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May 6, 2024

The Mayor and Council
Municipality of North Middlesex
229 Parkhill Main Street
Parkhill, ON
N0M 2K0

Gentlemen and Mesdames:

Re: Rock Drain

In accordance with your instructions, R. Dobbin Engineering has undertaken an examination of the Rock Drain in The Municipality of North Middlesex.

Authorization under the Drainage Act

This Engineers Report that has been prepared under Section 78 of the Drainage Act as per a request from an affected Landowner.

Under Section 78 of the Drainage Act, Council may undertake and complete the maintenance or repair of any drainage works constructed under a bylaw passed under this Act or its predecessor. Section 78 is to be used where it is considered expedient to change the course of the drainage works, or to make a new outlet for the whole or any part of the drainage works, or to construct a tile drain under the bed of the whole or any part of the drainage works as ancillary thereto, or to construct, reconstruct or extend embankments, walls, dykes, dams, reservoirs, bridges, pumping stations, or other protective works as ancillary to the drainage works, or to otherwise improve, extend to an outlet or alter the drainage works or to cover the whole or any part of it, or to consolidate two or more drainage works, the Council whose duty it is to maintain and repair the drainage works or any part thereof may, without a petition required under Section 4 but on the report of an Engineer appointed by it, undertake and complete the drainage works as set forth in such report.

Background

The Rock Drain outlets into the Prance Drain within the unopened portion of the Mark Settlement Drive road allowance. It continues northerly and then generally southeasterly

for a total distance of approximately 2,965m. In 2022, the drain was enclosed privately from Station 2+490 to 2+965, within the property with Roll Number 70-110.

The last Engineer's Report on the Rock Drain is dated July 2, 1974. Under this report the lower 636 meters were cleaned.

As per a report dated April 29, 1998 the Rock Drain open section and two closed sections from the west edge of Lot 6, Concession 25 to the upper limits of the watershed was abandoned. These portions are now private and will not be maintained under the provisions of the Drainage Act.

On-Site Meeting

A site meeting was held on February 1, 2023.

The following were present at the meeting:

- Josh Warner (R. Dobbin Engineering)
- Joanne Sadler (Municipality of North Middlesex)
- John McLinchey (Landowner)
- Dale McLinchey (Landowner)
- Ron Smith (Landowner)
- Jerry Hendrikx (Landowner)
- Ron Masschelein (Landowner)
- Laurie-Ann Masschelein (Landowner)
- Mike Mitchell (Landowner) (Virtually)

The following is a brief summary of the meeting:

- General discussion of the Drainage Act and Landowners rights under the Drainage Act.
- With the notice, Landowners were given a plan with a preliminary drainage area. It was mentioned that should Landowners have any concerns with the drainage area as presented they should bring it up to the engineer. No Landowners expressed any concerns with the drainage area as presented.
- Landowners were made aware that the drain has been privately enclosed. The report will incorporate the enclosure under Section 31 of the Drainage Act and the costs will be assessed out.
- Landowners were made aware that the tile is undersized when compared to the grantable standard of 38mm / 24 hours. Josh Warner stated that should a request

form upstream lands be initiated in the future the costs of replacing or twinning the tile will be assessed in accordance with this report. The Landowners present were okay with the undersized tile and the potential of it being replaced or twinned prior to it reaching its lifespan.

- The culverts on the drain will be investigated and replaced as required. Any culverts not replaced will be specified for future replacement.
- No adverse soil conditions were noted at the site meeting.

Discussion

Following the site meeting, it was determined, in discussion with the Municipality, that updating the maintenance specifications, profile and schedules would be to the benefit of the drainage works.

The enclosure done privately was completed by A.G. Hayter. They are a reputable Contractor and there are no concerns with the quality of the construction. A.G. Hayter provided information regarding the tile. A.G. Hayter stated that the tile was laid at a 0.20% grade, however, our survey information has it at a 0.30% grade.

Drain Classification

The Prance Drain is classified as a class "E" drain at the outlet of the Rock Drain. The Rock Drain is currently classified as class "F" drain. These ratings are according to the Department of Fisheries and Oceans (DFO) classification as presented by the Ontario Ministry of Agriculture, Food and Rural Affair's Agricultural Information Atlas.

Class "F" drains are intermittent or ephemeral (dry for more than two consecutive months).

Existing Conditions

Below is a summary of the condition of the existing culverts:

Culvert Number	Location	Existing Culvert Size	Condition
1	Roll Number 70-128	1350mm dia. CSP	Okay. Rust below spring line
2	Roll Number 70-128	New Culvert	
3	Hutchinson Road	1800mm dia. CSP	Okay.

4	Roll Number 70-112	700mm dia. Concrete and HDPE	Okay. Unable to see joint

Design

The tile drain appears to have been sized for a drainage coefficient of 22mm / 24 hours. The future replacement or twinning of the tile shall be done in order to provide a drainage coefficient of 38mm / 24 hours.

The agricultural culverts shall be designed to provide outlet for a 1 in 2-year storm event. The road culvert shall be designed to provide outlet for a 1 in 25-year storm event.

Draft Report

A draft report, dated July 6, 2023 was sent to all the affected Landowners and a meeting was held on August 10, 2023 to go over the report and address any questions and concerns related to the draft report. The following were present at the meeting:

- Josh Warner (R. Dobbin Engineering)
- Joanne Sadler (Municipality of North Middlesex)
- Mike Mitchell (Landowner)
- Scott Hendrikx (Landowner)
- Ron Smith (Landowner)
- Laurie Anne Masschelein (Landowner)

The following is a brief summary of the meeting:

- General discussion of the Drainage Act.
- No concerns were brought forward.

Discussion

Prior to the Meeting to Consider in the Fall of 2023, a Landowner requested that the report be referred back to review potential work at the lower end of the drain. After a meeting with the Landowner in May of 2024, it was determined that the work could be completed through maintenance. The Landowner also requested a culvert to service the property with Roll Number 70-128.

Recommendations

It is therefore recommended that the following work be carried out:

1. The tile enclosure on the property with Roll Number 70-110 be incorporated under Section 31 of the Drainage Act. The open channel shall be abandoned in this section of the drainage works.

2. The specifications, profile and maintenance schedule for the Rock Drain shall be updated.

3. Future specifications shall be developed for the replacement and future installation of culverts along the length of the drainage works.

Estimate of Cost

It is recommended that the work be carried out in accordance with the accompanying Specification of Work and Profile that forms part of this Report. There has been prepared an Estimate of Cost in the amount of $54,376, including engineering of the report, attending the Meeting to Consider the Report, attending the Court of Revision, and an estimate for tendering, contract administration and inspection. Appearances before appeal bodies have not been included in the cost estimate.

A plan has been prepared showing the location of the work and the approximate drainage area. A profile is included showing the depths and grades of the proposed work.

Assessment

As per Section 21 of the Drainage Act, the Engineer in their Report shall assess for benefit and outlet for each parcel of land and road liable for assessment. Lands, roads, buildings, utilities, or other structures that are increased in value or are more easily maintained as a result of the construction, improvement, maintenance, or repair of a drainage works may be assessed for benefit. (Section 22)

Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or indirectly through the medium of any other drainage works or of a swale, ravine, creek, or watercourse may be assessed for outlet. The assessment for outlet shall be based on the volume and rate of flow of the water artificially caused to flow into the drainage works from the lands and roads liable for such assessments. (Section 23)

The Engineer may assess for special benefit any lands for which special benefits have been provided by the drainage works. (Section 24)

A Schedule of Assessment for the lands and roads affected by the work and therefore liable for the cost thereof will be prepared as per the Drainage Act. Also, assessments may be made against any public utility or road authority, as per Section 26 of the Drainage Act, for any increased cost for the removal or relocation of any of its facilities and plant that may be necessitated by the construction or maintenance of the drainage works. Items to be assessed under Section 26 for road crossings and locating and working around utilities shall be tendered separately with the actual cost plus a portion of the engineering (25% of the construction cost) being assessed to the owner of the road or public utility.

The cost of any approvals, permits or any extra work, beyond that specified in this Report that is required by any utility, government ministry or organization (federal or provincial), or road authority shall be assessed to that organization requiring the permit, approval, or extra work.

The estimated cost of the drainage works has been assessed in the following manner:

1. The cost of engineering for the access culverts has been assessed with 50% of the cost applied as a benefit assessment to the owner of the property and the remainder of the cost assessed as an outlet assessment to upstream lands and roads based on equivalent hectares. The cost of engineering for the future replacement of road culvert has been assessed with 100% of the cost applied as a special benefit assessment to the owner of the road. The cost of engineering for the future replacement of Culvert No. 2 has been assessed with 100% of the cost applied as a special benefit assessment to the property with Roll Number 70-128 as it is a secondary access.

2. The incorporation of the enclosure, including engineering, on the property with Roll Number 70-110 has been assessed with 50% of a standard cleanout (less grant) assessed as an outlet assessment to upstream lands and roads based on equivalent hectares. The remaining cost has been assessed to the property with Roll Number 70-110 as a special benefit assessment. The outlet assessment for these costs has been separated in the Schedule of Assessment as R. Dobbin Engineering feels they will not be eligible for grant based on OMAFRA's current ADIP Policies.

3. The remaining cost has generally been assessed with approx. 50% of the estimated cost assessed as a benefit assessment and the remainder assessed as outlet assessment to the upstream lands and roads based on equivalent hectares.

All final costs included in the cost estimate of this report shall be pro-rated based on the Schedule of Assessment. Any additional costs shall be assessed in a manner as determined by the Engineer.

Allowances

Under Section 29 of the Drainage Act, the Engineer in his Report shall estimate and allow in money to the Landowner of any land that it is necessary to use for the construction or improvement of a drainage works or for the disposal of material removed from drainage works. This shall be considered an allowance for right-of-way.

Under Section 30 of the Drainage Act, the Engineer shall determine the amount to be paid to persons entitled thereto for damage, if any, to ornamental trees, lawns, fences, land and crops occasioned by the disposal of material removed from a drainage works. This shall be considered an allowance for damages.

As no work is proposed under this report, allowances under Section 29 and 30 were not provided.

Under Section 31 of the Drainage Act, the Engineer shall determine the amount to be paid for an existing drain that was not constructed on requisition or petition under this Act or any predecessor of this Act. The drain may be incorporated in whole or in part in a drainage works, the engineer in the report shall estimate and allow in money to the owner of such drain or part the value to the drainage works of such drain or part and shall include such sum in the estimates of the cost of the construction, improvement, repair or maintenance of the drainage works. The allowance under Section 31 was based on the amount paid for the enclosure.

Access and Working Area

Access to the work site for construction and future maintenance shall be from Mark Settlement Drive and Hutchinson Road and along the length of the drainage works. Access shall generally be restricted to a width of 6 metres.

The working area for the construction and future maintenance of the tile drain shall be restricted to a width of 20m along the length of the drainage works normally centred on the tile drain.

Access for culvert maintenance, tile repair and channel repair on a single property shall be from the properties in which the culvert, tile and/or channel is being repaired or

maintained. If maintenance is being done on multiple properties access shall be gained from the nearest roadway and shall be along the length of the drainage works. The working area at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert. The working area for channel maintenance shall be restricted to a width of 10m from the side the excavation is taking place. The channel shall generally be excavated from the north/west side of the channel unless otherwise determined by the Drainage Superintendent. Downstream of Station 0+320 the working area shall be on the east side of the channel. If, at the discretion of the Drainage Superintendent, there is erosion on the channel opposite the working area access may be gained along the channel and nearest culvert to maintain the bank.

Restrictions

No trees and shrubs shall be planted nor shall permanent structures be erected within 10m of either side of the proposed drain without prior written permission of Council.

Attention is also drawn to Sections 80 and 82 of the Drainage Act, which refer to the removal of obstructions in a drain and damage caused to a drain.

Agricultural Grant

If available, it is recommended that application for subsidy be made for eligible agricultural properties. Any assessments against non-agricultural properties are shown separately in the Schedule of Assessment.

Based on the current Agricultural Drainage Infrastructure Program (ADIP) policy the special benefit to the property with Roll Number 70-110 and 70-128 and the Section 31 outlet assessment will not be eligible for grant.

Maintenance

The Rock Drain, including catch basins, shall be repaired and maintained as per the applicable Schedule of Maintenance, specifications and drawings included in this report.

Properties that wish to have the excavated material trucked shall be assessed the cost of trucking less the cost of levelling. The cost of levelling will form part of the drain maintenance cost.

All the culverts, as included in the profile with rip rap end walls, shall be maintained and repaired in the following manner:

Culvert Number	Benefiting Lands	Road Authority	Upstream Based on Equivalent Hectares as Contained in the SofA
1	50% (Roll Number 70-128)		50%
2	100% (Roll Number 70-128)		
3		100%	
4	90% (Roll Number 70-112)		10%

If the owner of Culvert No. 1 requests an additional length of culvert beyond that required to have an 8m top width, the extra cost shall be borne by the Landowner making the request including the future maintenance and repair. The location of the 8m top width shall be determined by the Drainage Superintendent and shall generally be in the primary access location and shall include any headwalls.

The cost of an asphalt surface across any of the culverts shall be assessed to the benefitting property.

Each property is allowed one access culvert for each municipal drain with any second culvert on the property maintained and repaired 100% by the owner.

Yours truly,

Josh Warner, P. Eng.
R. Dobbin Engineering Inc.

Rock Drain
Municipality of North Middlesex
May 6, 2024

ALLOWANCES

Allowances have been made as per Sections 31 of the Drainage Act for Incorporation of the Drain Enclosure

Conc.	Lot or part	Roll No.	Owner	Section 29 ($)	Section 30 ($)	Section 31 ($)	Total ($)
26	Pt. Lot 6	70-110	Mitchell Swine Ltd.	-	-	39,006	39,006
			TOTAL ALLOWANCES	$0	$0	$39,006	$39,006

Estimate of Cost

Item Description	Quantity	Unit	Unit Cost ($)	Total ($)
Section 31 Allowance for Incorporation of Enclosure	1	LS	39,006	39,006
Engineering to Develop New Schedules of Maintenance	1	LS	1,200	1,200
Engineering to Develop New Maintenance Provisions and Profile	1	LS	3,800	3,800
Engineering for Future Culvert Replacements	1	LS	5,600	5,600
Engineering of Report to Incorporate Enclosure	1	LS	4,500	4,500
			Total Estimate excluding HST	**54,106**
			Non-Recoverable HST (1.76%)	270
			Total Estimate	**$ 54,376**

SCHEDULE OF ASSESSMENT

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Special Benefit	Benefit	Section 31 Outlet	Outlet	Total	Eq. Ha
Public Lands										
	Hagmier Road (Unopened)	1.08		Municipality of North Middlesex		-	15	16	31	0.97
	Hutchinson Road	1.44		Municipality of North Middlesex	1,400	-	20	48	1,468	1.30
	Bullock Road	0.70		Municipality of North Middlesex		-	10	43	53	0.63
	Adare Drive (Unopened)	1.60		Municipality of North Middlesex		-	22	88	110	1.44
	Mark Settlement Drive (Unope	0.20		Municipality of North Middlesex		13	3	2	18	0.18
					1,400	13	70	197	1,680	
Non-Agricultural Lands										
26	Pt. N 1/2 Lot 5	0.26	70-113-01	D. Mclinchey		-	2	6	8	0.13
27	Pt. Lot 6	0.10	07-116-05	D. Mclinchey		-	1	2	3	0.05
					-	-	3	8	11	
Agricultural Lands										
25	W 1/2 Lot 6	14.16	70-106	Dalgetta Farms Inc		-	76	337	413	4.96
	E 1/2 Lot 6	10.12	70-107-01	Lagerwerf's Greenway Acres c/o J. Lagerwerf		-	55	241	296	3.54
	E 1/2 Lot 7	22.25	70-108	1633552 Ontario Inc.		-	120	530	650	7.79
	W 1/2 Lot 7	26.30	70-109	Dalgetta Farms Inc		-	142	627	769	9.21
26	N 1/2 Lot 5	1.76	70-113	R. & L. Masschelein		-	10	31	41	0.62
	S 1/2 Lot 5 & Pt. Lot 6	22.53	70-112	J. & D. Mclinchey		991	122	397	1,510	7.89
	Pt. Lot 6	18.74	70-111	J. & D. Mclinchey		379	101	375	855	6.56
	Pt. Lot 6	23.47	70-110	Mitchell Swine Ltd.	38,140	4,369	127	559	43,195	8.21

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Special Benefit	Benefit	Section 31 Outlet	Outlet	Total	Eq. Ha
27	Lot 4	16.18	70-118	D. & B. Mclinchey		-	87	177	264	5.66
	E Pt. Lot 5	46.44	70-116	J. & D. Mclinchey		896	236	316	1,448	15.33
	W Pt. Lot 5	4.04	70-117	J. & D. Mclinchey		281	22	24	327	1.41
28	Lot 2	2.80	70-127	M. & L. Eagleson		-	14	15	29	0.92
	Pt. Lot 3	8.80	70-128	M. & L. Eagleson	1,400	1,209	45	25	2,679	2.90
	Pt. Lot 3	8.09	70-129	T. Shaw		131	37	41	209	2.43
					39,540	8,256	1,194	3,695	52,685	

Total - Public Lands	1,680
Total - Non-Agricultural Lands	11
Total Agricultural Lands	52,685
Total Assessment	$54,376

SCHEDULE OF MAINTENANCE NO. 1

To Maintain the Open Channel Portion of the Rock Drain (Station 0+000 to 2+490)

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Benefit	Outlet	Total
Public Lands							
	Hagmier Road (Unopened)	1.08		Municipality of North Middlesex	-	16	16
	Hutchinson Road	1.44		Municipality of North Middlesex	-	73	73
	Bullock Road	0.70		Municipality of North Middlesex	-	58	58
	Adare Drive (Unopened)	1.60		Municipality of North Middlesex	-	111	111
	Mark Settlement Drive (Unopened)	0.20		Municipality of North Middlesex	26	-	26
					26	258	284
Non-Agricultural Lands							
26	Pt. N 1/2 Lot 5	0.26	70-113-01	D. Mclinchey	-	7	7
27	Pt. Lot 6	0.10	07-116-05	D. Mclinchey	-	3	3
					-	10	10
Agricultural Lands							
25	W 1/2 Lot 6	14.16	70-106	Dalgetta Farms Inc	-	454	454
	E 1/2 Lot 6	10.12	70-107-01	Lagerwerf's Greenway Acres c/o J. Lagerwerf	-	325	325
	E 1/2 Lot 7	22.25	70-108	1633552 Ontario Inc.	-	714	714
	W 1/2 Lot 7	26.30	70-109	Dalgetta Farms Inc	-	844	844
26	N 1/2 Lot 5	1.76	70-113	R. & L. Masschelein	-	35	35
	S 1/2 Lot 5 & Pt. Lot 6	22.53	70-112	J. & D. Mclinchey	582	443	1,025
	Pt. Lot 6	18.74	70-111	J. & D. Mclinchey	758	458	1,216
	Pt. Lot 6	23.47	70-110	Mitchell Swine Ltd.	-	753	753

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Benefit	Outlet	Total
27	Lot 4	16.18	70-118	D. & B. Mclinchey	-	258	258
	E Pt. Lot 5	46.44	70-116	J. & D. Mclinchey	1,791	371	2,162
	W Pt. Lot 5	4.04	70-117	J. & D. Mclinchey	562	23	585
28	Lot 2	2.80	70-127	M. & L. Eagleson	-	15	15
	Pt. Lot 3	8.80	70-128	M. & L. Eagleson	1,018	-	1,018
	Pt. Lot 3	8.09	70-129	T. Shaw	262	40	302
					4,973	4,733	9,706

Total - Public Lands	284
Total - Non-Agricultural Lands	10
Total Agricultural Lands	9,706
Total Assessment	$10,000

SCHEDULE OF MAINTENANCE NO. 2

To Maintain the Tile Portion of the Rock Drain (Station 2+490 to 2+965)

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Benefit	Outlet	Total
Public Lands							
	Hagmier Road (Unopened)	1.08		Municipality of North Middlesex	-	-	-
	Hutchinson Road	1.44		Municipality of North Middlesex	-	-	-
	Bullock Road	0.70		Municipality of North Middlesex	-	96	96
	Adare Drive (Unopened)	1.60		Municipality of North Middlesex	-	-	-
	Mark Settlement Drive (Unopened)	0.20		Municipality of North Middlesex	-	-	-
					-	96	96
Non-Agricultural Lands							
26	Pt. N 1/2 Lot 5	0.26	70-113-01	D. Mclinchey	-	-	-
27	Pt. Lot 6	0.10	07-116-05	D. Mclinchey	-	-	-
					-	-	-
Agricultural Lands							
25	W 1/2 Lot 6	14.16	70-106	Dalgetta Farms Inc	-	759	759
	E 1/2 Lot 6	10.12	70-107-01	Lagerwerf's Greenway Acres c/o J. Lagerwerf	-	542	542
	E 1/2 Lot 7	22.25	70-108	1633552 Ontario Inc.	-	1,193	1,193
	W 1/2 Lot 7	26.30	70-109	Dalgetta Farms Inc	-	1,410	1,410
26	N 1/2 Lot 5	1.76	70-113	R. & L. Masschelein	-	-	-
	S 1/2 Lot 5 & Pt. Lot 6	22.53	70-112	J. & D. Mclinchey	-	-	-
	Pt. Lot 6	18.74	70-111	J. & D. Mclinchey	-	-	-
	Pt. Lot 6	23.47	70-110	Mitchell Swine Ltd.	6,000	-	6,000

Conc.	Lot or Part	Affected Hecatares	Roll No.	Owner	Benefit	Outlet	Total
27	Lot 4	16.18	70-118	D. & B. Mclinchey	-	-	-
	E Pt. Lot 5	46.44	70-116	J. & D. Mclinchey	-	-	-
	W Pt. Lot 5	4.04	70-117	J. & D. Mclinchey	-	-	-
28	Lot 2	2.80	70-127	M. & L. Eagleson	-	-	-
	Pt. Lot 3	8.80	70-128	M. & L. Eagleson	-	-	-
	Pt. Lot 3	8.09	70-129	T. Shaw	-	-	-
					6,000	3,904	9,904

Total - Public Lands	96
Total - Non-Agricultural Lands	-
Total Agricultural Lands	9,904
Total Assessment	$10,000

Rock Drain
Municipality of North Middlesex
May 6, 2024

SPECIFICATION OF WORK

1. Location

The Rock Drain is located in Lot 3, Concession 28 to Lot 6, Concession 26 in The Municipality of North Middlesex.

2. Scope of Work

The future work included in this specification includes, but is not limited to, the following:

- Open channel cleanout
- Supply and installation of concrete tile
- Supply and installation of catch basin structure
- Culvert replacements

3. General

Each tenderer must inspect the site prior to submitting their tender and satisfy themselves by personal examination as to the local conditions that may be encountered during this project. The Contractor shall make allowance in their tender for any difficulties which they may encounter. Quantities or any information supplied by the Engineer is not guaranteed and is for reference only.

All work and materials shall be to the satisfaction of the Drainage Superintendent who may vary these specifications as to minor details but in no way decrease the proposed capacity of the drain.

The Contractor shall be responsible for the notification of all utilities prior to the start of construction.

Measurement for Payment Clauses have not been included in these specifications and will be part of the Construction document. If the Construction document has not identified Measurement for Payment Clauses, the Contractor must notify the Municipality of North Middlesex and request clarification 2 days prior to pricing the project.

4. Plans and Specifications

This Specification of Work shall take precedence over all plans and general conditions pertaining to the Contract. The Contractor shall provide all labour, equipment, and supervision necessary to complete the work as shown in the Plans and described in these specifications. Any work not described in these specifications shall be completed according to the Ontario Provincial Standard Specifications and Standard Drawings.

Any reference to the Owner contained in these Contract Documents shall refer to The Municipality of North Middlesex or the Engineer authorized by The Municipality of North Middlesex to act on its behalf.

5. Health and Safety

The Contractor at all times shall be responsible for health and safety on the worksite including ensuring that all employees wear suitable personal protective equipment including safety boots and hard hats.

When applicable the Contractor shall be responsible for traffic control as per the Ontario Traffic Manual Book 7 – Temporary Conditions (latest revision).

The Contractor shall be responsible to ensure that all procedures are followed under the Occupational Health and Safety Act to ensure that work sites are safe and that accidents are prevented. In the event of a serious or recurring problem, a notice of non-compliance will be issued. The Contractor will be responsible for reacting immediately to any deficiency and correcting any potential health and safety risk. Continuous disregard for any requirement of the Occupational Health and Safety Act could be cause for the issuance of a stop work order or even termination of the Contract.

The Contractor shall also ensure that only competent workers are employed onsite and that appropriate training and certification is supplied to all employees.

6. Traffic Control

Access and driveways to private properties shall not be obstructed longer than the minimum time necessary for the work and shall be reinstated as soon as possible all to the satisfaction of the Engineer. The contractor shall schedule any obstruction of existing driveways with the owners at least two full working days in advance. Roads must be kept open to local traffic and all obstructions and diversions of traffic must be approved by the Engineer or Drainage Superintendent and Roads Superintendent at least two (2) full working days in advance.

a) The Contractor shall supply, erect and maintain all detour signs and special signs necessary for detours to divert traffic from the area under construction as directed

by the Road Superintendent or Engineer. All this work shall be at the Contractor's expense.

b) The Contractor shall be responsible for supplying, erecting and maintaining all signs, supports, barricades, flashers, cones, etc. in the construction area and at the boundaries of the work as part of the above detours, all to the satisfaction of the Engineer or Drainage Superintendent. All this work shall be done by the Contractor at their own expense.

c) The Contractor shall not be allowed to proceed with construction activities unless proper signage and flagmen are present. Flagging procedures, signage and detours shall conform to the recommendations of Book 7, Temporary Conditions, Ontario Traffic Manual, issued by the Ministry of Transportation. Conformance shall be enforced by the Ministry of Labour Inspector.

7. Access and Working Area

Access to the work site for construction and future maintenance shall be from Mark Settlement Drive and Hutchinson Road and along the length of the drainage works. Access shall generally be restricted to a width of 6 metres.

The working area for the construction and future maintenance of the tile drain shall be restricted to a width of 20m along the length of the drainage works normally centred on the tile drain.

Access for culvert maintenance, tile repair and channel repair on a single property shall be from the properties in which the culvert, tile and/or channel is being repaired or maintained. If maintenance is being done on multiple properties access shall be gained from the nearest roadway and shall be along the length of the drainage works. The working area at each culvert shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert. The working area for channel maintenance shall be restricted to a width of 10m from the side the excavation is taking place. The channel shall generally be excavated from the north/west side of the channel unless otherwise determined by the Drainage Superintendent. Downstream of Station 0+320 the working area shall be on the east side of the channel. If, at the discretion of the Drainage Superintendent, there is erosion on the channel opposite the working area access may be gained along the channel and nearest culvert to maintain the bank.

8. Benchmarks

The benchmarks are based on geodetic elevations. Elevations are available at the locations shown on the Plan and Profile drawings. Where these elevations are on existing structures to be replaced, they shall be transferred by the Contractor prior to the removal.

9. Removals

The culvert and excavated material shall be removed in their entirely and shall be disposed offsite at the expense of the Contractor.

10. Expose Existing Drain

The existing tile drain shall be exposed at the discretion of the Drainage Superintendent or Engineer and Contractor in order to adequately determine the future alignment. The future tile drain shall generally run beside the existing main. The side the new tile runs on shall be determined by the Drainage Superintendent once the existing tile is exposed.

11. Brushing and Tree Removal

All brush, trees, woody vegetation, stumps etc. shall be removed for a width of 20 metres along the tile drain. They shall be removed in their entirety including stumps. Removal of all brush, trees, woody vegetation, stumps etc. in order to facilitate the excavation of the open channel shall be removed at the discretion of the Drainage Superintendent or Engineer and shall be included as part of this item.

It is recommended that a mechanical grinder attached to an excavator be used for the removal of brush and trees. Any brush and trees too large to grind shall be close cut. The Contractor shall stockpile the trees and brush in a single pile on the property in which they were removed or dispose of the trees and brush offsite. The Contractor is responsible for the burning of the trees and brush. The Contractor is responsible for obtaining all necessary permits for any disposal sites. Burning of the trees and brush is subject to local bylaws and guidelines of the Ministry of the Environment Conservation and Parks.

Certain trees may be left in place at the direction of the Drainage Superintendent.

12. Excavation of Open Channel

For construction and future maintenance of the entire drain the open channel shall be excavated and maintained to the depths and grades as per the profile and drawings as contained in this Engineers Report. The channel shall be excavated to the proper depth using a laser or similar approved device with a labourer onsite to ensure correctness of grade and to confirm location of tile ends.

The excavated material shall be cast at least 1.5 metres clear of the bank. Excavated material shall not be placed in low runs or swales out letting surface water to the channel. The excavated material shall be levelled to a maximum depth of 150mm and left in a condition suitable for cultivation. This shall include the removal of any rocks larger then 10cm in diameter and any debris/wood that could damage or plug farm equipment. Leveling shall occur when the material is dry enough to do so as determined by the

Drainage Superintendent or Engineer. All high spots above grade shall be removed. The sediment shall be removed leaving a rounded bottom with the intent not to undercut the existing side slopes. All material unfit for placing on farmlands shall be disposed of offsite by the Contractor.

Where determined by the Drainage Superintendent, the banks are unstable the banks shall be re-sloped to 2:1.

13. Strip and Place Topsoil

The Contractor shall strip the topsoil for a width of 6m normally centered on the proposed tile drain. The topsoil shall be stockpiled at the edge of the working allowance for the duration of the tile installation. Once the tile is installed, the Contractor shall level the topsoil over the drain to their pre-construction condition.

14. Installation of Tile

Should a request be initiated for increased capacity to the tile on the property with Roll Number 70-110 it may either be twinned or replaced. This shall be at the discretion of the Drainage Superintendent. If replaced the existing tile shall be abandoned as part of the drainage works, the tile shall be 600mm dia. concrete tile and shall generally match the obvert of the existing tile. If twinned, the additional tile shall be 350mm dia. concrete tile and shall match the invert of the installed tile.

The Contractor shall supply, install, and backfill the specified sizes of tile and pipe to the depths and grades as shown on the drawings.

Concrete tile shall conform to ASTM C412, extra quality. Tile shall have a circular interior and exterior shape.

Where the concrete tile depth is greater than 2.5m the tile shall be 2000D concrete tile and shall be bedded to the spring line with clear stone. The estimated length of 2000D concrete tile required has been shown as a separate item. Clear stone bedding to the spring line shall be included as part of this item.

It is intended that the tile drain run beside or up the existing drain. exact location of tile can be changed under the direction of the Drainage Superintendent or Engineer.

The trenching and laying of the concrete tile shall be done by wheel machine. An excavator must be used in areas of soil instability, unless approved by the Engineer. All tile joints shall be wrapped with a minimum 300mm width of Mirafi P150 (or approved equal) filter fabric. The filter fabric shall be overlapped by 450mm at the top of the tile. The tile shall be laid in straight lines or on smooth gradual curves with a minimum radius or 25m.

Where approved by the Engineer (or specified) concrete tile may be laid in tighter curves by saw cutting joints. The maximum deflection of one concrete tile joint shall be 22 degrees. Turns of greater than 22 degrees shall require the use of manufactured bends (PE smooth wall).

Laser control shall be used to ensure proper grades. The grades calculated on the Profile are to the invert of the tile and pipe with allowances to be made by the Contractor for the wall thickness of the tile and pipe. The depths shown and figured are from ground level to the invert of the pipe along the line of the proposed drain. Should an error appear in the figured depth at any station or stations, the grade shall be made to correspond with that shown on the Profile without extra charge.

Wheel Machine

A wheel machine shall be used to excavate the trench to allow for a round bottom. Prior to backfilling, the tile shall be covered manually to a depth of approx. 100mm over the pipe to ensure that the tile and pipe are not displaced by large clumps of earth. The trench shall be backfilled with excavated material free of stones, broken tile or other deleterious material. All stones larger than 100mm in diameter evident immediately after construction shall be picked up by the Contractor and disposed offsite. The Landowners are responsible for stones after that. The material shall be left windrowed over the trench to allow for settlement.

Excavator

When concrete tile is installed with an excavator, the tile must be installed as per the manufacturer’s recommendations complete with bedding to the spring line. Prior to backfilling, the tile shall be covered manually to a depth of approx. 100mm over the pipe to ensure that the tile and pipe are not displaced by large clumps of earth. The trench shall be backfilled with excavated material free of stones, broken tile or other deleterious material. All stones larger than 100mm in diameter evident immediately after construction shall be picked up by the Contractor and disposed offsite. The Landowners are responsible for stones after that. The material shall be left windrowed over the trench to allow for settlement.

If the land level must be lowered in order to carry out trenching operations, then it is up to the Contractor to determine if it is necessary and include any extra cost involved. They shall first strip the topsoil to its full depth and stockpile it along one side of the working width and then grade the area to allow the trenching to be carried out. All excavated material shall be windrowed on the side opposite the trench that the topsoil is stockpiled. After trenching and backfilling operations are complete, the topsoil shall be spread to its original depth.

All areas disturbed by construction, except the material windrowed over the trench, shall be left in a condition suitable for cultivation. Final levelling or the removal of excess material shall be the responsibility of the Landowner.

The Contractor shall not operate any trenching or backfill equipment, delivery trucks or equipment, pickup trucks or other vehicles along or over the trench during or after construction. The Contractor shall be responsible for any damage caused by any equipment or vehicles operated over the trench. If the Contractor must cross the trench, he will do so in one area.

Future replacements shall conform to these specifications.

15. Catch Basins

Should the tile be replaced or twinned the existing basin shall be utilized.

The catch basins shall be set on a layer of clear stone. The clear stone shall be extended up to the spring line of the inlet and outlet pipe connections.

The tile at the connection to the catch basins shall be concreted on both the inside and outside prior to backfilling. Any pipe or tile shall not protrude more than 50mm inside the wall.

16. Outlet Works

The outlet works for the drain shall consist of 6m of HDPE smooth wall pipe as shown on the profile (320 kPa) with a manufactured rodent rotating grate. It shall be installed at the outlet to the open channel. If twinned in the future the outlet pipe shall be 375mm dia. HDPE pipe and if replaced the outlet pipe shall be 600mm dia. HDPE pipe.

Erosion protection made up of rip rap and filter fabric shall be installed on the channel side slope from the bottom of the channel to the top of the bank and for a distance of 1m on either side of the outlet pipe. Rip rap shall be made up of 150mm to 300mm quarry stone or approved equal. The area to receive the rip rap shall first be graded to allow the placement of the rip rap to a depth of 400mm below finished grade. After grading, a layer of filter fabric (Terrafix 270R or approved equal) is to be placed with any joints overlapped a minimum of 600mm. Rip rap shall then be placed with the smaller pieces placed in the gaps and voids to give it a uniform appearance.

17. Installation of Culverts

The Contractor is required to notify the Landowner forty-eight (48) hours prior to the removal of a culvert.

The Contractor shall supply, install, and backfill aluminized corrugated steel pipe with a minimum wall thickness of 2.8mm in all cases. Corrugated Steel Pipe Arches shall have a minimum wall thickness of 3.5mm in all cases. Roads culverts may be polymer laminated at the discretion of the Road Authority. All corrugation profiles shall be of helical lock seam manufacture using 68 x 13mm corrugations for 1600mm dia. pipe and smaller and 125 x 25mm corrugations for 1800mm dia. pipe and larger. Pipe with 125 x 25mm corrugations shall be used if 68 x 13mm corrugations are not available.

The high-density polyethylene (HDPE) smooth wall pipe (320 kPa) shall be CSA Approved with bell and spigot joints.

The culverts designated to be replaced in the future under this report shall be examined after any cleanout of the open channel as to its condition. If it is found to be in disrepair (i.e. there are holes corroded in the bottom or sides) it shall be replaced as per these specifications.

The culverts shall be installed generally in the same location or as approved by the Drainage Superintendent or Engineer. The culverts shall be installed with the invert 10% (minimum 150mm) below the original channel bottom elevation unless otherwise shown in order to achieve the minimum cover. It is the Contractors responsibility to ensure that the minimum cover is achieved when backfilling the culverts.

All culverts may have concrete block or rip rap end walls. The access culverts shall be assessed, as per the report, to provide an 8m access width. If an owner requests a longer culvert than that required to achieve an 8m top width, please refer to the report.

Any tile outlets extended as a result of a culvert shall be extended at the landowner's expense. The pipes that shall be extended upstream or downstream of the proposed culvert shall be done with non-perforated HDPE agricultural tubing with a manufactured coupling, elbow and rodent grate.

Access Culverts/Lawn Piping:

The bottom of the excavation shall be excavated to a minimum of 100mm below the proposed invert. The pipe shall be bedded with ¾" clear stone. When the pipe has been installed to the proper grade and depth, the excavation shall be backfilled with ¾" clear stone and wrapped in filter fabric from the bottom of the excavation to the spring line of the pipe. Care shall be taken to ensure that the backfill on either side of the culvert does not differ by more than 300mm so that the pipe is not displaced. The access culverts shall be backfilled from the spring line to within 150mm of finished grade with Granular "B" Type II. Where no vehicular traffic is proposed to cross the culvert, the culvert may be backfilled with select native material. The top 150mm shall be backfilled with compacted 100% crushed granular "A" material to finished grade. In sections where no vehicular traffic is proposed to cross the culvert, the top 150mm shall be topsoil and seeded as per the restoration specification. If asphalt is proposed, the asphalt shall be HL4 and shall

match the existing thickness. In these cases, the compacted granular “A” shall occupy 150mm below the proposed asphalt.

Road Culverts:

The bottom of the excavation shall be excavated to a minimum of 100mm below the proposed invert. The pipe shall be bedded with ¾” clear stone. When the pipe has been installed to the proper grade and depth, the excavation shall be backfilled with ¾” clear stone and wrapped in filter fabric from the bottom of the excavation to 300mm above the pipe. Care shall be taken to ensure that the backfill on either side of the culvert does not differ by more than 300mm so that the pipe is not displaced. The pipe shall be backfilled above the clear stone with Granular “B” Type II.

Asphalt Road: The sub-base shall consist of a minimum of 300mm of OPS 100% crushed Granular “A”. The sub-base material shall not be native material. The asphalt shall be HL4 and HL3 at depths to match the existing thickness.

Gravel Road: The top 200mm shall be OPS Granular “M”, produced from 100% crushed dolomite, and shall be mechanically compacted to 100% modified standard proctor density.

The length of culverts specified in the profile are based on utilizing rip rap end walls. If concrete block end walls are proposed the culvert shall be reduced in length accordingly.

If the Hutchinson Road culvert is replaced prior to the upstream enclosure, the upstream enclosure shall be cut to allow for the placement of the road culvert.

If rip rap end walls are used, they shall consist of 150mm x 300mm quarry stone or approved equal. The area to receive the rip rap shall be graded to a depth of 400mm below finished grade. Filter fabric (Mirafi P150 or approved equal) shall then be placed with any joints overlapped a minimum 600mm. The quarry stone shall then be placed with the smaller pieces placed in the gaps and voids to give it a uniform appearance.

If concrete block end walls are used, they shall consist of concrete blocks with dimensions of approx. 600mm x 600mm x 1200mm, 600mm x 600mm x 2400mm or 300mm x 600mm x 1200mm as required. 600mm x 600mm x 2400mm concrete blocks will be paid at twice the unit price established per block, all others will be at a unit of 1. The top of the culvert shall govern block elevation. The correct block shall be set with the top of the block equal to the top of the culvert. 2400mm wide concrete blocks shall be used as the top block on arch and larger round pipes in order to span between the culvert top and the supporting block. The blocks shall be set at each end of the culvert so that each row of blocks will be offset approx. 100mm from the row below. The bottom row shall consist of one block placed parallel to the culvert. The blocks shall be imbedded a minimum of 300mm into each bank and shall extend into the drain bottom to match the pipe invert or below. Erosion protection shall be placed on the banks next to the end

walls. The erosion protection shall consist of 150mm x 300mm quarry stone over filter fabric (Mirafi P150 or approved equal). It shall extend 500mm upstream or downstream and from top of bank to top of bank at each end wall.

The blocks shall be placed over a layer of filter fabric (Mirafi P150 or approved equal). The culvert shall be backfilled in conjunction with the placement of the blocks. The gaps between the culvert and the blocks shall be filled with concrete cinder blocks/bricks and mortar to give the end wall a finished appearance.

After completion of the construction, the silt fence and any collected sediment shall be removed.

18. Seeding/Restoration

All grass areas disturbed by construction, shall be hand seeded on a daily basis or hydroseeded immediately following construction in accordance with the seed mixture, fertilizer and application rate as shown below. Spreading of the seed shall be by use of a mechanical spreader.

If the hand seed or hydroseed has not germinated, at the discretion of the Engineer or Drainage Superintendent, prior to the one-year maintenance period, 100mm of screened topsoil shall be placed on all grass areas disturbed by the construction, and shall be hydroseeded in accordance with the seed mixture, fertilizer and application rate as shown below.

Seed mixture, fertilizer and application rates are as follows:

- Canada Wild Rye (Elymus Canadensis), Virginia Wild Rye (Elymus virginicus), or Indian grass (Sorghastrum nutans)
- Fertilizer (300 kg/ha.) consisting of 8-32-16.
- Hydraulic mulch (2,999 kg/ha.) type “B” and water (52,700 litres/ha.) in accordance with OPSS 572 (hydroseed).

The above seed mixture shall apply unless otherwise approved by the Drainage Superintendent or Engineer.

19. Environmental Considerations

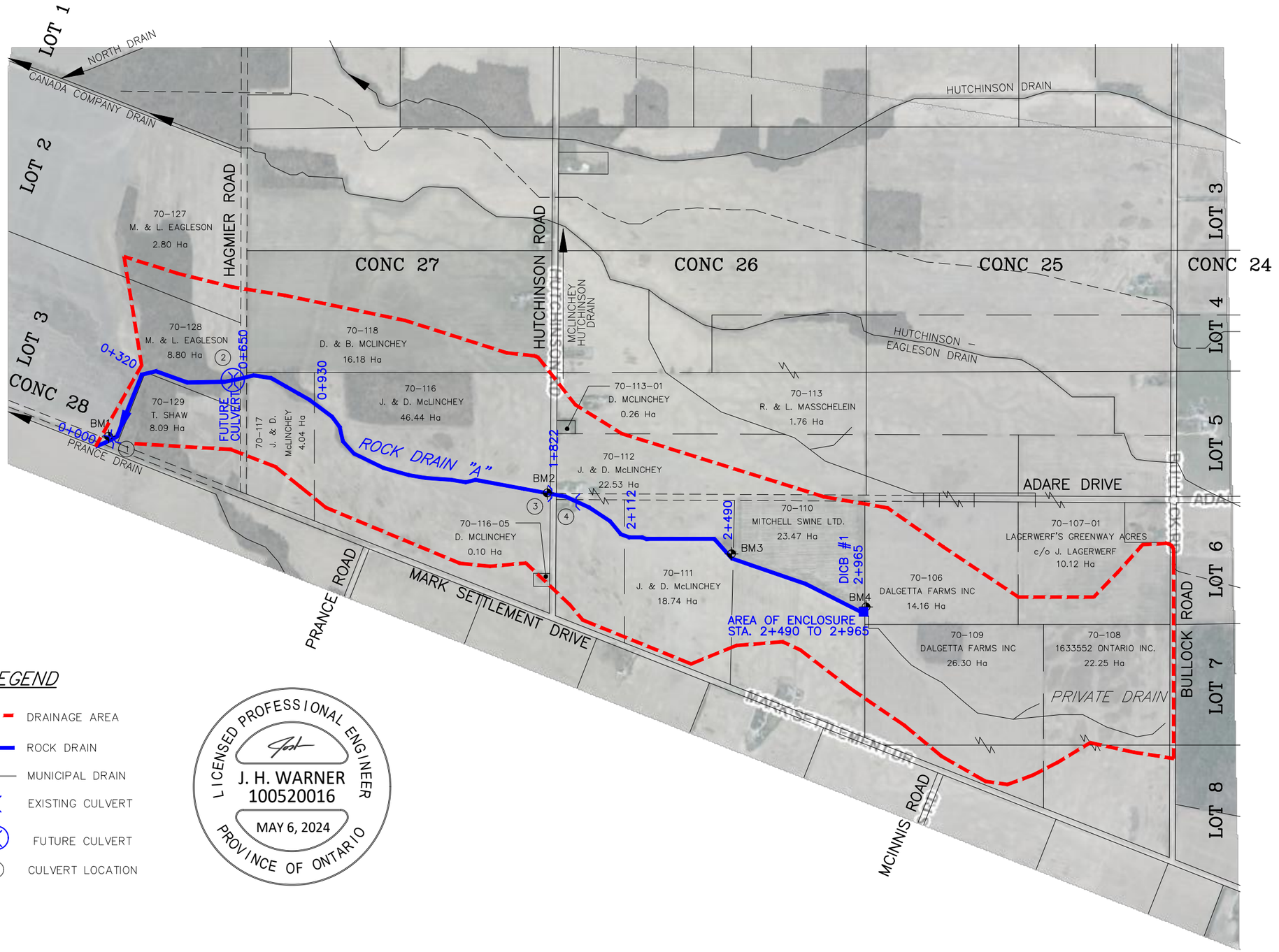
The Contractor shall take care to adhere to the following considerations.

- Operate machinery in a manner that minimizes disturbance to the banks of the watercourse.
- Erosion and sediment control measures must be installed prior to construction to prevent sediment from entering the water body.

- Material shall not be in areas regulated by the Conservation Authority or Ministry of Natural Resources.
- All granular and erosion control materials shall be stockpiled a minimum of 3.0m from the top of the bank or excavation. Material shall not be placed in surface water runs or open inlets that enter the channel.
- All activities, including maintenance procedures, shall be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicle and equipment refuelling and maintenance shall be conducted away from the channel, any surface water runs, or open inlets. All waste materials shall be stockpiled well back from the top of the bank and all surface water runs and open inlets that enter the drain.
- When possible, all construction within the open channel shall be carried out during periods of low flow or in dry conditions.
- The Contractor shall conduct regular inspections and maintain erosion and sediment control measures and structures during the course of construction.
- The Contractor shall repair erosion and sediment control measures and structures if damage occurs.
- The Contractor shall remove non-biodegradable erosion and sediment control materials once site is stabilized.
- Remove all construction materials from site upon project completion.

A light duty silt fencing shall be installed down-gradient of the work for the duration of construction.

The light duty silt fencing shall be supplied and installed in accordance with OPSS 577 and OPSD 219.110. The light duty silt fencing shall be removed once construction is complete.



LEGEND

- DRAINAGE AREA
- ROCK DRAIN
- MUNICIPAL DRAIN
- EXISTING CULVERT
- FUTURE CULVERT
- (7) CULVERT LOCATION

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
MAY 6, 2024
PROVINCE OF ONTARIO

Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME: Rock Drain Plan

PROJECT No. 2022-1473

APPROVED: J. WARNER

CHECKED: B. VAN RUITENBURG

DRAWN: C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	CS

SCALE: 1:15,000
0 400m

MUNICIPALITY of NORTH-MIDDLESEX

ROCK DRAIN PLAN

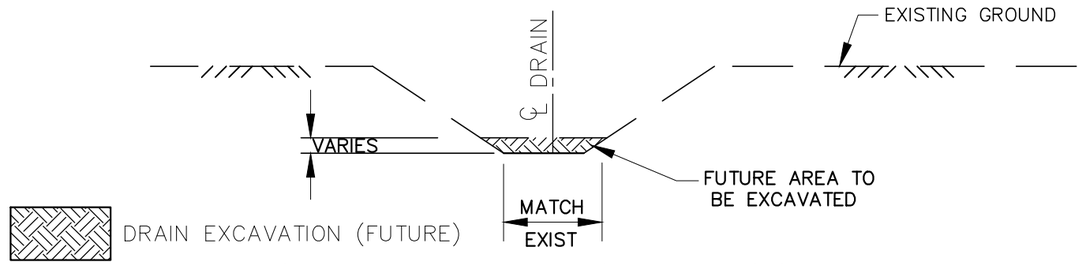
1 OF 8

Last Updated: May 6, 2024

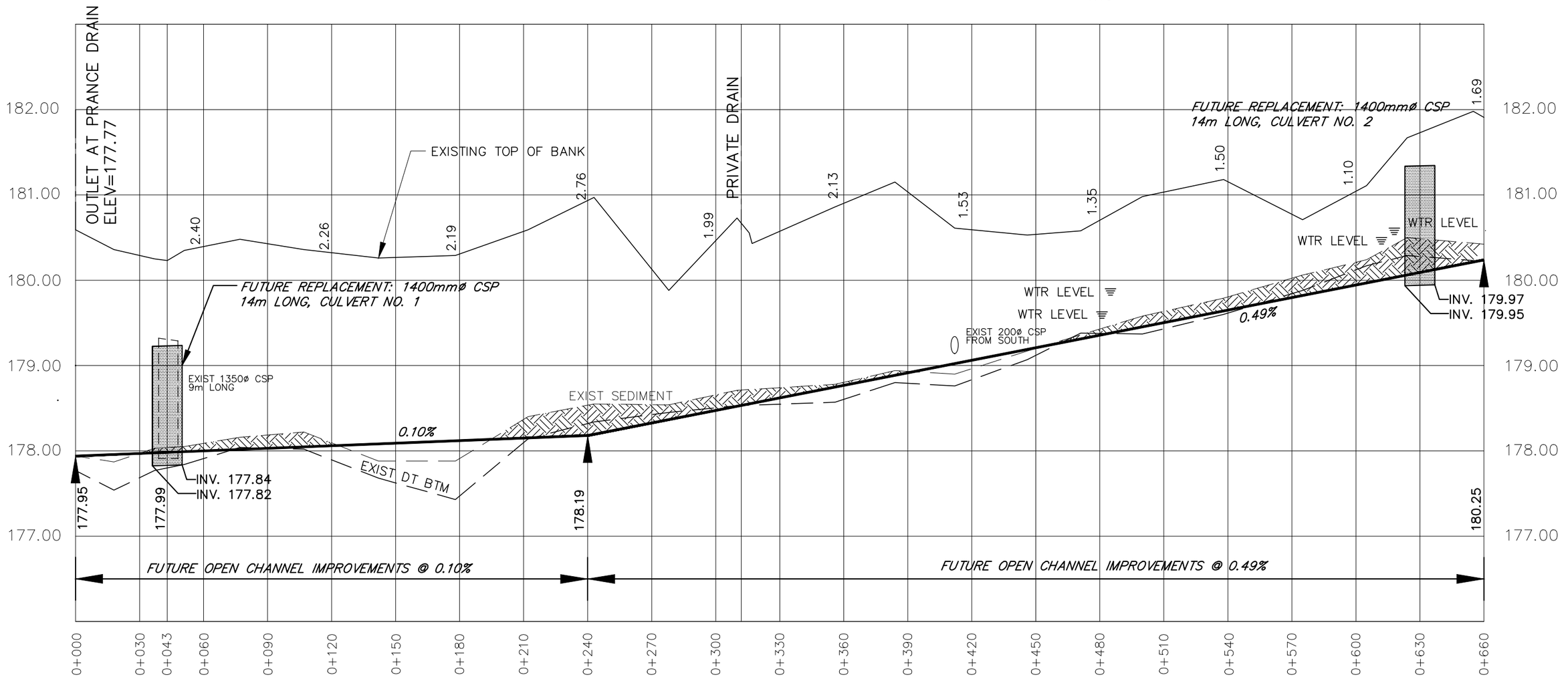
GENERAL NOTES

1. BENCHMARK No.1 ELEV. 179.32
   TOP SOUTH END OF EXISTING 1350ø CSP
   STATION 0+043
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
MAY 6, 2024
PROVINCE OF ONTARIO



TYPICAL DRAIN CROSS SECTION
NTS



Dobbin Engineering Inc.
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DRAWING NAME: Rock Drain Profile 1
PROJECT No. 2022-1473

APPROVED	CHECKED	DRAWN
J. WARNER	B. VAN RUITENBURG	C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

ROCK DRAIN PROFILE

Last Updated: May 6, 2024

GENERAL NOTES

1. BENCHMARK No.1 ELEV. 179.32
   TOP SOUTH END OF EXISTING 1350ø CSP
   STATION 0+043
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.

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J. H. WARNER
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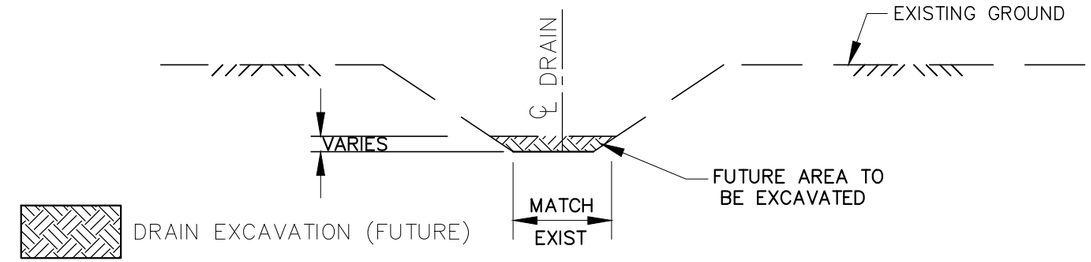
MAY 6, 2024
PROVINCE OF ONTARIO



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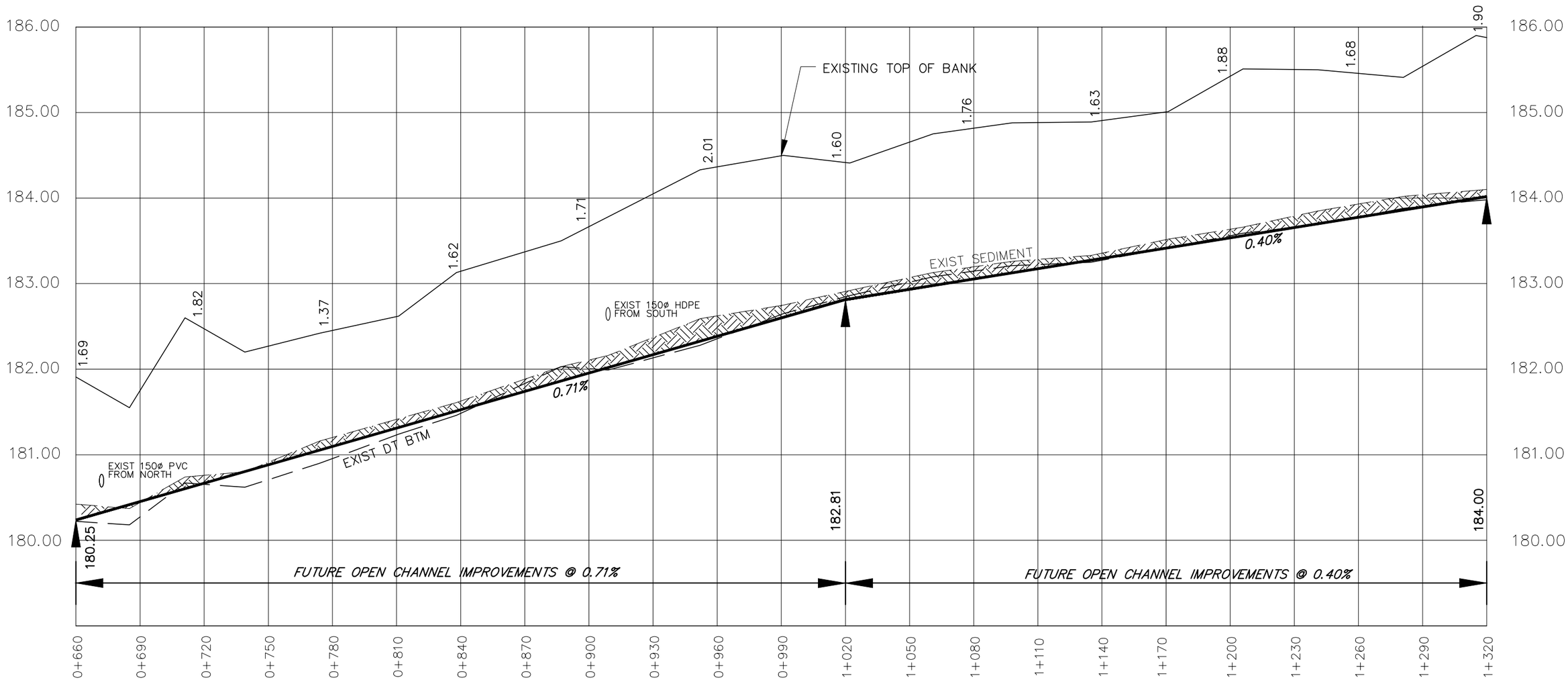

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DRAWING NAME: Rock Drain Profile 2
PROJECT No. 2022–1473

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	MAY 6, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
0 20 40 60m

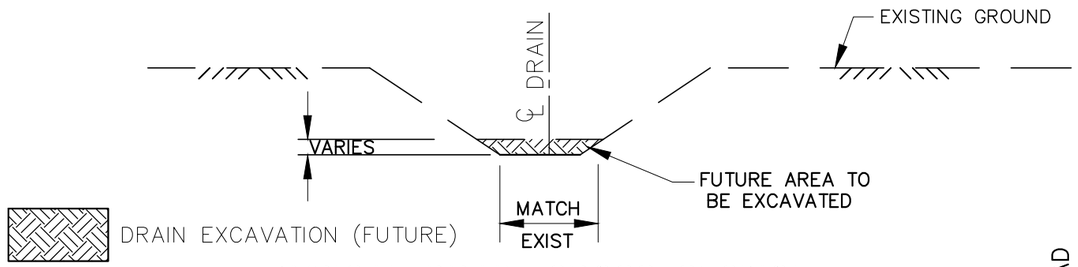
MUNICIPALITY of NORTH MIDDLESEX

ROCK DRAIN PROFILE

Last Updated: May 6, 2024

GENERAL NOTES

1. BENCHMARK No.2 ELEV. 187.75
   TOP EAST END OF EXISTING 1800ø CSP
   UNDER HUTCHINSON ROAD, STATION 1+822
2. UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



TYPICAL DRAIN CROSS SECTION

NTS

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J. H. WARNER
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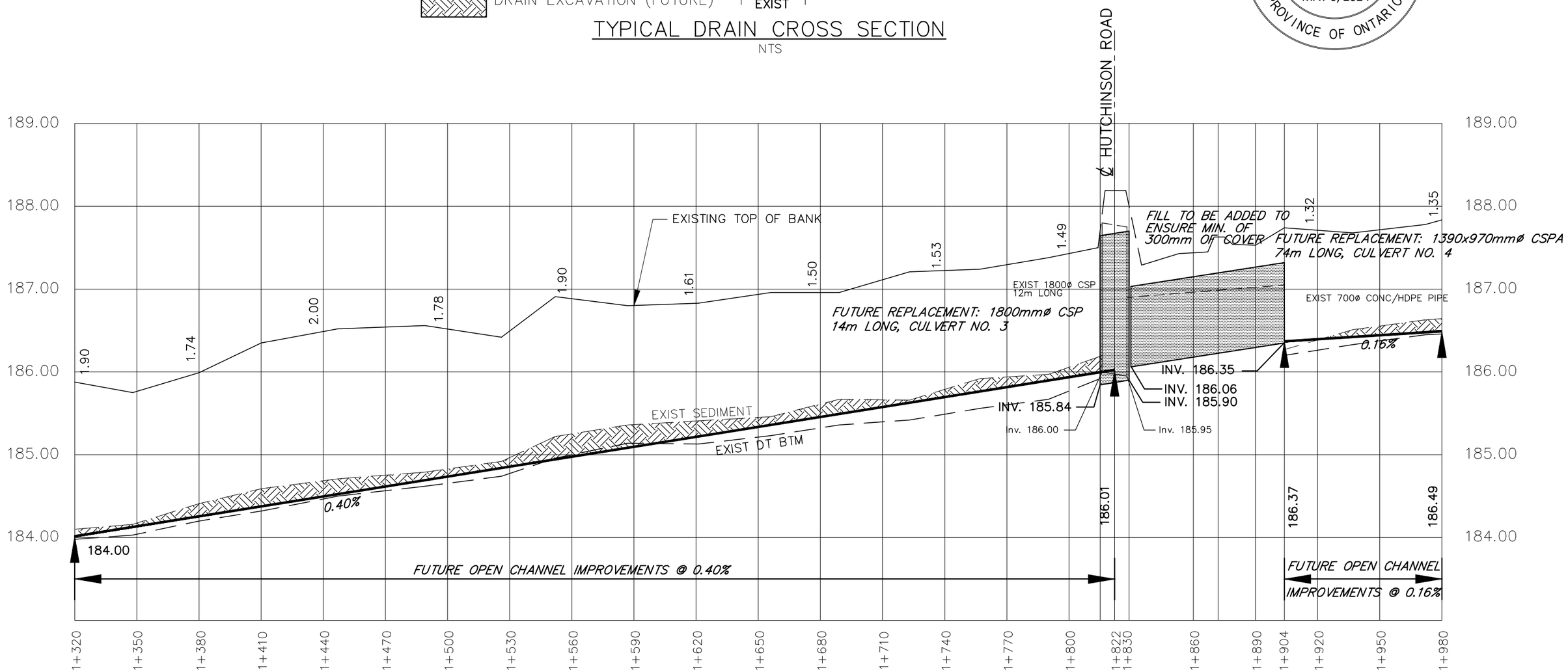
MAY 6, 2024
PROVINCE OF ONTARIO



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DRAWING NAME: Rock Drain Profile 3

PROJECT No. 2022-1473

APPROVED	J. WARNER
CHECKED	B. VAN RUITENBURG
DRAWN	C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

ROCK DRAIN PROFILE

Last Updated: May 6, 2024

GENERAL NOTES

1. BENCHMARK No.3 ELEV. 188.13
   TOP WEST END OF EXISTING 525ø HDPE
   AT EXISTING OUTLET, STATION 2+490
2. UPPER NUMBERS ARE DEPTH FROM TOP OF
   BANK TO FUTURE CHANNEL BOTTOM.

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
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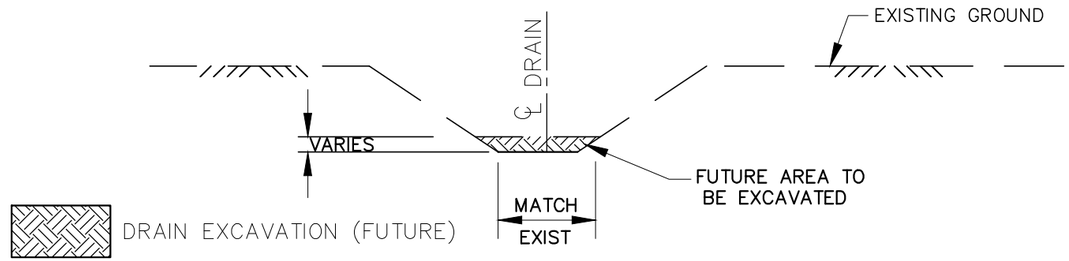
MAY 6, 2024
PROVINCE OF ONTARIO



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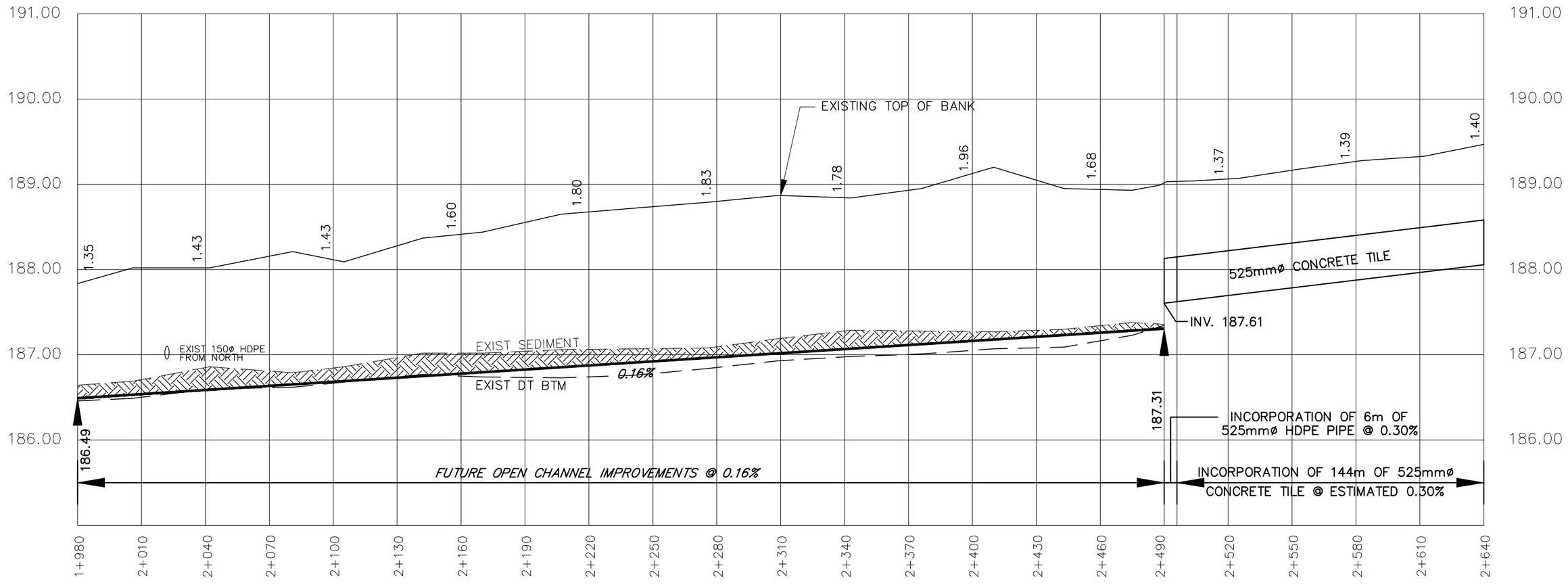

Dobbin Engineering Inc.
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DRAWING NAME: Rock Drain Profile 4

PROJECT No. 2022-1473

APPROVED J. WARNER

CHECKED B. VAN RUITENBURG

DRAWN C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

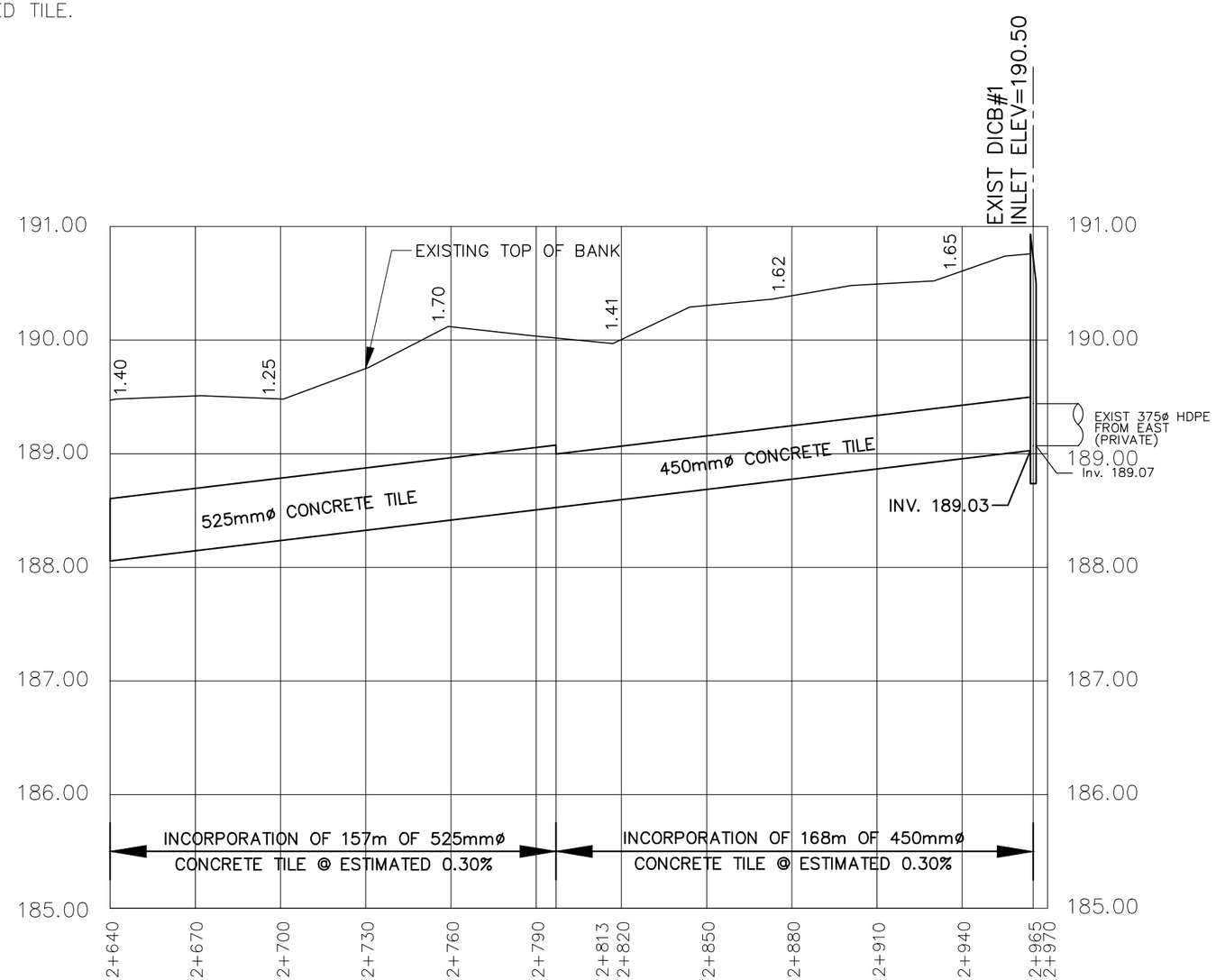
ROCK DRAIN PROFILE

Last Updated: May 6, 2024

GENERAL NOTES

1. BENCHMARK No.4 ELEV. 190.93
   TOP OF EXISTING DICB AT STATION 2+965

2. NUMBERS ARE DEPTH FROM EXISTING GROUND
   TO THE ESTIMATED INVERT OF THE INSTALLED TILE.



Dobbin Engineering Inc.

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Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME:
Rock Drain Profile 5

PROJECT No.
2022-1473

APPROVED
J. WARNER
CHECKED
B. VAN RUITENBURG
DRAWN
C. SAUNDERS

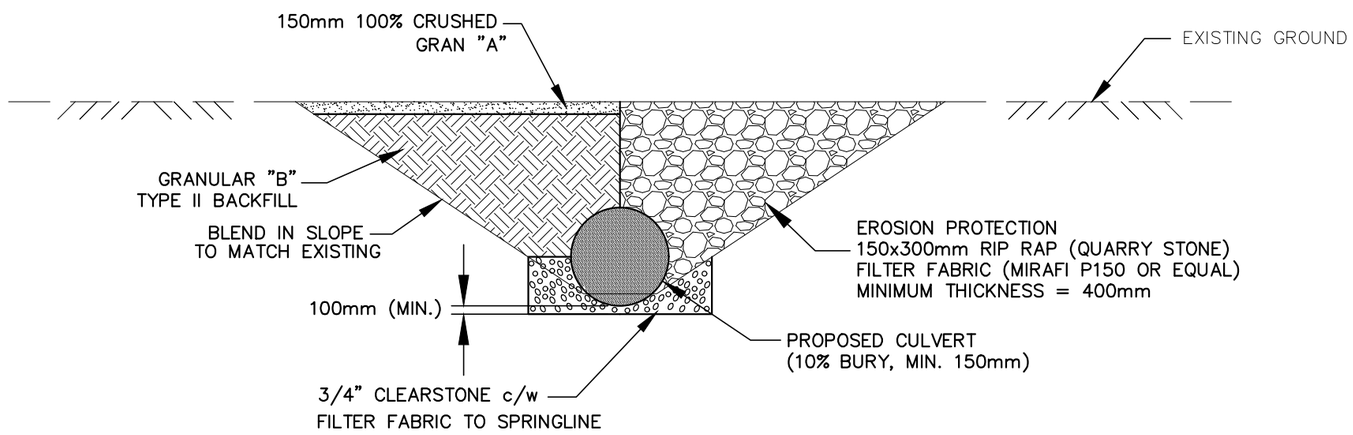
NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	CS

SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX

ROCK DRAIN
PROFILE

Last Updated: May 6, 2024



TYPICAL CULVERT END SECTION

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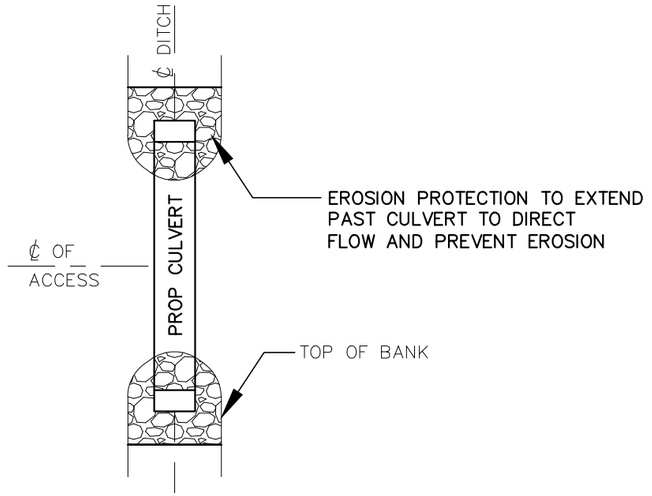
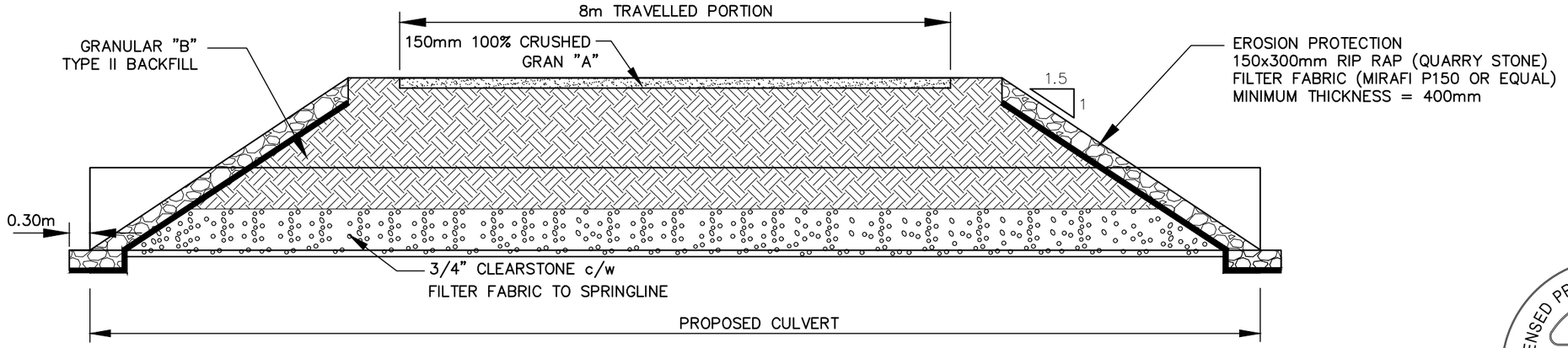


TYPICAL CULVERT PLAN

NTS



TYPICAL CROSS-SECTION

NTS

NOTE:
ALL GRANULARS COMPACTED
TO 98% MODIFIED PROCTOR DENSITY

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
100520016
MAY 6, 2024
PROVINCE OF ONTARIO

Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia Ontario, N0N 1R0
Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME:
Rock Drain Access Culvert Detail

PROJECT No.
2022-1473

APPROVED	J. WARNER
CHECKED	B. VAN RUITENBURG
DRAWN	J. WARNER

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	MAY 6, 2024	JW

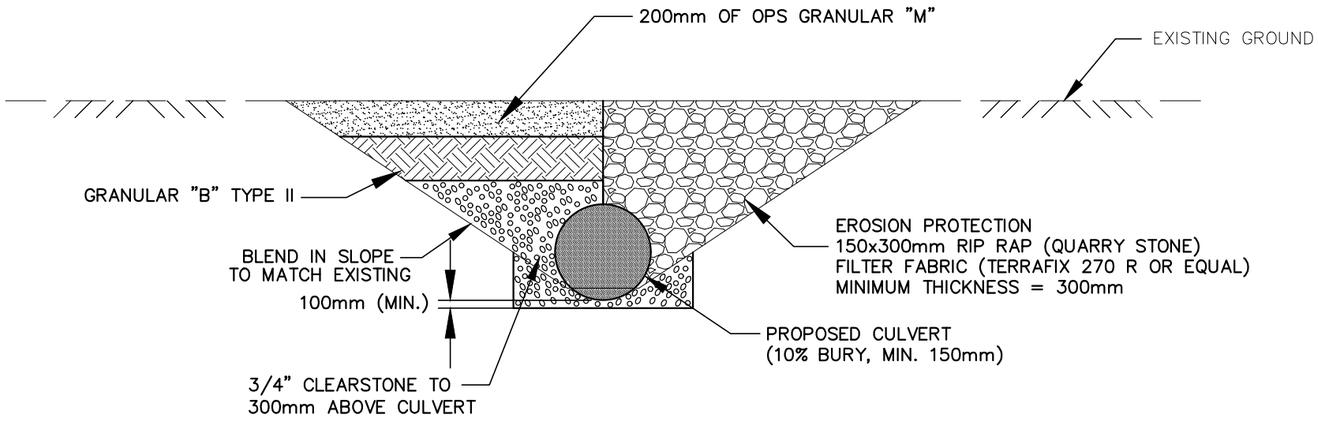
SCALE 1:75
0 2m

MUNICIPALITY of NORTH - MIDDLESEX

ROCK DRAIN
TYPICAL ACCESS CULVERT DETAIL

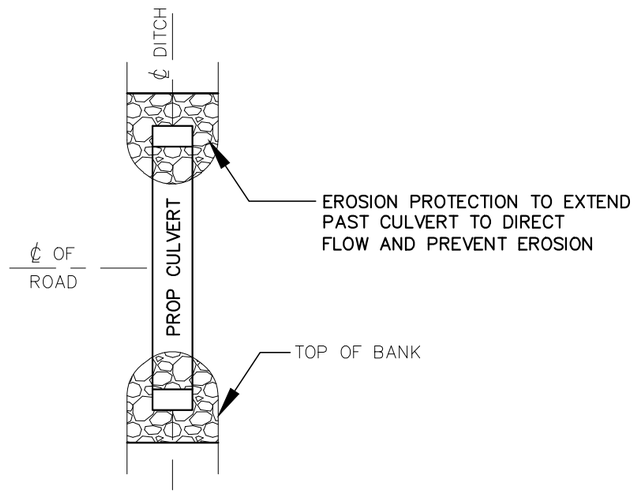
7
OF 8

Last Updated: May 6, 2024



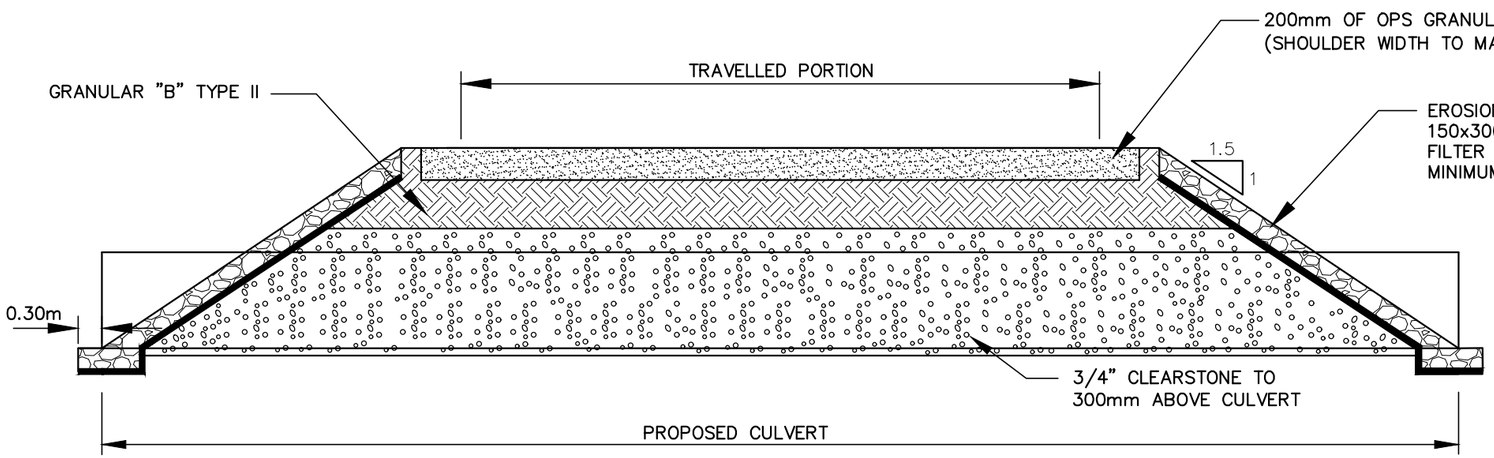
TYPICAL ASPHALT ROAD CULVERT END SECTION

NTS



TYPICAL ROAD CULVERT PLAN

NTS



TYPICAL ASPHALT ROAD CROSS-SECTION

NTS

NOTE:
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TO 98% MODIFIED PROCTOR DENSITY

LICENSED PROFESSIONAL ENGINEER
J. H. WARNER
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Dobbin Engineering Inc.
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Phone: (519) 882-0032 Fax: (519) 882-2233

DRAWING NAME:
Rock Drain Road Culvert Detail

PROJECT No.
2022-1473

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	MAY 6, 2024	JW
B. VAN RUITENBURG				
DRAWN				
J. WARNER				

SCALE 1:75
0 2m

MUNICIPALITY of NORTH - MIDDLESEX

ROCK DRAIN
TYPICAL ROAD CULVERT DETAIL

Last Updated: May 6, 2024