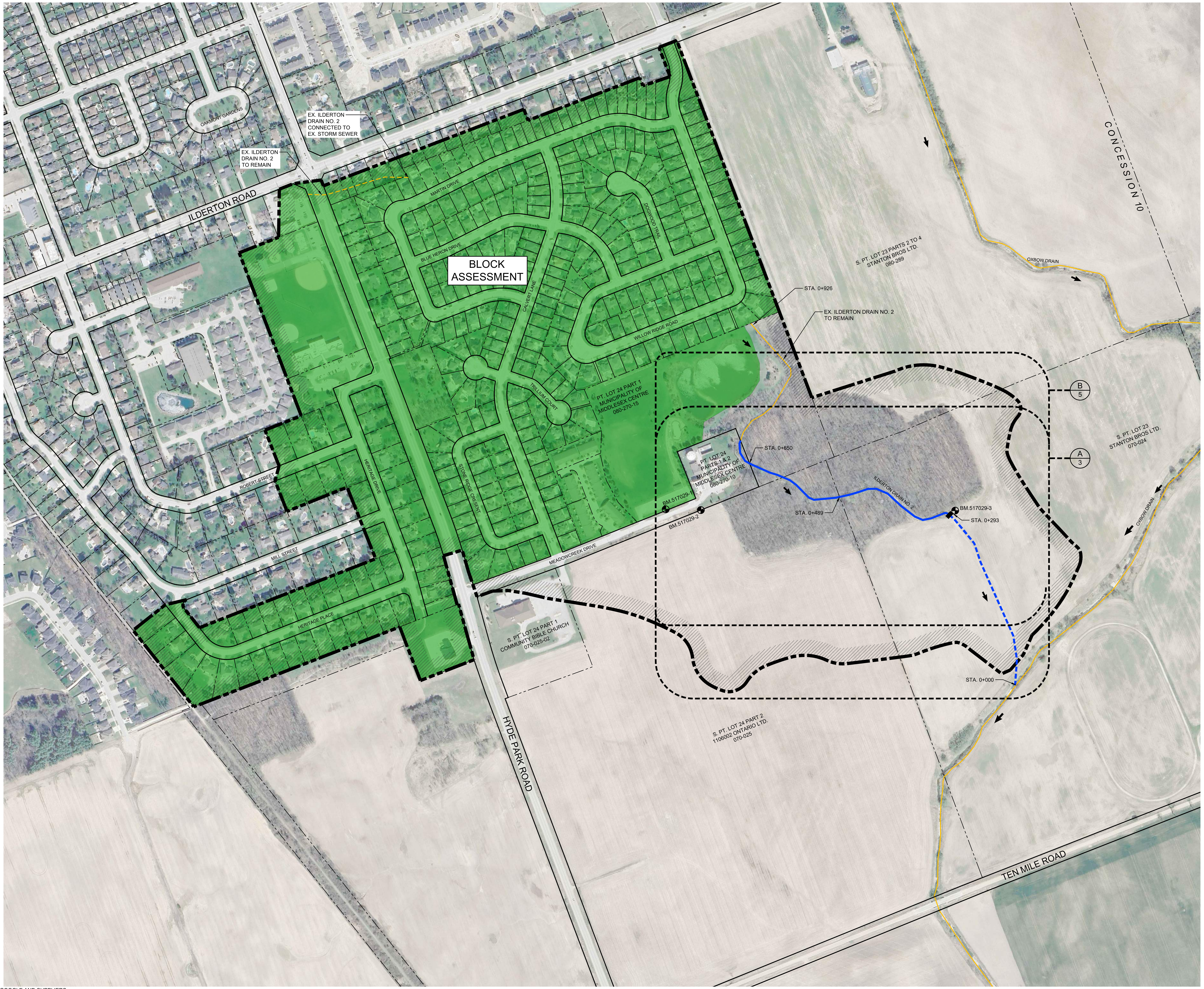
[1]**Agricultural lands may be eligible for a one third provincial grant. Neither the availability nor the amount of the grant can be determined in advance.**

Appendix B Schedule of Assessments for Future Maintenance

Schedule of Assessment for Future Maintenance
Prepared by GM BluePlan Engineering Limited Feburary 2025
Ilderton Municipal Drain No. 2

Conc.	Lot	Owner and Roll No.		Land Area		Adjusted Area		Maintenance Assessment
				ac.	ha.	ac.	ha.	
Lands								
10	S. Pt. 23	Stanton Brothers Ltd.	070-024	27.03	10.94	23.10	9.35	2.7%
10	S. Pt. 23 Parts 2 to 4	Stanton Brothers Ltd.	080-289	5.51	2.23	4.23	1.71	0.5%
10	S. Pt. 24 Part 2	1106002 Ontario Ltd.	070-025	26.34	10.66	16.01	6.48	1.9%
10	Pt. 24 Part 1	Municipality of Middlesex Centre	080-270-15	6.55	2.65	3.29	1.33	0.4%
10	Pt. 24 Parts 1 and 2	Municipality of Middlesex Centre	080-270-10	4.35	1.76	316.39	128.04	37.0%
10	S. Pt. 24 Part 1	Community Bible Church	070-025-02	0.69	0.28	1.38	0.56	0.2%
10	-	Upstream Residential Lands (Block Assessment)		105.51	42.70	364.23	147.40	42.5%
Total Assessment - Lands				**175.98**	**71.22**	**728.62**	**294.87**	**85.2%**
Roads and Utilities								
10	Municipal Roads	Municipality of Middlesex Centre (Block Assessment)		22.98	9.30	114.28	46.25	13.3%
10	Hyde Park Road	County of Middlesex (Block Assessment)		4.65	1.88	13.20	5.34	1.5%
Total Assessment - Roads and Utilities				**27.63**	**11.18**	**127.48**	**51.59**	**14.8%**
Total Assessment				**203.61**	**82.40**	**856.10**	**346.46**	**100.0%**

Appendix C Drawings



MAP DATA © 2024 GOOGLE AND SUPPLIERS

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

NOMENCLATURE:

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

LEGEND:

- WATERSHED BOUNDARY
- INTERMEDIATE WATERSHED BOUNDARY
- R.O.W. LIMITS
- PROPERTY LINE
- EX. OPEN DRAIN
- EX. CLOSED DRAIN
- PROPOSED CLOSED DRAIN
- PROPOSED OPEN DRAIN
- BLOCK ASSESSMENT BOUNDARY
- BENCHMARK LOCATION
- PROPOSED CATCHBASIN
- EX. CATCHBASIN
- DIRECTION OF FLOW

BENCH MARKS :

BM.517029-1 - ELEV. = 275.87
CC IN BASE OF MIDDLE STREET LIGHT IN PARKING LOT ALONG THE SOUTH PROPERTY LINE OF ROLL NO. 080-270-15.

BM.517029-2 - ELEV. = 275.66
SIB LOCATED ON SOUTHWEST CORNER OF ROLL NO. 080-270-10. 228m EAST OF CALVERT LINE AT ENTRANCE GATE OF MIDDLESEX CENTRE WASTEWATER TREATMENT FACILITY.

BM.517029-3 - ELEV. = 273.64
CC ON SOUTHEAST CORNER OF EX. DICB LOCATED AT DOWNSTREAM END OF THE OPEN DRAIN PORTION OF ILDERTON DRAIN NO. 2.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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

LICENSED PROFESSIONAL ENGINEER
February 7, 2025
B. J. SHAPTON
100573170
PROVINCE OF ONTARIO
517029

NO.	DATE	REVISION DESCRIPTION	CH'KD
4.	02/07/2025	ENGINEER'S REPORT	B.S.
3.	06/28/2024	DESIGN REVIEW MEETING	B.S.
2.	02/08/2024	DRAFT DESIGN	B.S.
1.	03/22/2023	DESIGN BRIEF	B.B.

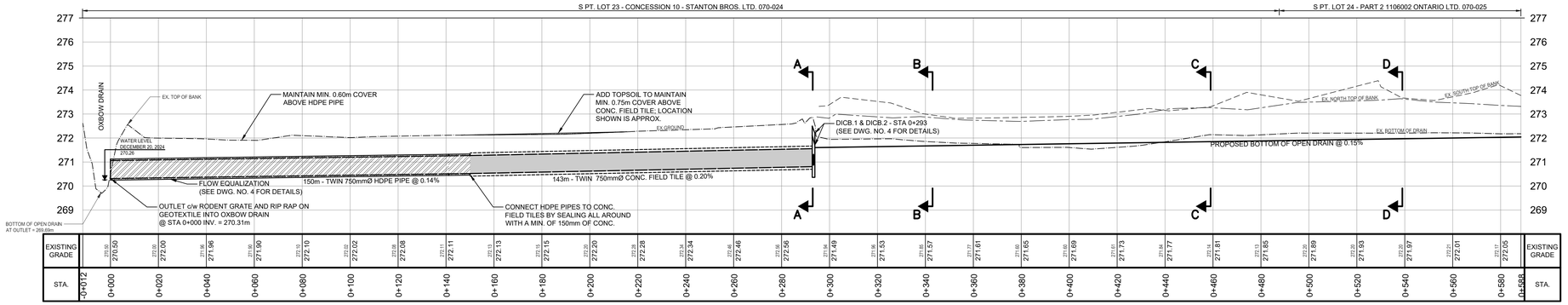
GEI Consultants
235 NORTH CENTRE ROAD, SUITE 103
LONDON, ONTARIO N5X 4E7
519.672.9403

ILDERTON DRAIN NO.2

MUNICIPALITY OF MIDDLESEX CENTRE

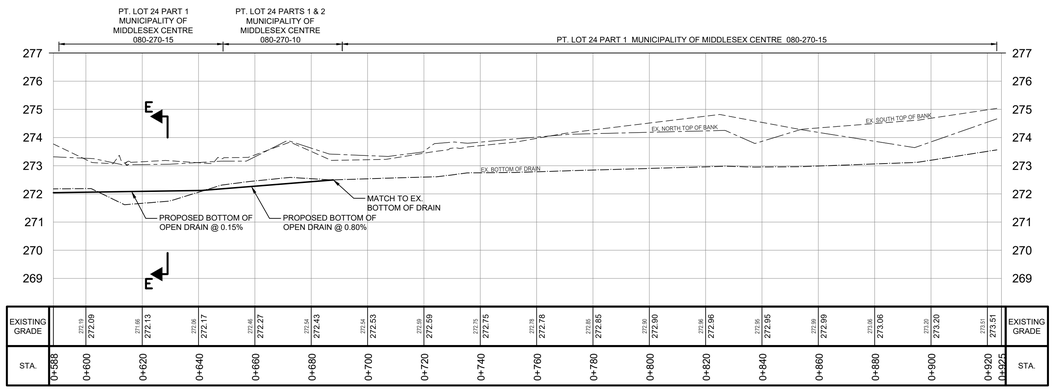
OVERALL PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
B.N./C.M	B.S.	517029	1
DESIGNED BY : C.C.	DATE : MARCH 2023	SCALE : 1:3000	



PROFILE - ILDERTON DRAIN NO. 2

SCALE - 1:1000 H
1:100 V



PROFILE - ILDERTON DRAIN NO. 2

SCALE - 1:1000 H
1:100 V

ENVIRONMENTAL PROTECTION NOTES :

1. THE CONTRACTOR IS TO CONTROL THE PLACEMENT OF STABILIZATION WORKS TO MINIMIZE EROSION AND SEDIMENT TRAVEL IMPACTS DOWNSTREAM.
2. GEOTEXTILE FABRIC SHALL BE INDUSTRIAL POLYPROPYLENE.
3. INSTALLATION OF SILT FENCE SHALL CONFORM TO OPSD 219.130.
4. INSPECTION OF SILT FENCE SHALL BE CONDUCTED DAILY, REPAIRS TO THE FENCE MUST BE COMPLETED IMMEDIATELY AND ANY SECTION OF THE FENCE WHICH DECOMPOSES BEFORE THE END OF ITS EXPECTED USE SHALL BE REPLACED IMMEDIATELY.
5. SEDIMENT TRAPPED IN THE FILTER SHOULD BE REMOVED FOLLOWING EACH STORM AND WHEN THESE DEPOSITS REACH ⅓ THE HEIGHT OF THE BARRIER.
6. PERFORM WORK IN NO/LOW FLOW CONDITIONS TO MINIMIZE SEDIMENT MOVEMENT AND EROSION.
7. ALL WORK SHOULD BE HALTED IF A FORECAST OF SIGNIFICANT RAINFALL IS EXPECTED.
8. PLACE BRUSH, DEBRIS AND SEDIMENT IN SUCH A LOCATION AS TO MINIMIZE ENTRY INTO THE CHANNEL.
9. LIMIT SOIL MOVEMENT AND EROSION; USE APPROPRIATE CONTROL MEASURES BEFORE WORK BEGINS AND INSPECT AND MAINTAIN THOSE MEASURES REGULARLY UNTIL ALL DISTURBED AREAS ARE STABILIZED.
10. ANY AREAS OF DISTURBED OR BARE SOIL AROUND THE DRAIN SHOULD BE SEEDED WITH APPROVED GRASS SEED WHILE THE GROUND IS MOIST AND CONDITIONS ARE APPROPRIATE FOR GERMINATION.
11. ALL MATERIAL AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND PROJECT COMPLETION SHOULD BE OPERATED AND STORED IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE. (EG. PETROLEUM PRODUCTS, SILT, DEBRIS, ETC.) FROM ENTERING THE WATER.
12. ANY STOCKPILED MATERIALS SHALL BE STORED AND STABILIZED AWAY FROM THE WATERCOURSE.
13. VEHICLE AND EQUIPMENT RE-FUELING AND MAINTENANCE SHALL BE CONDUCTED AWAY FROM THE WATERCOURSE.
14. ONLY APPROVED WORK IS PERMITTED IN THE WATERCOURSE AND NO MATERIAL SHALL BE RELEASED INTO THE WATERCOURSE.
15. CROSSING OF THE WATERCOURSE BY CONSTRUCTION EQUIPMENT IS NOT PERMITTED.
16. PLAN IN-WATER WORKS, UNDERTAKINGS AND ACTIVITIES TO RESPECT TIMING WINDOWS TO PROTECT FISH, INCLUDING THEIR EGGS, JUVENILES, SPAWNING ADULTS AND/OR THE ORGANISMS UPON WHICH THEY FEED. NO IN-WATER WORK SHALL OCCUR BETWEEN MARCH 15 AND JULY 15 OF ANY GIVEN YEAR.
17. NO TREE, BRUSH, OR VEGETATION REMOVAL AND ASSOCIATED WORK SHALL OCCUR BETWEEN MARCH 15 AND AUGUST 31 (INCLUSIVE) OF ANY GIVEN YEAR UNLESS OTHERWISE APPROVED BY A QUALIFIED BIOLOGIST.

STRUCTURE DETAIL SCHEDULE - ILDERTON DRAIN NO. 2			
ITEM NO.	STA.	STRUCTURE DESCRIPTION	LENGTH
1	STA. 0+000 TO STA. 0+150	TWIN 750mmØ HDPE PIPE @ 0.14% c/w RODENT GRATE AND RIP RAP ON GEOTEXTILE	150m
2	STA. 0+150 TO STA. 0+293	TWIN 750mmØ CONC. FIELD TILE @ 0.20%	143m
3	STA. 0+293	DICB.1 - 3000mm x 1200mm DICB C/W BIRDCAGE GRATE, BERM, RIP RAP ON GEOTEXTILE AND 3:1 SLOPED TOP	
4	STA. 0+293	450mmØ HDPE PIPE @ 8.0% c/w GRANULAR 'B' BEDDING AND BACKFILL	2m
5	STA. 0+293	DICB.2 - 1200mm x 900mm DICB C/W BIRDCAGE GRATE, BERM, RIP RAP ON GEOTEXTILE AND 3:1 SLOPED TOP	
6	STA. 0+293 TO STA. 0+689	CLEAR, GRUB AND SEED BUFFER STRIPS - 15m WIDTH ON BOTH SIDES OF OPEN DRAIN	396m
7	STA. 0+293 TO STA. 0+641	OPEN DRAIN RECONSTRUCTION @ 0.15%	348m
8	STA. 0+641 TO STA. 0+689	OPEN DRAIN RECONSTRUCTION @ 0.80%	48m

STRUCTURE INFORMATION - ILDERTON DRAIN NO. 2	
STRUCTURE	DATA
DICB.1	STA. 0+293 3000mm x 1200mm DICB c/w BIRDCAGE GRATE, BERM, RIP RAP ON GEOTEXTILE AND 3:1 SLOPED TOP T/CONC = 271.70m S INV. = 270.81m E INV. = 270.87m
DICB.2	STA. 0+293 1200mm x 900mm DICB c/w BIRDCAGE GRATE, BERM, RIP RAP ON GEOTEXTILE AND 3:1 SLOPED TOP T/CONC = 272.20m W INV. = 271.03m

NOTES :

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2. CONTRACTOR IS TO CONNECT EXISTING TILES DURING CONSTRUCTION.

NOMENCLATURE:

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

LEGEND:

- EX. GROUND / EX. BOTTOM OF DRAIN
- EX. SOUTH TOP OF BANK
- EX. NORTH TOP OF BANK
- BOTTOM OF OPEN DRAIN
- CONCRETE PIPE
- HDPE PIPE
- CATCHBASIN

BENCH MARKS :

BM 517029-1 - ELEV. = 275.87
CC IN BASE OF MIDDLE STREET LIGHT IN PARKING LOT ALONG THE SOUTH PROPERTY LINE OF ROLL NO. 080-270-15.

BM 517029-2 - ELEV. = 275.66
SIB LOCATED ON SOUTHWEST CORNER OF ROLL NO. 080-270-10. 228m EAST OF CALVERT LINE AT ENTRANCE GATE OF MIDDLESEX CENTRE WASTEWATER TREATMENT FACILITY.

BM 517029-3 - ELEV. = 273.64
CC ON SOUTHEAST CORNER OF EX. DICB LOCATED AT DOWNSTREAM END OF THE OPEN DRAIN PORTION OF ILDERTON DRAIN NO. 2.

LICENSED PROFESSIONAL ENGINEER
B. J. SHAPTON
100573170
PROVINCE OF ONTARIO
517029

NO.	DATE	REVISION DESCRIPTION	CHKD
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1.	03/22/2023	DESIGN BRIEF	B.B

GEI Consultants
235 NORTH CENTRE ROAD, SUITE 103
LONDON, ONTARIO N5X 4E7
519.672.9403

ILDERTON DRAIN NO.2

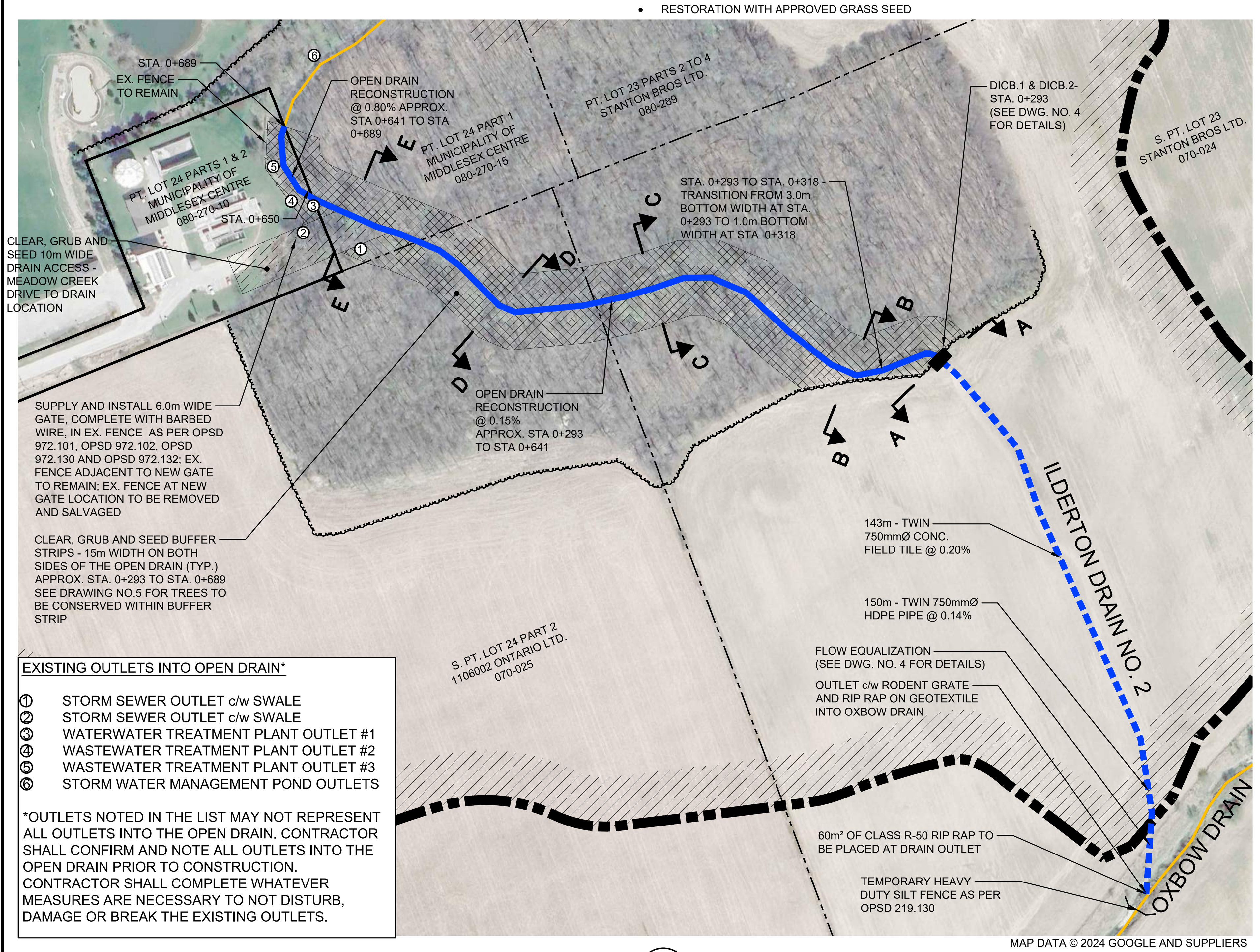
MUNICIPALITY OF MIDDLESEX CENTRE

PROFILE

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
B.N./C.M	B.S.	517029	2
DESIGNED BY :	DATE :	SCALE :	
C.C.	MARCH 2023	AS NOTED	

15m BUFFER STRIP NOTES:

- BUFFER STRIPS TO BE 15m WIDE ON BOTH SIDES OF THE OPEN DRAIN, MEASURED FROM THE TOP OF BANK, EXCEPT WHERE THE BUFFER STRIP WOULD EXTEND BEYOND EX. TREELINE LIMITS
- CLEAR GRUB AND REMOVE OVERGROWTH AS PER SPECIFICATIONS
- SEE DRAWING NO. 5 FOR TREES TO BE CONSERVED WITHIN BUFFER STRIP
- TOP SOIL TO BE STRIPPED FOR FULL 15m WIDTH AND TEMPORARILY STOCKPILED AS DIRECTED BY THE ENGINEER
- OPEN DRAIN EXCAVATED MATERIAL TO BE SPREAD ON ONE OR BOTH SIDES OF THE OPEN DRAIN AS DIRECTED BY THE ENGINEER - MAXIMUM SPOIL DEPTH = 200mm
- STOCKPILED TOP SOIL TO BE PLACED OVER BUFFER STRIP AREA TO A MINIMUM 150mm DEPTH
- RESTORATION WITH APPROVED GRASS SEED



EXISTING OUTLETS INTO OPEN DRAIN*

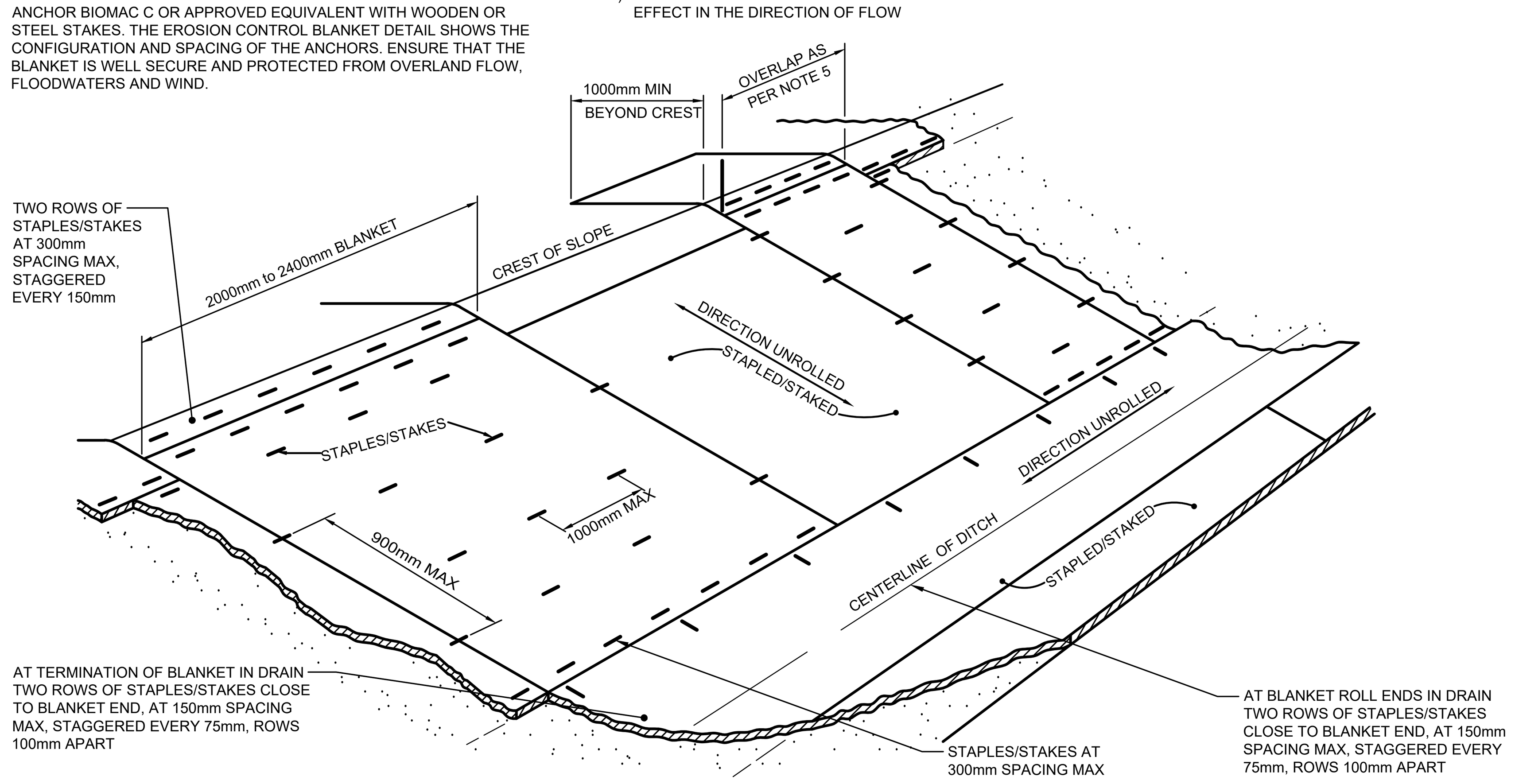
1. STORM SEWER OUTLET c/w SWALE
2. STORM SEWER OUTLET c/w SWALE
3. WATERWATER TREATMENT PLANT OUTLET #1
4. WASTEWATER TREATMENT PLANT OUTLET #2
5. WASTEWATER TREATMENT PLANT OUTLET #3
6. STORM WATER MANAGEMENT POND OUTLETS

*OUTLETS NOTED IN THE LIST MAY NOT REPRESENT ALL OUTLETS INTO THE OPEN DRAIN. CONTRACTOR SHALL CONFIRM AND NOTE ALL OUTLETS INTO THE OPEN DRAIN PRIOR TO CONSTRUCTION. CONTRACTOR SHALL COMPLETE WHATEVER MEASURES ARE NECESSARY TO NOT DISTURB, DAMAGE OR BREAK THE EXISTING OUTLETS.

A/3 PLAN
SCALE 1:2000

EROSION CONTROL BLANKET INSTALLATION GUIDELINES:

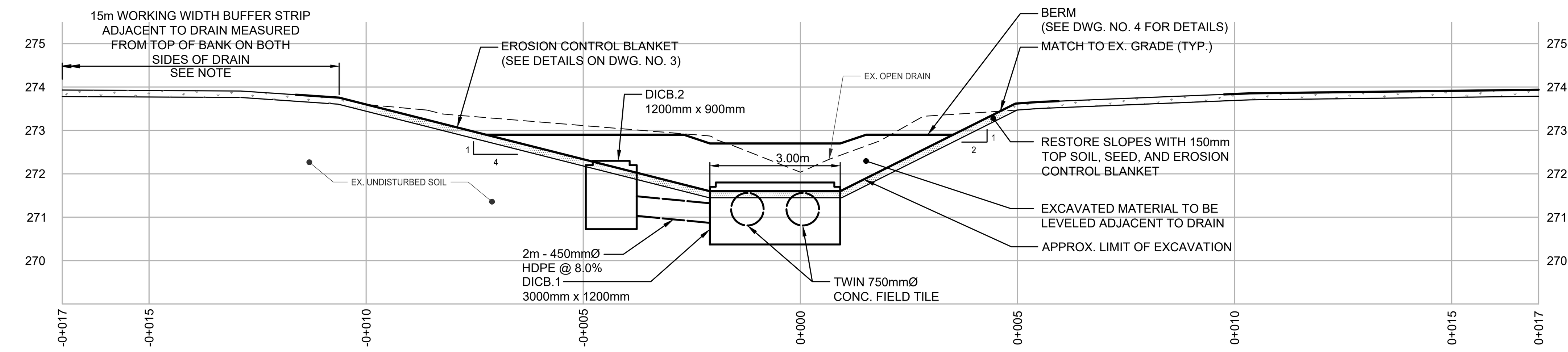
1) REGRADE THE SITE AS PER THE DESIGN.
2) PREPARE THE SITE BY REMOVING LARGE ROCKS, OBSTRUCTIONS OR MATERIALS THAT MAY PREVENT THE EROSION CONTROL BLANKET FROM MAKING DIRECT FIRM CONTACT WITH THE SOIL.
3) APPLY THE SEED AND LIGHTLY RAKE IN.
4) ANCHOR THE BLANKET AT THE TOP OF THE SLOPE IN A 150mm DEEP TRENCH (SEE ANCHOR DETAIL).
5) OVERLAP PARALLEL ROLLS 100mm AND END 300mm MINIMUM.
6) ANCHOR BIOMAC C OR APPROVED EQUIVALENT WITH WOODEN OR STEEL STAKES. THE EROSION CONTROL BLANKET DETAIL SHOWS THE CONFIGURATION AND SPACING OF THE ANCHORS. ENSURE THAT THE BLANKET IS WELL SECURE AND PROTECTED FROM OVERLAND FLOW, FLOODWATERS AND WIND.
7) DO NOT STRETCH THE BLANKETS.
8) PLANT AS PER THE DRAWING WITH ROOTED PLANTS OR LIVE STAKES.
9) INSERT STAKE/STAPLES SO THAT THE HEADS ARE PARALLEL TO THE FLOW OF WATER.
10) ADD ADDITIONAL STAKES/STAPLES SO THAT STAKES/STAPLES ARE PLACED IN CRITICAL CHANNEL POINTS (INTERFACE BETWEEN SIDE SLOPE AND DRAIN BOTTOM, CORNERS OF BLANKET, EDGES AND OVERLAP OF BLANKETS, ETC.)
11) BLANKETS ARE TO BE INSTALLED TO HAVE AN OVERLAP "SHINGLE" EFFECT IN THE DIRECTION OF FLOW



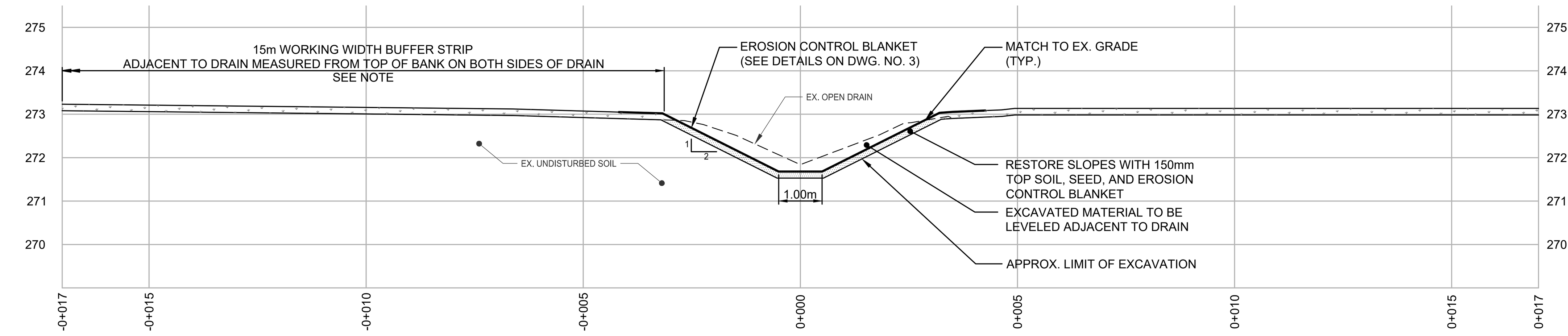
SUGGESTED MANUFACTURER INSTALLATION SPECIFICATIONS: EROSION CONTROL BLANKET **

NOT TO SCALE

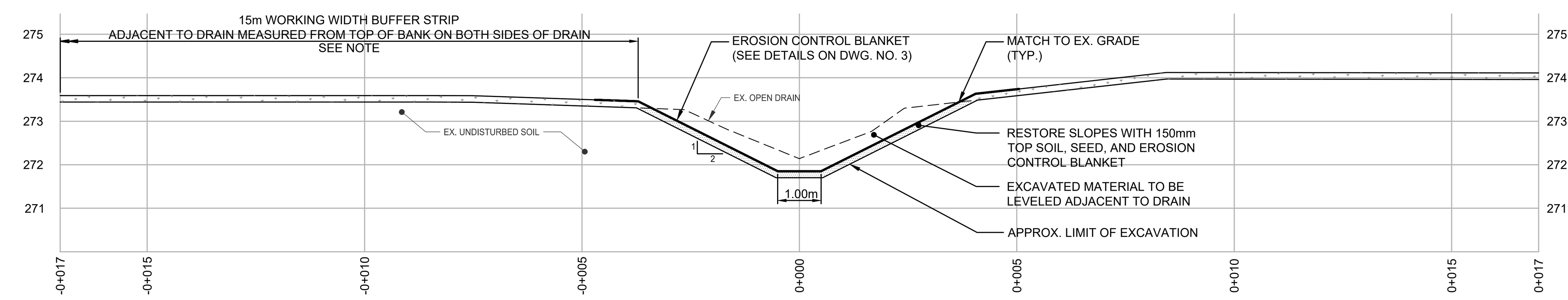
** CONTRACTOR TO CONFIRM WITH EROSION CONTROL BLANKET MANUFACTURER



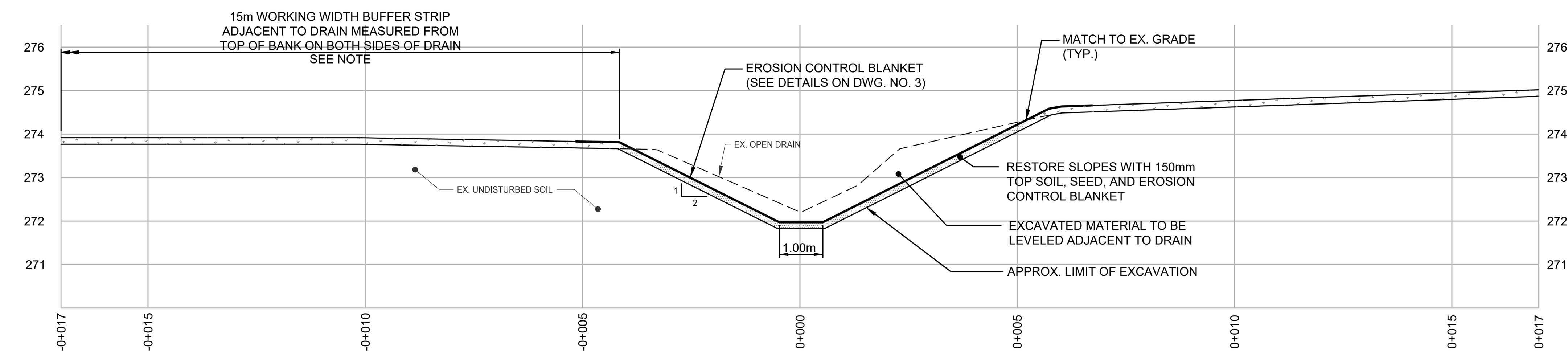
SECTION A-A
SCALE: 1:100
STA. 0+293



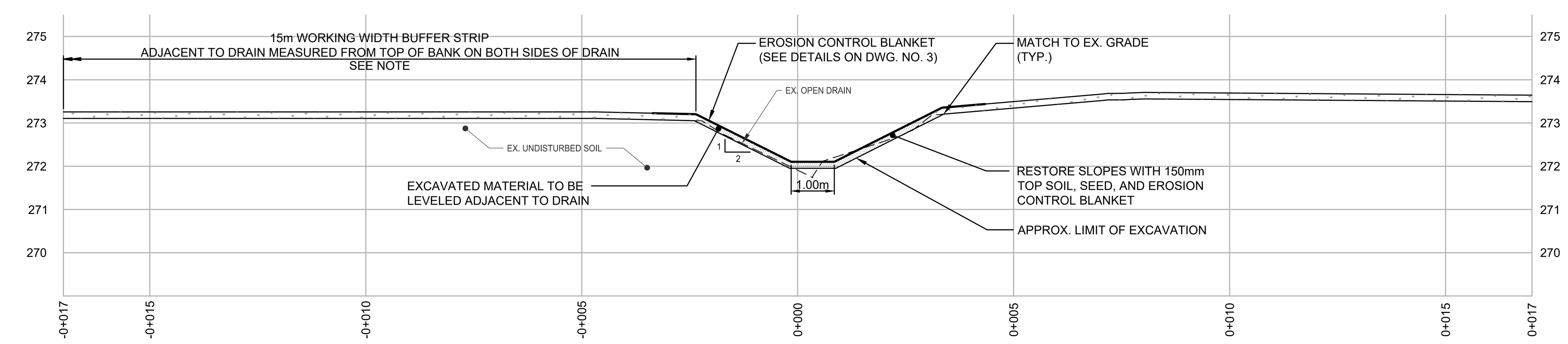
SECTION B-B
SCALE: 1:100
STA. 0+343



SECTION C-C
SCALE: 1:100
STA. 0+459



SECTION D-D
SCALE: 1:100
STA. 0+539



SECTION E-E
SCALE: 1:100
STA. 0+629

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2. CONTRACTOR IS TO CONNECT EXISTING TILES DURING CONSTRUCTION.

NOMENCLATURE:

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

LEGEND:

- WATERSHED BOUNDARY
- INTERMEDIATE WATERSHED BOUNDARY
- R.O.W. LIMITS
- PROPERTY LINE
- EX. OPEN DRAIN
- PROPOSED CLOSED DRAIN
- PROPOSED OPEN DRAIN
- APPROX. EX. DRIPLINE
- DIRECTION OF FLOW
- EX. CATCHBASIN
- PROPOSED CATCHBASIN
- BENCHMARK LOCATION
- EXCAVATED MATERIAL SPREAD AND RESTORATION ON BUFFER STRIP
- RESTORATION ON OPEN DRAIN
- 10m DRAIN ACCESS
- 15m BUFFER STRIP

BENCH MARKS :

BM 517029-1 - ELEV. = 275.87
CC IN BASE OF MIDDLE STREET LIGHT IN PARKING LOT ALONG THE SOUTH PROPERTY LINE OF ROLL NO. 080-270-15.

BM 517029-2 - ELEV. = 275.66
SIB LOCATED ON SOUTHWEST CORNER OF ROLL NO. 080-270-10. 228m EAST OF CALVERT LINE AT ENTRANCE GATE OF MIDDLESEX CENTRE WASTEWATER TREATMENT FACILITY.

BM 517029-3 - ELEV. = 273.64
CC ON SOUTHEAST CORNER OF EX. DICB LOCATED AT DOWNSTREAM END OF THE OPEN DRAIN PORTION OF ILDERTON DRAIN NO. 2.

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February 7, 2025
B. J. SHAPTON
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PROVINCE OF ONTARIO
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NO.	DATE	REVISION DESCRIPTION	CHKD
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3.	06/28/2024	DESIGN REVIEW MEETING	B.S.
2.	02/08/2024	DRAFT DESIGN	B.S.
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LONDON, ONTARIO N5X 4E7
519.672.9403

ILDERTON DRAIN NO.2

MUNICIPALITY OF MIDDLESEX CENTRE

PLAN AND CROSS SECTIONS

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
B.N./C.M	B.S.	517029	3
DESIGNED BY :	DATE :	SCALE :	
C.C.	MARCH 2023	AS NOTED	

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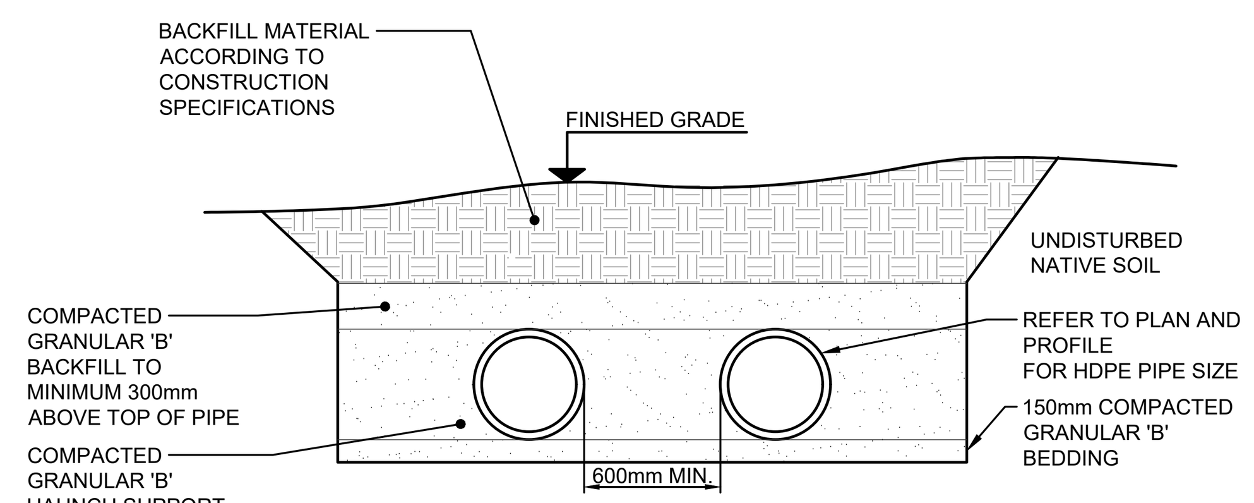
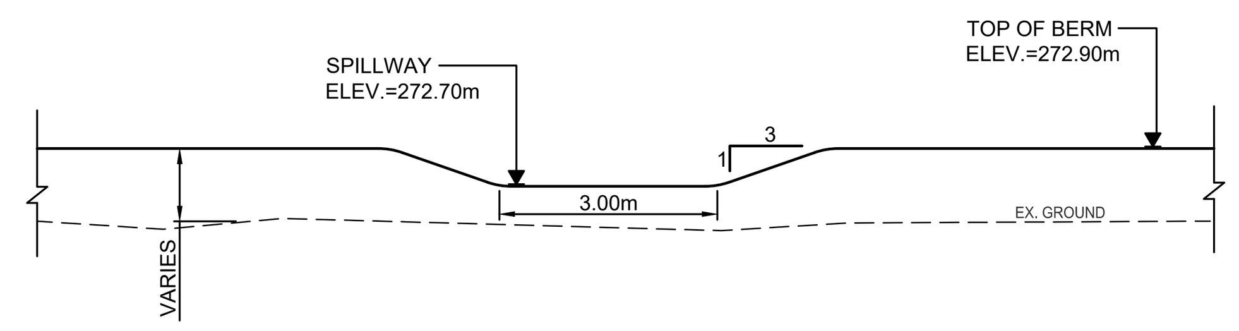
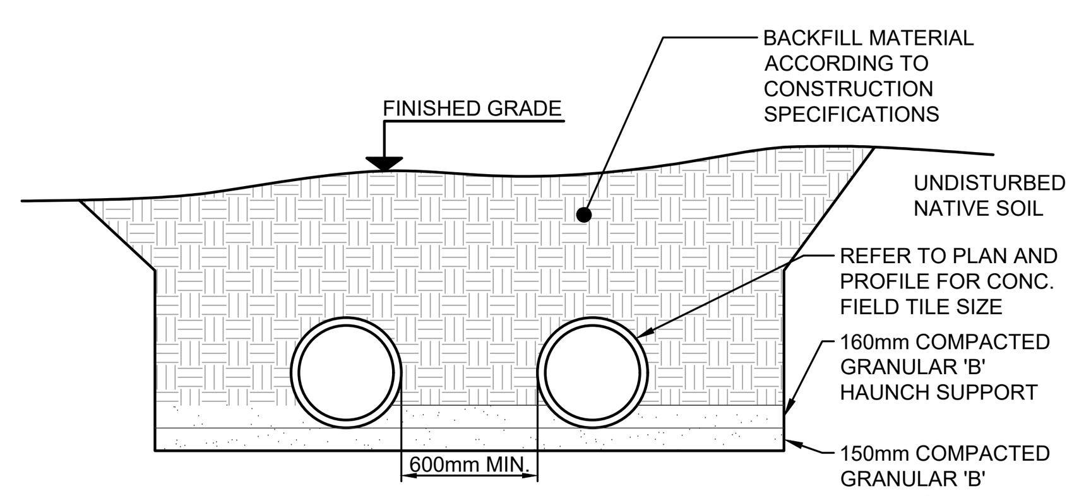


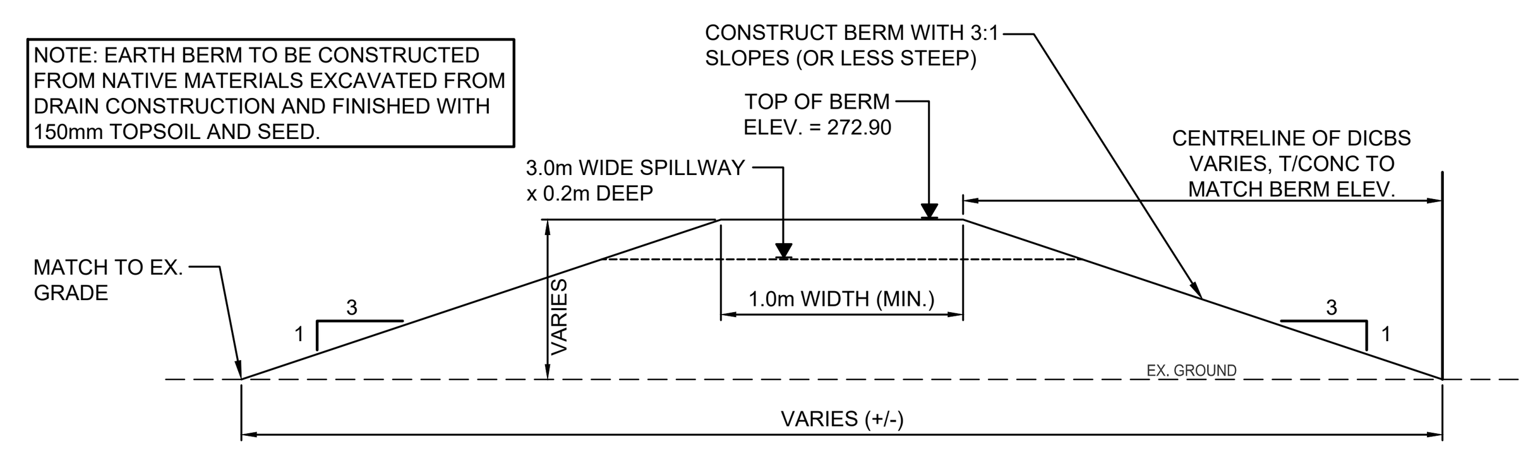
TYPICAL TWIN HDPE PIPE BEDDING DETAIL
STA. 0+000 - STA. 0+150
NOT TO SCALE



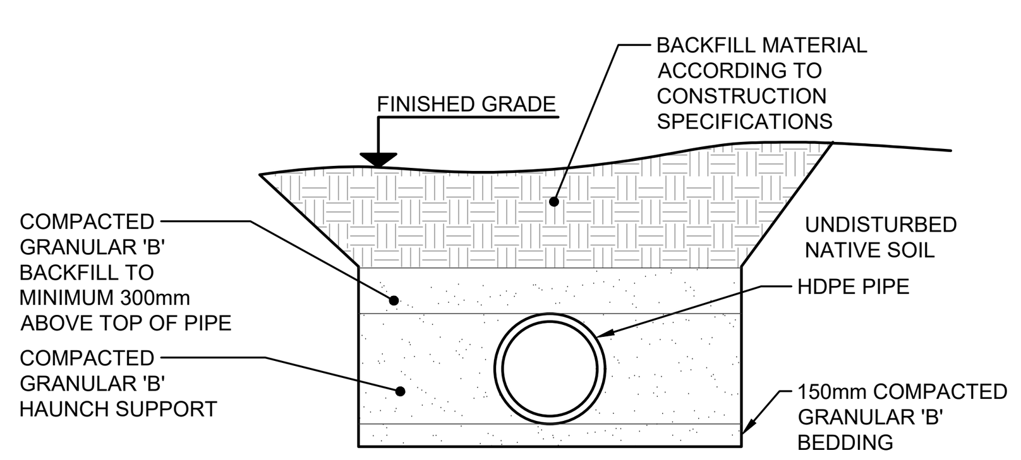
TYPICAL BERM SPILLWAY - ELEVATION VIEW
NOT TO SCALE



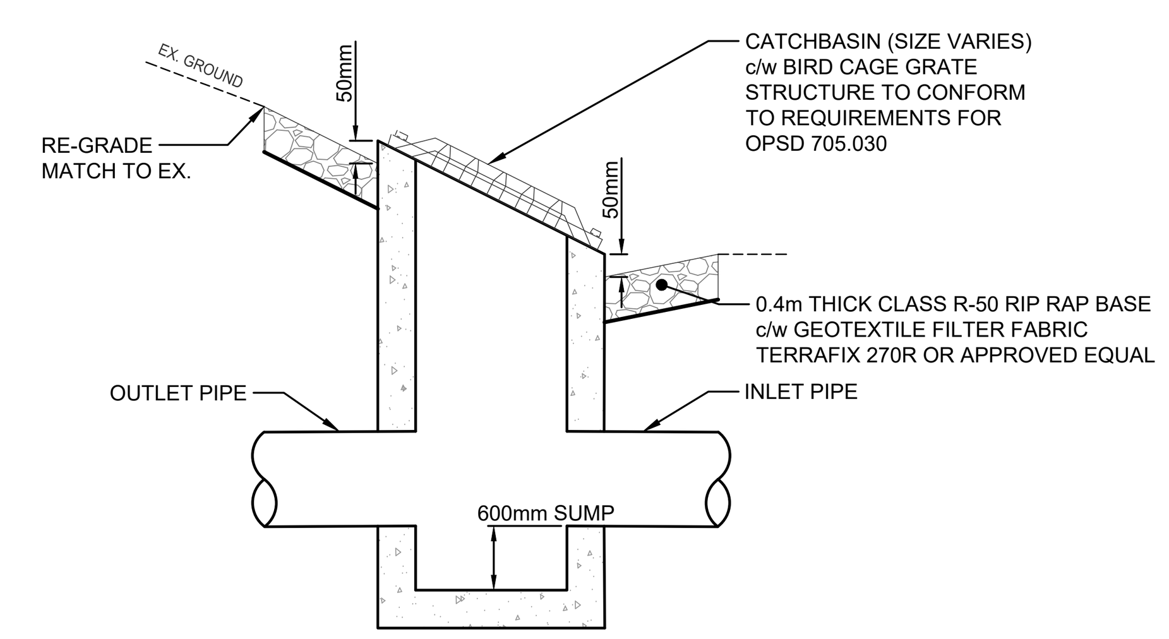
TYPICAL TWIN CONC. FIELD TILE BEDDING DETAIL - INSTALLED BY EXCAVATOR
STA. 0+150 - STA. 0+293
NOT TO SCALE



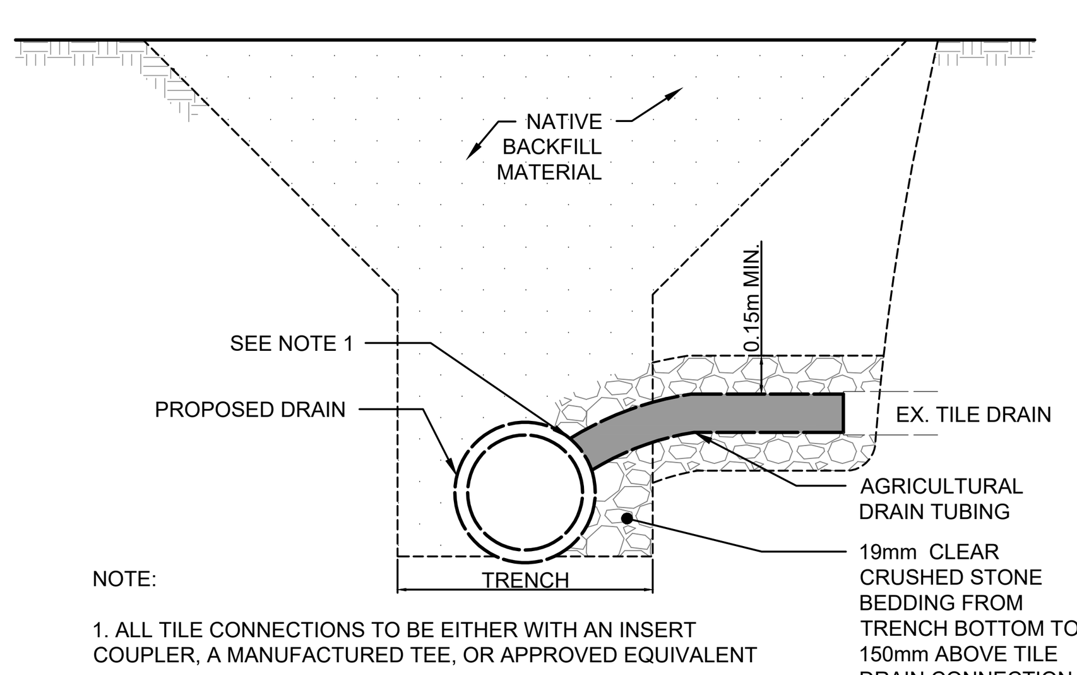
TYPICAL BERM DETAIL - SECTION
NOT TO SCALE



TYPICAL HDPE PIPE BEDDING DETAIL
NOT TO SCALE

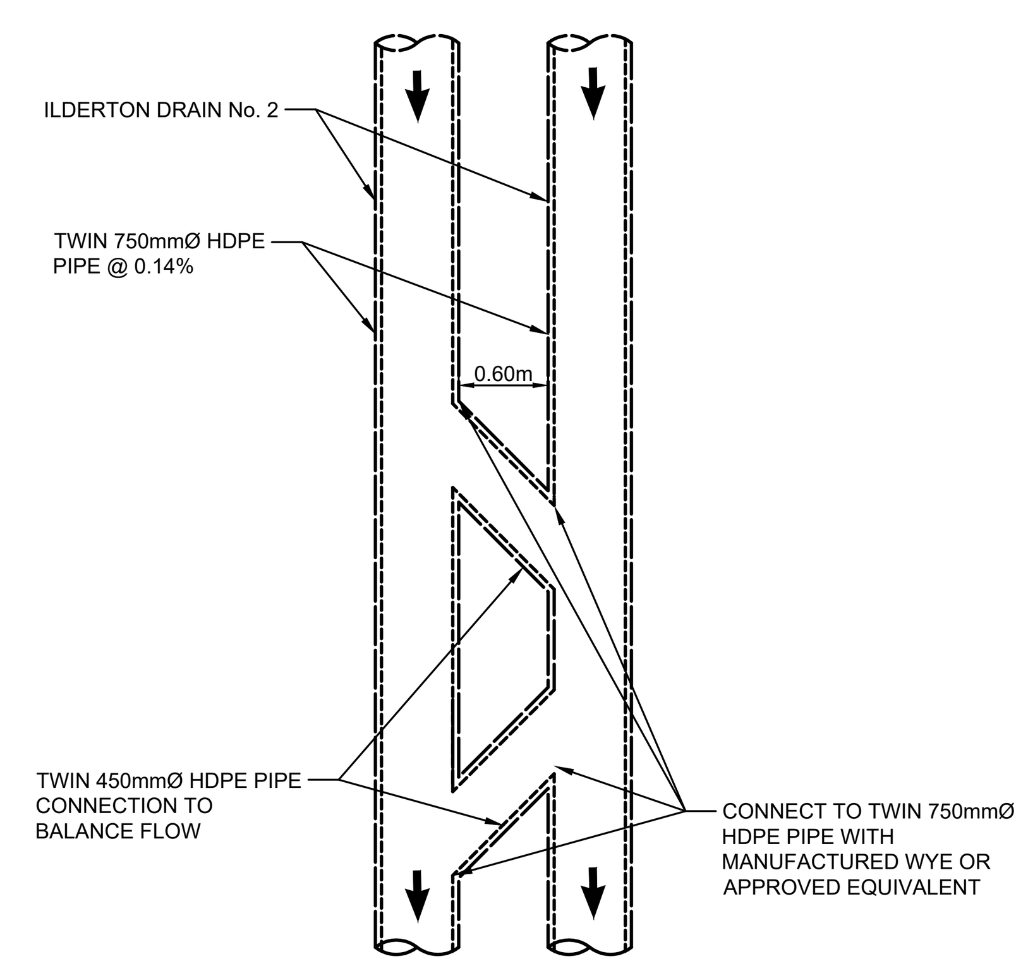


TYPICAL DITCH INLET CATCH BASIN DETAIL
NOT TO SCALE

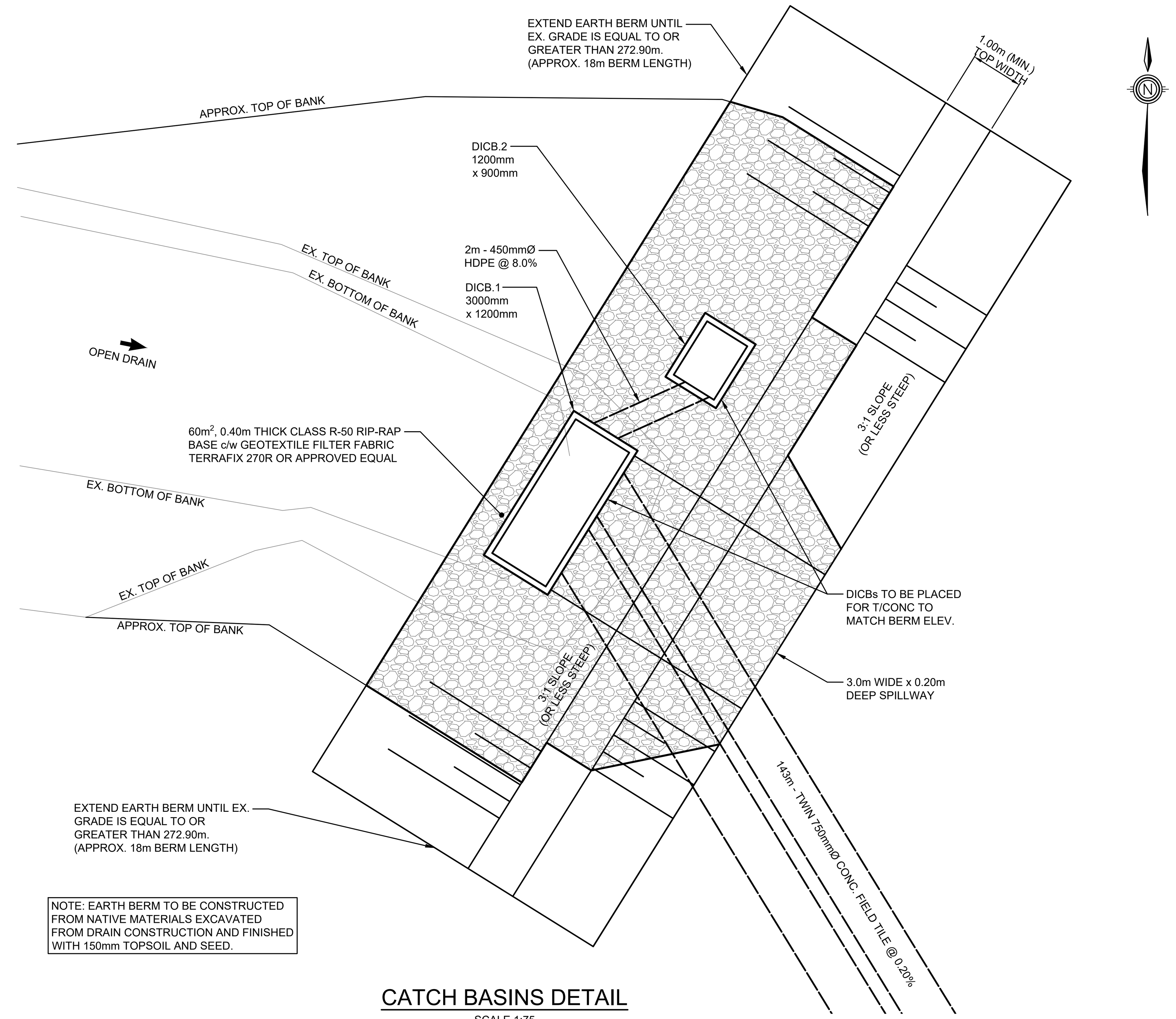


NOTE:
1. ALL TILE CONNECTIONS TO BE EITHER WITH AN INSERT COUPLER, A MANUFACTURED TEE, OR APPROVED EQUIVALENT

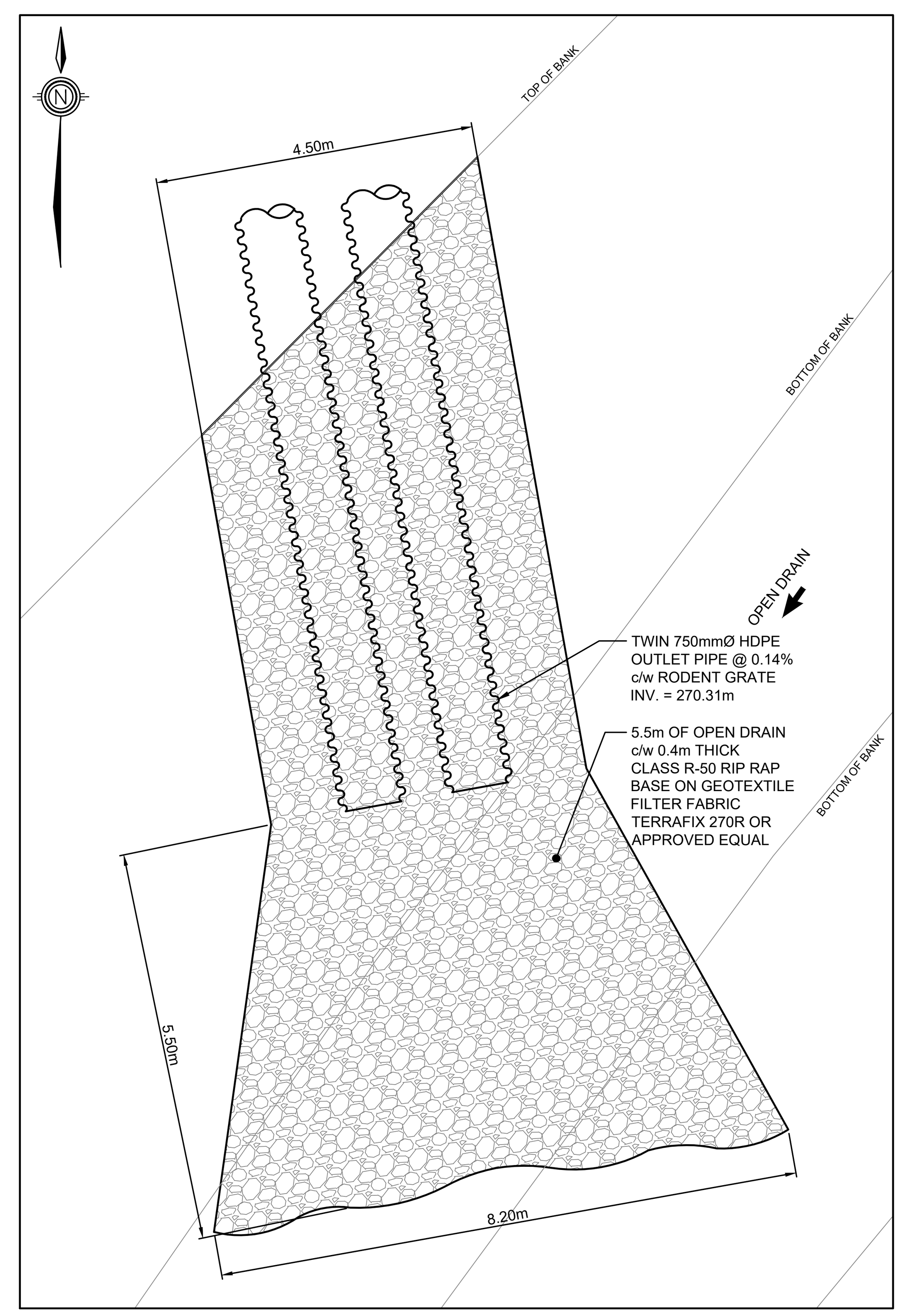
TYPICAL TILE CONNECTION DETAIL - SECTION
NOT TO SCALE



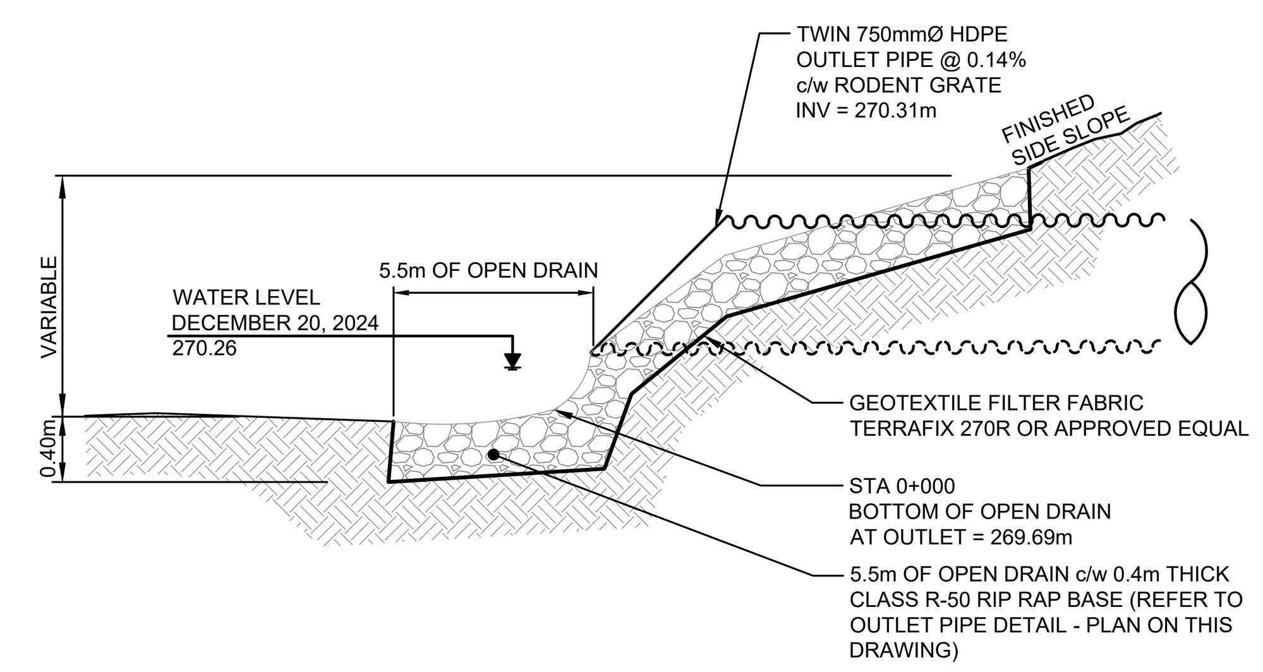
TYPICAL FLOW EQUALIZATION DETAIL
NOT TO SCALE



CATCH BASINS DETAIL
SCALE 1:75



OUTLET PIPE DETAIL - PLAN
SCALE 1:75



OUTLET PIPE DETAIL
NOT TO SCALE

NOTES :

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NOMENCLATURE:

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INV.	INVERT
min.	MINIMUM
PL	PROPERTY LINE
R	RADIUS
STA.	STATION
TYP.	TYPICAL

BENCH MARKS :

BM 517029-1 - ELEV. = 275.87
CC IN BASE OF MIDDLE STREET LIGHT IN PARKING LOT ALONG THE SOUTH PROPERTY LINE OF ROLL NO. 080-270-15.

BM 517029-2 - ELEV. = 275.66
SIB LOCATED ON SOUTHWEST CORNER OF ROLL NO. 080-270-10. 228m EAST OF CALVERT LINE AT ENTRANCE GATE OF MIDDLESEX CENTRE WASTEWATER TREATMENT FACILITY.

BM 517029-3 - ELEV. = 273.64
CC ON SOUTHEAST CORNER OF EX. DICB LOCATED AT DOWNSTREAM END OF THE OPEN DRAIN PORTION OF ILDERTON DRAIN NO. 2.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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

LICENSED PROFESSIONAL ENGINEER
February 7, 2025
B. J. SHAPTON
100573170
PROVINCE OF ONTARIO
517029

NO.	DATE	REVISION DESCRIPTION	CHKD
4.	02/07/2025	ENGINEER'S REPORT	B.S.
3.	06/28/2024	DESIGN REVIEW MEETING	B.S.
2.	02/08/2024	DRAFT DESIGN	B.S.
1.	03/22/2023	DESIGN BRIEF	B.B

GEI Consultants
235 NORTH CENTRE ROAD, SUITE 103
LONDON, ONTARIO N5X 4E7
519.672.9403

ILDERTON DRAIN NO.2

MUNICIPALITY OF MIDDLESEX CENTRE

DETAILS

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
B.N./C.M	B.S.	517029	4
DESIGNED BY :	DATE :	SCALE :	
C.C.	MARCH 2023	AS NOTED	

MAP DATA © 2024 GOOGLE AND SUPPLIERS

B/5 TREE CONSERVATION PLAN

NOTE: TREE SIZES ARE NOT TO SCALE

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

NOMENCLATURE:

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

LEGEND:

- WATERSHED BOUNDARY
- INTERMEDIATE WATERSHED BOUNDARY
- R.O.W. LIMITS
- PROPERTY LINE
- EX. OPEN DRAIN
- PROPOSED CLOSED DRAIN
- PROPOSED OPEN DRAIN
- APPROX. EX. DRIPLINE
- EX. FENCE
- PROPOSED CATCHBASIN
- EX. TREE TO BE CONSERVED PER UTRCA (TREE SIZES ARE NOT TO SCALE)
- 10m DRAIN ACCESS
- 15m BUFFER STRIP (MEASURED FROM TOP OF BANK)

BENCH MARKS :

BM.517029-1 - ELEV. = 275.87
CC IN BASE OF MIDDLE STREET LIGHT IN PARKING LOT ALONG THE SOUTH PROPERTY LINE OF ROLL NO. 080-270-15.

BM.517029-2 - ELEV. = 275.66
SIB LOCATED ON SOUTHWEST CORNER OF ROLL NO. 080-270-10. 228m EAST OF CALVERT LINE AT ENTRANCE GATE OF MIDDLESEX CENTRE WASTEWATER TREATMENT FACILITY.

BM.517029-3 - ELEV. = 273.64
CC ON SOUTHEAST CORNER OF EX. DICB LOCATED AT DOWNSTREAM END OF THE OPEN DRAIN PORTION OF ILDERTON DRAIN NO. 2.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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LICENSED PROFESSIONAL ENGINEER
February 7, 2025
B. J. SHAPTON
100573170
PROVINCE OF ONTARIO
517029

NO.	DATE	REVISION DESCRIPTION	CH'KD
4.	02/07/2025	ENGINEER'S REPORT	B.S.
3.	06/28/2024	DESIGN REVIEW MEETING	B.S.
2.	02/08/2024	DRAFT DESIGN	B.S.
1.	2023/10/31	DRAFT TREE CONSERVATION PLAN	B.B.

GEI Consultants
235 NORTH CENTRE ROAD, SUITE 103
LONDON, ONTARIO N5X 4E7
519.672.9403

ILDERTON DRAIN NO.2

MUNICIPALITY OF MIDDLESEX CENTRE

TREE CONSERVATION PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
B.N./C.M	B.S.	517029	5
DESIGNED BY :	DATE :	SCALE :	
C.C.	MARCH 2023	1:1000	

Appendix D Special Provisions

Special Provisions (Non-Tender Items)
For The Construction Of The
Ilderton Municipal Drain No. 2
Municipality of Middlesex Centre

1. STANDARD SPECIFICATIONS

Where reference is made to OPSS or OPSD, the Contractor shall refer to the latest version of the Ontario Provincial Standard Specifications and the Ontario Provincial Standard Drawings. Where reference is made to OPSS, it shall be assumed to refer to OPSS.MUNI wherever equivalent municipal specifications exist. These specification and drawings may not be bound within this document. They are available on-line from the Ontario Ministry of Transportation.

All work to be undertaken shall comply with the latest version of OPSS and OPSD, unless supersede by the Special Provisions included herein.

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

Where in the Specifications the word “Engineer” occurs it shall mean “GEI Consultants Canada Limited”.

2. SALES TAXES

Harmonized Sales Tax (H.S.T.)

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

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

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

3. ALIGNMENT

The Contractor shall be responsible for the true and proper setting out of the work and for the correctness of the position, elevation and alignment of all parts of the work in accordance with accepted survey procedures. Using qualified personnel and following accepted engineering practice, the Contractor shall calculate, layout, establish and maintain all lines and grades necessary for the construction and verification of the work. The Contractor shall provide such information on the calculations, layout, lines and grades as the Engineer may at any time require.

All elevations and dimensions pertaining to the work shall be verified by the Contractor before commencing work. The Contractor shall be responsible for, and bear the cost of, field verification of all elevations and dimensions as they affect the work. Any discrepancy between the actual conditions and details on the drawings shall be reported to the Engineer before proceeding with the work or fabricating materials so affected. Any delay or cost incurred by the Contractor’s failure to comply with this provision shall be borne by the Contractor.

Any discrepancies, errors, omissions or inconsistencies in the information shall be reported to the Engineer before proceeding with the work.

The Contractor shall use electronic means (laser, GPS) or equivalent line and grade control methods to maintain the vertical and horizontal alignment shown on the plans. Batter boards or any other means will not be acceptable. All tile drains shall be installed to a maximum vertical tolerance of +/-25mm, and any deviation from this tolerance shall be corrected by the Contractor at their expense.

4. TRENCHES TO BE CLOSED

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

5. ROAD SIGNS

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

6. DAMAGE TO TREES

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

7. COORDINATION OF MEETINGS

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

8. DISPOSAL OF SURPLUS OR UNSUITABLE EXCAVATED MATERIAL

All earth material excavated in carrying out the work of the various tender items included in this Contract and which is unsuitable for, or which is surplus to, the requirements for backfill shall be disposed of off-site. Excess material excavated from this site is anticipated not to meet MECP Table 1 criteria. The excess material may be disposed of at a site arranged by the contractor upon receipt of a sign-off by the property owner. The property owner must be aware and must acknowledge that the fill might not pass MECP Table 1 criteria.

The contractor shall be responsible for complying with O.Reg. 406/19 including, but not limited to, information provided to truck drivers carrying excess soil and planning for environmentally safe transportation. All excess soil and earth material shall be managed, hauled and disposed of in accordance with O.Reg. 406/19.

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

9. COMPACTION

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

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

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

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

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

10. NATURAL GAS CONSTRUCTION SPECIFICATIONS

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

11. HYDRO INFRASTURCTURE CONSTRUCTION SPECIFICATIONS

When the Contractor is working near hydro infrastructure the work shall be carried out in accordance with the requirements and specifications of the hydro authority having control over such infrastructure.

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

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

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

13. UTILITY POLES AND LINES

Where utility poles and lines may have to be supported or de-energized, the Contractor shall be responsible for all efforts to make arrangements with the hydro authority to do this work. The Contractor shall bear the costs for all coordination and any associated project delays; however, the Owner will bear the costs for the hydro authority to complete any work. The Contractor must request the hydro authority's service in writing at least 30 days in advance of the need, with final verbal confirmation 48 hours in advance. Only the hydro authority or their subcontractor may support or de-energize poles and lines. No claims for delays will be accepted if the foregoing is not observed.

14. UTILITIES AND PIPE CROSSINGS

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

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

15. DAMAGE BY VEHICLES AND OTHER EQUIPMENT

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

16. SURVEY BARS AND MONUMENTS

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

17. MAINTENACNE OF ROAD

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

18. ACCESS TO PRIVATE PROPERTIES

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

19. TRAFFIC CONTROL

This Contract contains no separate tender item for traffic control as may be required to facilitate construction.

The Contract prices for the materials to be placed or the work to be carried out shall include full compensation for all labour, material and equipment necessary to supply, install, inspect, maintain, operate and remove all traffic control measures and methods to facilitate construction. The Owner, road authority and Engineer accept no liability for improper traffic control.

The Contractor shall provide a detailed Traffic Control Plan for review at least two (2) week(s) prior to the commencement of work and plan their work so that it interferes as little as possible with traffic, subject to the following guidelines:

a) Traffic control shall be in accordance with Ontario Traffic Manual Book 7, Temporary Conditions.
b) The Contractor shall obtain a road occupancy permit, road use permit, etc. from the road authority who has jurisdiction on the road right-of-way as necessary to facilitate construction.
c) Traffic control shall met the requirements of the road authority who has jurisdiction on the road right-of-way, including complying and conforming to the road occupancy permit, road use permit, etc.
d) Traffic control shall be installed prior to construction in the right-of-way, maintained until completion of construction within the right-of-way, and removed following construction within the right-of-way.
e) During Construction through traffic shall be maintained at all times, unless noted otherwise. Temporary lane closures are permitted, while maintaining through traffic, provided that qualified traffic control persons are used for the temporary lane closures.
f) No residential driveways shall be blocked after working hours. If driveways are required to be closed after working hours the Contractor shall have permission from the owner/tenant of the property.
g) Where the work requires blocking access to the driveway of a residence during construction hours, the Contractor shall provide the occupants with 24 hours advance notice.
h) During construction, the Contractor shall make changes to the traffic control measures and methods, if requested by the Engineer or road authority.

20. CONSTRUCTION HOURS

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

21. MAINTENANCE OF FLOWS

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

Special Provisions
For The Construction Of The
Ilderton Municipal Drain No. 2
Municipality of Middlesex Centre

SPECIFICATIONS

The Special Provisions, along with the "*Specifications for the Construction of Municipal Drainage Works*" attached hereto shall apply to and govern the construction of the "*Ilderton Municipal Drain No. 2*".

PLAN AND REPORT

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

EXTENT OF WORK

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

2. The Contractor shall coordinate a pre-construction meeting with the Owner, County, impacted landowners and Engineer prior to construction. This meeting is not required to be held immediately before construction begins and can be held in advance of construction. The Contractor shall provide at least two weeks notice prior to the pre-construction meeting. No work will be undertaken by the Contractor in advance of this meeting unless otherwise authorized by the Engineer in writing.

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

4. The Contractor shall verify the location of existing drains to be supplanted by the improved Ilderton Municipal Drain No. 2 prior to construction. The Contractor shall be responsible for, and bear the cost of, field verification of all elevations and dimensions as they affect the work. Any discrepancy between the location of the existing drains and the location of the proposed improved Ilderton Municipal Drain No. 2 shall be reported to the Engineer before proceeding with the work or fabricating materials so affected. Any discrepancy between the actual conditions and details on the drawings shall be reported to the Engineer before proceeding with the work or fabricating materials so affected. Any delay or cost incurred by the Contractor's failure to comply with this provision shall be borne by the Contractor.

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

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

7. The working area for construction purposes for the closed drain shall be a width of 25m centered on the proposed closed drain. The working area for construction purposes for the open drain shall be a width of 40m centred on the proposed open drain. The working areas for maintenance purposes for the closed

drain shall be a width of 15m centered on the proposed closed drain. The working area for maintenance purposes for the open drain shall be a width of 40m centered on the proposed open drain.

Access to the Ilderton Municipal Drain No. 2 shall be:

i. North from Ten Mile Road along the west side of the Oxbow Municipal Drain to Sta. 0+000; and
ii. East from Meadowcreek Drive through the WWTF to Sta. 0+625.

Each landowner on whose property the drainage work is to be constructed may designate access, different from the access discussed above in writing, to and from the working area at the time of construction or upon failure to do so, the Engineer or Drainage Superintendent, as the case may be, shall designate access.

8. The Contractor shall obtain road occupancy permits as necessary to facilitate construction.

9. The Contractor shall obtain utility locates prior to construction.

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

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

12. All standard catch basins shall be precast concrete catch basins as per OPSD. Knockouts shall be provided in the catch basins.

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

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

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

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

17. All concrete tile shall meet the requirements of ASTM C412-15. Minimum three-edge bearing crushing strength for all concrete tile to meet or exceed 2000D (Class IV) as per ASTM C412-15, unless noted otherwise. The Contractor shall have the tile manufactured specifically for this project tested for conformance to ASTM C412-15 (2000D) prior to shipment to site. The Contractor shall retain these testing records and make them available to the Engineer upon request.

18. All CSP pipe shall be minimum 2.0mm (14 gauge) with a 68mm x 13mm corrugation profile, and galvanized unless noted otherwise.

19. All HDPE pipe shall be CSA rated 320kPa with bell and spigot complete with water-tight gasket joints (CSA B182.8 Type 1). Pipe shall be non-perforated double wall smooth interior, Boss2000 as supplied by Armtec or approved equivalent.

20. Material change across pipe connections shall be connected by sealing all around with a minimum of 150mm of concrete.

21. The Contractor shall supply and wrap all concrete tile joints with geotextile filter material as part of this contract. The filter material shall completely cover the tile joint and shall have a minimum overlap of 300mm. The type of filter material shall be Terrafix 270R or approved equivalent. The minimum width of the filter material shall be as follows:

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

22. All clear stone shall be 19mm Type I as per OPSS.MUNI 1004.

23. All rip-rap stone shall be R50 quarry stone (150mm to 300mm diameter) and placed to a depth of 400mm, as per OPSS.MUNI 1004, unless noted otherwise.

24. The Contractor shall be responsible for all trench settlement.

25. The Contractor shall supply and install catch basin markers beside all catch basins.

26. The Contractor shall strip the topsoil centered on the drain before installing the closed drain and reconstructing the open drain. The width of topsoil stripping shall be at the Contractor's discretion, but all operations shall be constrained to the working width as previously denoted in the report. In locations where there may be deep cuts or excessive soil generation, the Contractor may apply to the Engineer to strip wider than the working width. The Engineer shall have the right to permit or deny this request. Topsoil shall be kept separate from subsoil as much as possible. The topsoil shall be later spread over the backfilled trench, closed drain, open drain, buffer strips and other areas disturbed by construction.

27. The Contractor shall, where directed, remove either by excavation or by crushing, any existing tile drains, inlets and/or catch basins encountered that are no longer required for the drainage system. Removal of existing tile drains and associated works shall be considered part of the work and there will be no extra payment for removal of existing drainage infrastructure.

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

29. The Contractor shall maintain the following minimum cover for all tile placed:

    - 600mm minimum cover for all HDPE pipe, unless noted otherwise
    - 750mm minimum cover for all concrete field tile, unless noted otherwise

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

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

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

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

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

35. No in-water work shall occur between March 15 and July 15 (inclusive) of any year.

36. Unless approved by a qualified biologist, no vegetation and brush clearing, and associated work shall occur between March 15 and August 31 (inclusive) of any year.

37. All work shall conform and comply with the requirements of the approvals, permits and best practices issued by the Conservation Authority, Ministry of Environment, Conservations and Parks, Ministry of Natural Resources and Department of Fisheries and Oceans.

38. All work shall conform and comply with the following environmental mitigation measures:

    <u>In-Water Works</u>

    - The duration of in-water works should be minimized or spread out to lower the risk of sedimentation issues.
    - An emergency spill kit should always be on-site in the event of a spill. All workers should be properly trained on site procedures and the use of an emergency spill kit.
    - Ensure that all machinery used near water bodies arrives on site clean and is checked for fluid leaks prior to any construction activities.
    - Re-fueling and maintenance of construction equipment should be done at a minimum of 30 m away from any body of water and on an impervious surface to minimize the risk of harmful substances entering the water and soil.
    - Operate machinery on land.
    - Sediment and erosion control measures will be installed where appropriate before construction occurs to minimize the risk of sedimentation to the Guide for Erosion and Sediment Control for Urban Construction Sites (OMNR, 2006) and applicable standards in the Ontario Provincial Standard Specification/Ontario Provincial Standard Drawings (OPSS/OPSD).
    - Sediment and erosion control measures should be inspected and maintained during construction activities near water.

- Schedule work to avoid wet, windy and rainy periods that may result in high flow volumes and/or increase erosion and sedimentation.
- Any disturbed ground near water will be re-vegetated as soon as possible.
- Any excavated material that is to be stockpiled near water should be placed above the high-water mark to reduce sedimentation risk.

Riparian Re-Vegetation and Stabilization

- Clearing of riparian vegetation should be kept to a minimum. Use existing trails and clearing when possible.
- Immediately stabilize shoreline areas and bank after construction activities near water to reduce the risk of sedimentation.
- Re-vegetation should be done with an approved grass seed mixture for use in wooded areas suitable for the environment.

Drain Construction Work

- Minimize vegetation removal on sloped or hilled areas to reduce the impacts.
- Ensure that the grading for the site remains unaltered during and post construction of the drain.
- Minimize the disturbance to the land and avoid grading any areas containing significant land features.

CLOSED WORK

C-1 Dye Testing

The Contractor shall complete dye tests from the catch basin at approximately Sta. 0+293 to the outlets at approximately Sta. 0+000 prior to construction to confirm the outlet locations of the existing Ilderton Municipal Drain No. 2 drain into the Oxbox Municipal Drain. The dye tests shall confirm the outlet location of each pipe alignment which exits the catch basin at approximately Sta. 0+293.

Payment for this item shall be lump sum and includes all labour, material and equipment necessary to complete dye testing to confirm the outlet location for each pipe alignment at the locations indicated above.

C-2 Environmental Protection Measures

Payment for this item shall be lump sum for all material, equipment and labour required for protection of the environment, including costs to supply, install, maintain, remove and dispose all arrangements to ensure debris, silt, sediment, deleterious substances, and any other material is contained and does not enter the watercourse, as shown on the Drawings and as specified by the Engineer.

A minimum of 7 days prior to commencing work, the Contractor shall submit to the Engineer for review an environmental management plan complete with diagrams and written procedures which shall conform and comply with the requirements of the approvals, permits and best practices issued by the Conservation Authority, Ministry of Environment, Conservations and Parks, Ministry of Natural Resources and Department of Fisheries and Oceans.

Heavy-duty silt fence shall be installed at the locations shown on the Drawings in accordance with OPSD 219.130 and to the approval of the Engineer. Silt fence shall be inspected by the Contractor periodically and after every rainfall event and maintained as necessary or as directed by the Engineer, at no additional cost. The Contractor shall also remove silt fences upon stabilization of restored surfaces. Silt fence shall be Mirafi silt fence, or 'Terrafence' by Terrafix, or an approved equivalent. All fencing shall be installed prior to local excavations.

If a Species at Risk is observed, the Ministry of Environment, Conservation and Parks (Guelph Office) shall be contacted immediately.

Notwithstanding other special provisions with respect to environmental consideration, refuelling of equipment is not to take place within 30m of the edge of the watercourse. All activities, including equipment maintenance and refuelling shall be controlled to prevent the entry of petroleum products or other deleterious substances, including any debris, waste, rubble or concrete material, from all construction operations, into the watercourse. Any such material which inadvertently enters the watercourse shall be removed by the Contractor at their own expense, in a manner satisfactory to the Engineer.

In the event that the Engineer determines that controls are unacceptable the Contractor shall cease those operations as identified by the Engineer which are causing the entry of deleterious material to watercourse.

Such operations shall remain suspended until otherwise directed by the Engineer. The controls shall be monitored and inspected by the Contractor periodically at regular intervals and after every rainfall event, and maintained as necessary or as directed by the Engineer, at no additional cost. The Contractor shall also remove the controls upon stabilization of restored surfaces.

C-3 Rip-Rap Outlet Protection

Supply and place approximately 60m^2 of rip-rap at the outlet pipe of the Ilderton Municipal Drain No. 2 into the open Oxbow Municipal Drain in accordance with the details shown on the Drawings. The rip-rap shall be R-50 quarry stone (150mm to 300mm diameter) as per OPSS.MUNI 1004 or as approved by the Engineer on geotextile filter material (Terrafix 270R or approved equivalent), machine placed to produce a smooth locked surface. All rip-rap and geotextile shall be installed in accordance with OPSD 810.010 Type B. Rip-rap through the stream bed shall be placed so that the top surface of the rip-rap is at the approximate elevation of the bottom of the existing or proposed drain.

The price shall include the removal, salvage and reinstallation of any existing rip-rap and rock protection encountered in the open drain on geotextile filter cloth (Terrafix 270R or approved equivalent). Rip-rap and rock protection reinstallation shall be to the standard described above for rip-rap placement.

Payment for this item shall be for all labour, equipment and material necessary to supply and install rip-rap on geotextile filter cloth (Terrafix 270R or approved equivalent) as per the locations and dimensions shown on the Drawings or as directed by the Engineer including removal, salvage and re-installation of any existing rip-rap and rock protection. Measurement for payment shall be per square metre of for the actual quantity new rip-rap supplied and installed at the rate quoted in the Form of Tender.

C-4 HDPE Pipe

Supply and install 150m of twin 750mm diameter HDPE pipe by excavator complete with two (2) rodent gates at the outlet in accordance with the details shown on the Drawings.

The pipe shall be installed as follows (as shown on the Drawings and placed conforming to OPSD 802.010 (Flexible Pipe)):

- Bedding – Shall be Granular ‘B’ with a minimum thickness of 150mm placed in maximum 150mm lifts and compacted to 98% SPDD. The Contractor shall ensure that bedding is properly placed and compacted under the haunches of the pipe.
- Haunching – From bedding to the springline of the pipe shall be Granular ‘B’ placed in maximum 150mm lifts and compacted simultaneously both sides of the pipe to 98% SPDD.
- Initial backfill – From the springline of the pipe to a minimum of 300mm above the top of the pipe shall be Granular ‘B’ placed in maximum 150mm lifts and compacted simultaneously both sides of the pipe to 98% SPDD.
- Final Backfill – From initial backfill to topsoil shall be approved granular material (native if available) free of any large stones, clumps, etc. placed in maximum 300mm lifts and compacted uniformly to 95% SPDD. Final backfill shall be placed, graded and leveled in a manner to not damage or displace the pipe.

This item shall include the connection of the HDPE pipe to the successive concrete field tile. No additional payment will be made for these connections.

The trench shall be backfilled to ensure that minimum cover is maintained for all HDPE pipe. If additional trench backfill is required beyond the native material available on-site, topsoil shall be used. The supply, placement, spreading and grading of imported topsoil shall be as per Special Provision C-13.

Extra will not be paid for stoney conditions while installing the HDPE pipe unless boulders are encountered larger than can be lifted by the excavator.

Payment under this item shall be per metre of twin HDPE pipe, including rodent grates, supplied and installed and includes all labour, equipment and materials necessary to excavate and shape the trench, supply, install, lay and connect the pipe, backfill the trench, and includes topsoil stripping, stockpiling and replacement. The supply, placement, grading and compaction of the Granular 'B' required for the pipe shall be as per Special Provision C-7.

C-5 Concrete Field Tile by Excavator

Supply and install 143m of twin 750mm diameter concrete field tile by excavator.

The Contractor shall place the pipe on a 150mm thick bed and 160mm thick haunching of compacted Granular 'B' so that the pipe is supported from the bottom and sides. This may require hand work to "blind" the pipe and place stone under the haunches of the pipe, and/or modification to the excavator. Refer to Drawings for pipe bedding detail.

The Contractor is responsible for any breakage of pipe in the ground however it occurs and whether or not the method of installation is approved by the Engineer.

This item shall include the wrapping of tile joints. No additional payment will be made for wrapping of tile.

The trench shall be backfilled to ensure that minimum cover is maintained for all concrete field tile. If additional trench backfill is required beyond the native material available on-site, topsoil shall be used. The supply, placement, spreading and grading of imported topsoil shall be as per Special Provision C-13.

Extra will not be paid for stoney conditions unless boulders are encountered, larger than can be lifted by the excavator.

Payment under this item shall be per metre of twin concrete field tile supplied and installed and includes all labour, equipment and materials necessary to excavate and shape the trench, supply, install, lay and wrap the pipe, backfill the trench, and includes topsoil stripping, stockpiling and replacement. The supply, placement, grading and compaction of the Granular 'B' required for the pipe shall be as per Special Provision C-7.

C-6 Flow Equalization

Supply and install four (4) – 450mm x 750mm Inserta Wye, Manufactured Wye, or approved equivalent, complete with two (2) – 450mm diameter HDPE pipe connections, in accordance with the details shown on the Drawings. Inserta Wye, Manufactured Wye or approved equivalent shall be installed as per manufacturer recommendations. HDPE pipe and manufactured wyes shall be supplied and installed to the standard described in Special Provision C-4.

The Contractor is responsible for any breakage of pipe in the ground however it occurs and whether or not the method of installation is approved by the Engineer.

This item shall include the connection and wrapping of pipe, tile and wye joints. No additional payment will be made for connection and wrapping of pipe, tile and wyes.

Extra will not be paid for stoney conditions while installing the HDPE pipe unless boulders are encountered larger than can be lifted by the excavator.

Payment under this item shall be lump sum for the supply and installation of the Inserta Wye, Manufactured Wye, or approved equivalent, and HDPE pipe connections and includes all labour, equipment and materials necessary to excavate and shape the trench, supply, install, lay, wrap and connect the wyes and pipes, backfill the trench, and includes topsoil stripping, stockpiling and replacement. The supply, placement, grading and compaction of the Granular 'B' required shall be as per Special Provision C-7.

C-7 Granular 'B'

Payment for this item shall be for all labour, equipment and material necessary to supply, place, grade, and compact all Granular 'B' at locations described in the special provisions, shown on the Drawings or as directed by the Engineer. Measurement for payment shall be per tonne of Granular 'B' supplied, placed, graded and compacted confirmed by copies of aggregate supply tickets signed by the Contractor and obtained from the aggregate supplier.

C-8 Ditch Inlet Catch Basins

Supply and install one (1) – 3000mm x 1200mm ditch inlet catch basin complete with birdcage grate, earth berm, 3:1 sloped top, and 600mm sump as per OPSD 705.030.

Supply and install one (1) – 1200mm x 900mm ditch inlet catch basin complete with birdcage grate, earth berm, 3:1 sloped top, and 600mm sump as per OPSD 705.030, offset from the drain by approximately 2m. The offset ditch inlet catch basin shall be connected to the ditch inlet catch basin at the drain with approximately 2m of 450mm diameter HDPE pipe. The HDPE pipe shall be supplied and installed to the standard described in Special Provision C-4. The supply and installation of the HDPE and granular 'B' for the HDPE pipe shall be included in the price of the ditch inlet catch basin and there shall be no extra payment.

All ditch inlet catch basins shall have a heavy duty galvanized steel grate (minimum bar diameter 15mm, maximum spacing 75mm) of the "birdcage" type set so that the top of the concrete is approximately 50mm above the surrounding ground. Securely fasten the grate to the structure with two galvanized bolts.

All ditch inlet catch basins shall be set on a 200mm thick layer of compacted Granular 'B' or 19mm drainage stone. Granular 'B' or 19mm drainage stone shall be included in the price of the ditch inlet catch basin, and there shall be no extra payment.

All ditch inlet catch basins shall include at least one 150mm riser section.

All necessary minor grading and contouring to convey water to the ditch inlet catch basin is included. The approximate top of grate elevation has been shown on the Drawings; however, the Contractor shall confirm the surface elevations prior to ordering or placing any ditch inlet catch basins, and shall ensure that the top extends 50mm above the ground surface, unless noted otherwise. For the purposes of this report, top of grate shall be equivalent to the lowest point that surface water can enter the structure.

The trench backfill adjacent to and around the ditch inlet catch basins shall be compacted to ensure that there is no settlement of the rip-rap.

All ditch inlet catch basins shall include an earth berm, unless otherwise noted. The berm shall be constructed from native material (or approved equivalent) and to the details shown on the Drawings. The berm shall be finished with topsoil and seed to the standard described in Special Provision O-4. The berm construction shall be included in the price of the ditch inlet catch basin, and there shall be no extra payment.

Knockouts shall be provided for in all ditch inlet catch basins. All pipes connected to the ditch inlet catch basin shall be suitably grouted with concrete, and all grouted connections shall be completely wrapped with geotextile. The connection of pipes to the catch basins as shown on the Drawings is included in the price for this item. Further, geotextile shall be placed over all the joints between sections of the box for the entire perimeter of the box.

Payment under this item shall be per ditch inlet catch basin supplied and installed and includes provision of shop drawings (as required), all labour, equipment and materials necessary to excavate and shape the trench, supply and place the compacted Granular 'B' or drainage stone, supply, install, grout and wrap the ditch inlet catch basin, backfill the trench, supply and install the grate, supply and install the HDPE pipe, supply and install of pipe and tile connection items described above, connect pipes and tiles to the ditch inlet catch basins, construction of the berm, and includes topsoil stripping, stockpiling and replacement (with seed as required).

Supply and install approximately 60m^2 of rip-rap at the ditch inlet catch basins as shown on the Drawings. All rip-rap shall be supplied and placed to the standard described in Special Provision C-3. The price shall include the removal, salvage and reinstallation of any existing rip-rap and rock protection encountered at the existing catch basin on geotextile filter cloth (Terrafix 270R or approved equivalent). Rip-rap and rock protection reinstallation shall be to the standard described above for rip-rap placement.

Payment for rip-rap item shall be for all labour, equipment and material necessary to supply and install rip-rap on geotextile filter cloth (Terrafix 270R or approved equivalent) including removal, salvage and re-installation of any existing rip-rap and rock protection. Measurement for payment shall be per square metre of for the actual quantity new rip-rap supplied and installed at the rate quoted in the Form of Tender.

C-9 Dewatering

Payment for this item shall be lump sum for all labour, equipment and materials necessary to maintain a dry condition and maintain flow within the limits of installation for the ditch inlet catch basins and earth berm, until ditch inlet catch basin and earth berm construction has been completed, including the supply, installation, maintenance, removal and disposal of all dewatering arrangements and restoration of the affected areas. Dewatering arrangements shall include, but not be limited to, temporary coffer dams, by-pass piping or pumping, sediment bag and straw bale filters, as shown on the Drawings and as specified by the Engineer.

A minimum of 7 days prior to commencing work, the Contractor shall submit to the Engineer for review a dewatering plan for the catch basin replacement work complete with diagrams and written procedures, which shall conform and comply with the requirements of the approvals, permits and best practices issued by the Conservation Authority, and Ministry of Environment, Conservations and Parks, Ministry of Natural Resources and Department of Fisheries and Oceans.

The temporary cofferdams, temporary by-pass or pump is not to be installed until the “In-Water” timing window has taken effect. The Contractor shall be responsible for sizing and constructing the cofferdams to suit site conditions. Cofferdams shall be constructed from non-earthen material. Cofferdams constructed from bare earth material or equivalent are not acceptable. Cofferdams shall include a polyethylene membrane or approved equivalent to seal the cofferdams and minimize the amount of water entering the site.

In the event that the Engineer determines that the dewatering arrangements are unacceptable the Contractor shall cease those operations as identified by the Engineer which are causing the dewatering issues. Such operations shall remain suspended until otherwise directed by the Engineer. The dewatering arrangements shall be monitored and inspected by the Contractor periodically at regular intervals and after every rainfall event, and maintained as necessary or as directed by the Engineer, at no additional cost. The Contractor shall also not remove dewatering arrangements until ditch inlet catch basins and earth berm construction has been completed.

C-10 Fish Rescue Services (PROVISIONAL)

The provisional allowance under this item is intended to cover expenditures required for the Contractor to retain the services of a qualified aquatic biologist to relocate fish stranded within the dewatering area for the installation of the ditch inlet catch basins and earth berm to a suitable habitat using appropriate capture, handing and release techniques.

The Contractor shall obtain a Scientific Collectors Permit from the Ministry of Natural Resources prior to conducting any fish rescue. Proof of the permit shall be provided to the Engineer and Owner prior to mobilization to complete the works. The costs to prepare and apply for the permit, including permit application fees, are to be paid from this provisional allowance which is included in the Form of Tender for this item.

The Owner and Engineer shall not be responsible for any delays in construction due to the Contractor’s inability to obtain a permit from the Ministry of Natural Resources. The Owner and Engineer shall not be responsible for delays or standby time caused by the Fish Rescue Services.

All work under this item shall conform and comply with the requirements of the approvals, permits and best practices issued by the Conservation Authority, Ministry of Environment, Conservations and Parks, Ministry of Natural Resources and Department of Fisheries and Oceans.

The amount of the Fish Rescue Services provisional allowance shown in the Form of Tender shall be included in the Total Tender Price.

Payment will be made only for work authorized by the Engineer, which is completed in accordance with the instructions of the Engineer and as per regulatory requirements. Payment under this provisional allowance shall be made based on invoices for the Fish Rescue Services described above provided to the Engineer from the Contractor and shall include a 10% Contractor mark-up. The Contractor shall be responsible for monitoring Fish Rescue Services costs, including Contractor mark-up, on an ongoing basis throughout construction and shall inform the Engineer immediately if the potential exists for final Fish Rescue Services costs to exceed the provided allowance in the Form of Tender for this item.

This item shall only be used under the authorization of the Engineer.

C-11 19mm Clear Stone (PROVISIONAL)

Supply and install 19mm diameter clear crushed stone for bedding or envelope. Where not already specified in the contract, location for installation shall be designated by the Engineer at the time of construction.

Measurement for payment shall be per tonne of 19mm diameter clear crushed stone supplied, placed, graded and compacted confirmed by copies of aggregate supply tickets signed by the Contractor and obtained from the aggregate supplier.

This item shall only be used under the authorization of the Engineer.

C-12 Poor Soil Conditions (PROVISIONAL)

Poor soil conditions may be encountered. The Contractor shall immediately contact the Engineer if poor soil conditions are suspected. Should they occur and be sufficiently severe, in the opinion of the Engineer, that installation by means of the specified equipment is not possible; extra will be paid at the rate quoted in the Form of Tender for installation of the tile by modified means approved by the Engineer. Work under this item will include trench excavation of sufficient depth to install clear stone bedding if necessary, or other such action as may be necessary. All costs involved in removing equipment, crew downtime, or any other costs related to the transition from stand equipment to modified will be included in the cost of this item, and no additional payment will be made.

This item shall only be used under the authorization of the Engineer.

C-13 Imported Topsoil (PROVISIONAL)

Supply, place, spread and grade imported topsoil to a depth of not less than 150mm. Where not already specified in the contract, location for installation shall be designated by the Engineer at the time of construction.

This item shall include the supply and installation of grass seed (if required) to the standard described in Special Provision O-4. All clods or lumps shall be pulverized and any roots, stones over 50mm in diameter, or foreign matter shall be raked up and removed as directed prior to placement of grass seed. The seed and fertilizer shall be to the standard described in Special Provision O-4

Measurement for payment shall be per cubic metre of imported topsoil supplied, placed, spread and graded, including grass seed, confirmed by copies of aggregate supply tickets signed by the Contractor and obtained from the aggregate supplier.

This item shall only be used under the authorization of the Engineer.

C-14 Tile Connections (PROVISIONAL)

All tile encountered shall be connected into the main drain or a catch basin or a junction box. Tile connections may be made by using the same size of concrete field tile or one size larger of standard corrugated plastic drainage tubing. Connection at the main shall be "earth-tight" to the satisfaction of the Engineer. Connection to a catch basin or junction box shall be "water-tight", suitably grouted with concrete, and all grouted connections shall be completely wrapped with geotextile. All tile connections shall be done by core drilling the main drain or catch basin or junction box, and the connection shall be sealed by a method satisfactory to the Engineer. All connections shall be left uncovered for inspection by the Engineer.

The provisional allowance under this item is intended to cover expenditures required to connect all tile encountered into the main drain or a catch basin or a junction box. The contractor will be paid as follows for the connection of tributary tile to the proposed works:

100mm Connections to	Total c/w Coring	150mm Connections to	Total c/w Coring	200mm Connections to	Total c/w Coring
250-675	$ 110.00	300-675	$ 120.00	250-675	$ 150.00
750-900	$ 140.00	750-900	$ 155.00	750-900	$ 185.00
Catch basin or Junction Box	$ 200.00	Catch basin or Junction Box	$ 215.00	Catch basin or Junction Box	$ 260.00

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

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

The amount of the Tile Connections provisional allowance shown in the Form of Tender shall be included in the Total Tender Price.

This item shall only be used under the authorization of the Engineer.

OPEN WORK

O-1 Clearing and Grubbing

The Contractor is to clear, grub and remove the brush, trees, branches, debris, and vegetation in the existing open drain bank, open drain top of bank to 15m on both sides, and working area to facilitate the construction of the open drain and closed drain as shown on the Drawings and as directed by the Engineer. This item shall apply only to those trees, shrubs, brush, bushes, stumps, debris, vegetation and windfalls designated for removal as required for construction and access for construction.

Trees are to be conserved within the area required for construction and access for construction as shown on the Drawings and as directed by the Engineer. The Contractor shall safeguard and protect the trees to be conserved and no additional payment shall be made for the safeguard and protection of the trees to be conserved.

This item shall include the stockpile of trees, shrubs, brush, bushes, stumps, debris, vegetation and windfalls on-site at a location designated by the Engineer and landowner. The stockpiles shall be such a distance on each side to eliminate any interference with the construction of the drain and spreading of the excavated material. The stockpiles shall be disposed of by the landowner following construction. Clearing and grubbing shall be to the satisfaction of the Engineer.

Unless approved by a qualified bioloigst, no vegetation and brush clearing, and associated work shall occur between March 15 and August 31 (inclusive) of any year.

Clearing and grubbing required for this work shall be accordance with the Construction Specifications. This includes removing all tree stumps in the cleared area as close as practically possible to the ground and chemically treated to prevent regrowth. This applies to all areas of the construction and access for construction.

Payment for this item shall be per metre along the length of the drain or along the access, and includes all labour, materials and equipment required to clear, grub and remove brush, trees, branches and vegetation, including stockpile on-site at a location designated by the Engineer and landowner, and safeguarding and protection of the trees to be conserved.

O-2 Reconstruct Open Drain

The Contractor shall use a hydraulic excavator to reconstruct the open drain from approximately STA. 0+293 to STA. 0+689 to the proposed grade and depth as shown on the Drawings.

The excavated material shall be deposited, spread and leveled within the working area to a maximum depth of 200mm and in accordance with the construction specifications. The Contractor shall be responsible to establish the quantity of material to be deposited, spread and leveled based on the Drawings. The Contractor may apply to the Engineer to deposit, spread and level excavated material wider than the working width. The Engineer shall have the right to permit or deny this request. The Contractor shall contact all landowners before proceeding with the work to verify the location to place and level the excavated material. Excavation, reconstruction and deepening of the open drain, spreading and leveling of excavated material required for this work shall be in accordance with the Construction Specifications.

The Contractor shall construct and grade buffer strips 15.0m in width on both sides of the open drain from approximately STA. 0+293 to STA. 0+689. The vegetation on the buffer strips shall the approved grass seed mixture as discussed in Special Provision O-4, as well as the trees are to be conserved within the area required for construction and access for construction as shown on the Drawings and as directed by the Engineer.

The topsoil is to be stripped from the open drain, buffer strips and adjacent land for leveling of excavated material as required in all areas which may be disturbed by construction, and temporarily stockpiled prior to construction. Topsoil may be re-used from the existing lands provided it is screened to remove any unwanted material such as stones, clumps of sod, sticks, etc. All areas to be topsoiled shall be fine graded to the required lines and grades, allowing for a minimum depth of 150mm of topsoil. The surface shall be free of all vegetation

and other debris and free of stones which would not be covered by the depth of topsoil specified and shall be loose to a depth of 25mm at the time of placing topsoil. The Contractor shall perform such mowing, raking and picking up of debris and such discing, harrowing or other mean of scarification as may be necessary to comply with this requirement and shall dispose of all debris off-site.

Any large stones or boulders which exceed 500mm in diameter shall be removed from the excavated material and buried adjacent to the ditch and at a depth so as to not interfere with farm machinery or stockpiled at a location adjacent to the open drain as directed by the Engineer.

Prior to spreading and leveling the excavated material, trees, shrubs, brush, bushes, stumps, debris, vegetation and windfalls shall be removed from the open drain bank, slopes and working area and stockpiled to such a distance on each side to eliminate any interference with the construction of the drain and spreading of the excavated material as per Special Provision O-1.

During the spreading and leveling of excavated material, the Contractor shall safeguard and protect the trees to be conserved and no additional payment shall be made for the safeguard and protection of the trees to be conserved.

All tile outlets in the existing open drain shall be noted by the Contractor prior to reconstruction and excavation. The Contractor shall contact all landowners and ask them to mark all their tile outlets which enter the open drain. The price shall include whatever measures are necessary to not disturb, damage or break any existing tile or other component of the drain encountered in the open drain. All existing tile disturbed, broken or damaged during open drain reconstruction, deepening and excavation shall be repaired at the Contractor's expense.

If the Contractor obtains a statement in writing, signed by the owner of the lands affected that they do not wish the excavated material to be leveled, the Engineer may release the Contractor from obligation in that regard. In this case, the excavated material shall be stockpiled on the property by the contractor as directed by the Engineer at no additional cost.

Payment for this item shall be per metre along the length of the drain and includes all labour, materials and equipment to reconstruct and deepen the open drain which includes buffer strip construction and grading, topsoil stripping and stockpiling, spreading and leveling of excavated material, and safeguarding and protection of trees to be conserved.

O-3 Remove, Salvage and Reinstall Existing Erosion Protection

The Contractor shall remove, salvage and reinstall any existing rip-rap and rock protection encountered in the open drain on geotextile filter cloth (Terrafix 270R or approved equivalent). Reinstalled rip-rap and rock protection shall be placed to the standard described in Special Provision C-3.

During the remove, salvage and reinstallation of existing rip-rap and rock protection, the Contractor shall safeguard and protect the trees to be conserved and no additional payment shall be made for the safeguard and protection of the trees to be conserved.

Payment for this item shall be lump sum for all labour, equipment and material necessary to remove, salvage and reinstall any existing rip-rap and rock protection encountered in the open drain on geotextile filter cloth (Terrafix 270R or approved equivalent), and includes safeguarding and protection of trees to be conserved.

O-4 Topsoil and Grass Seed

The Contractor shall uniformly spread native topsoil to a depth of not less than 150mm over the excavated open drain, buffer strips, leveled excavated material and other areas disturbed by construction. The native topsoil is to be stripped and stockpiled as per Special Provision O-2. All clods or lumps shall be pulverized and any roots, stones over 50mm in diameter, or foreign matter shall be raked up and removed as directed prior to placement of grass seed. All excess native topsoil (beyond cover requirements, if applicable) shall be spread and leveled as directed by the Engineer.

The excavated open drain, buffer strips, leveled excavated material and other areas disturbed by construction shall have application of an approved grass seed mixture. The seed shall be Roadside & Forest Edge Seed Mix by St. Williams Nursery & Ecology Centre or approved equivalent applied at a rate of 30kg/ha, with a cover crop of Common Oats or approved equivalent applied at a rate of 30kg/ha.

During the spreading of topsoil and grass seed, the Contractor shall safeguard and protect the trees to be conserved and no additional payment shall be made for the safeguard and protection of the trees to be conserved.

Payment for this item shall be for all labour, equipment and material necessary to spread native topsoil and supply and install the approved grass seed mixture over the excavated open drain, buffer strips, leveled excavated material and other areas disturbed by construction. Measurement for payment shall be per square metre for the actual quantity of topsoil spread and grass seed supplied and installed at the rate quoted in the Form of Tender.

O-5 Erosion Control Blanket

Payment for this item shall be for all labour, equipment and materials necessary to supply and install erosion control blanket installed as per manufacturer's recommendations as directed by the Engineer, including the and safeguarding and protection of trees to be conserved. Measurement for payment shall be per square metre of erosion control blanket supplied and installed, without any allowance for overlap.

The erosion control blanket shall be Terrafix Geosynthetics 'C200' (from Terrafix Geosynthetics Inc.), Maccaferri's 'Biomac C' (from Maccaferri Canada Ltd.), or approved equivalent, installed as per manufacturer's recommendations. The Contractor shall submit to the Engineer one (1) complete set of shop drawings for the erosion control blanket for review and approval prior to the purchase and installation of the erosion control blanket on-site. The drawings shall include the erosion control blanket type, specifications, sizes and dimensions, and installation specifications and layout as per the manufacturer's specifications.

During installation of the erosion control blanket, the Contractor shall safeguard and protect the trees to be conserved and no additional payment shall be made for the safeguard and protection of the trees to be conserved.

O-6 Access Gate and Fencing

Supply and install a 6m wide chain link gate into the existing chain link fence as per OPSD 972.101, OPSD 972.102, OPSD 972.130 and OPSD 972.132 complete with barbed wire, located at approximately STA. 0+650 as

shown on the Drawings, for drain access from Waste Water Treatment Plan property. The exact location of the chain link gate shall be confirmed by the Owner and Engineer prior to construction.

The Contractor shall safeguard, protect and temporarily support the existing chain link fencing to remain during installation of the chain link gate and no additional payment shall be made for the safeguard, protect and temporarily support of the existing chain link fence to remain. The Contractor shall remove and salvage the existing chain link fencing required to be removed for the installation of the chain link gate and no additional payment shall be made for the removal and salvage of the existing chain link fence.

Under this item and at the lump sum price, the Contractor shall supply all labour, equipment and materials necessary to supply and install new chain link gate at the location specified in the Drawings, including safeguard, protect and temporary support of the existing chain link fencing to remain, and removal and salvage of the existing chain link fence required to be removed.

O-7 Rip-Rap Erosion Control (PROVISIONAL)

Supply and install rip-rap on geotexitle filer material for erosion control. All rip-rap shall be supplied and placed to the standard described in Special Provision C-3. Payment for rip-rap item shall be for all labour, equipment and material necessary to supply and install rip-rap on geotextile filter cloth (Terrafix 270R or approved equivalent). Measurement for payment shall be per square metre of for the actual quantity rip-rap supplied and installed at the rate quoted in the Form of Tender.

This item shall only be used under the authorization of the Engineer.

Appendix E Construction Specifications

SPECIFICATIONS
for the
CONSTRUCTION
of
MUNICIPAL DRAINAGE WORKS

Revised February 2025

GEI CONSULTANTS CANADA LIMITED
GUELPH – OWEN SOUND – LISTOWEL – KITCHENER – LONDON – GTA – HAMILTON – MARKHAM – BARRIE

SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINAGE WORKS

INDEX

SPECIFICATIONS FOR THE CONSTRUCTION OF MUNICIPAL DRAINAGE WORKS

SECTION A - GENERAL

A.1 BENCH MARKS

Bench Marks will be set by the Engineer in the vicinity of the work as shown on the accompanying Drawings. Attention is drawn to Section 13 (2) of the Drainage Act regarding liability for interference with Bench Marks.

A.2 LINE

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

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

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

A.3 PROFILE

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

The drain shall be constructed with a uniform grade in accordance with the Profile Drawing. A variation of 25mm from the proposed Profile shall be sufficient to require the Contractor to remedy this discrepancy.

A.4 ERRORS OR OMISSIONS

The Contractor shall satisfy themselves before the commencement of any part of the work of the meaning of the plans and specifications, and any errors or omissions they may find in Plans, Profiles or Specifications shall not relieve the responsibility of completing the work in accordance with the evident intention of such Plans, Profiles and Specifications. The Contractor shall report any such errors or omissions to the Engineer for correction before the work is commenced, and failure to do so shall relieve the Contractor of any opportunity for additional compensation.

A.5 CLEARING

(a) General

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

Where included, the Special Provisions and/or Drawings lay out the amount of the work of clearing through bush and treed areas for both open and closed drains.

All brush and trees removed from the drain and banks thereof must be piled to the satisfaction of the Engineer for burning or disposal by the Owner. Where trees are to be trimmed only, trimming shall be done by saw cutting. Branch removal by excavator bucket will not be permitted.

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

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

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

(b) Open Work

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

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

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

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

(c) Closed Work

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

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

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

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

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

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

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

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

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

A.6 FENCES

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

A.7 TRIBUTARY OUTLETS

During the construction of an open drain, the Contractor shall guard against damaging outlets of any tributary drains and during the construction of a tile drain the Contractor shall connect all tributary tile drains to the main tile as work progresses and before backfilling the new drain. Attention is drawn to Article B.8 and Article C.5 of these Specifications. The Contractor will be held liable for damage caused by negligence or carelessness, on the part of their self, their workers or subcontractors.

A.8 ALTERATIONS

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

A.9 SPECIAL CONDITIONS

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

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

A.10 HIGHWAYS, RAILWAYS, UTILITIES

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

Notices Required

(a) Highways

Before any construction may take place on the right-of-way of any highway, forty-eight (48) hours notice in writing, exclusive of Saturdays, Sundays and Holidays, must be given to the appropriate District Engineer of the Ministry of Transportation of Ontario, or the Road Superintendent of the local Road Authority as the case may be.

(b) Railways

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

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

A.11 CONTRACTOR'S LIABILITY INSURANCE

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

The Contractor shall furnish evidence of compliance with all requirements of the Workplace Safety and Insurance Act including payments due there under.

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

A.12 SUB-CONTRACTORS

The Contractor shall not sublet the whole or part of this Contract without the written approval of the Engineer, which approval shall not be unreasonably withheld.

A.13 STANDING CROPS AND LIVESTOCK

The Contractor shall not be held responsible for damages to standing crops within the "working area" as defined in the Engineer's Report or in the access to and from such "working area", such access having been defined by the owner of the property if the Contractor notifies the owner thereof in writing at least two (2) days prior to

commencement of the work on that portion. Similarly, the Contractor constructing a tile drain shall not be held responsible for damages or injury to livestock occasioned by leaving trenches open for inspection by the Engineer if they notify the owner in writing at least two (2) days prior to commencement of the work on that portion. But the Contractor will be held liable for such damages or injury if the backfilling of such trenches is delayed more than seven (7) days after acceptance by the Engineer.

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

A.14 LANEWAYS

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

All pipe culverts located under laneways shall be backfilled with granular material to a minimum of 900mm beyond each side of the culvert. 150mm of granular 'A' shall be placed under the culvert as a base. Granular material shall be placed simultaneously on each side of the culvert in 150 mm layers and compacted to 98% Standard Proctor maximum dry density. All culverts are to be assembled according to the Manufacturers Specifications. Culverts to have a minimum of 600mm of cover over the pipe unless otherwise noted on the Drawings.

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

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

A.15 REMOVALS

Unless otherwise specified, the cost of removing existing catchbasins, junction boxes, tile (any size), outlets, farm bridge/culverts, and other such structures that are no longer required for the proposed drainage works and are encounter during construction are consider part of the Contract price.

A.16 FINAL INSPECTION

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

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

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

A.17 NOTICE OF COMMENCEMENT OF WORK

The Contractor shall give the Engineer and the Drainage Superintendent a minimum of seventy-two (72) hours advance notice before commencement of work on any municipal drain.

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

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

A.18 FIELD MEETINGS

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

A.19 SUPERVISION

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

A.20 MAINTENANCE OR FAULTY WORKMANSHIP

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

A.21 DRAINAGE SUPERINTENDENT

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

SECTION B - OPEN DRAINS

B.1 BOTTOM WIDTH AND SIDE SLOPES

The drain shall have the full specified bottom width at the grade line at the time of final inspection. Both sides of an open drain are to be sloped as shown on the accompanying Profile. Bottom widths will vary with the size of the drain. Where the width of the bottom of the existing ditch is sufficient to permit the desired width, depth and back slopes for the new ditch to be constructed without disturbing the existing banks, such banks shall be left as is, subject to clearing required as described in Section B.7 “Obstructions”. Sides of the drain shall be smooth and have a uniform slope from top to bottom.

B.2 EXCAVATED MATERIAL

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

A clear berm or margin of at least 2.0m shall be left between the top edge of the ditch and the leveled spoil. In no case shall the side of the spoil bank nearest the ditch have a slope greater than 1.5m to 1m.

Any large stones or boulders which exceed 500mm in diameter shall be buried adjacent to the ditch and at a depth so as to not interfere with farm machinery.

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

B.3 SPREADING AND LEVELLING

The spoil shall be deposited, spread and leveled up to a maximum depth of 200mm and be left so that the land on which it lies may be cultivated with adjacent lands by use of ordinary farm machinery. If the Contractor obtains a statement in writing, signed by the owner of the lands affected that they do not wish the spoil to be leveled, the Engineer may release the Contractor from obligation in that regard. Disposal of the material shall be to the satisfaction of the Engineer. Through timbered land the excavated material may be spread to a maximum depth of 600mm unless otherwise noted on the Plans governing the work.

B.4 FILLING OLD CHANNEL

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

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

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

B.5 INLETS FOR SURFACE WATER

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

B.6 EXCAVATION AT BRIDGE SITES

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

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

B.7 OBSTRUCTIONS

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

B.8 TILE OUTLETS IN EXISTING DITCHES

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

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

B.9 GRASS SEED

The ditch slopes where disturbed shall be seeded using an approved seed mixture. The grass seed shall be applied no more than 3 days following the excavation of the open ditch. Grass seed shall only be applied between April 15th and November 15th, unless otherwise directed by the Engineer.

Grass seed shall be fresh, clean and new crop seed, meeting the requirements of OPSS 804 for Standard Roadside Mix, and applied at the rate of 170kg/ha (150lbs/acre).

B.10 EQUIPMENT

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

B.11 COMPLETION

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

SECTION C - TILE DRAINS

C.1 TILE QUALITY

All tile supplied shall be approved by the Engineer before being incorporated into the work and the Engineer shall have the right to order such tests as deemed necessary to be made upon the tile, including that of testing by an independent testing laboratory. The costs of all such tests shall be borne by the Contractor and may be deducted from monies due to the Contractor under this Contract.

C.2 LINE

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

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

C.3 TILE LAYING

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

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

C.4 LOWERING OF SURFACE GRADES

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

C.5 TRIBUTARY DRAINS

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

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

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

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

C.6 BACKFILLING

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

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

C.7 OUTLET PROTECTION

The protection at the outlet of a tile drain shall be a length of corrugated metal or plastic pipe, as specified, fitted with a rodent-proof grate. The grate shall be hinged at the top to permit the exit of foreign material from the tile and shall have a maximum spacing between bars of 50mm. The pipe shall be protected with rip rap protection consisting of quarry stone or heavy field stone and geotextile filter material in a manner satisfactory to the Engineer. The rip rap shall extend from the bottom of the trench to the original ground surface and for a distance of at least 4m from the end of the outlet pipe unless otherwise specified on the Drawings. The protection shall extend to the top of the backfilled trench and below the pipe to 400mm under the streambed and also extend 600mm into undisturbed soil on either side of the backfilled trench unless otherwise specified on the Drawings.

Where the outlet occurs at the end of an open ditch, the above rip rap protection will extend all around the end of the ditch and to a point 800mm downstream on either side unless otherwise specified on the Drawings. Where heavy overflow is likely to occur, sufficient additional rip rap and filter material shall be placed as directed by the Engineer to prevent the water cutting around the protection.

C.8 BRUSH, TREES, DEBRIS, ETC.

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

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

C.9 CATCH BASINS

All catch basins shall be approved reinforced precast units having inside dimensions as noted on the drawings with a 600mm sump. The sides shall be a minimum of 115mm thick, and the bottom shall have a minimum thickness of 150mm. The elevation of the top of the catch basin shall be as set by the Engineer at the time of construction. All necessary grading to convey water to the catch basin shall be included as part of the Contract.

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

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

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

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

C.10 ROCKS

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

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

C.11 BROKEN OR DAMAGED TILE

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

C.12 FILLING IN EXISTING DITCHES

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

C.13 CONSTRUCTION OF GRASSED SWALES/WATERWAYS

Where the Contractor is required to construct a grassed swale/waterway, the waterway shall be graded, shaped and a seed bed prepared prior to applying the grass seed. The grass seed shall be fresh, clean and new crop seed, meeting the requirements of “Lowland Mix” as per OPS 804. Grass seed shall be applied at the rate of 170kg/ha (150lbs/acre).

C.14 RECOMMENDED PRACTICE FOR CONSTRUCTION OF SUBSURFACE DRAINAGE SYSTEMS

The latest version of The Drainage Guide for Ontario, as published by OMAFRA, shall be the guide to all methods and materials to be used in the construction of tile drains except where superceded by other Specification of the Contract.