



Latronica Municipal Drain

April 30, 2026

Prepared for:



Headway Engineering
35-500 Fairway Road South
Suite 308
Kitchener, Ontario N2C 1X3
226 243 6614
www.headwayeng.ca

Kitchener, Ontario

April 30, 2026

To the Mayor and Members of Council:

**Re: Latronica Municipal Drain
Municipality of Morris-Turnberry
Our Reference No. MT-006**

Headway Engineering is pleased to provide its report for the **Latronica Municipal Drain** in the Municipality of Morris-Turnberry, County of Huron.

The preparation of this report was authorized by a resolution of the Council of the Municipality of Morris-Turnberry on August 13, 2024, per Section 78 of the Drainage Act.

The primary objective of this report is to enclose approximately 482 metres of existing open ditch on the Latronica Drain, that has been susceptible to erosion and slumping of the side-slopes, especially in the upper reaches of the ditch, and install a new tile drainage system designed to today's standards of drainage.

A summary of the estimated assessments for this project are as follows:

Municipal Lands	\$ 2,839
Privately Owned Non-Agricultural	\$ 23,825
Privately Owned Agricultural	\$350,136
Total Estimated Assessments	\$376,800

Yours truly,

Stephen Brickman, P.Eng.
Project Engineer and Manager

Michel Terzian, B.Eng.
Project Coordinator
HEADWAY ENGINEERING

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TABLE OF CONTENTS

1.0	Introduction and location	1
2.0	Authorization	1
3.0	Drainage History	1
4.0	Meetings and Engagements	2
5.0	Findings.....	3
6.0	Design Considerations	5
7.0	Environmental Considerations	6
8.0	Recommendations	8
9.0	Summary of Proposed Works	9
10.0	Working Area and Access.....	9
11.0	Schedules.....	10
12.0	Allowances	10
13.0	Estimated Construction Costs.....	11
14.0	Summary of Estimated Project Costs	11
15.0	Assessment	12
16.0	Grant Eligibility	13
17.0	Abandonment of Existing Municipal Drains	15
18.0	Maintenance.....	15

SCHEDULES

Schedule A Schedule of Allowances

Schedule B Schedule of Estimated Construction Costs

Schedule C Schedule of Estimated Assessment for Construction

Schedule D Schedule of Assessment for Future Maintenance

SPECIFICATIONS

Specifications for the Construction of Municipal Drainage Works

REPORT

1.0 INTRODUCTION AND LOCATION

The Council of the Municipality of Morris-Turnberry has appointed Headway Engineering to investigate a request for improvements to the Latronica Municipal Drain.

The project is located in the north part the Municipality, approximately 7km east of Wingham, on Salem Road between Powell Line and Kieffer Line.

The project services parts of Lots 7 to 9, Concession 6, and parts of Lots 7 to 10, Concession 7, in the Municipality of Morris-Turnberry, Turnberry Ward.

The Drainage Area comprises approximately 114.48 hectares, and land uses within the watershed consists mainly of agricultural lands, with parts being woodlots, roads and built up residential.

The current outlet for the Latronica Drain is into an existing channel that enters the Maitland River in the south-west part of Lot 8, Concession 8.

The attached Plans, Profiles, and Details; Drawing Numbers 1 to 4, and Specifications form part of this report. They show and describe in detail the location and extent of the work to be completed and the lands and roads which are affected.

2.0 AUTHORIZATION

Authority to prepare this report was obtained by a resolution of the Council of the Municipality of Morris-Turnberry at the August 13, 2024, meeting to appoint Headway Engineering to prepare an Engineer's Report under Section 78 of the Drainage Act.

3.0 DRAINAGE HISTORY

The historical records revealed two reports have been prepared which authorized drainage works on the Latronica Drain.

The earliest known report was for the construction of the Latronica Award Drain, completed by S.W. Archibald, O.L.S., dated April 19, 1930. The report authorized the construction of approximately 900 feet of open ditch, and the installation of approximately 2,279 feet of 6 inch to 14-inch diameter pipe (150mm to 350mm).

The open drain commenced in an overflow channel of the Maitland River in the north part of Lot 8, Concession 7, and proceeded upstream in a southerly direction for approximately 900 feet. The closed drainage system was installed from an outlet into the open ditch and proceeded upstream in a southerly direction to the north road limit of Salem Road.

The Latronica Drainage Works report, prepared by E.W. Shifflett, P.Eng., of Gamsby & Mannerow, dated April 9, 1973, authorized the extension of the existing open ditch from 900 feet to 2,200 feet; the improvement included the upstream extension of the Main Drain (Closed) and the construction of three new branch drains, 'A' Drain, 'B' Drain, and 'C' Drain.



- Main Drain (Closed) consisted of approximately 1,766 feet of 8 inch to 15-inch diameter pipe.
- 'A' Drain consisted of approximately 1,504 feet of 6 inch to 8-inch diameter pipe.
- 'B' Drain consisted of approximately 1,613 feet of 6 inch to 10-inch diameter pipe.
- 'C' Drain consisted of approximately 1,320 feet of 6 inch to 8-inch diameter pipe.

It is unknown whether the 1930 tile drain was destroyed during the extension of the open ditch; it may remain beneath the existing ditch bed.

The table below summarizes all documented historical works identified to date.

Date	Report	Notes (Based on Available Records)
April 19, 1930	S.W. Archibald, O.L.S. – Award Drain Report	First documented construction of the Latronica Drain (as an Award Drain)
April 9, 1973	E.W. Shifflett, P.Eng – Drainage Act Report	First documented construction of the Latronica Municipal Drain, included improvements to the open and closed portions of the award drain and construction of three new branch drains (A, B and C).

Table 1 - Summary of Previous Engineering Reports

4.0 MEETINGS AND ENGAGEMENTS

A series of statutory, technical and stakeholder meetings and engagements have been held throughout the development of this report. These engagements involved landowners, municipal staff, regulatory authorities and Hydro One. The key engagements are summarized in Table 2.

Date	Meeting/Engagement Description	Summary
July 15, 2024	Request for Improvement filed with Municipality	The Notice of Request for Drain Major Improvement form under Section 78 of the Drainage Act was filed with the Municipality of Morris-Turnberry.
August 13, 2024	Council Meeting	Headway Engineering appointed under Section 78 of the Drainage Act to investigate improvements to the Latronica Drain.
August 19, 2024	Email Correspondence	Headway Engineering notified of their appointment under Section 78 of the Drainage Act.
October 10, 2024	On-Site Meeting (Section 9(1) of the Drainage Act)	Preliminary watershed plan circulated; meeting held with landowners and municipal staff to investigate the request for improvements and determine the general scope of work.
November 28, 2024	Department of Fisheries and Oceans (DFO) Request for Review Application	Headway Engineering submitted a Request for Review application complete with application, photolog, photolog map, watershed plan and SAR map. The application summarized the proposed works.



February 27, 2025	DFO	DFO provided a letter concluding an Authorization under the Fisheries Act would be required for the proposed works.
April 11, 2025	DFO	Headway Engineering met with two DFO staff members and the Municipality's Drainage Superintendent at the site to review the existing conditions of the open ditch and determine if conditions would allow the proposed works to proceed with a letter of advice under the Fisheries Act.
July 29, 2025	DFO	After revising the originally proposed scope of work, DFO provided correspondence stating and Authorization would be required under the Fisheries Act.
December 16, 2025	Public Information Meeting	The meeting provided a review of the proposed design, estimated costs, and the proposed assessments, among other information. All meeting materials were posted online following the meeting, and all parties invited to attend the meeting were provided with access instructions to the meeting materials.
March 30, 2026	DFO	An Application for Authorization form, DRAFT drawing set and a detailed Offsetting Plan was submitted to the DFO for their review and acceptance. Offsetting plan and measures were a result of several discussions with DFO staff to determine acceptable measures which would offset the damage and destruction to the existing open ditch caused by the proposed works.

Table 2 – Summary of Meetings and Engagements.

5.0 FINDINGS

Based on the information collected during field investigations, surveys, public engagements, and review of documentation, the following summarizes Headway Engineering's findings:

5.1. Watershed Condition (Hydrology):

- The watershed was established through the analysis of tile drainage maps, previous engineers' reports for the Latronica Drain and surrounding drainage systems, field investigations, surveys and data analysis of the LiDAR derived digital data from Land Information Ontario. The drainage area comprises of approximately 114.48 hectares.
- Land uses within the watershed are as follows:
 - Agricultural: approximately 89%
 - Woodlot: approximately 5%
 - Roads: approximately 2%
 - Residential/Built up: approximately 4%



- The Ontario Ministry of Agriculture, Food and Agribusiness's (OMAFRA's) Agricultural Information Atlas describes the soil types within the watershed as Loam, however wet and unstable soils were observed along the upper reaches of the ditch.

5.2. Existing Drainage System:

- The existing municipal drainage system was constructed under the authority of a report prepared in 1973.
- The existing municipal drainage systems consist of both open and closed portions.
 - **Main Drain (Open)** is an open ditch system that commences at an outlet into an overflow channel of the Maitland River in the north part of Lot 8, Concession 7, and proceeds upstream in a southerly direction approximately 663m to the head of the ditch in the south part of Lot 8, Concession 7.
 - **Main Drain (Closed)** is a pipe drain commencing at an outlet into the upstream end of the Main Drain (Open) and proceeds upstream approximately 540m in a south-westerly direction to the north side of Salem Road. The closed drain consists of 200mm to 375mm diameter field tile and corrugated steel pipe.
 - **'A' Drain** is a closed drain system commencing at an outlet into the Main Drain (Closed) in the south-west part of Lot 8, Concession 7, and proceeds upstream in a north-westerly direction to the lot line between Lot 9 and Lot 10, Concession 7. The total length of the drain is approximately 458m and consists of 150mm to 200mm diameter field tile.
 - **'B' Drain** is a closed drain system commencing at an outlet into the Main Drain (Open) near the upstream end of the ditch and proceeds upstream in an east direction than south to the north road limit of Salem Road on Lot 8, Concession 7. The total length of the drain is approximately 491m and consists of 150mm to 250mm diameter field tile and corrugated steel pipe.
 - **'C' Drain** is a closed drain system commencing at an outlet into the Main Drain (Closed) in the south-west part of Lot 8, Concession 7, and proceeds upstream in a southerly direction through Salem Road to the north part of Lot 9, Concession 6. The total length of the drain is approximately 402m and consists of 200mm to 250mm diameter field tile and corrugated steel pipe.
- There is significant bank slumping and erosion in the Main Drain (Open), mainly in the upper half of the existing ditch that has caused sediment loading in the ditch and a significant increase in the overall ditch cross-section compared to the design specifications from the 1973 report.
- The erosion and slumping have exposed over three metres of the existing 400mm diameter corrugated steel outlet pipe for the Main Drain (Closed).
- In addition to the general erosion and slumping, several localized sections show more severe bank failure than adjacent areas.
- No requests were received to upgrade the existing closed drainage systems for 'A' Drain, 'B' Drain, 'C' Drain, or most of the Main Drain (Closed).
- Part of the Main Drain (Closed) passes through a Hydro One Networks property, and under an existing Hydro Tower corridor.



- During their review, Hydro One requested the existing catch basin along the Main Drain (Closed) directly under the Hydro Tower corridor, be moved to a location along the edge of the corridor.
- The Main Drain (Closed) from where the 'A' and 'C' Drains enter, is not of sufficient size, capacity, depth or condition to drain the surrounding and upstream lands within their respective watersheds at today's standards of drainage.

5.3. Outlet:

- The current outlet for the Latronica Municipal Drain (Main Open) is into a natural watercourse which ultimately enters the Maitland River approximately 400 metres from the river in the south-east part of lot 9, Concession 8.
- The existing 1973 drainage works from approximately Sta. 0+482 downstream to the current outlet are not of sufficient capacity and condition to meet today's drainage standards.
- The receiving natural watercourse (at approximately Sta. 0+181, Main Drain (Open)) and the Maitland River provide a sufficient outlet for the proposed drainage works.

5.4. Other Noted Observations:

- The Main Drain (Open) is currently not deep enough to provide adequate freeboard for the Main Drain (Closed) or private tile outlets into the ditch.
- The Main Drain (Open) would require deepening to the approximate design grade of the proposed tile drainage system (nearly 350mm) to provide sufficient freeboard for existing upstream tile outlets, and even further deepening to provide adequate freeboard for a deeper improved Main Drain (Closed).
- To stabilize the banks and side slopes of the ditch, significant bank stabilization would be required along most of the current length proposed to be enclosed, at significant costs.
- Accordingly, enclosure of the upper reach is the more practical design alternative, relative to reconstructing and stabilizing the existing banks, when considering constructability, costs, and longer-term maintenance.

5.5. Environmental Findings:

- The Main Drain (Open) is "Not Rated" according to the Department of Fisheries and Oceans (DFO) drain classification system, as shown on the OMAFA Agricultural Information Atlas.
- Due to the aquatic features observed during DFO site visits as well as aquatic habitat in the watercourse downstream of the Main Drain (Open), DFO has assigned an "E" Class drain classification to the existing open ditch.
- An authorization under paragraphs 34.4(2)(b) and 35(2)(b) of the Fisheries Act is required for the proposed works.
- Offsetting features must be provided to offset the damage to existing aquatic habitat in the Main Drain (Open).

6.0 DESIGN CONSIDERATIONS

6.1. Open Ditch Work:

The Main Drain (Open) has been designed to provide adequate freeboard for the proposed closed drainage system while minimizing the impact on existing aquatic features and habitat.



Table 3 provides a comparison between design attributes specified in the 1973 Latronica Drain report and the conditions measured during Headway Engineering's field survey.

Design Attribute	1973 Drain Report Specification	Current Condition
Bottom Width	0.90m	4.5m (widest: 8.1m)
Average Top Width	6.0m	7.9m (widest: 11.8m)
Side Slopes	1.5H:1.0V	1H:1V or steeper

Table 3 – Comparison of 1973 Drain Report Design Specifications and Current Conditions.

The above noted measurements highlight the significant differences between the original design specifications of the ditch and those measured during the field survey.

The changes to the cross section from the 1973 design can be attributed to the slumping in of the banks and erosion of the side slopes throughout the upper section of the ditch to be enclosed. The sedimentation in the ditch, lack of freeboard for current tile outlets and visible erosion and bank slumping support the differences in the cross section.

If an enclosure were not proposed, the improvements to the Main Drain (Closed) would require the existing open ditch to be deepened more than the proposed tile invert (approximately 350mm deeper than existing).

To restore the open ditch to the 1973 design specifications, or to improve it to accommodate upgrades to the Main Drain (Closed), extensive ditch reconstruction would be required, along with significant bank protection and side-slope stabilization to address the ongoing slumping and erosion. As a result, an enclosure of the upper reach of the Main Drain (Open) was determined to be the most cost-effective and viable solution from both the short-term perspective and when considering longer term maintenance requirements.

6.2. Main Drain (Closed):

The Main Drain (Closed) was sized using the Drainage Coefficient method included in the OMAFRA Publication 29 – 'Drainage Guide for Ontario'. The Drainage Coefficient describes a depth of water to be conveyed by the drainage works per a 24-hour period and is expressed in millimeters per 24 hours. The drainage coefficient design standard used for the works proposed in this report is 38mm per 24-hour period.

Pipe materials were selected based on vicinity land use and cost effectiveness.

7.0 ENVIRONMENTAL CONSIDERATIONS

7.1. Department of Fisheries and Oceans (DFO)

A Request for Review package was submitted to the DFO on November 28, 2024, containing a photolog, watershed map, a SAR map and a complete application form.

DFO's review included the application package and information presented during discussions and meetings (both virtual and at the site) that were held between Headway Engineering staff and DFO personnel.



As a result, the DFO provided comments dated February 27, 2025, stating that the destruction of habitat in the open ditch to be enclosed, as well as in the downstream section to be cleaned out, will require an authorization under paragraphs 34.4(2)(b) and 35(2)(b) of the Fisheries Act for the proposed works.

For authorization to be granted, DFO requires sufficient measures be proposed to offset the destruction and damage to the existing open ditch. Several discussions were held between DFO staff and Headway Engineering to determine the acceptable offsetting measures.

A package was submitted to the DFO on March 30, 2026, containing an Offsetting Plan, a corresponding drawing set and a complete application form, for their review. The DFO authorization is currently undergoing indigenous review. Pending the result of indigenous consultations, the Municipality will be providing the DFO with a financial guarantee in the form of a Letter of Credit for \$10,000 which includes the estimated cost of purchasing and planting the 100 trees, as well as providing monitoring services once annually for two years after the offsetting measures were constructed/planted.

7.2. Maitland Valley Conservation Authority (MVCA)

The MVCA is included on the circulation list for this report and has been invited to all public engagement meetings for the project.

After notification of the project was forwarded to the MVCA for initial comment, they indicated a permit to undertake work in an open watercourse, as well as works within 15 metres from a stable-top of bank, is required.

Furthermore, upon review of the design drawings, MVCA would seek assurances that the proposed works will not negatively affect the adjacent floodplains or water flows.

The proposed changes to the Latronica Drain include improvements to the closed portion and open ditch portions of the drain, which were both initially constructed under the authority of a report prepared in 1973.

The proposed changes to the Main Drain (Closed) include replacing the lower one-third of the existing drainage system (approximately), which consists of 300mm diameter field tile, with a new 600mm diameter pipe, providing up to four times more flow capacity than the 1973 drain.

Improvements to the Main Drain (Open) include cleaning out approximately 325 metres of the open watercourse between the outlet upstream of the Maitland River and the outlet of Main Drain (Closed).

The improved drainage system serves a watershed area of approximately 115 hectares of predominantly agricultural lands and is designed to convey waters from upstream lands to the outlet in a more efficient manner than the existing system for events not exceeding the design standard.

Backwater in the Maitland River during various rainfall events have a much more direct influence over the localized flooding of the Latronica Drain as the River has an approximate watershed area



of over 50,000 hectares where the Main Drain (Open) enters it, serving lands as far east as Kenilworth, in the Township of Wellington North, Wellington County.

Accordingly, the proposed improvements to the Latronica Drain are not anticipated to adversely affect adjacent floodplain conditions or result in negative hydraulic impacts to the broader drainage system.

7.3. Ministry of Natural Resources (MNR)

Headway Engineering completed a review of the Natural Heritage Information Centre mapping for Species at Risk in Ontario. The NHIC mapping indicates that there is Rainbow Trout and Northern Sunfish, which are both categorized as “Special Concern”, in the Maitland River, but not within the open portions of the Latronica Drain. Species of Special Concern are not subject to the same species and habitat protection requirements as endangered or threatened species, but their presence in the broader receiving system has been noted.

8.0 RECOMMENDATIONS

Headway Engineering recommends the following:

1. Main Drain (Open)
 - Approximately 325 metres of existing open ditch be cleaned out (181 metres of the existing Main Drain (Open) and 144 metres of the Natural Watercourse) to provide a sufficient outlet for the proposed new tile drain (Main Drain (closed)).
 - A plunge pool be constructed at the outlet of the new closed drain.
 - A rock-check dam and sediment trap be constructed at the downstream end of the proposed works.
 - Approximately 482 metres of the existing Main Drain (Open) be enclosed.
 - The open ditch to have a 0.90m parabolic bottom width and 1.5H:1V side slopes.
2. Main Drain (Closed)
 - A new closed drainage system be installed from an outlet into Main Drain (Open) upstream approximately 689 metres.
 - The new closed drainage system consists of 400mm to 750mm diameter concrete field tile and HDPE pipe.
 - Approximately 482 metres of the tile drainage system be installed five metres west of the existing open ditch.
 - The new closed drainage system shall be designed to convey flows from the watershed using a design standard of 38mm per 24-hour period Drainage Coefficient.
 - HDPE pipe shall be used through the existing Hydro One tower corridor.
 - The existing catch basin at station 0+654 be replaced and installed out of the Hydro One tower corridor at Sta. 0+659.
3. 'A' Drain
 - No work required.



4. 'B' Drain
 - Extend existing outlet to the improved Main Drain (Closed).
5. 'C' Drain
 - No work required.
6. Offsetting Measures for DFO Authorization include:
 - Construction of four rip-rap lined riffle features in the Main Drain (Open).
 - Converting a rock check dam into a rip-rap lined riffle feature following construction.
 - Plant 100 new trees along the east side of the Main Drain (Open).
7. New maintenance schedules be provided for the Main Drain (Open) and Main Drain (Closed).
8. Watersheds of the surrounding municipal drainage systems be updated when those drainage works are revisited in the future.
9. The natural watercourse from Sta. 0+181 to Sta. 0+325 be incorporated under the Drainage Act, and form part of the Latronica Municipal Drain (Main Drain (Open)).
10. The improved drainage system be known as the **Latronica Municipal Drain**.

9.0 SUMMARY OF PROPOSED WORKS

The proposed work consists of:

1. The cleanout of approximately 325 metres of open ditch on the Main Drain (Open).
2. The installation of approximately 689 metres of 400mm diameter to 750mm diameter concrete field tile and HDPE pipe on Main Drain (Closed).
3. The installation of one 900mm x 1200mm concrete catch basin and one 900mm x 1200mm concrete junction box on the Main Drain (Closed).
4. Extend the 'B' Drain to the Main Drain (Closed).

10.0 WORKING AREA AND ACCESS

Access to the working area shall be designated by the Landowners where an access route is not defined.

The working area for the installation of the tile drainage system shall be an average width of 25m for construction purposes and an average width of 10m for maintenance purposes along the alignment of the proposed closed drain.

The working area for the open ditch work shall be an average width of 12m on the primary working side of the existing ditch (the west side) for construction purposes and 10m for maintenance purposes.

The working area for the enclosure of the existing open ditch shall remain within the working corridor for the closed work on the west side of the ditch, and five metres on the east side of the ditch from sta. 0+000 to sta. 0+482 (Main Drain Closed).



11.0 SCHEDULES

Four schedules are attached and form part of this report.

11.1. Schedule A – Schedule of Allowances

In accordance with Sections 29 and 30 of the Drainage Act, allowances are provided to affected Landowners for Right-of-Way and Damages to Lands and Crops. Schedule A contains a table of the applicable allowances to Landowners.

11.2. Schedule B – Schedule of Estimated Construction Costs

An itemized cost estimate of the proposed construction work is included in detail in Schedule B.

11.3. Schedule C – Schedule of Estimated Assessment for Construction

Schedule C provides details of the distribution of the total estimated costs of the construction of the municipal drain.

11.4. Schedule D – Schedule of Assessment for Future Maintenance

Schedule D provides details of the distribution of future maintenance costs for the municipal drain. Maintenance assessments are expressed as a percentage of the total maintenance. Lands located upstream of the maintenance shall be determined by the Drainage Superintendent and assessed according to this schedule.

12.0 ALLOWANCES

In accordance with Sections 29 and 30 of the Drainage Act, Allowances payable to Landowners are calculated using the following methodology.

12.1. Allowances for Right-of-Way (Section 29)

The Right-of-Way allowance compensates the lands for the right to enter onto the land at various times for the purpose of inspecting the drainage system and conducting maintenance activities.

If applicable, the land value used for the Right-of-Way calculation may be adjusted to account for the continued use of the land after the construction.

The values used for calculating allowances for Right-of-Way are as follows:

Land Use	Land Value	Adjustment Factor for Drainage Act Right-of-Way	Adjusted Land Value for Drainage Act Right-of-Way Allowance
Agricultural Working Side of Ditch and Tile Drain	\$60,000/Ha	25%	\$15,000/Ha
Woodlot top width for land out of production	\$15,000/Ha	100%	\$15,000/Ha
Woodlot	\$15,000/Ha	25%	\$3,750/Ha

Table 4 – Land Values for Right-of-Way Allowances.



12.2. Allowances for Damages to Lands and Crops (Section 30)

Allowances for Damages to Lands and Crops under Section 30 of the Drainage Act, were primarily calculated to compensate landowners for crop losses, bush losses and land damages due to the construction and operation of the drain, including access to the working area.

Area values used for calculating allowances for Damages are as follows:

Land Use	Damage Value
Agricultural	\$6,000/Ha
Woodlot	\$2,000/Ha.

Table 5 – Standard Land Damage Values.

Allowances payable to Landowners entitled thereto are as shown in Schedule A.

Total Allowances, under Sections 29 and 30 of the Drainage Act:

LATRONICA MUNICIPAL DRAIN: \$26,380

13.0 ESTIMATED CONSTRUCTION COSTS

Headway Engineering has made an estimate of the cost of the proposed construction work. A detailed description of the estimated construction costs can be found in Schedule B of this report.

A) Main Drain (Open) including construction of DFO offsetting features	\$ 114,976
B) Main Drain (Closed)	\$ 121,434
C) Provisional Items	\$ 15,780
Total Estimated Construction Costs	<u>\$ 252,190</u>

14.0 SUMMARY OF ESTIMATED PROJECT COSTS

The total estimated project costs are as follows:

Allowances under Sections 29 and 30 of the Drainage Act (Refer to Schedule A)	\$ 26,380
Total Estimated Construction Costs (Refer to Schedule B)	\$ 252,190
Meetings, survey, design, preparation of preliminary cost estimates, preparation of final drainage report, consideration of report	\$ 39,500
Consultation with Environmental Agencies and Permitting Fees (DFO, MVCA)	\$ 15,200
DFO Offsetting Monitoring and Administration	\$ 5,000
Preparation of contract documents, contract administration, supervision, and inspection of construction	\$ 17,500
Contingencies, Interest and net H.S.T.	\$ 21,030
TOTAL ESTIMATED PROJECT COSTS – LATRONICA MUNICIPAL DRAIN	<u>\$ 376,800</u>

The estimated cost of the work in the Municipality of Morris-Turnberry is \$ 376,800.



The above costs are estimates only. The final costs of construction, engineering and administration cannot be determined until construction is completed.

The above cost estimate does not include costs associated with defending the drainage report should appeals be filed with the Court of Revision, Drainage Tribunal and/or Drainage Referee. Should additional costs be incurred, unless otherwise directed, the additional costs would be distributed in a pro-rata fashion over the assessments contained in Schedule C and as may be varied under the Drainage Act.

15.0 ASSESSMENT

Headway Engineering assesses the cost of this work against the Lands and Roads as shown in Schedule C - Assessment for Construction.

Assessments were determined using the principles included in the 'Drainage Assessment Revisited' paper prepared by E.P. Dries and H.H. Todgham. These principles of assessment are recognized to be fair and equitable for determining cost distributions among those affected.

15.1. Benefit (Section 22)

Benefit assessment is applied to those properties receiving a benefit as defined in Section 1 of the Drainage Act which is extracted below:

Benefit means the advantages to any lands, roads, buildings or other structures from the construction, improvement, repair, or maintenance of a drainage works such as will result in a higher market value or increased crop production or improved appearance or better control of surface or sub-surface water, or any other advantages relating to the betterment of lands, roads, buildings or other structures.

Typically, properties which have direct, or near direct access to the proposed drain receive Benefit as defined above.

15.2. Outlet Liability (Section 23)

Outlet Liability is distributed to all properties within the watershed area on an adjusted area basis. The areas are adjusted to accurately reflect equivalent run-off rates relative to other lands and roads within the watershed. Due to development, roads have been assessed higher Outlet Liability rates relative to agricultural lands.

15.3. Special Benefit (Section 24)

The Special Benefit instrument of assessment was used to assess the increased costs of enclosing the open ditch and installing a new closed drainage system to the property who requested the open ditch be enclosed. The Special Benefit assessment tool is used to separate the increased costs to enclose the open drain and the installation of a new closed drainage system from the normal costs, approximately equivalent to cleaning out the same segment of open ditch to be enclosed, twice under the maintenance program.



15.4. Special Assessment (Section 26)

Special Assessments apply to public utilities and roads which directly cause increased costs to the construction of a drainage works due to the existence and operation of the public utility or road.

Construction costs, which are required solely because of the existence of the Hydro One tower corridor on the Hydro One Network Inc. property (Roll No. 23-900-00), are fully assessed to the Hydro One property. The Special Assessment is calculated based on the actual costs of crossing the tower corridor, plus an allowance for administration, interest and Net HST as described below.

Utility Name	Estimated Construction Costs	Plus, Estimated Administration Costs	Less Equivalent Drain Costs (Fixed)	Plus Estimated Interest, and Net HST	Estimated Special Assessment
Hydro One Networks Inc. (Main Drain Closed))	\$4,320	\$1,000	\$1,940	\$160	\$3,540

Table 6 – Estimated Special Assessment Calculations.

Whether or not Hydro One Networks Inc. elects to do the work on their property, they shall be assessed the actual increased costs to the drainage works due to the construction and operation of the Main Drain (Closed) as a Special Assessment in addition to any benefit and outlet liability assessments.

If any additional work is required to construct or maintain the drainage works due to the existence of buried utilities, roads, railways, or if utilities require relocation or repair, then the extra costs incurred shall be borne by the utility, road or railway involved in accordance with the provisions of Section 26 of the Drainage Act.

16.0 GRANT ELIGIBILITY

The Province provides grants towards assessment to eligible properties for drainage improvements which meet the specific criteria. The provision of these grants for activities under the Drainage Act is called the *Agricultural Drainage Infrastructure Program (ADIP)*.

A grant may be available for assessments to privately owned parcels of land which are used for agricultural purposes and eligible for the Farm Property Class Tax rate. Section 88 of the Drainage Act directs the Municipality to make application for this grant upon certification of completion. The Municipality will then deduct the grant from the assessments.

16.1. Municipal Drain Enclosure

The proposed works consist of enclosing part of an existing open ditch municipal drain and replacing it with a new closed drain that has more flow capacity than a single 300mm diameter corrugated plastic pipe can provide, which is the maximum pipe size and material that could be



installed to replace a ditch and still be eligible for grant, according to the ADIP program, Part III: Policies, 2.3(f).

Exceptions may be made if the Director of OMAFA is satisfied that the proposed enclosure addresses bank slumping and erosion problems along the enclosed portion of the drain.

As previously discussed in Section 6.1, the existing open ditch has experienced severe bank slumping and erosion in the upper reach of the ditch since its construction in 1973. Field surveys and site visits highlight the significant changes in the ditch cross-section over that period.



Figure 1- Bank slumping and erosion along the Main Drain (Open)

The option of improving the ditch to accommodate a new closed drainage system was explored. It was determined that enclosing 482 metres of the existing open ditch and installing a closed drainage system is more cost effective when considering the extents, estimated costs, and risks of the work required to reconstruct and sufficiently stabilize the ditch to prevent bank failure and erosion.

To summarize, in this particular setting there is no net incremental cost associated with enclosing the drain, relative to the work required to retain an open drainage system that is stable and resilient to slumping. Further, the enclosure directly addresses the bank slumping and erosion problems along the enclosed portion of the drain and therefore meets the basis for the ADIP program exception.



17.0 ABANDONMENT OF EXISTING MUNICIPAL DRAINS

In accordance with Section 19 of the Drainage Act, the portion of the 1973 Latronica Municipal Drain (Main Drain) from its outlet near the Maitland River and extending upstream to Sta. 0+689 shall be abandoned and cease to be a municipal drain after the improved Latronica Municipal Drain is constructed under this report. The remaining portions of the 1973 Latronica Municipal Drain shall remain.

18.0 MAINTENANCE

After completion, this drain shall be maintained by the Municipality of Morris-Turnberry at the expense of all the lands and roads assessed in the attached Schedule D - Assessment for Maintenance, and in the same relative proportions until such time as the assessment is changed under the Drainage Act, except for those portions of the drainage works on municipal right-of-ways. These portions of the drain shall be maintained at the expense of the road authority having jurisdiction over said road.



Schedule A

Schedule of Allowances

Schedule of Allowances Latronica Municipal Drain

Main Drain (Open)	Property Details				Drainage Act Allowances		
	Part Lot	Con.	Landowner	Roll Number	Right of Way (Sec. 29)	Damages (Sec. 30)	Total Allowances
	Pt. 8	7	Foxhill Farms Inc.	7-012-15	\$ 1,120	\$ 320	\$ 1,440
	Pt. 8 & 9	7	Hydro One Networks Inc.	23-900-00	\$ 1,530	\$ 710	\$ 2,240
Pt. 8	8	1000171205 Ontario Ltd.	8-008-00	\$ 440	\$ 140	\$ 580	
Total Allowances Main Drain (Open)					\$ 3,090	\$ 1,170	\$ 4,260

Main Drain (Closed)	Property Details				Drainage Act Allowances		
	Part Lot	Con.	Landowner	Roll Number	Right of Way (Sec. 29)	Damages (Sec. 30)	Total Allowances
	Pt. 8	7	Foxhill Farms Inc.	7-012-15	\$ 8,330	\$ 9,770	\$ 18,100
	Pt. 8 & 9	7	Hydro One Networks Inc.	23-900-00	\$ 2,010	\$ 2,010	\$ 4,020
Total Allowances Main Drain (Closed)					\$ 10,340	\$ 11,780	\$ 22,120

				Drainage Act Allowances		
				Right of Way (Sec. 29)	Damages (Sec. 30)	Total Allowances
Total Allowances				\$ 13,430	\$ 12,950	\$ 26,380



Schedule B

Schedule of Estimated Construction Costs

Schedule of Estimated Construction Costs

An estimate of the cost of the proposed work has been completed, which is outlined in detail as follows:

Part A - Main Drain (Open)

Description	Estimated Quantity	\$/Unit	Total
1) Clearing, brushing and mulching	l.s.		\$ 5,000.00
2) Open ditch excavation, including stripping available topsoil from the ditch and placing it back, approx. 100m ³ of excavated material (Sta. 0+000 to Sta. 0+325)	325 m	\$ 20.00	\$ 6,500.00
3) Construction of a plunge pool at the outlet of the new tile drain (Sta. 0+000)	l.s.		\$ 3,000.00
4) Construction of a sediment trap (Sta. 0+320)	l.s.		\$ 3,000.00
5) Hand seeding of disturbed side slopes and top of bank	2000 m ²	\$ 1.50	\$ 3,000.00
Sub-Total			\$ 20,500.00
<u>Existing Ditch Enclosure</u>			
1) Cleanout existing ditch of all available topsoil and stockpile	482 m	\$ 8.00	\$ 3,856.00
2) Supply fill material for enclosure (approx. 3,500 m ³)			
a) Load & haul excess excavated material from tile drain installation (0+000 to Sta. 0+689)	440 m ³	\$ 5.00	\$ 2,200.00
b) Load & haul excavated material from open ditch excavation (Main Open Sta. 0+000 to Sta. 0+325)	100 m ³	\$ 5.00	\$ 500.00
c) Import approved fill material	2,960 m ³	\$ 10.00	\$ 29,600.00
3) Backfill existing ditch (approx. 3,500 m ³)	3,500 m ³	\$ 10.00	\$ 35,000.00
4) Place and grade topsoil on enclosed ditch	482 m	\$ 10.00	\$ 4,820.00
Sub-Total - Ditch Enclosure			\$ 75,976.00

<u>Description</u>	<u>Estimated Quantity</u>	<u>\$/Unit</u>	<u>Total</u>
<u>DFO Offsetting</u>			
1) Construction of riffles at Sta. 0+010, 0+181, 0+285 and 0+306 (approx. 30m ² each)	4 ea.	\$ 2,500.00	\$ 10,000.00
2) Construction of a rock check dam, converted to a riffle after construction (Sta. 0+325, approx. 40m ²)	l.s.		\$ 3,500.00
3) Supply and plant 100 mixed species per MVCA recommendations (Sta. 0+075 to Sta. 0+190)	l.s.		\$ 5,000.00
Sub-Total - DFO Offsetting			\$ 18,500.00
Total Estimated Construction Costs			
Part A - Main Drain (Open)			\$ 114,976.00
Part B - Main Drain (Closed)			
1) Topsoil stripping (10m width), including placement back over the trench (Sta. 0+000 to Sta. 0+482)	482 m	\$ 10.00	\$ 4,820.00
2) Supply 750mm diameter HDPE outlet pipe complete with rodent grate Installation including quarry stone rip-rap protection and geotextile filter material (Sta. 0+000 to Sta. 0+012)	12 m l.s.	\$ 240.00	\$ 2,880.00 \$ 3,000.00
3) Supply 750mm diameter concrete field tile Installation (by wheel machine) (Sta. 0+012 to Sta. 0+482)	470 m 470 m	\$ 100.00 \$ 55.00	\$ 47,000.00 \$ 25,850.00
4) Supply 600mm diameter concrete field tile Installation (by wheel machine) (Sta. 0+482 to Sta. 0+643)	161 m 161 m	\$ 65.00 \$ 50.00	\$ 10,465.00 \$ 8,050.00
5) Supply 600mm diameter HDPE pipe Installation (Sta. 0+643 to Sta. 0+659)	16 m 16 m	\$ 150.00 \$ 120.00	\$ 2,400.00 \$ 1,920.00
6) Supply 400mm diameter concrete field tile Installation (by wheel machine) (Sta. 0+659 to Sta. 0+689)	30 m 30 m	\$ 35.00 \$ 100.00	\$ 1,050.00 \$ 3,000.00

Description	Estimated Quantity	\$/Unit	Total
7) Tile connections using HDPE pipe (from opposite side of ditch) Sta. 0+415 (300mm dia.) & Sta 0+422 (200mm dia.), approximately 15m per connection	l.s.		\$ 3,999.00
8) Supply and install 900mm X 1200mm junction box at Sta. 0+482	1 ea.	\$ 3,000.00	\$ 3,000.00
9) Supply and install 900mm X 1200mm concrete catch basin at Sta. 0+659 (inline type)	1 ea.	\$ 4,000.00	\$ 4,000.00
Total Estimated Construction Costs			
Part B - Main Drain (Closed)			\$ 121,434.00

Part C - Provisional Items

A Provisional Item is an item that may or may not be required as a part of the Contract. The decision as to whether a Provisional Item will form part of the Contract will be at the discretion of the engineer at time of construction. Payment for Provisional Items will only be made for work authorized in writing by the Engineer. Payment for work performed under a Provisional Item shall be based on the Unit Price bid in the Scope of Work below.

- 1) Additional costs associated with installation of tile drain on 19mm diameter crushed clear stone bedding. This includes the supply and placement of all stone, and additional labour and equipment required for installation in accordance with the Typical Pipe Installation on wrapped Stone Bedding Detail.

Description	Estimated Quantity	\$/Unit	Total
750mm diameter pipe	50 m	\$ 75.00	\$ 3,750.00
600mm diameter pipe	50 m	\$ 75.00	\$ 3,750.00

- 2) Additional costs associated with installation of tile drain on 19mm diameter crushed clear stone bedding. This includes the supply and placement of all stone, and additional labour and equipment required for installation in accordance with the Typical Pipe Installation on Stone Bedding Detail (un-wrapped bedding).

Description	Estimated Quantity	\$/Unit	Total
750mm diameter pipe	50 m	\$ 60.00	\$ 3,000.00
600mm diameter pipe	50 m	\$ 60.00	\$ 3,000.00



Schedule C

Schedule of Estimated Assessment for Construction

**Schedule of Estimated Assessment for Construction
Latronica Municipal Drain**

	Property Details					Drainage Act Instruments of Assessment				For Information				
	Part Lot	Concession	Landowner	Roll Number	Approx. Ha. Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Benefit (Sec. 24)	Special Assessment (Sec. 26)	Total Estimated Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense	
Main Drain (Open)	Pt. 7 & 8	6	Alan & Alice Willits	6-007-00	10.1	\$ -	\$ 514			\$ 514	\$ 171	\$ -	\$ 343	
	Pt. 7	6	Mark Willits	6-007-02	0.3	\$ -	\$ 49			\$ 49	\$ 16	\$ -	\$ 33	
	Pt. 8	6	Willem Feddes & Klazina Feddes- VanWieringen	6-008-00	10.1	\$ -	\$ 514			\$ 514	\$ 171	\$ -	\$ 343	
	Pt. 8	6	Mathew & Alyssa Van Wyk	6-008-02	1.53	\$ -	\$ 277			\$ 277	\$ 92	\$ -	\$ 185	
	Pt. 8 & 9	6	Hydro One Networks Inc.	23-900-00	15.3	\$ -	\$ 815			\$ 815	*	\$ -	\$ 815	
	Pt. 7	7	Daniel & Stephanie Murray	7-011-00	1.34	\$ -	\$ 79			\$ 79	\$ 26	\$ -	\$ 53	
	Pt. 7 & 8	7	Donald Ross	7-012-00	16.4	\$ -	\$ 799			\$ 799	\$ 266	\$ -	\$ 533	
	Pt. 8	7	Foxhill Farms Inc.	7-012-15	16.5	\$ 6,765	\$ 687	\$ 142,910		\$ 150,362	\$ 50,121	\$ 1,440	\$ 98,801	
	Pt. 8	7	Catherine Curtis	7-013-00	1.41	\$ -	\$ 264			\$ 264	\$ 88	\$ -	\$ 176	
	Pt. 8 & 9	7	Hydro One Networks Inc. Willem Feddes & Klazina Feddes-	23-900-00	9.8	\$ 3,135	\$ 407			\$ 3,542	*	\$ 2,240	\$ 1,302	
	Pt. 9 & 10	7	VanWieringen	7-015-00	29.6	\$ -	\$ 1,751			\$ 1,751	\$ 584	\$ -	\$ 1,167	
	Pt. 8	8	1000171205 Ontario Ltd.	8-008-00	0	\$ -	\$ -			\$ -	\$ -	\$ 580	\$ 580	
	Total Estimated Assessments on Lands						\$ 9,900	\$ 6,156	\$ 142,910	\$ -	\$ 158,966	\$ 51,535	\$ 4,260	\$ 103,171
	Salem Road Municipality of Morris-Turnberry					2.1	\$ -	\$ 534			\$ 534			\$ 534
Total Assessments on Roads						\$ -	\$ 534		\$ -	\$ 534			\$ 534	
Total Estimated Assessments Main Drain (Open)						\$ 9,900	\$ 6,690	\$ 142,910	\$ -	\$ 159,500	\$ 51,535	\$ 4,260	\$ 103,705	

	Property Details					Drainage Act Instruments of Assessment					For Information			
	Part Lot	Concession	Landowner	Roll Number	Approx. Ha. Affected	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Benefit (Sec. 24)	Special Assessment (Sec. 26)	Total Estimated Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense	
Main Drain (Closed)	Pt. 7 & 8	6	Alan & Alice Willits	6-007-00	10.1	\$ -	\$ 1,604			\$ 1,604	\$ 535	\$ -	\$ 1,069	
	Pt. 7	6	Mark Willits	6-007-02	0.3	\$ -	\$ 153			\$ 153	\$ 51	\$ -	\$ 102	
	Pt. 8	6	Willem Feddes & Klazina Feddes-VanWieringen	6-008-00	10.1	\$ -	\$ 2,321			\$ 2,321	\$ 774	\$ -	\$ 1,547	
	Pt. 8	6	Mathew & Alyssa Van Wyk	6-008-02	1.53	\$ -	\$ 999			\$ 999	\$ 333	\$ -	\$ 666	
	Pt. 8 & 9	6	Hydro One Networks Inc.	23-900-00	15.3	\$ -	\$ 3,961		\$ 3,540	\$ 7,501	*	\$ -	\$ 7,501	
	Pt. 7	7	Daniel & Stephanie Murray	7-011-00	1.34	\$ -	\$ 247			\$ 247	\$ 82	\$ -	\$ 165	
	Pt. 7 & 8	7	Donald Ross	7-012-00	16.4	\$ -	\$ 2,605			\$ 2,605	\$ 868	\$ -	\$ 1,737	
	Pt. 8	7	Foxhill Farms Inc.	7-012-15	11.73	\$ 13,183	\$ 1,422	\$ 150,440		\$ 165,045	\$ 55,015	\$ 18,100	\$ 91,930	
	Pt. 8	7	Catherine Curtis	7-013-00	1.41	\$ -	\$ 946			\$ 946	\$ 315	\$ -	\$ 631	
	Pt. 8 & 9	7	Hydro One Networks Inc.	23-900-00	7.05	\$ 10,909	\$ 1,058			\$ 11,967	*	\$ 4,020	\$ 7,947	
	Pt. 9 & 10	7	Willem Feddes & Klazina Feddes-VanWieringen	7-015-00	27.55	\$ 13,398	\$ 8,209			\$ 21,607	\$ 7,202	\$ -	\$ 14,405	
	Total Estimated Assessments on Lands						\$ 37,490	\$ 23,525	\$ 150,440	\$ 3,540	\$ 214,995	\$ 65,175	\$ 22,120	\$ 127,700
	Salem Road Municipality of Morris-Turnberry					2.1	\$ -	\$ 2,305			\$ 2,305			\$ 2,305
Total Assessments on Roads						\$ -	\$ 2,305	\$ -	\$ -	\$ 2,305			\$ 2,305	
Total Estimated Assessments Main Drain (Closed)						\$ 37,490	\$ 25,830	\$ 150,440	\$ 3,540	\$ 217,300	\$ 65,175	\$ 22,120	\$ 130,005	

	Drainage Act Instruments of Assessment Summary					For Information		
	Benefit (Sec. 22)	Outlet Liability (Sec. 23)	Special Benefit (Sec. 24)	Special Assessment (Sec. 26)	Total Estimated Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
Total Estimated Assessments Latronica Municipal Drain	\$ 47,390	\$ 32,520	\$ 293,350	\$ 3,540	\$ 376,800	\$ 116,710	\$ 26,380	\$ 233,710

Notes:

- 1 '*' Denotes Lands not eligible for ADIP Grants.
- 2 The Special Benefit Assessment (Sec. 24) is the increased estimated costs of enclosing the existing ditch and replacing it with a tile drainage system, less the Special Assessment under Section 26, and less the equivalent cost of two ditch cleanouts.
- 3 The Special Assessments (Sec. 26) shall be non-proratable assessments. All other assessments are proratable.
- 4 The Net Estimated Expense is the Total Estimated Assessment less Government Grants and Allowances (if applicable).

**Schedule of Estimated Assessment for Construction
Latronica Municipal Drain**

Property Details					Summary of Assessment			For Information		
Part Lot	Con.	Landowner	Roll Number	Approx. Ha. Affected	Main Drain (Open)	Main Drain (Closed)	Total Estimated Assessment	Less Gov't Grant	Less Allowances	Net Estimated Expense
Pt. 7 & 8	6	Alan & Alice Willits	6-007-00	10.10	\$ 514	\$ 1,604	\$ 2,118	\$ 706	\$ -	\$ 1,412
Pt. 7	6	Mark Willits	6-007-02	0.30	\$ 49	\$ 153	\$ 202	\$ 67	\$ -	\$ 135
Pt. 8	6	Willem Feddes & Klazina Feddes-VanWieringen	6-008-00	10.10	\$ 514	\$ 2,321	\$ 2,835	\$ 945	\$ -	\$ 1,890
Pt. 8	6	Mathew & Alyssa Van Wyk	6-008-02	1.53	\$ 277	\$ 999	\$ 1,276	\$ 425	\$ -	\$ 851
Pt. 8 & 9	6	Hydro One Networks Inc.	23-900-00	15.30	\$ 815	\$ 7,501	\$ 8,316	*	\$ -	\$ 8,316
Pt. 7	7	Daniel & Stephanie Murray	7-011-00	1.34	\$ 79	\$ 247	\$ 326	\$ 109	\$ -	\$ 217
Pt. 7 & 8	7	Donald Ross	7-012-00	16.40	\$ 799	\$ 2,605	\$ 3,404	\$ 1,135	\$ -	\$ 2,269
Pt. 8	7	Foxhill Farms Inc.	7-012-15	16.50	\$ 150,362	\$ 165,045	\$ 315,407	\$ 105,136	\$ 19,540	\$ 190,731
Pt. 8	7	Catherine Curtis	7-013-00	1.41	\$ 264	\$ 946	\$ 1,210	\$ 403	\$ -	\$ 807
Pt. 8 & 9	7	Hydro One Networks Inc.	23-900-00	9.80	\$ 3,542	\$ 11,967	\$ 15,509	*	\$ 6,260	\$ 9,249
Pt. 9 & 10	7	Willem Feddes & Klazina Feddes-VanWieringen	7-015-00	29.60	\$ 1,751	\$ 21,607	\$ 23,358	\$ 7,786	\$ -	\$ 15,572
Pt. 8	8	1000171205 Ontario Ltd.	8-008-00		\$ -	\$ -	\$ -		\$ 580	-\$ 580
Total Estimated Assessments on Lands					\$ 158,966	\$ 214,995	\$ 373,961	\$ 116,712	\$ 26,380	\$ 230,869
Salem Road		Municipality of Morris-Turnberry		2.10	\$ 534	\$ 2,305	\$ 2,839			\$ 2,839
Total Estimated Assessments on Roads					\$ 534	\$ 2,305	\$ 2,839	\$ -	\$ -	\$ 2,839
Total Estimated Assessments Latronica Municipal Drain					\$ 159,500	\$ 217,300	\$ 376,800	\$ 116,712	\$ 26,380	\$ 233,708

Notes:

- 1 '*' Denotes Lands not eligible for ADIP Grants.
- 2 The Net Estimated Expense is the Total Estimated Assessment less Government Grants and Allowances (if applicable).



Schedule D

Schedule of Assessment for Future Maintenance

Schedule of Assessment for Future Maintenance Latronica Municipal Drain

Latronica Municipal Drain	Property Details					Portion of Maintenance Assessment	
	Part Lot	Concession	Landowner	Roll Number	Approx. Ha. Affected	Latronica Municipal Drain (Open) Sta. 0+000 to 0+325	Latronica Municipal Drain (Closed)
	Pt. 7 & 8	6	Alan & Alice Willits	6-007-00	10.1	7.68%	7.93%
	Pt. 7	6	Mark Willits	6-007-02	0.3	0.73%	0.75%
	Pt. 8	6	Willem Feddes & Klazina Feddes-VanWieringen	6-008-00	10.1	7.68%	7.93%
	Pt. 8	6	Mathew & Alyssa Van Wyk	6-008-02	1.53	4.14%	4.28%
	Pt. 8 & 9	6	Hydro One Networks Inc. *	23-900-00	15.3	12.18%	12.51%
	Pt. 7	7	Daniel & Stephanie Murray	7-011-00	1.34	1.18%	1.22%
	Pt. 7 & 8	7	Donald Ross	7-012-00	16.4	11.94%	12.88%
	Pt. 8	7	Foxhill Farms Inc.	7-012-15	16.5	10.27%	9.21%
	Pt. 8	7	Catherine Curtis	7-013-00	1.41	3.95%	4.08%
	Pt. 8 & 9	7	Hydro One Networks Inc. *	23-900-00	9.8	6.08%	5.54%
	Pt. 9 & 10	7	Willem Feddes & Klazina Feddes-VanWieringen	7-015-00	29.6	26.17%	25.41%
	Total Assessments on Lands					92.01%	91.75%
	Salem Road	Municipality of Morris-Turnberry			2.1	7.99%	8.25%
	Total Assessments on Roads					7.99%	8.25%
	Total Maintenance Assessments Latronica Municipal Drain					100.00%	100.00%

Notes:

- 1 '*' Denotes Lands not eligible for ADIP Grants.
- 2 Lands located upstream of the maintenance shall be determined by the Drainage Superintendent.



Specifications for the Construction of Municipal Drainage Works

DIVISION A – General Conditions

DIVISION B – Specification for Open Drains

DIVISION C – Specifications for Tile Drains

DIVISION H – Special Provisions



DIVISION A

General Conditions



TABLE OF CONTENTS

A.1.	Scope	1
A.2.	Examinations of Site, Drawings, and Specifications.....	1
A.3.	Payment	1
A.4.	Contractor’s Liability Insurance	1
A.5.	Losses Due to Acts of Nature, Etc.	2
A.6.	Commencement and Completion of Work	2
A.7.	Working Area and Access.....	2
A.8.	Sub-Contractors.....	3
A.9.	Permits, Notices, Laws and Rules	3
A.10.	Railways, Highways, and Utilities	3
A.11.	Errors and Unusual Conditions.....	3
A.12.	Alterations and Additions	3
A.13.	Supervision.....	4
A.14.	Field Meetings	4
A.15.	Periodic and Final Inspections	4
A.16.	Acceptance By the Municipality	4
A.17.	Warranty	4
A.18.	Termination of Contract By The Municipality.....	4
A.19.	Tests.....	5
A.20.	Pollution	5
A.21.	Species and Risk.....	5
A.22.	Road Crossings	5
	A.22.1. Road Occupancy Permit.....	5
	A.22.2. Road Closure Request and Construction Notification.....	5
	A.22.3. Traffic Control	6
	A.22.4. Weather	6
	A.22.5. Equipment	6
A.23.	Laneways.....	6
A.24.	Fences.....	7
A.25.	Livestock	7
A.26.	Standing Crops	7



A.27.	Surplus Gravel.....	7
A.28.	Iron Bars.....	7
A.29.	Rip-Rap.....	8
A.30.	Clearing, Grubbing and Brushing.....	8
A.31.	Restoration of Lawns.....	8



DIVISION A – GENERAL CONDITIONS

A.1. Scope

The work to be done under this contract consists of supplying all labour, equipment and materials to construct the drainage work as outlined in the Scope of Work, Drawings, General Conditions and other Specifications.

A.2. Examinations of Site, Drawings, and Specifications

The Tenderer must examine the premises and site to compare them with the Drawings and Specifications in order to satisfy himself of the existing conditions and extent of the work to be done before submission of his Tender. No allowance shall subsequently be made on behalf of the Contractor by reason of any error on his part. Any estimates of quantities shown or indicated on the Drawings, or elsewhere are provided for the convenience of the Tenderer. Any use made of these quantities by the Tenderer in calculating his Tender shall be done at his own risk. The Tenderer for his own protection should check these quantities for accuracy.

The standard specifications (Divisions B through G) shall be considered complementary and where a project is controlled under one of the Divisions, the remaining Divisions will apply for miscellaneous works.

In case of any inconsistency or conflict between the Drawings and Specifications, the following order of precedence shall apply:

- Direction of the Engineer
- Special Provisions (Division H)
- Scope of Work
- Contract Drawings
- Standard Specifications (Divisions B through G)
- General Conditions (Division A)

A.3. Payment

Progress payments equal to 87±% of the value of work completed and materials incorporated in the work will be made to the Contractor monthly. An additional ten per cent (10±%) will be paid 60 days after the final acceptance by the Engineer, and three per cent (3±%) of the Contract price may be reserved by the Municipality as a maintenance holdback for a one (1) year period from the date of the Completion Certificate. A greater percentage of the Contract price may be reserved by the Municipality for the same one (1) year period if in the opinion of the Engineer, particular conditions of the Contract requires such greater holdback.

After the completion of the work, any part of this reserve may be used to correct defects developed within that time from faulty workmanship and materials, provided that notice shall first be given to the Contractor and that he may promptly make good such defects.

A.4. Contractor's Liability Insurance



Prior to commencement of any work, the Contractor shall file with the Municipality evidence of compliance with all Municipality insurance requirements (Liability Insurance, WSIB, etc.) for no less than the minimum amounts as stated in the Purchasing Procedures of the Municipality. All insurance coverage shall remain in force for the entire contract period including the warranty period which expires one year after the date of the Completion Certificate.

The following are to be named as co-insured:

- Successful Contractor
- Sub-Contractor
- Municipality
- Headway Engineering

A.5. Losses Due to Acts of Nature, Etc.

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

A.6. Commencement and Completion of Work

The work must commence as specified in the Form of Tender and Agreement. If conditions are unsuitable due to poor weather, the Contractor may be required, at the discretion of the Engineer to postpone or halt work until conditions become acceptable and shall not be subject of a claim for additional compensation.

The Contractor shall give the Engineer a minimum of 48 hours notice before commencement of work. The Contractor shall then arrange a meeting to be held on the site with Contractor, Engineer, and affected Landowners to review in detail the construction scheduling and other details of the work.

If the Contractor leaves the job site for a period of time after initiation of work, he shall give the Engineer and the Municipality a minimum of 24 hours notice prior to returning to the project. If any work is commenced without notice to the Engineer, the Contractor shall be fully responsible for all such work undertaken prior to such notification.

The work must proceed in such a manner as to ensure its completion at the earliest possible date and within the time limit set out in the Form of Tender and Agreement.

A.7. Working Area and Access

Where any part of the drain is on a road allowance, the road allowance shall be the working area. For all other areas, the working area available to the Contractor to construct the drain is specified in the Special Provisions (Division H).

Should the specified widths become inadequate due to unusual conditions, the Contractor shall notify the Engineer immediately. Where the Contractor exceeds the specified working widths without authorization, he shall be held responsible for the costs of all additional damages.



If access off an adjacent road allowance is not possible, each Landowner on whose property the drainage works is to be constructed, shall designate access to and from the working area. The Contractor shall not enter any other lands without permission of the Landowner and he shall compensate the Landowner for damage caused by such entry.

A.8. Sub-Contractors

The Contractor shall not sublet the whole or part of this Contract without the approval of the Engineer.

A.9. Permits, Notices, Laws and Rules

The Contractor shall obtain and pay for all necessary permits or licenses required for the execution of the work (but this shall not include MTO encroachment permits, County Road permits permanent easement or rights of servitude). The Contractor shall give all necessary notices and pay for all fees required by law and comply with all laws, ordinances, rules and regulations relating to the work and to the preservation of the public's health and safety.

A.10. Railways, Highways, and Utilities

A minimum of 72 hours' notice to the Railway or Highways, exclusive of Saturdays, Sundays, and Statutory Holidays, is required by the Contractor prior to any work activities on or affecting the applicable property. In the case of affected Utilities, a minimum of 48 hours' notice to the utility owner is required.

A.11. Errors and Unusual Conditions

The Contractor shall notify the Engineer immediately of any error or unusual conditions which may be found. Any attempt by the Contractor to correct the error on his own shall be done at his own risk. Any additional cost incurred by the Contractor to remedy the wrong decision on his part shall be borne by the Contractor. The Engineer shall make the alterations necessary to correct errors or to adjust for unusual conditions during which time it will be the Contractor's responsibility to keep his men and equipment gainfully employed elsewhere on the project.

The Contract amount shall be adjusted in accordance with a fair evaluation of the work added or deleted.

A.12. Alterations and Additions

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



A.13. Supervision

The Contractor shall give the work his constant supervision and shall keep a competent foreman in charge at the site.

A.14. Field Meetings

At the discretion of the Engineer, a field meeting with the Contractor or his representative, the Engineer and with those others that the Engineer deems to be affected, shall be held at the location and time specified by the Engineer.

A.15. Periodic and Final Inspections

Periodic inspections by the Engineer will be made during the performance of the work. If ordered by the Engineer, the Contractor shall expose the drain as needed to facilitate inspection by the Engineer.

Final inspection by the Engineer will be made within twenty (20) days after he has received notice from the Contractor that the work is complete.

A.16. Acceptance By the Municipality

Before any work shall be accepted by the Municipality, the Contractor shall correct all deficiencies identified by the Engineer and the Contractor shall leave the site neat and presentable.

A.17. Warranty

The Contractor shall repair and make good any damages or faults in the drain that may appear within one (1) year after its completion (as dated on the Completion 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 Completion Certificate nor any payment there under, nor any provision in the Contract Documents shall relieve the Contractor from his responsibility.

A.18. Termination of Contract By The Municipality

If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or fail to supply enough properly skilled workmen or proper materials after having received seven (7) days notice in writing from the Engineer to supply additional workmen or materials to commence or complete the works, or if he should fail to make prompt payment to Sub-Contractors, or for material, or labour, or persistently disregards laws, ordinances, or the instruction of the Engineer, or otherwise be guilty of a substantial violation of the provisions of the Contract, then the Municipality, upon the certificate of the Engineer that sufficient cause exists to justify such action, may without prejudice to any other right or remedy, by giving the Contractor written notice, terminate the employment of the Contractor and take possession of the premises, and of all materials, tools and appliances thereon, and may finish the work by whatever method the Engineer may deem expedient but without delay or expense. In such a case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price will exceed the expense



of finishing the work including compensation to the Engineer for his additional services and including the other damages of every name and nature, such excess shall be paid by the Contractor. If such expense will exceed such unpaid balance, the Contractor shall pay the difference to the Municipality. The expense incurred by the Municipality, as herein provided, shall be certified by the Engineer.

If the Contract is terminated by the Municipality due to the Contractor's failure to properly commence the works, the Contractor shall forfeit the certified cheque bid deposit and furthermore shall pay to the Municipality an amount to cover the increased costs, if any, associated with a new Tender for the Contract being terminated.

If any unpaid balance and the certified cheque do not match the monies owed by the Contractor upon termination of the Contract, the Municipality may also charge such expense against any money which may thereafter be due to the Contractor from the Municipality.

A.19. Tests

The cost for the testing of materials supplied to the job by the Contractor shall be borne by the Contractor. The Engineer reserves the right to subject any lengths of any tile or pipe to a competent testing laboratory to ensure the adequacy of the tile or pipe. If any tile supplied by the Contractor is determined to be inadequate to meet the applicable A.S.T.M. standards, the Contractor shall bear full responsibility to remove and/or replace all such inadequate tile in the Contract with tile capable of meeting the A.S.T.M. Standards.

A.20. Pollution

The Contractor shall keep their equipment in good repair. The Contractor shall refuel or repair equipment away from open water.

If polluted material from construction materials or equipment is caused to flow into the drain, the Contractor shall immediately notify the Ministry of the Environment, and proceed with the Ministry's protocols in place to address the situation.

A.21. Species and Risk

If a Contractor encounters a known Species at Risk as designated by the MNR or DFO, the Contractor shall notify the Engineer immediately and follow the Ministry's guidelines to deal with the species.

A.22. Road Crossings

This specification applies to all road crossings (Municipality, County, Regional, or Highway) where no specific detail is provided on the drawings or in the standard specifications. This specification in no way limits the Road Authority's regulations governing the construction of drains on their Road Allowance.

A.22.1. Road Occupancy Permit

Where applicable, the Contractor must submit an application for a road occupancy permit to the Road Authority and allow a minimum of five (5) working days for its review and issuance.

A.22.2. Road Closure Request and Construction Notification



The Contractor shall submit written notification of construction and request for road closure (if applicable) to the Road Authority and the Engineer for review and approval a minimum of five (5) working days prior to proceeding with any work on the road allowance. The Contractor shall be responsible for notifying all applicable emergency services, schools, etc. of the road closure or construction taking place.

A.22.3. Traffic Control

The Contractor shall supply flagmen, and warning signs and ensure that detour routes are adequately signed in accordance with no less than the minimum standards as set out in the Ontario Traffic Manual's Book 7.

A.22.4. Weather

No construction shall take place during inclement weather or periods of poor visibility.

A.22.5. Equipment

No construction material and/or equipment is to be left within three (3) metres of the travelled portion of the road overnight or during periods of inclement weather.

If not stated on the drawings, the road crossing shall be constructed by open cut method. Backfill from the top of the cover material over the subsurface pipe or culvert to the under side of the road base shall be Granular "B". The backfill shall be placed in lifts not exceeding 300mm in thickness and each lift shall be thoroughly compacted to 98% Standard Proctor. Granular "B" road base for County Roads and Highways shall be placed to a 450mm thickness and Granular "A" shall be placed to a thickness of 200mm. Granular road base materials shall be thoroughly compacted to 100% Standard Proctor.

Where the road surface is paved, the Contractor shall be responsible for placing HL-8 Hot Mix Asphalt patch at a thickness of 50mm or of the same thickness as the existing pavement structure. The asphalt patch shall be flush with the existing roadway on each side and without overlap.

Excavated material from the trench beyond 1.25 metres from the travelled portion or beyond the outside edge of the gravel shoulder may be used as backfill in the trench in the case of covered drains. The material shall be compacted in lifts not exceeding 300mm.

A.23. 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 is not easily erodible. All backfill material shall be thoroughly compacted as directed by the Engineer.

Culverts shall be bedded with a minimum of 300mm of granular material. Granular material shall be placed simultaneously on each side of the culvert in lifts not exceeding 150mm in thickness and compacted to 95% Standard Proctor Density. Culverts shall be installed a minimum of 10% of the culvert diameter below design grade with a minimum of 450mm 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” material and 150mm of Granular “A” material. All backfill shall be thoroughly compacted as directed by the Engineer. All granular material shall be placed to the full width of the travelled portion.

Any settling of backfilled material shall be repaired by or at the expense of the Contractor during the warranty period of the project and as soon as required.

A.24. Fences

No earth is to be placed against fences and all fences removed by the Contractor shall be replaced by him in as good a condition as found. Where practical the Contractor shall take down existing fences in good condition at the nearest anchor post and roll it back rather than cutting the fence and attempting to patch it. The replacement of the fences shall be done to the satisfaction of the Engineer. Any fences found in such poor condition where the fence is not salvageable, shall be noted and verified with the Engineer prior to commencement of work.

Fences damaged beyond repair by the Contractor’s negligence shall be replaced with new materials, similar to those materials of the existing fence, at the Contractor’s expense. The replacement of the fences shall be done to the satisfaction of the Landowner and the Engineer.

Any fences paralleling an open ditch that are not line fences that hinder the proper working of the excavating machinery, shall be removed and rebuilt by the Landowner at his own expense.

The Contractor shall not leave fences open when he is not at work in the immediate vicinity.

A.25. Livestock

The Contractor shall provide each landowner with 48 hours notice prior to removing any fences along fields which could possibly contain livestock. Thereafter, the Landowner shall be responsible to keep all livestock clear of the construction areas until further notified. The Contractor shall be held responsible for loss or injury to livestock or damage caused by livestock where the Contractor failed to notify the Landowner, or through negligence or carelessness on the part of the Contractor.

A.26. Standing Crops

The Contractor shall be responsible for damages to standing crops which are ready to be harvested or salvaged along the course of the drain and access routes if the Contractor has failed to notify the Landowners 48 hours prior to commencement of the work on that portion of the drain.

A.27. Surplus Gravel

If as a result of any work, gravel or crushed stone is required and not all the gravel or crushed stone is used, the Contractor shall haul away such surplus material.

A.28. Iron Bars

The Contractor is responsible for the cost of an Ontario Land Surveyor to replace any iron bars that are altered or destroyed during the course of the construction.



A.29. Rip-Rap

Rip-rap shall be quarry stone rip-rap material and shall be the sizes specified in the Special Provisions. Broken concrete shall not be used as rip-rap unless otherwise specified.

A.30. Clearing, Grubbing and Brushing

This specification applies to all brushing where no specific detail is provided on the drawings or in the Special Provisions.

The Contractor shall clear, brush and stump trees from within the working area that interfere with the installation of the drainage system.

All trees, limbs and brush less than 150mm in diameter shall be mulched. Trees greater than 150mm in diameter shall be cut and neatly stacked in piles designated by the Landowners.

A.31. Restoration of Lawns

This specification applies to all lawn restoration where no specific detail is provided on the drawings or in the Special Provisions and no allowance for damages has been provided under Section 30 of the Drainage Act RSO 1990 to the affected property.

The Contractor shall supply “high quality grass seed” and the seed shall be broadcast by means of an approved mechanical spreader. All areas on which seed is to be placed shall be loose at the time of broadcast to a depth of 25mm. Seed and fertilizer shall be spread in accordance with the supplier’s recommendations unless otherwise directed by the Engineer. Thereafter it will be the responsibility of the Landowner to maintain the area in a manner so as to promote growth

END OF DIVISION



DIVISION B

Specifications for Open Drains



TABLE OF CONTENTS

B.1.	Alignment	1
B.2.	Profile	1
B.3.	Excavation	1
B.4.	Excavated Material	1
B.5.	Excavation at Existing Bridge and Culvert Sites	2
B.6.	Pipe Culverts	2
B.7.	Rip-Rap Protection For Culverts	2
B.8.	Clearing, Grubbing and Mulching	3
B.9.	Tributary Tile Outlets	3
B.10.	Seeding	3
B.11.	Hydro Seeding	3
B.12.	Hand Seeding	3
B.12.1.	Completion	3



DIVISION B – SPECIFICATIONS FOR OPEN DRAINS

B.1. Alignment

The drain shall be constructed in a straight line and shall follow the course of the present drain or water run unless noted on the drawings. Where there are unnecessary bends or irregularities on the existing course of the drain, the Contractor shall contact the Engineer before commencing work to verify the manner in which such irregularities or bends may be removed from the drain. All curves shall be made with a minimum radius of fifteen (15) metres from the centre line of the drain.

B.2. Profile

The Profile Drawing shows the depth of cuts from the top of the bank to the final invert of the ditch in metres and decimals of a metre, and also the approximate depth of excavated material from the bottom of the existing ditch to the final invert of the ditch. These cuts are established for the convenience of the Contractor; however, bench marks (established along the course of the drain) will govern the final elevation of the drain. The location and elevation of the bench marks are given on the Profile Drawing. Accurate grade control must be maintained by the Contractor during ditch excavation.

B.3. Excavation

The bottom width and the side slopes of the ditch shall be those shown on the drawings. If the channel cross-section is not specified it shall be a one metre bottom width with 1.5(h):1(v) side slopes. At locations along the drain where the cross section dimensions change, there shall be a transitional length of not less than 10:1 (five metre length to 0.5 metre width differential). Where the width of the bottom of the existing ditch is sufficient to construct the design width, then construction shall proceed without disturbing the existing banks.

Where existing side slopes become unstable, the Contractor shall immediately notify the Engineer. Alternative methods of construction and/or methods of protection will then be determined prior to continuing work.

Where an existing drain is being relocated or where a new drain is being constructed, the Contractor shall strip the topsoil for the full width of the drain, including the location of the spoil pile. Upon completion of levelling, the topsoil shall be spread to an even depth across the full width of the spoil.

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

B.4. Excavated Material

Excavated 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.

No excavated material shall be placed in tributary drains, depressions, or low areas which direct water behind the spoil bank. The excavated material shall be placed and levelled to a maximum



depth of 200 mm, unless instructed otherwise and commence a minimum of one (1) metre from the top of the bank. The edge of the spoil bank away from the ditch shall be feathered down to the existing ground; the edge of the spoil bank nearest the ditch shall have a maximum slope of 2(h):1(v). The material shall be levelled such that it may be cultivated with ordinary farm equipment without causing undue hardship to the farm machinery and farm personnel. No excavated material shall cover any logs, brush, etc. of any kind.

Any stones or boulders which exceed 300mm in diameter shall be removed and disposed of in a location specified by the Landowner.

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

B.5. Excavation at Existing Bridge and Culvert Sites

The Contractor shall excavate the drain to the full specified depth under all bridges and to the full width of the structure. Temporary bridges may be carefully removed and left on the bank of the drain but shall be replaced by the Contractor when the excavation is complete. Permanent bridges must, if at all possible, be left intact. All necessary care and precautions shall be taken to protect the structure. The Contractor shall notify the Landowner if excavation will expose the footings or otherwise compromise the structural integrity of the structure.

The Contractor shall clean through all pipe culverts to the grade and width specified on the profile.

B.6. Pipe Culverts

All pipe culverts shall be installed in accordance with the standard detail drawings. If couplers are required, five corrugation couplers shall be used for up to and including 1200mm diameter pipes and 10 corrugation couplers for greater than 1200mm diameter pipes.

When an existing crossing is being replaced, the Contractor may backfill the new culvert with the existing native material that is free of large rocks and stones. The Contractor is responsible for any damage to a culvert pipe that is a result of rocks or stones in the backfill.

B.7. Rip-Rap Protection For Culverts

Quarry stone rip-rap shall be used as end treatment for new culverts and placed on geotextile filter material (Mirafi 160N or approved equal). The rip-rap shall be adequately keyed in along the bottom of the slope, and shall extend to the top of the pipe or as directed on the drawings. The maximum slope for rip-rap shall be 1(h):1(v) or as directed by the Engineer.

The Contractor shall be responsible for any defects or damages that may develop in the rip-rap or the earth behind the rip-rap that the Engineer deems to have been fully or partially caused by faulty workmanship or materials.



B.8. Clearing, Grubbing and Mulching

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

All trees or limbs 150mm or larger, that is necessary to remove, shall be cut, trimmed and neatly stacked in the working width for the use or disposal by the Landowner. Brush and limbs less than 150mm in diameter shall be mulched. Clearing, grubbing and mulching shall be carried out as a separate operation from the excavation of the ditch, and shall not be completed simultaneously at the same location.

B.9. Tributary Tile Outlets

All tile outlets in existing ditches shall be marked by the Landowner prior to excavation. The Contractor shall guard against damaging the outlets of tributary drains. Any tile drain outlets that were marked or noted on the drawings and are subsequently damaged by the Contractor shall be repaired by the Contractor at his expense. The Landowner shall be responsible for repairs to damaged tile outlets that were not marked.

B.10. Seeding

The side slopes where disturbed shall be seeded using an approved grass seed mixture. The grass seed shall be applied the same day as the excavation of the open ditch.

Grass seed shall be fresh, clean and new crop seed, meeting the requirements of the MTO and composed of the following varieties mixed in the proportion by weight as follows:

- 55% Creeping Red Fescue
- 40% Perennial Rye Grass
- 5% White Clover

Grass seed shall be applied at the rate of 100 kg/ha.

B.11. Hydro Seeding

The areas specified in the contract document shall be hydro seeded and mulched upon completion of construction in accordance with O.P.S.S. 572.

B.12. Hand Seeding

Placement of the seed shall be of means of an approved mechanical spreader.

B.13. 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.

END OF DIVISION



DIVISION C

Specifications for Tile Drains



TABLE OF CONTENTS

C.1.	Pipe Materials.....	1
C.2.	Alignment	1
C.3.	Profile	1
C.4.	Excavation	2
C.5.	Installation	2
C.6.	Trench Crossings	3
C.7.	Outlet Protection	3
C.8.	Catch Basins and Junction Boxes.....	4
C.9.	Tributary Drains.....	4
C.10.	Clearing, Grubbing and Mulching.....	5
C.11.	Roads and Laneway Sub-Surface Crossings	5
C.12.	Filling In Existing Ditches	5
C.13.	Construction of Grassed Waterways	6
C.14.	Unstable Soil	6
C.15.	Rocks	6
C.16.	Broken or Damaged Tile	6
C.17.	Recommended Practice For Construction of Sub-Surface Drainage Systems.....	6



DIVISION C – SPECIFICATIONS FOR TILE DRAINS

C.1. Pipe Materials

Concrete Tile

Concrete drain tile shall conform to the requirements of the most recent A.S.T.M. specification for Heavy-Duty Extra Quality drain tile. All tile shall have a pipe strength of 2000D, unless otherwise noted.

All tile furnished shall be subject to the approval of the Engineer. All rejected tile are to be immediately removed from the site.

High Density Polyethylene (HDPE) Pipe

All HDPE pipe shall be dual-wall corrugated drainage pipe with a smooth inner wall. HDPE pipe shall have a minimum stiffness of 320 kPa at 5% deflection.

Unless otherwise noted, all sealed HDPE pipe shall have a water tight gasketed bell and spigot joining system meeting the minimum requirements of CSA B182.8. Perforated HDPE pipe shall have a soil tight joining system, and shall be enveloped in non-woven geotextile filter sock.

C.2. Alignment

The Contractor shall contact the Engineer to establish the course of the drain. Where an existing drain is to be removed and replaced by the new drain, or where the new drain is to be installed parallel to an existing drain, the Contractor shall locate the existing drain (including repairing damaged tile caused by locating) at intervals along the course of the drain. The costs of locating shall be included in the tender price.

The drain shall run in as straight a line as possible throughout its length, except that at intersections of other watercourses or at sharp corners, it shall run on a curve of at least 15 metres radius. The new tile drain shall be constructed at an offset from and parallel with any ditch or defined watercourse in order that fresh backfill in the trench will not be eroded by the flow of surface water.

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 the necessary repair at his expense.

C.3. Profile

Benchmarks have been established along the course of the drain which are to govern the elevations of the drain. The location and elevations of the benchmarks are shown on the drawings. Tile is to be installed to the elevation and grade shown on the profiles. Accurate grade control must be maintained by the Contractor at all times.



When installing a drain towards a fixed point such as a bore pipe, the Contractor shall uncover the pipe and confirm the elevation a sufficient distance away from the pipe in order to allow for any necessary minor grade adjustments to be made.

C.4. Excavation

Wheel Machine

Unless otherwise specified, all trenching shall be carried out with a wheel machine approved by the Engineer. The wheel machine shall shape the bottom of the trench to conform to the outside diameter of the pipe. The minimum trench width shall be equal to the outside diameter of the pipe plus 100mm on each side of the pipe, unless otherwise specified. The maximum trench width shall be equal to the outside diameter of the pipe plus 300mm on each side of the pipe, unless otherwise specified.

Scalping

Where the depths of cuts in isolated areas along the course of the drain as shown on the profile exceed the capability of the Contractor's wheel machine, he shall lower the surface grade in order that the wheel machine may trench to the correct depth. Topsoil is to be stripped over a sufficient width that no subsoil will be deposited on top of the topsoil. Subsoil will then be removed to the required depth and piled separately. Upon completion, the topsoil will then be replaced to an even depth over the disturbed area. The cost for this work shall be included in his tender price.

Excavator

Where the use of an excavator is used in-lieu of a wheel machine, the topsoil shall be stripped and replaced in accordance with Item C.4.2. All tile shall be installed on 19mm clear crushed stone bedding placed to a minimum depth of 150mm which has been shaped to conform to the bottom of the pipe. The Contractor shall include the costs of this work in his tender price.

C.5. Installation

Concrete Tile

The tile is to be laid with close joints and in regular grade and alignment in accordance with the drawings. The tiles are to be bevelled, if necessary to ensure close joints. The inside of the tile is to be kept clear when laid. The sides of the tile are to be supported by partial filling of the trench (blinding) prior to inspection by the Engineer. No tile shall be backfilled until inspected by the Engineer unless otherwise permitted by the Engineer. The tile shall be backfilled such that a sufficient mound of backfill is placed over the trench to ensure that no depression remains after settling occurs in the backfill.

Where a tile connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a tile drain passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of



compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

The Contractor shall supply and wrap all concrete tile joints with Mirafi 160N geotextile filter material as part of this contract. The width of the filter material should be:

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

The filter material shall completely cover the tile joint and shall have a minimum overlap of 300mm. The type of filter material shall be.

HDPE Pipe

HDPE pipe shall be installed using compacted Granular 'A' bedding or 19mm clear crushed stone bedding from 150mm below the pipe to 300mm above the pipe. All granular material shall be compacted using a suitable mechanical vibratory compactor. Granular bedding and backfill shall be placed in lifts not exceeding 300mm and compacted to at least 95% Standard Proctor Maximum Dry Density (SPMDD).

Where a pipe connects to a catch basin or similar structure, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone under areas backfilled from the underside of the pipe to undisturbed soil. Where a pipe passes through a bore pit, the Contractor shall include in his tender price for the supply and placement of compacted Granular 'A' bedding or 19mm clear crushed stone from the underside of the pipe down to undisturbed soil with the limits of the bore pit.

As determined by the Engineer, unsuitable backfill material must be hauled off-site by the Contractor and Granular "B" shall be used as replacement backfill material.

C.6. Trench Crossings

The Contractor shall not cross the backfilled trench with any construction equipment or vehicles, except by one designated crossing location on each property. The Contractor shall ensure that the bedding and backfill material at this designated crossing location is properly placed and compacted so as to adequately support the equipment and vehicles that may cross the trench. The Contractor may undertake any other approved work to ensure the integrity of the tile at the crossing location. The Contractor shall ensure that no equipment or vehicles travel along the length of the trench. The Contractor shall be responsible for any damage to the new tile caused by the construction of the drain.

C.7. Outlet Protection

A tile drain outlet into a ditch shall be either HDPE pipe or corrugated steel pipe and shall include a hinged grate for rodent protection. The maximum spacing between bars on the rodent grate shall be 40mm. All corrugated steel outlet pipes shall be bevelled at the end to generally conform to the slope of the ditch bank.



Quarry stone rock rip-rap protection and geotextile filter material (Mirafi 160N), shall be installed around the outlet pipe and extended downstream a minimum distance of three metres, unless otherwise specified. The protection shall extend to the top of the backfilled trench and below the pipe to 300 mm under the streambed. The protection shall also extend 600mm into undisturbed soil on either side of the backfilled trench. In some locations, rip-rap may be required on the bank opposite the outlet.

Where the outlet occurs at the upper end of an open ditch, the rip-rap protection will extend all around the end of the ditch and to a point 800mm downstream on either side. 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. Catch Basins and Junction Boxes

Unless otherwise noted, catch basins shall be in accordance with OPSD 705.010 and 705.030. The catch basin grate shall be a “Birdcage” type substantial steel grate, removable for cleaning and shall be inset into a recess provided around the top of the structure. The grate shall be fastened to the catch basin with bolts into the concrete. Spacing of bars on grates for use on 600mmX600mm structures shall be 65mm centre to centre. Spacing of bars on grates for use on structures larger than 600mmX600mm shall be 90mm.

All catch basins shall be backfilled with compacted Granular ‘A’ or 19mm clear crushed stone placed to a minimum width of 300mm on all sides. If settling occurs after construction, the Contractor shall supply and place sufficient granular material to maintain the backfill level flush with adjacent ground. The riser sections of the catch basin shall be wrapped with filter cloth.

Quarry stone rip-rap protection shall be placed around all catch basins and shall extend a minimum distance of one (1) metre away from the outer edge of each side of the catch basin, and shall be placed so that the finished surface of the rip-rap is flush with the existing ground.

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 elevations as the outlet tile.

Junction boxes shall have a minimum cover over the lid of 450mm.

The Contractor shall include in his tender price for the construction of a berm behind all ditch inlet structures. The berm shall be constructed of compacted clay keyed 300mm into undisturbed soil. The top of the spill way of the earth berm shall be the same elevation as the high wall of the ditch inlet catch basin. The earth berm shall be covered with 100mm depth of topsoil and seeded with an approved green seed mixture. The Contractor shall also include for regrading, shaping and seeding of road ditches for a maximum of 15 metres each way from all catch basins.

The Contractor shall clean all catch basin sumps after completion of the drain installation. Catch basin markers shall be placed beside each catch basin.

C.9. 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 in accordance with the typical tile drain connection detail. 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 either a cored hole with an insert coupler or a manufactured tee.

Where the existing drains are full of sediment, the decision to connect the tributary drain to 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 Agreement.

The Contractor shall be responsible for all tributary tile connections for a period of one year from the date of the Completion Certificate. 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 an open ditch is being replaced by a new tile drain, existing tile outlets entering the ditch from the side opposite the new drain shall be extended to the new drain.

Where the Contractor is required to connect an existing tile which is not encountered in the course of the drain, the cost of such work shall constitute an extra to the contract.

C.10. Clearing, Grubbing and Mulching

The Contractor shall clear, brush and stump trees from within the working area.

All trees or limbs 150mm or larger, that is necessary to remove, shall be cut, trimmed and neatly stacked in the working width for the use or disposal by the Landowner. Brush and limbs less than 150mm in diameter shall be mulched.

Clearing, grubbing and mulching shall be carried out as a separate operation from installing the drain, and shall not be completed simultaneously at the same location.

C.11. Roads and Laneway Sub-Surface Crossings

All roads and laneway crossings may be made with an open cut. The Contractor may use original ground as backfill to within 600mm of finished grade only if adequate compaction and if the use of the original ground backfill has been approved beforehand by the Engineer.

C.12. Filling In Existing Ditches

The Contractor shall backfill the ditch sufficiently for traversing by farm equipment. If sufficient material is available on-site 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. The Contractor shall ensure sufficient compaction of the backfill and if required, repair excess settlement up to the end of the warranty period.



C.13. Construction of Grassed Waterways

Where the Contractor is required to construct a grassed waterway, the existing waterway shall be filled in, regraded, 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 the MTO.

- 55% Creeping Red Fescue
- 15% Perennial Rye Grass
- 27% Kentucky Bluegrass
- 3% White Clover

Grass seed shall be applied at the rate of 100 kg/ha.

C.14. Unstable Soil

The Contractor shall immediately contact the Engineer if unstable soil is encountered. The Engineer shall, after consultation with the Contractor, determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.

C.15. Rocks

The Contractor shall immediately contact the Engineer if boulders of sufficient size and number are encountered such that the Contractor cannot continue trenching with a wheel machine. The Engineer shall determine the action necessary and a price for additions or deletions shall be agreed upon prior to further drain installation.

If only scattered large stone or boulders are removed on any project, the Contractor shall either excavate a hole to bury same adjacent to the drain, or he shall haul the stones or boulders to a location designated by the Landowner.

C.16. Broken or Damaged Tile

The Contractor shall remove and dispose of all broken (existing or new), damaged or excess tile off site.

C.17. Recommended Practice For Construction of Sub-Surface Drainage Systems

Drainage Guide for Ontario, Ministry of Agriculture, Food and Rural Affairs, Publication 29 and its amendments, dealing with the construction of Subsurface Drainage Systems, shall be the guide to all methods and materials to be used in the construction of tile drains except where superseded by other Specifications of the Contract.

END OF DIVISION



DIVISION H

SPECIAL PROVISIONS

Latronica Municipal Drain



CONTENTS

H.1. GENERAL	1
H.2. UTILITIES	1
H.3. WORKING AREA AND ACCESS	1
H.4. CLEARING, BRUSHING, AND PROTECTION OF FEATURES.....	2
H.5. OPEN DITCH EXCAVATION	2
H.6. EXCAVATED MATERIAL.....	2
H.7. FILLING IN EXISTING OPEN DITCH	2
H.8. TOPSOIL STRIPPING	2
H.9. DRAIN ALIGNMENT, PIPE MATERIALS, AND INSTALLATION	3
H.10. EXISTING DRAINS/TILE CONNECTIONS	4
H.11. CATCH BASINS AND JUNCTION BOXES	5
H.12. RIP-RAP	5
H.13. RIFFLE & PLUNGE POOL.....	5
H.14. EROSION AND SEDIMENT CONTROL	6
H.15. SEEDING	6
H.16. HYDRO TOWER CORRIDOR.....	6



Special Provisions means special directions containing requirements particular to the work not adequately provided for by the standard or supplemental specifications. Special provisions shall take precedence and govern over any standard or supplemental specification.

H.1. GENERAL

The Contractor shall notify the Landowner, the Drainage Superintendent, and the Engineer 48 hours prior to construction.

The Contractor shall arrange a pre-construction meeting and shall invite the Engineer, Drainage Superintendent, and the Landowners on whose property the work will take place, including all affected road authorities, a minimum of five working days prior to the anticipated start date of construction.

The Contractor shall verify the location of the new drainage system with the Engineer and Landowner prior to construction.

The Contractor shall check and verify all dimensions and elevations and report any discrepancies to the Engineer prior to proceeding with the work.

The Contractor must maintain access to all driveways along the route of the drain as well as always maintain access for all emergency vehicles during the construction.

The Contractor shall be responsible for settlement within the warranty period.

H.2. UTILITIES

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

The locations and elevations of all utilities shown on the drawings are approximate locations. Actual locations and elevations of all utilities must be verified by the Contractor prior to construction.

The Contractor shall arrange to have a representative of the utility owner on site during construction if it is a requirement by the utility owner.

H.3. WORKING AREA AND ACCESS

Access to the working area shall be designated by the Landowners where an access route is not defined.

The working area for the installation of the tile drainage system shall be an average width of 25m for construction purposes and an average width of 10m for maintenance purposes along the alignment of the proposed closed drain.

The working area for the open ditch work shall be an average width of 12m on the primary working side of the existing ditch (the west side) for construction purposes and 10m for maintenance purposes.

The working area for the enclosure of the existing open ditch shall remain within the working corridor for the closed work on the west side of the ditch, and five metres on the east side of the ditch from sta. 0+000 to sta. 0+482 (Main Drain Closed).



H.4. CLEARING, BRUSHING, AND PROTECTION OF FEATURES

The Contractor shall clear, brush, and mulch vegetation within the working area as required to complete the work. Clearing shall be limited to that necessary for construction, unless otherwise authorized by the Engineer.

All brush, limbs, and trees less than 150mm in diameter, and any larger material that can be reasonably mulched, shall be mulched or chipped and spread within the working area.

Where larger diameter material is encountered that is not practical to mulch, the Contractor shall cut such material into manageable lengths and place it in neat, stable piles along the outer limits of the working area in locations designated by the Landowner. Where no direction is provided by the Landowner and where reasonable attempts were made to contact the Landowner, the Contractor may select appropriate locations to neatly pile the material within the working area.

Unless otherwise specified, cleared materials are not intended to be salvaged or preserved for later use.

Landowners shall clearly identify any trees, features, objects, or improvements of particular value within or adjacent to the working area and access routes prior to construction. While reasonable efforts may be made to accommodate such features where practicable, no guarantee of protection is provided where such features interfere with the work.

H.5. OPEN DITCH EXCAVATION

An approved hydraulic excavator shall be used to carry out the excavation of the open ditches. The Main Drain (Open) shall have a 0.9m bottom width, parabolic in shape. The side slopes shall be a 1.5H:1V or flatter.

H.6. EXCAVATED MATERIAL

Excavated material shall be used as fill material for the ditch enclosure.

H.7. FILLING IN EXISTING OPEN DITCH

The Contractor shall strip all available topsoil from the existing open ditch and stockpile the topsoil on site. The topsoil shall be spread over the backfilled ditch.

The Contractor shall use the excavated material from the open ditch work, the excess backfill from the tile drain installation, and imported fill material to fill in the existing open ditch.

The existing open ditch shall be backfilled during dry conditions.

H.8. TOPSOIL STRIPPING

8.1 Tile Drain Installation

The Contractor shall strip the topsoil along the alignment of the tile drain to a width of 10m from Stat 0+000 to Sta. 0+482. From Sta. 0+482 to Sta. 0+689, the Contractor shall strip the topsoil for a minimum of 4m, centred on the trench.



Where the drain is to be installed by means of an approved hydraulic excavator (due to poor soil conditions or for HDPE pipe), the Contractor shall strip the topsoil for a width equal to the top width of the trench, or the specified width, whichever is greater.

The Contractor shall stockpile the topsoil and later spread it over the backfilled trench. The Contractor shall ensure that the topsoiled trench is left in a condition such that the landowner can perform final restoration using nothing more than farm equipment. The Contractor will not attempt to place frozen topsoil over the backfilled trench.

8.2 Existing Ditch Enclosure

The Contractor shall strip all available topsoil from the side slopes and streambed of the ditch prior to the enclosure and shall stockpile it adjacent to the ditch. Additionally, the Contractor shall strip the topsoil for a width of 5m along the east side of the ditch.

The Contractor shall later spread the topsoil over the backfilled ditch and east side of the ditch and shall ensure that the topsoiled enclosed ditch is left in a condition that the Landowner can perform final restoration using nothing more than farm equipment.

8.3 Open Ditch Cleanout

The Contractor shall strip topsoil from the side slopes and streambed of the ditch prior to the ditch cleanout. The topsoil shall later spread the topsoil back on the disturbed side slopes of the excavated ditch.

H.9. DRAIN ALIGNMENT, PIPE MATERIALS, AND INSTALLATION

9.1 Drain Alignment

The new tile drainage system shall be installed approximately 5 metres west of the west top of bank for the ditch from Sta. 0+000 to Sta. 0+482.

From Sta. 0+482 to Sta. 0+689, the new drain shall be installed along the route of the existing drain. The Contractor shall locate the existing drain prior to the installation of the new drainage system.

9.2 Concrete Field Tile

An approved wheel trencher shall be used to install the concrete field tile whenever possible.

All concrete tile shall be Heavy-Duty Extra Quality Concrete Drain Tile 2000D.

Concrete field tile installed by means of a wheel machine shall be backfilled using suitable native material. The backfill shall not be compacted but a sufficient mound shall be left over the trench by the Contractor to allow for settlement flush with adjacent lands.

Concrete field tile installed by means of an approved hydraulic excavator shall be installed using 19mm crushed stone bedding from a minimum of 150mm below the pipe to the springline of the pipe. Suitable native material shall be used as backfill from the springline to the underside of the topsoil.

The Contractor shall supply and wrap all concrete joints with geotextile filter material.



The filter material shall completely cover the tile joint.

The Contractor shall be responsible for all trench settlement within the warranty period.

9.3 High Density Polyethylene Pipe (HDPE)

All HDPE pipe shall be CSA B182.8 with soil tight (couplers) jointing systems unless otherwise stated.

All HDPE pipe shall be installed using 19mm crushed stone bedding (or approved equivalent) from a minimum of 150mm below the pipe to 150mm above the pipe. Suitable native material shall be used as backfill from 150mm above the pipe to the underside of the topsoil.

The Contractor shall use HDPE pipe within the Hydro Tower corridor, from Sta. 0+643 to Sta. 0+659.

The Contractor shall be responsible for all trench settlement within the warranty period.

9.4 Poor Soil Conditions

The Contractor shall submit a unit price for installation of the pipe per the detail on wrapped crushed stone bedding as a provisional item. The provisional amount for installation on wrapped crushed stone bedding shall include the supply and installation of all additional labour, equipment and materials required for the installation of the pipe by this method.

If poor soil conditions are encountered, the Contractor shall install the pipe in accordance with the detail for wrapped crushed stone bedding and shall be entitled to the provisional tender amount, in addition to the tendered standard installation price. The Contractor shall be paid for the actual lengths installed in this condition.

H.10. EXISTING DRAINS/TILE CONNECTIONS

The Contractor shall make all tributary tile drain connections in accordance with the Typical Tile Connection Detail found in the drawing set.

All existing drains cut off during the installation of the new drainage system that will be connected to the new drainage system shall be flagged or marked by the Contractor prior to the connection being made.

Existing tile outlets into the catch basin at Sta. 0+654 shall be reconnected into the new catch basin at Sta. 0+659 by the Contractor in accordance with the Typical Tile Connection Detail found in the drawing set. using appropriate pipe materials, pipe sizes, fittings and bedding materials.

The Contractor shall extend the existing tile outlets at Sta. 0+415 and 0+422 to the new tile drain and make the necessary connections into the new tile drainage system. Any existing tile drains that are connected directly into the new concrete field tile shall be cored into the new pipe such that the appropriate pipe diameter and fitting are considered. Square cut or hammered out holes into the new pipe will not be accepted.

The Contractor shall be responsible for all tile connections for a period of one year after the issuance of the completion certificate. Tile connections required to be made within this warranty period shall be made at the expense of the Contractor. After construction, the Contractor will be given the option



to make any subsequent tile connections or have the Municipality make said connections and have the costs of which deducted from the maintenance holdback.

The Contractor shall supply all necessary materials to compete the connections of the existing drains to the new drain. The type of materials, diameter of pipe and bedding used to make the tributary drain connections shall be verified with the engineer.

H.11. CATCH BASINS AND JUNCTION BOXES

All catch basins shall be precast concrete catch basins and shall have a 300mm sump.

All catch basin grates shall be fastened to the new catch basin and shall be new hot dipped galvanized bird cage grates. Catch basin marker signs shall be erected at all catch basins.

The catch basin grate elevations shall be set to the satisfaction of the Engineer. Lifts shall be placed by the Contractor on all catch basins if necessary to achieve the desired elevation when field setting the structures.

All catch basins shall be installed using 19mm crushed stone bedding from 150mm below the structure to 150mm above the top of the highest pipe entering or exiting the structure. Structures on private property shall be backfilled using approved native material up to the underside of the topsoil layer. All backfill material shall be placed and thoroughly compacted evenly around each structure in lifts not exceeding 300mm to minimize settlement around the structures.

The Contractor shall be responsible for all settlement around catch basins. Should the area around the catch basin settle after construction, the Contractor shall be responsible for providing additional rip-rap required so that the top of the rip-rap is flush with the surrounding ground.

The Contractor shall place quarry stone rip-rap material around all sides of the catch basins and shall be placed on geotextile filter material in accordance with the attached set of drawing plans.

All holes for catch basin pipe connections to be cored by the manufacturer. All pipes entering or exiting a catch basin shall be installed such that the face of the pipe is flush with the inside wall of the structure.

The Contractor shall be responsible to repair or reapply mortar for all damaged mortared connections into any catch basin for a period of one year after the completion certificate has been issued, as determined by the Engineer.

H.12. RIP-RAP

All stone rip-rap material shall be quarry stone 150mm to 300mm diameter and placed to a depth of 450mm, unless otherwise noted. All rip-rap material shall be placed on geo-textile filter material.

The Contractor shall not use broken concrete tile as rip-rap protection.

H.13. RIFFLE & PLUNGE POOL

Riffles shall be constructed in accordance with the Typical Riffle Detail included in the attached set of drawings.

Anchor stones shall be 300mm to 500mm diameter angular stone. Rounded field stone shall be used to fill the voids of the anchor stone and shape the remaining portions of the riffle structure. The



Contractor may check with the landowner to see if suitable field stone is available, otherwise approved rounded stone shall be imported and placed by the Contractor.

The Contractor shall place quarry stone rip-rap protection 150mm to 300mm dia. and placed 450mm deep in accordance with the Plunge Pool Detail in the attached set of plans.

All rip-rap to be placed on an approved geotextile filter material.

H.14. EROSION AND SEDIMENT CONTROL

The Contractor shall provide adequate erosion and sediment control for the duration of the construction including monitoring and maintenance of the control measures put in place. The Contractor shall inspect the erosion and sediment control measures regularly, and specifically before predicted rainfall events, and after rainfall events.

H.15. SEEDING

The Contractor shall supply and spread an approved seed mixture (OPS 804 – Standard Roadside Mix) over the disturbed areas of the road right-of-way.

All seed mixtures are to be applied using the manufacturer's application recommendations.

H.16. HYDRO TOWER CORRIDOR

All works within the Hydro Tower Corridor and under the Hydro Tower lines shall conform to the regulations and requirements from Hydro One.



NOTES:

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2. THE CONTOURS WERE CREATED USING LIDAR DERIVED DIGITAL DATA (2022) FROM LAND INFORMATION ONTARIO.

BENCHMARK DESCRIPTIONS

- BENCHMARK No. 1** ELEV.=323.97
TOP CENTRE OF 400mmØ CSP OUTLET PIPE AT STA. 0+000 (MAIN)
- BENCHMARK No. 2** ELEV.=329.79
TOP CENTRE UPSTREAM END OF 400mmØ CSP SURFACE CULVERT 185m SOUTH OF STA. 0+654 (MAIN)

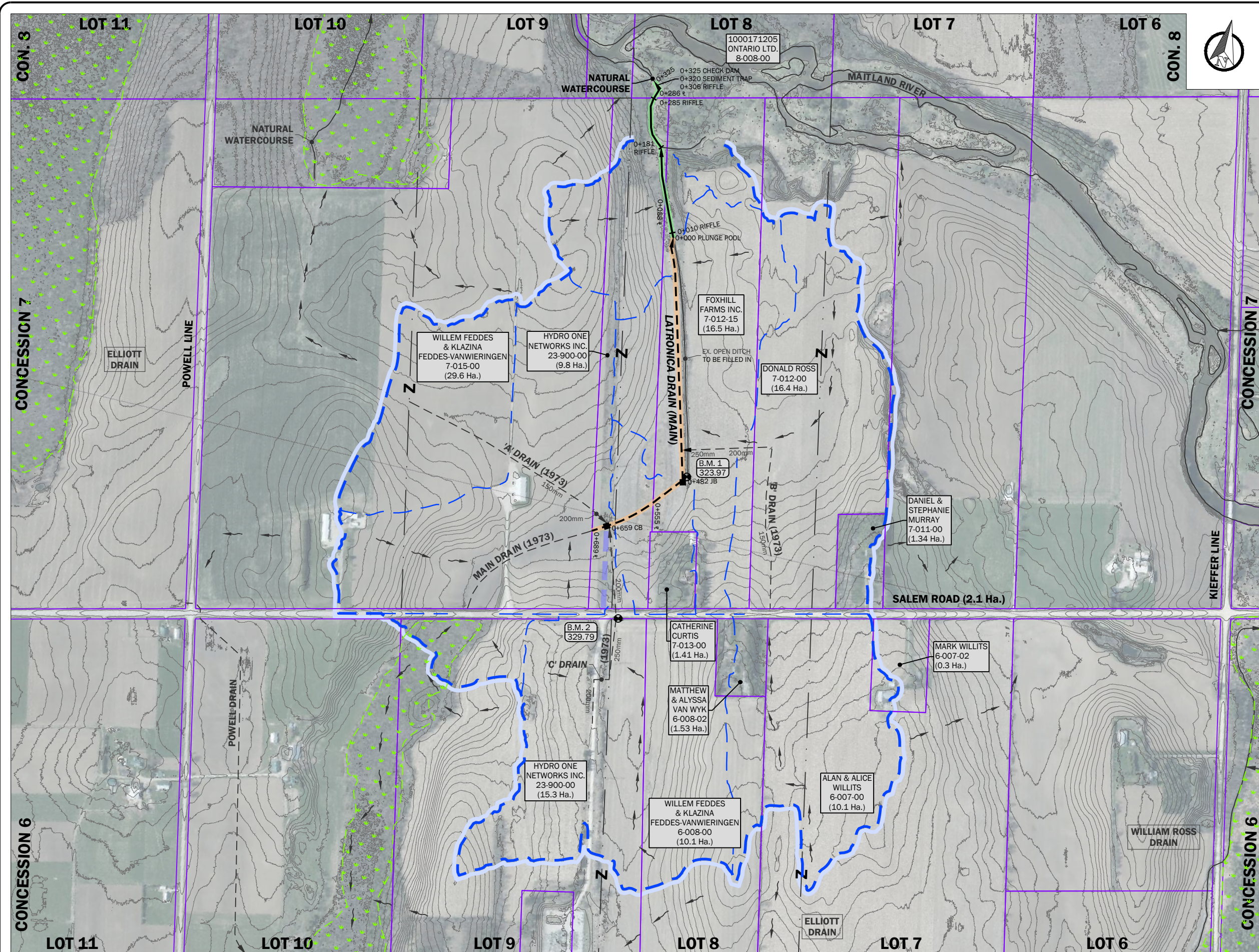
LEGEND

- LOT/CONCESSION LINE
 - PROPERTY LINE
 - MAJOR WATERSHED BOUNDARY
 - MINOR WATERSHED BOUNDARY
 - WETLAND LIMIT
 - CONSTRUCTION/MAINTENANCE ACCESS
 - BENCHMARK LOCATION
 - BENCHMARK No.
 - BENCHMARK ELEVATION
 - LANDOWNER NAME(S)
 - ASSESSMENT ROLL No. (ABBREVIATED)
 - AREA WITHIN WATERSHED
- EXISTING FEATURES:
- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION
 - OVERLAND FLOW PATH
- PROPOSED FEATURES:
- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
 - DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION

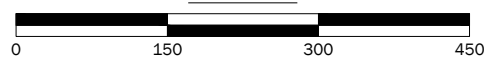
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4	PUBLIC INFORMATION MEETING	25-12-15
3	DFO SUBMISSION NO. 2	25-12-05
2	DFO SUBMISSION NO. 1	25-12-01
1	ON-SITE MEETING	24-10-10
No.	REVISION	DATE (YY-MM-DD)



DRAWN BY: R.U.	DESIGNED BY: M.T.	CHECKED BY: S.B.	DRAWING 1 OF 4
DATE: 2026-04-30		REFERENCE No. MT-006	



PLAN SCALE

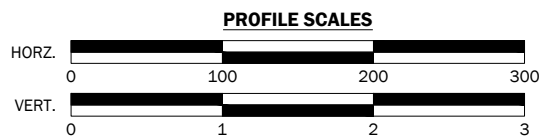
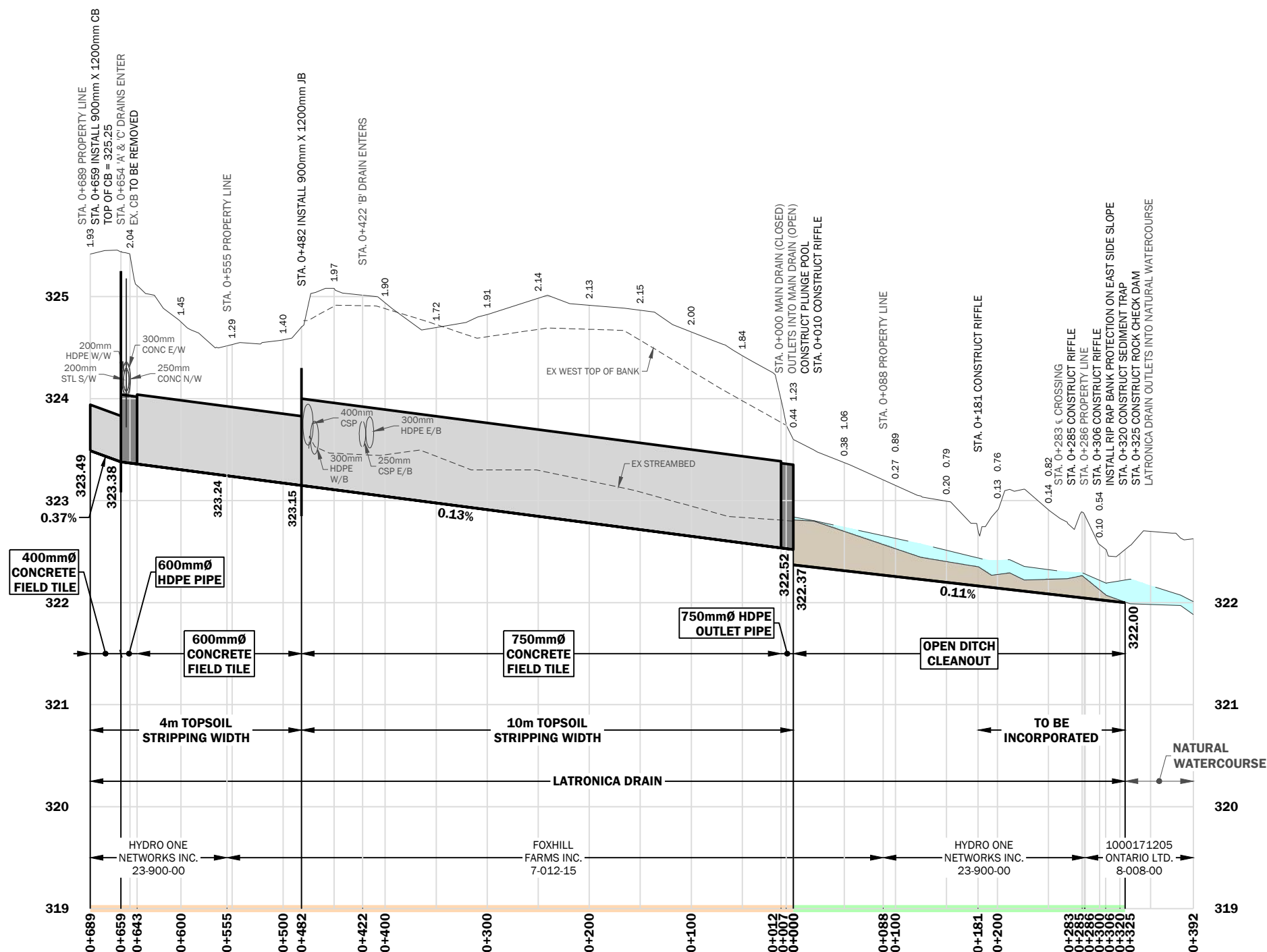




BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 ELEV.=323.97
TOP CENTRE OF 400mmØ CSP OUTLET PIPE AT STA. 0+000 (MAIN)

BENCHMARK No. 2 ELEV.=329.79
TOP CENTRE UPSTREAM END OF 400mmØ CSP SURFACE CULVERT 185m SOUTH OF STA. 0+654 (MAIN)



SCHEDULE OF PIPE MATERIALS

MATERIAL	DIAMETER (mm)	STATION RANGE	LENGTH (m)
1. HIGH DENSITY POLYETHYLENE OUTLET PIPE	750	0+000 - 0+012	12
2. CONCRETE FIELD TILE	750	0+012 - 0+482	470
3. CONCRETE FIELD TILE	600	0+482 - 0+643	161
4. HIGH DENSITY POLYETHYLENE PIPE	600	0+643 - 0+659	16
5. CONCRETE FIELD TILE	400	0+659 - 0+689	30

OPEN DITCH CLEANOUT

BOTTOM WIDTH
0.9m (PARABOLIC)

SIDE SLOPES
1.5:1



5	REPORT SUBMISSION	26-04-30
4	PUBLIC INFORMATION MEETING	25-12-15
3	DFO SUBMISSION NO. 2	25-12-05
2	DFO SUBMISSION NO. 1	25-12-01
1	ON-SITE MEETING	24-10-10
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DRAWN BY: R.U.	DESIGNED BY: M.T.	CHECKED BY: S.B.	DRAWING 2 OF 4
DATE: 2026-04-30		REFERENCE No. MT-006	



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TOP CENTRE OF 400mmØ CSP OUTLET PIPE AT STA. 0+000 (MAIN)
- BENCHMARK No. 2** ELEV.=329.79
TOP CENTRE UPSTREAM END OF 400mmØ CSP SURFACE CULVERT 7m ? OF STA. ? ('C' DRAIN)

LEGEND

- LOT/CONCESSION LINE
- PROPERTY LINE
- MAJOR WATERSHED BOUNDARY
- MINOR WATERSHED BOUNDARY
- OVERHEAD HYDRO LINE / TOWER CORRIDOR
- BENCHMARK LOCATION
- B.M. 1 123.45
- BENCHMARK No.
- BENCHMARK ELEVATION
- JOHN & JANE SMITH
- LANDOWNER NAME(S)
- 12-345
- ASSESSMENT ROLL No. (ABBREVIATED)
- (12.3 Ha.)
- AREA WITHIN WATERSHED

EXISTING FEATURES:

- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION
- OVERLAND FLOW PATH

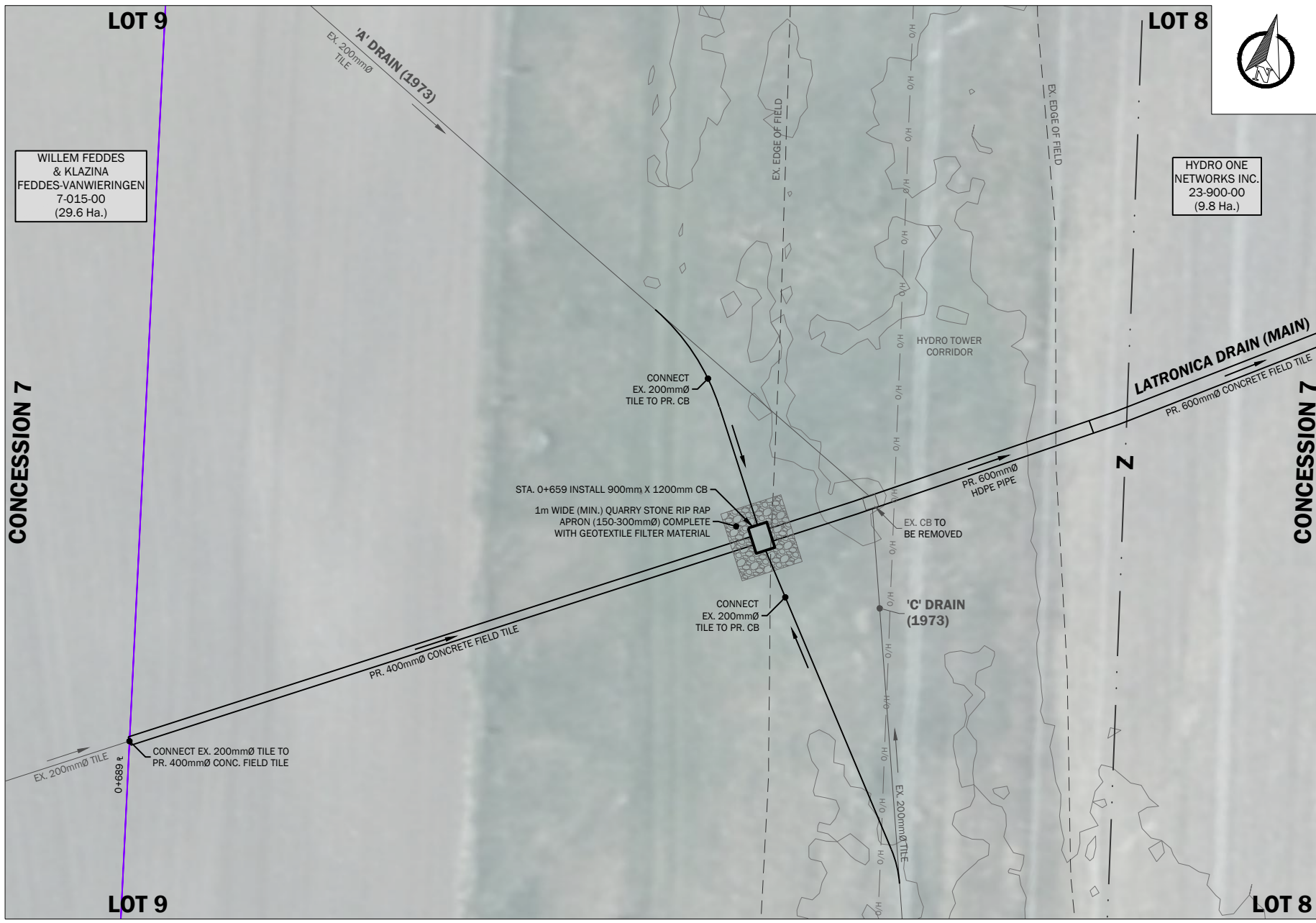
PROPOSED FEATURES:

- DRAIN NAME** OPEN DRAIN WITH CROSSING AND FLOW DIRECTION
- DRAIN NAME** CLOSED DRAIN WITH CATCH BASIN, MANHOLE AND FLOW DIRECTION

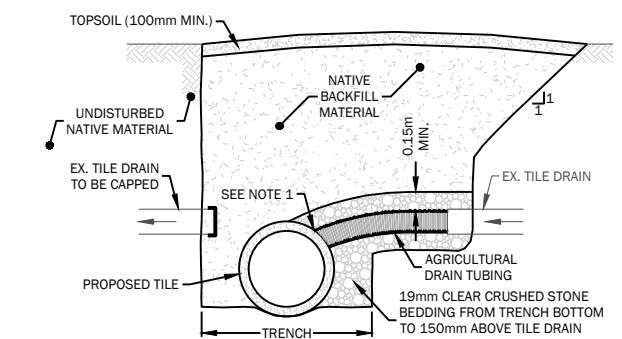
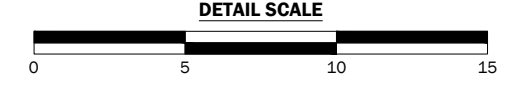
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No.	REVISION	DATE (YY-MM-DD)



DRAWN BY: R.U.	DESIGNED BY: M.T.	CHECKED BY: S.B.	DRAWING 3 OF 4
DATE: 2026-04-30		REFERENCE No. MT-006	

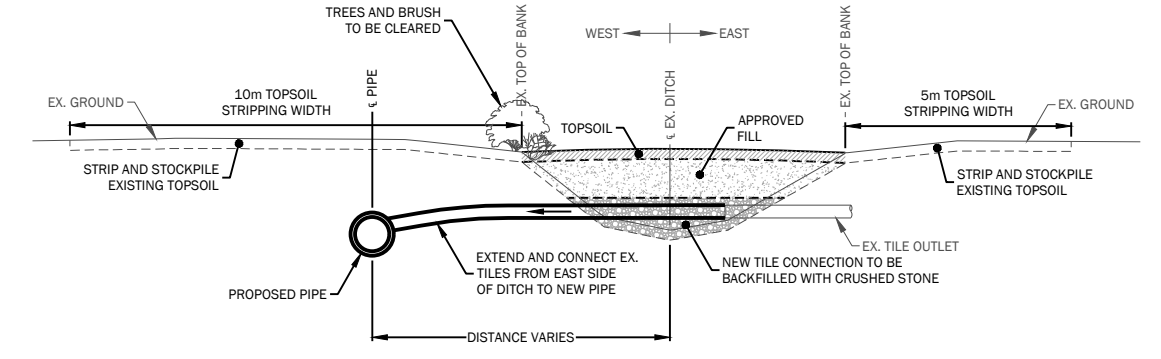


HYDRO CORRIDOR WORK AREA DETAIL

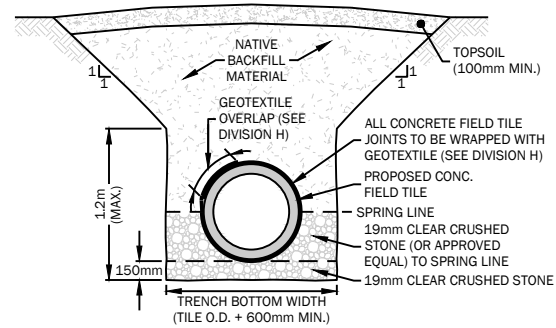


- NOTE:
- ALL TILE CONNECTIONS TO BE EITHER A CORED HOLE WITH AN INSERT COUPLER, OR A MANUFACTURED TEE.
 - CLEAR CRUSHED STONE BEDDING NOT REQUIRED IF DUAL WALL H.D.P.E. PIPE IS USED FOR THE CONNECTION.

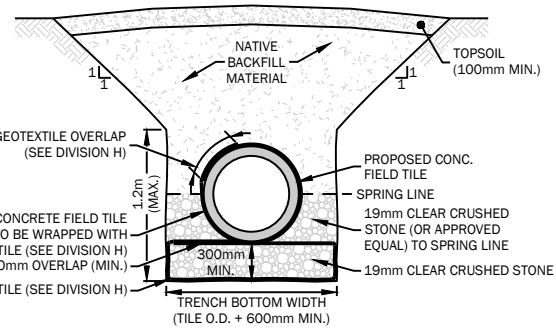
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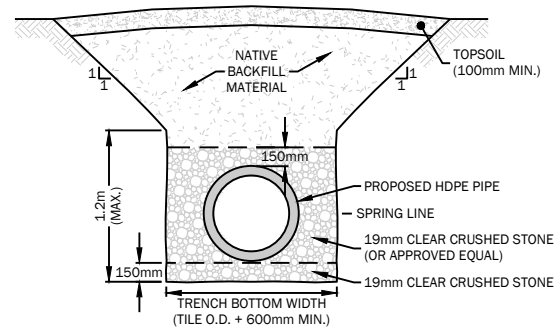
TYPICAL ENCLOSURE CROSS SECTION N.T.S.



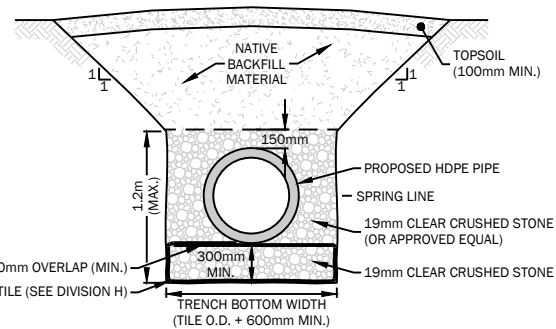
TYPICAL CONCRETE TILE INSTALLATION ON STONE BEDDING DETAIL N.T.S.



TYPICAL CONC. TILE INSTALLATION ON WRAPPED STONE BEDDING DETAIL (PROVISIONAL ITEM) N.T.S.



TYPICAL HDPE PIPE INSTALLATION ON STONE BEDDING DETAIL N.T.S.



TYPICAL HDPE PIPE INSTALLATION ON WRAPPED STONE BEDDING DETAIL (PROVISIONAL ITEM) N.T.S.

WILLEM FEDES & KLAZINA
FEDES-VANWIERINGEN
7-015-00
(29.6 Ha.)

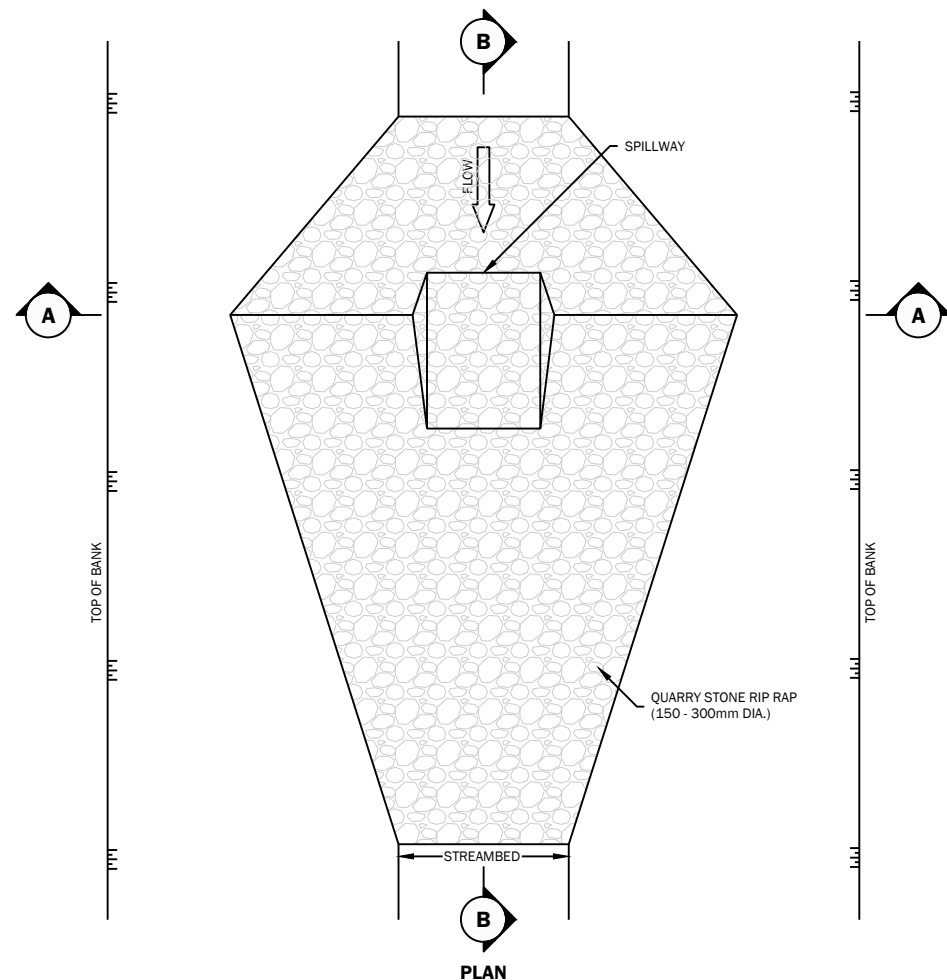
HYDRO ONE
NETWORKS INC.
23-900-00
(9.8 Ha.)



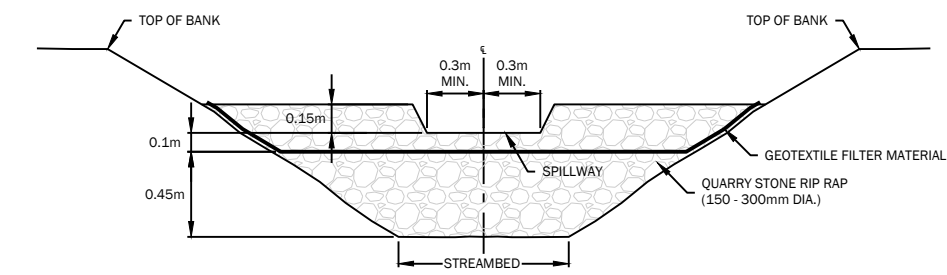
BENCHMARK DESCRIPTIONS

BENCHMARK No. 1 ELEV.=323.97
 TOP CENTRE OF 400mmØ CSP OUTLET PIPE AT STA. 0+000 (MAIN)

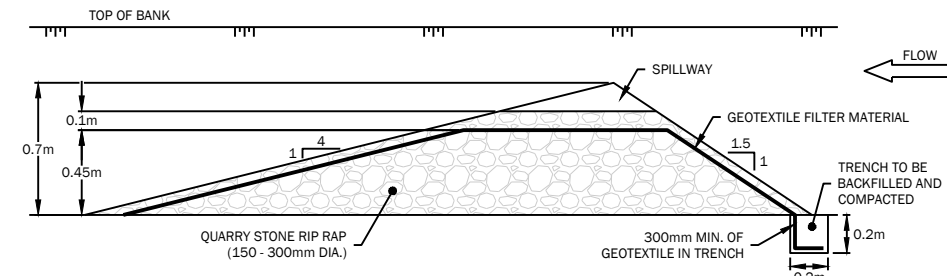
BENCHMARK No. 2 ELEV.=329.79
 TOP CENTRE UPSTREAM END OF 400mmØ CSP SURFACE CULVERT 185m SOUTH OF STA. 0+654 (MAIN)



PLAN

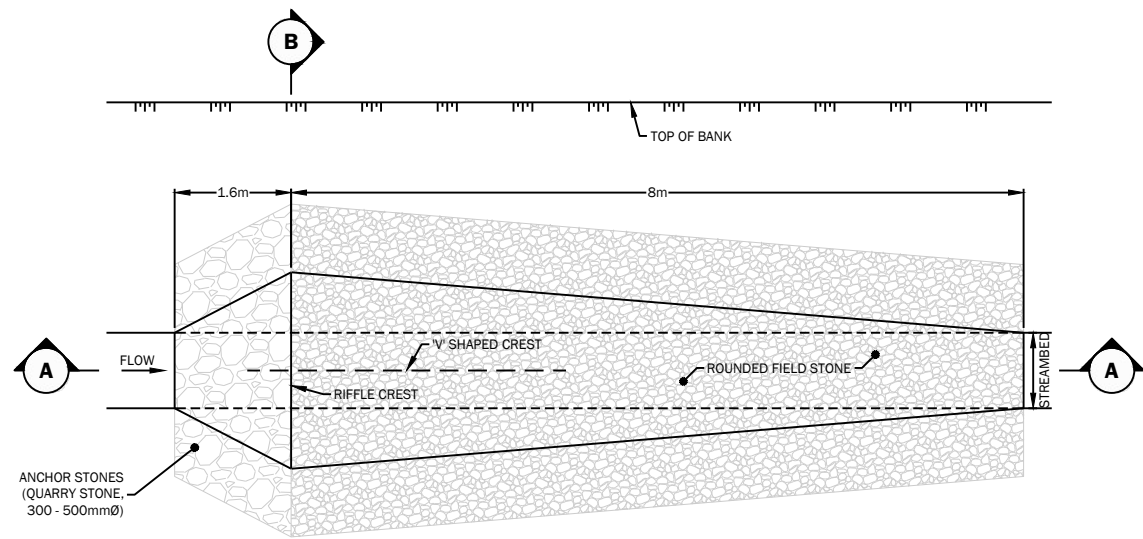


SECTION A

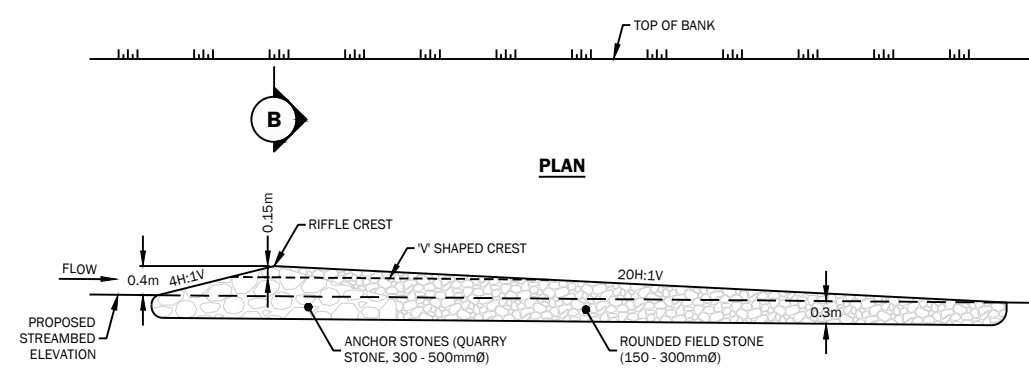


SECTION B

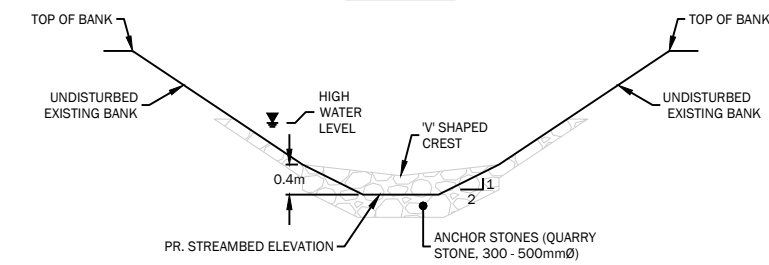
TYPICAL ROCK CHECK DAM DETAIL
N.T.S.



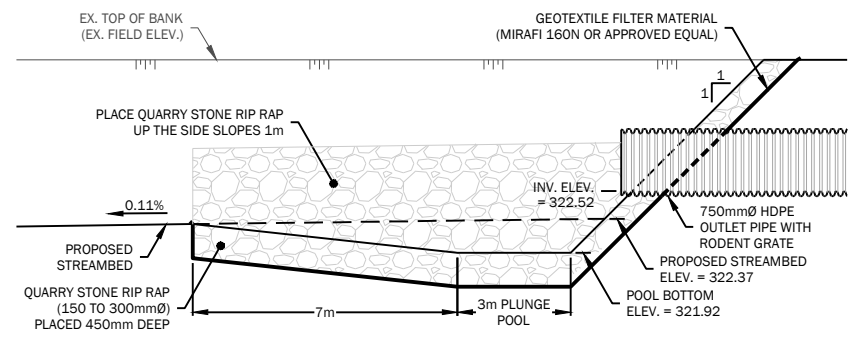
PLAN



SECTION A-A



SECTION B-B
TYPICAL RIFFLE DETAIL
N.T.S.



PLUNGE POOL DETAIL
N.T.S.



5	REPORT SUBMISSION	26-04-30
4	PUBLIC INFORMATION MEETING	25-12-15
3	DFO SUBMISSION NO. 2	25-12-05
2	DFO SUBMISSION NO. 1	25-12-01
1	ON-SITE MEETING	24-10-10
No.	REVISION	DATE (YY-MM-DD)



DRAWN BY: R.U.	DESIGNED BY: M.T.	CHECKED BY: S.B.	DRAWING 4 OF 4
DATE: 2026-04-30		REFERENCE No. MT-006	