

LOCKHART DRAIN “A” AND “D”

THE MUNICIPALITY OF NORTH MIDDLESEX
TENDER for CONTRACT MD 07-2024



CLOSING DATE: July 10, 2024 @ 11 a.m.

**BID FORM
LOCKHART DRAIN "A" AND "D"**

MUNICIPALITY OF NORTH MIDDLESEX

OWNER: The Municipality of North Middlesex
CONTRACT ADMINISTRATOR: R. Dobbin Engineering Inc.
LOCATION: Lot 1 to 4, Concession WCR and Lot 1 to 4, Concession ECR
in the Municipality of North Middlesex.

Bids will be received in sealed envelopes clearly marked "**LOCKHART DRAIN "A" AND "D"**" at
the Municipal office of:

**The Municipality of North Middlesex
229 Parkhill Main Street
Parkhill, ON
NOM 2K0**

Your bid must be received at the above specified location no later than:

Wednesday July 10, 2024

11:00 a.m. LOCAL TIME

Bid inquiries shall be submitted to Josh Warner, R. Dobbin Engineering Inc.:

Josh Warner, P. Eng.
R. Dobbin Engineering Inc.
4218 Oil Heritage Road
Petrolia, Ontario
(519)-882-0032 ext. 204

Tender enquiries shall be accepted until July 5, 2024

SCHEDULE OF TENDER PRICES

TENDER PRICE

A. **Offer by:** _____
Name: _____
Address: _____

HST #: _____
Date: _____
To: The Municipality of North Middlesex _____

We, the undersigned, having examined the site of the Work, having carefully investigated the conditions pertaining to the Work and having secured all the information necessary to enable us to submit a bid, and having inspected all the Contract Documents and Drawings, hereby agree to enter into a Contract and perform all the Work in accordance with the Contract Documents and Drawings to the satisfaction of the Contract Administrator for the total bid price **INCLUDING HST** of:

_____ (\$ _____)

1. ADDENDA

We agree that we have received addenda ___ to ___ inclusive, and the bid price includes the provisions set out in such addenda.

TENDER TABLE

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Pre-Construction Meeting	1	LS		
Restoration/Seeding	1	LS		
<u>Lockhart Drain "A"</u>				
Culvert No. 6 (Masschelein, Station 2+232)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS		
Supply and Install 2230x1700mmø CSPA c/w Bedding (3.5mm Thick)	19	m		
Supply and Install Granular "B" Type II	180	tonne		
Supply and Install 100% Crushed Granular "A"	25	tonne		
Supply and Install Rip Rap at End Walls	30	tonne		
Remove existing Culvert and Excavated Material and Repair Channel (Masschelein, Station 2+605)	1	LS		
Culvert No. 7 (Grieves Road, Station 3+765)				
Traffic Control	1	LS		
Daylight and Work Around Watermain	1	LS		
Daylight, Work Around and Relocate Telecom	1	LS		
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS		
Supply and Install 2200mmø CSP c/w Bedding (3.5mm Thick)	20	m		
Supply and Install Granular "B" Type II	250	tonne		
Supply and Install 100% Crushed Granular "M" Dolomite	50	tonne		
Supply and Install Rip Rap End Walls	45	tonne		
Restoration and Ditch Grading	1	LS		

		<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Culvert No. 9 (Conservation Authority, Station 4+659)					
	Brushing and Tree Removal to Access Culvert and Construct Low Level Crossing	1	LS		
	Removal and Disposal of Existing Structure and Unsuitable Material	1	LS		
	Excavation and Disposal of Material to Shape Banks and Channel Bottom	1	LS		
	Clear Stone Bedding	40	tonne		
	4' x 10' Hog Slats	8	each		
	Supply and Install Rip Rap End Walls	25	tonne		
	Restoration	1	LS		
Culvert No. 10 (Falck, Station 4+944)					
	Removal and Disposal of Existing Structure and Unsuitable Material	1	LS		
	Supply and Install 1600mm \varnothing CSP c/w Bedding (2.8mm Thick)	11	m		
	Supply and Install Granular "B" Type II	100	tonne		
	Supply and Install 100% Crushed Granular "A"	25	tonne		
	Supply and Install Rip Rap at End Walls	30	tonne		
Culvert No. 11 (Toonen, Station 5+315)					
	Removal and Disposal of Existing Structure and Unsuitable Material	1	LS		
	Supply and Install 1600mm \varnothing CSP c/w Bedding (2.8mm Thick)	19	m		
	Supply and Install Granular "B" Type II	250	tonne		
	Supply and Install 100% Crushed Granular "A"	25	tonne		
	Supply and Install Rip Rap at End Walls	40	tonne		
Excavation of Open Channel and Levelling (Station 1+650 to 1+925)		275	LS		
Excavation of Open Channel and Levelling (Station 5+315 to 5+347)		32	LS		
Rip Rap for Newbury Weir Downstream of Culvert No. 11		20	tonne		
Silt Fences		3	each		

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Drain "D"</u>				
Locate and Abandon Existing Tile Drain	1	LS		
Locate and Work Around Watermain near Station 0+000	1	LS		
Strip and Level Topsoil and Gravel for Tile Drain (0+000 to 2+621)	2621	m		
6m of 600mmØ HDPE Outlet Pipe c/w Rodent Grate	1	LS		
Rip Rap at Tile Outlet and Basins	80	tonne		
600mmØ Concrete Tile	1118	m		
525mmØ Concrete Tile	838	m		
350mmØ Concrete Tile	620	m		
600mmØ HDPE Pipe	24	m		
100% Crushed Granular "A" at Driveways	40	tonne		
Remove Existing Catch Basins (Station 0+290, 1+148, 1+986, 2+001 and 2+621)	5	ea		
Remove Existing Concrete Bridge at Station 0+679	1	LS		
Remove Existing Hickenbottom (Station 0+405)	1	ea		
JB #1 (900mm x 1200mm) c/w Connections	1	LS		
CB #2 (900mm x 1200mm) c/w Connections	1	LS		
CB #3 (900mm x 1200mm) c/w Connections	1	LS		
CB #4 (900mm x 1200mm) c/w Connections	1	LS		

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
CB #5 (900mm x 1200mm) c/w Connections	1	LS		
CB #6 (900mm x 1200mm) c/w Connections	1	LS		
CB #7 (900mm x 1200mm) c/w Connections	1	LS		
CB #9 (900mm x 1200mm) c/w Connections	1	LS		
Locate and Connect Existing Field Tile	70	ea		
Grieves Road				
Traffic Control	1	LS		
Locate and Work Around Utilities	1	LS		
Remove Existing Tile and Unsuitable Backfill Material	1	LS		
450mmØ HDPE Smooth Wall Pipe (Open Cut) c/w Bedding	15	m		
Supply and Install Granular "A"	150	tonne		
Supply and Install 100% Crushed Granular "M" Dolomite	25	tonne		
Restoration and Ditch Grading	1	LS		
Silt Fence	1	ea		
Miscellaneous/Contingency				24,300

Sub Total

Tax (13%) _____

Total Tender Price

OFFERED ON BEHALF
OF THE CONTRACTOR

COMPANY NAME

SIGNATURE

CONTRACTOR'S SEAL
(See Note Below)

SIGNATURE

WITNESS (See Note Below)

COMPANY STREET ADDRESS

CITY, PROVINCE, POSTAL CODE

DATE OF OFFER

The Contractor agrees to complete substantially the work included in the contract barring delays regarding strikes and acts of God beyond our control, within _____ working days from the time of starting construction.

Note: Contractor to have the necessary signatures to bind the company. If a Contractor's seal is used there is no need for the offer to be witnessed. If no Contractor's seal is used, then a witness signature is needed.

CONDITIONS OF BID

1. The lowest or any bid will not necessarily be accepted by the Owner.
2. Contract Drawings 1 to 18 and the attached Specifications of Work for the Lockhart Drain "A" and "D" are made part of this Contract Bid. The Contractor is to complete construction in accordance with the Drawings and the conditions indicated within this Bid Document.
3. TENDER DEPOSIT

The tender shall be accompanied by a tender deposit in the form of a certified cheque or a Bid Bond payable to the Owner (Municipality of North Middlesex) in the amount of 10% of the value of the tender price.

The Tenderers shall keep their tenders open for acceptance for 45 days after the closing date. Withdrawal during this period will result in forfeiture or enforcement of the tender deposit or Bid Bond.

Upon being notified that the tender has been accepted, the Contractor shall execute copies of the Agreement, supply bonds and insurance documents as specified, and start Work as specified.

Failure to execute the copies of the Agreement, or to supply bonds and insurance documents, within one week of the date of acceptance of the tender, will automatically mean the forfeiture or enforcement of the tender deposit. Tender deposits of unsuccessful Tenderers will be returned not later than two weeks following Tender close. The tender deposit of the successful Tenderer will be returned once the Contract Security is in place.

4. CONTRACT SECURITY

The bid deposit of the successful Tender shall be retained by the Municipality of North Middlesex until the contract is completed and a completion certificate is issued by the Engineer. The successful Contractor shall have the option of furnishing the Municipality of North Middlesex with a Performance Bond in the amount of one hundred percent (100%) of the total tender price (not including HST). The Performance Bond shall ensure completion of the work and maintenance of the work for a period of one year after the date of the completion certificate.

5. SCHEDULE

- a) The Contract is to be completed on or before – **May 15, 2025.**
- b) If the time limit above is not sufficient to permit completion by the Contractor working a normal number of hours, the Contractor shall make changes to permit the Work to be completed by the above date. Additional costs incurred shall be deemed to be included in the price bid for the Works.

6. EXAMINATION

- a) Upon receipt of Documents, verify that they are complete; notify the Contract Administrator should the Documents be incomplete.
- b) Each firm submitting a Tender shall carefully examine the Documents for discrepancies or omissions, and immediately notify the Consultant upon finding discrepancies or omissions, at least four (4) days prior to the date specified for closing.
- c) All firms submitting Tenders will acknowledge receipt of Addenda in the space provided in the Tender Form. If no Addenda are received, insert the word "None" in the space provided.

7. EXAMINATION OF SITE

- a) The Tenderers shall visit the site of the Work before submitting their Tender and shall by personal examination satisfy themselves as to the local conditions that may be encountered during construction of the Work. They shall make their own estimate of the facilities and difficulties that may be encountered and the nature of the subsurface materials and conditions.
- b) The Tenderer shall not claim at any time after submission of their Tender that there was any misunderstanding of the terms and conditions of the Contract relating to site conditions.

8. INSURANCE

- a) The successful Bidder will file with the Municipality within 10 calendar days of award of Contract, General Liability, Automobile and Property Damage Insurance coverage required by the Ontario Provincial Standard General Conditions.

9. WORKER'S SAFETY INSURANCE BOARD

- a) The successful Bidder will file with the Municipality within 10 calendar days of award of Contract, a current Certificate of good standing from the Worker's Safety Insurance Board (WSIB).

10. TIME CONSTRAINTS

- a) All Work shall be completed within the times outlined in The Municipality of North Middlesex noise by-law regulations.
- b) No weekend Work is permitted without prior approval by The Municipality of North Middlesex.

11. GUARANTEE PERIOD

- a) The Contractor shall guarantee the Material and Work shall for a period of twelve (12) months from the acceptance date remain in such condition as will meet the Contract Administrator's approval, and that they will make good in a permanent manner, satisfactory to the Contract Administrator, any imperfections due to materials or workmanship used in the construction and any damage caused by such imperfections. The decision of the Contract Administrator shall be final as to the nature and cause of such imperfections and the necessity for remedying them.

Should the Contractor fail to comply with the directions of the Contract Administrator, the Contract Administrator may, after giving the Contractor forty-eight (48) hours written notice, perform the necessary Work, and the cost may be deducted, or collected by the Owner as provided in the Contract.

- b) Notwithstanding the provision of the subsection (a) of this clause, the Contract Administrator may, in cases of danger or public safety, make such immediate arrangements for repairs as he/she sees fit, and the Contract Administrator will inform the Contractor of such action. The cost of such emergency Work shall be borne by the Contractor.
- c) If the Contract Administrator notifies the Contractor, in writing, of imperfections prior to the termination of the guarantee period, the Contractor shall make good the imperfections as required in subsection (a) above, notwithstanding that such Work of making good may commence after or extend beyond the end of the guarantee period.

- d) To cover the rectification costs during the guarantee period, the Municipality shall retain 3% of the value of Work done. This holdback will be retained for a period of twelve (12) months from the acceptance date.

12. PAYMENT

- a) Monthly draws for Work completed will be paid as needed. Payment will be subject to the 3% maintenance holdback and a 10% statutory holdback in accordance with the Construction Act. Payment at the unit priced bid for each item shall be full compensation for all labour, equipment, and materials required to do the Work.

13. EXTRA WORK

- a) Extra Work shall be undertaken as described in subsection GC3.10.02 of the General Conditions.
- b) If applicable tender items are provided in other parts of the Contract, extra Work shall be performed using the appropriate unit prices from these parts.
- c) Extra Work shall be paid under the Contingency Allowance.

14. QUANTITY OVERUNS AND UNDERUNS

- a) Compensation for quantity over runs and under runs shall be as described in GC 8.01.02 of the General Conditions.

15. DAMAGE

- a) Any damage to existing infrastructure and neighboring properties shall be repaired by the Contractor to the satisfaction of the Contract Administrator and be at the Contractors expense.

16. Liquidated Damages

Where the working days exceeds those identified in the contract the Contractor shall be

responsible for the cost of the engineering inspection for the additional working days.

17. UTILITIES

- a) The Contractor shall secure locates at no extra cost to the Contract prior to any construction activities.

18. CONSTRUCTION LAYOUT

- a) The Contractor will be responsible for the layout of all lines and grades from the plans at no extra cost to the Contract. Control information will be provided to the successful Bidder by R. Dobbin Engineering Inc. in a digital format.
- b) All discrepancies are to be reported to the Contract Administrator prior to proceeding with the Work. The Contract Administrator will review the layout in the field prior to construction.

19. INCLEMENT WEATHER

- a) There will be no compensation for inclement weather other than consideration of an extension for lost time at the end of the Contract that will be at the discretion of the Contract Administrator.

20. SUBSTANTIAL PERFORMANCE

- a) The project will be considered substantially performed when all parts of the Contract are completed in accordance with the General Conditions of Contract – GC 1.05.

21. ONTARIO PROVINCIAL STANDARDS

- a) GENERAL CONDITIONS OF CONTRACT (OPSS.MUNI 100), November 2006 apply to this Contract.

- b) The Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD) apply to this contract. All required OPS Specifications can be downloaded at:

<http://www.ragsb.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>

THE SUPPLEMENTAL SPECIFICATIONS APPLICABLE TO THIS PROJECT ARE AS FOLLOWS:

Operational Constraints

The following operational constraints form part of the Contract. No additional costs will be made for completing Work within the operational constraints. Payment for Work associated with the operational constraints shall be included in the applicable unit price item.

1. The Contractor is responsible to complete the Contract within the schedule specified.
2. Safe and reasonable access must be provided to local vehicle traffic and to pedestrian traffic. The Contractor shall ensure traffic regulatory signs and 911 signs are in place and secure at all times.
3. The Contractor is responsible for securing locates and providing coordination with all utilities and agencies. In addition, the Contractor shall protect from damage all buried and aerial utility lines during construction.
4. If required, the Contractor is responsible for obtaining a Permit to Take Water (PTTW) for dewatering purposes.
5. Geotechnical investigation has not been undertaken within the project limits.
6. All conditions from the Department of Fisheries and Oceans (DFO) and Ausable Bayfield Conservation's (ABCA) approvals shall be adhered to.

Estimate of Cost

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Pre-Construction Meeting	1	LS	300	300
Restoration/Seeding	1	LS	2,000	2,000
<u>Lockhart Drain "A"</u>				
Culvert No. 6 (Masschelein, Station 2+232)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 2230x1700mmø CSPA c/w Bedding (3.5mm Thick)	19	m	1,600	30,400
Supply and Install Granular "B" Type II	180	tonne	30	5,400
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	30	tonne	150	4,500
Remove existing Culvert and Excavated Material and Repair Channel (Masschelein, Station 2+605)	1	LS	2,000	2,000
Culvert No. 7 (Grieves Road, Station 3+765)				
Traffic Control	1	LS	3,000	3,000
Daylight and Work Around Watermain	1	LS	1,000	1,000
Daylight, Work Around and Relocate Telecom	1	LS	1,000	1,000
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	4,000	4,000
Supply and Install 2200mmø CSP c/w Bedding (3.5mm Thick)	20	m	1,500	30,000
Supply and Install Granular "B" Type II	250	tonne	30	7,500
Supply and Install 100% Crushed Granular "M" Dolomite	50	tonne	40	2,000
Supply and Install Rip Rap End Walls	45	tonne	150	6,750
Restoration and Ditch Grading	1	LS	1,000	1,000
Culvert No. 9 (Conservation Authority, Station 4+659)				
Brushing and Tree Removal to Access Culvert and Construct Low Level Crossing	1	LS	2,000	2,000
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	2,000	2,000
Excavation and Disposal of Material to Shape Banks and Channel Bottom	1	LS	500	500
Clear Stone Bedding	40	tonne	35	1,400
4' x 10' Hog Slats	8	each	350	2,800
Supply and Install Rip Rap End Walls	25	tonne	150	3,750
Restoration	1	LS	500	500
Culvert No. 10 (Falck, Station 4+944)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 1600mmø CSP c/w Bedding (2.8mm Thick)	11	m	1,000	11,000
Supply and Install Granular "B" Type II	100	tonne	30	3,000
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	30	tonne	150	4,500

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Culvert No. 11 (Toonen, Station 5+315)				
Removal and Disposal of Existing Structure and Unsuitable Material	1	LS	1,200	1,200
Supply and Install 1600mm \varnothing CSP c/w Bedding (2.8mm Thick)	19	m	1,000	19,000
Supply and Install Granular "B" Type II	250	tonne	30	7,500
Supply and Install 100% Crushed Granular "A"	25	tonne	35	875
Supply and Install Rip Rap at End Walls	40	tonne	150	6,000
Excavation of Open Channel and Levelling (Station 1+650 to 1+925)	275	LS	30	8,250
Excavation of Open Channel and Levelling (Station 5+315 to 5+347)	32	LS	30	960
Rip Rap for Newbury Weir Downstream of Culvert No. 11	20	tonne	150	3,000
Silt Fences	3	each	200	600
<u>Drain "D"</u>				
Locate and Abandon Existing Tile Drain	1	LS	2,500	2,500
Locate and Work Around Watermain near Station 0+000	1	LS	1,500	1,500
Strip and Level Topsoil and Gravel for Tile Drain (0+000 to 2+621)	2621	m	6	15,726
6m of 600mm \varnothing HDPE Outlet Pipe c/w Rodent Grate	1	LS	1,800	1,800
Rip Rap at Tile Outlet and Basins	80	tonne	150	12,000
600mm \varnothing Concrete Tile	1118	m	90	100,620
525mm \varnothing Concrete Tile	838	m	80	67,040
350mm \varnothing Concrete Tile	620	m	55	34,100
600mm \varnothing HDPE Pipe	24	m	300	7,200
100% Crushed Granular "A" at Driveways	40	tonne	40	1,600
Remove Existing Catch Basins (Station 0+290, 1+148, 1+986, 2+001 and 2+621)	5	ea	500	2,500
Remove Existing Concrete Bridge at Station 0+679	1	LS	1,200	1,200
Remove Existing Hickenbottom (Station 0+405)	1	ea	300	300
JB #1 (900mm x 1200mm) c/w Connections	1	LS	2,500	2,500
CB #2 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #3 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000
CB #4 (900mm x 1200mm) c/w Connections	1	LS	3,000	3,000

Lockhart Drain “A” and “D”
Municipality of North Middlesex
April 26, 2024

SPECIFICATION OF WORK

1. Location

The work in this specification is located from Lot 9, Concession 7 WCR to Lot 5, ECR on the Lockhart Drain “A” and “D” in The Municipality of North Middlesex.

2. Scope of Work

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

- Proposed Works
 - Five Access Culvert Replacements (Culvert No. 6, 8, 9, 10 and 11)
 - One Road Culvert Replacement (Culvert No. 7)
 - Culvert Removal at Stations 2+605
 - 307m of Channel Improvements complete with Newbury Weir
 - 2,621m of Tile Drain Replacement complete with catch basins

- Future Works
 - Channel Works
 - Culvert Replacements
 - Tile Drain Replacement

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.

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. Utilities

The Contractor is responsible for organizing locates and exposing all the utilities along the length of the drainage works. If any utilities interfere with the proposed drainage works in a manner not shown on the accompanying Estimate of Cost or profile the Contractor shall notify the Drainage Superintendent and Engineer.

The Contractor is responsible for coordinating the replacement of additional utilities with the utility company if they interfere with the proposed drain. All costs for the utility to replace their services will be outside of this report and shall be borne by the utility as per Section 26 of the Drainage Act.

All additional costs to work around and organize replacement of the utilities not included in the estimate shall be tracked separately and the cost plus a portion of the engineering (25% of the cost) shall be borne by that utility.

There is an existing watermain on the property with Roll Number 000-060-080 that shall be located prior to cleaning out the channel and the installation of Branch "D". Drawings of the watermain are included at the end of this report. The outlet of Branch "D" shall be east of the watermain.

7. 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. The Traffic Plan must be approved by the Municipality prior to the commencement of any road closures.

- 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.

8. Pre-Construction Meeting

There is a requirement for a pre-construction meeting to be held prior to any construction taking place. The meeting shall be scheduled by the Contractor. The Landowners, Engineer, and the Municipality of North-Middlesex shall be notified of the pre-construction meeting at least 48 hours prior.

9. Access and Working Area

Lockhart Drain “A”

Construction:

Access to the work site for the proposed work on the Lockhart Drain “A” shall be from West Corner Drive and within the property the improvements are located, except for the replacement of the culvert on the property with Roll Number 00-040-083. For this access culvert, access shall be gained from the property with the Roll Number 000-040-084, along the existing access and along the length of the drainage works. All access shall be restricted to a width of 6 metres and shall generally be along fence lines, and existing access laneways.

The working area for the construction at each culvert and for any channel improvements shall extend 10 metres from the bank on both sides and for 10 metres along the channel on either side of the culvert or improvements.

Maintenance:

Access for culvert maintenance and channel repair on a single property shall be from the properties in which the culvert 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 south side of the channel unless otherwise determined by the Drainage Superintendent. 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.

The working area for future maintenance 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.

Lockhart Drain “D”

Access to the work site for construction and future maintenance shall be from West Corner Drive and Grieves Road and along the length of the drainage works. Access shall generally be restricted to a width of 6 metres and shall be along existing access laneways.

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

10. 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.

11. Removals

The culverts, catch basins, unsuitable or not required excavated material, etc. shall be removed in their entirety and shall be disposed offsite at the expense of the Contractor. Tile under road crossings shall be removed in their entirety.

Where the culvert is being removed and not replaced the Contractor shall be responsible for repairing the channel. This shall include resloping the banks to match the adjacent (minimum 1.5:1), levelling the excavated material in the field or bush, installation of straw matting and seeding the side slopes.

12. Brushing and Tree Removal

For the tile drain all brush, trees, woody vegetation, stumps etc. shall be removed for a width of 15 metres along the tile drain. They shall be removed in their entirety including stumps.

For the open channel all brush, trees, vegetation, stumps etc. in order to facilitate the excavation of the open channel and culvert construction, as determined by the Drainage Superintendent or Engineer, shall be removed at the discretion of the Drainage Superintendent or Engineer and shall be included as part of this item.

A mechanical grinder attached to an excavator shall 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.

13. Excavation of Open Channel

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 generally be cast on the side it is being excavated from, except across finished lawns where the excavated material shall be trucked. 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 than 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.

14. 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 (CSP) with a minimum wall thickness of 2.8mm. Corrugated Steel Pipe Arches and culverts under roadways shall have a minimum wall thickness of 3.5mm. 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. The minimum cover for CSP under Highway Loading shall be 1/6 of the span, and shall be no less than 300mm.

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:

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 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 pipe shall be backfilled above the clear stone with imported 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 decreased in length accordingly.

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.

15. Low Level Crossing

The low level crossing for Culvert No. 9 shall be constructed using 4' x 10' hog slats, deemed "seconds" from Stubbe's Centralia. The hog slats shall be bedded with ¾" clear stone complete with filter fabric. The side slopes shall be protected with 150mm x 300mm rip rap complete with filter fabric. The rip rap shall have a minimum thickness of 400mm.

The picture provides an idea of the proposed structure but is not meant to replace the drawings included as part of this report.



Example of Hog Slot Low Level Crossing

16. Newbury Weir

A Newbury weir shall be installed downstream of culvert No. 11, as per the drawings and in consultation with the Drainage Superintendent or Engineer on-site at the time of construction. The weir shall generally be located with the crest of the weir approximately 3m downstream of the culvert where they are specified. The crest shall be 0.30m high and shall have a 4:1 slope on the upstream side and 20:1 on the downstream side of the crest. The rip rap 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 300mm below finished grade. Filter fabric (Terrafix 250R or approved equal) shall then be placed with any joints overlapped a minimum 600mm. The quarry stone shall then be placed with the larger pieces placed near the riffle crest and the downstream slope of the riffle. The large rocks on the downstream face shall be 200 to 300mm apart to dissipate energy and create low flow fish passage. Smaller pieces shall be placed in the gaps and voids to give it a uniform appearance and on the surface of the riffle to allow for breaks in the flow that can be followed up by migrating fish.

Newbury Weirs may be installed in the future downstream of sections of the drain with steep grades. They shall be assessed in accordance with the Schedule of Maintenance contained in this report.

17. Locate and Abandon 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 proposed alignment. The proposed tile drain shall generally run up the existing tile with the existing drain being abandoned until Branch "F", where it shall then head northerly to the west side of Culvert No. 5.

18. Strip and Place Topsoil

The Contractor shall strip the topsoil for a width of 6m normally centered on the proposed 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.

19. Installation of 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.

HDPE pipe shall be CSA Approved smooth wall gasketed pipe with bell and spigot joints (320 kPa) and shall include clear stone bedding to the spring line under gravel driveways and accesses. Under roadways the road crossing specification shall be used.

The tile drain shall run up the existing tile and in the low runs at the basin locations in order maximize the surface water captured by the in-line catch basins. The 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 (HDPE 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.

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.

The Landowners are also warned not to operate farm equipment over the trench or along the length of the trench for 1 year after construction in order to protect the tile.

Future replacements shall conform to these specifications.

20. 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.

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. 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 (Mirafi P150 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.

The rip rap at the outlet of Branch "D" may extend along the side slopes and bottom of the channel to the downstream end of Culvert No. 5 at the discretion of the Engineer or Drainage Superintendent.

21. Installation of Tile Drain Road Crossing

Where High Density Polyethylene Pipe is specified, the Contractor shall supply, install, and backfill the HPDE smooth wall gasketed pipe with bell and spigot joints (320 KPa) or approved equivalent under road crossings. Future crossings shall be to the same specifications.

Where corrugated steel pipe (CSP) is specified, the Contractor shall supply, install, and backfill aluminized CSP with a minimum wall thickness of 2.8mm in all cases. All corrugation profiles shall be of helical lockseam 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. Future culvert replacements shall be to the same specifications.

The bottom of the excavation shall be excavated to the required depth with any over excavation backfilled with ¾" clear stone material. When the tile has been installed to the proper grade and depth, the excavation shall be backfilled with ¾" clear stone from the bottom of the excavation to the spring line of the tile. Care shall be taken to ensure that the backfill on either side of the pipe does not differ by more than 300mm so that the pipe is not displaced. Within the road allowance the tile shall be backfilled above the spring line to 200mm below finished grade with OPS Granular "A". Outside the road allowance excavated material can be used. The top 200mm shall be OPS Granular "M", produced from 100% crushed dolomite, and shall be mechanically compacted to 100% modified standard proctor density. Filter fabric shall be placed between the changes in bedding and backfill in all cases.

It is the Contractors responsibility to locate and expose any utilities prior to the installation of any tile. If there is a conflict with the tile elevation the Contractor is required to notify the Engineer. Any permits that are required by the Road Authority are the responsibility of the Contractor.

The ditch shall be graded to ensure the surface water is collected to the catch basins and culverts on all road crossings.

The Contractor shall be responsible for maintenance of the crossings for a period of one year after their installation. This will include repairing any settlement areas on the travel surface with granular “M”.

22. Catch Basins

Structure	Station	Type (mm)	Inlet Elev. (m)	Outlet Pipe Elev. (m)	Inlet Pipe Elev. (m)
CB #2	0+290	900x1200	207.30	205.48 (W) 600	205.49 (E) 600
CB #3	0+405	900x1200	207.80	206.06 (W) 600	206.08 (E) 600
CB #4	0+683	900x1200	208.90	207.09 (W) 600	207.13 (E) 600
CB #5	1+148	900x1200	210.70	208.83 (W) 600	208.91 (E) 525
CB #6	1+986	900x1200	213.78	211.67 (W) 525	211.72 (E) 450
CB #7	2+001	900x1200	213.82	211.76 (W) 450	212.37 (E) 350
CB #8 (FUTURE)	OFFSET 2+211	600x600	214.70	214.00 (N) 250	
CB #9	2+621	900x1200	217.35	216.08 (W) 350	216.15 (E) 250 k/o

Catch Basin #8 is for future replacement. It is intended to utilize the existing catch basin.

The catch basins shall be square precast concrete structures as noted above and shall have a birdcage type grate. The ditch inlet catch basins (denoted DICB) shall have a 2:1 sloped top. The direction in the inlet elevation column denotes the direction the low side of the ditch inlet catch basins shall face. The catch basins shall be located with the backside at the property line and at the locations identified on the Plans. The catch basin elevations shall be 50mm above grade. When specified the catch basins shall have a berm constructed on the downstream end. The top of the berm shall be 0.60m above the inlet elevation. The berm shall have a 2:1 front slope and 5:1 back slope with a 1m wide top. The height and back slopes can be increased under the direction of the Drainage Superintendent in order to reduce erosion and facilitate farming. Care shall be taken to

ensure this does not negatively impact upstream lands. The berms shall be constructed using excess materials on site. If more material is required it shall be supplied at the expense of the drainage works.

The catch basins shall be made with the top sections separate from the base sections in order to allow riser sections to be installed or removed as necessary (i.e. the base section shall not extend for more than 150mm above the top of the highest opening in the base section). The wall thickness of all structures shall be 115mm and each shall have a 300mm sump. Birdcage grates shall be manufactured with a bar spacing no larger than 50mm.

The catch basins shall be set at the final elevations as directed by the Drainage Superintendent. 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.

As part of this item the Contractor shall grade the area in the vicinity of the basin to ensure proper drainage. Rip rap shall be installed around the basins as determined by the Drainage Superintendent or Engineer. The rip rap shall be 150mmx300mm c/w filter fabric. 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 (Mirafi P150 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

The Drainage Superintendent or Engineer may change a birdcage type grate on a catch basin to a concrete lid or sloped birdcage grate at the request of a Landowner.

23. Junction Boxes

The junction boxes shall be installed to the elevations and in the locations shown on the drawings as follows:

Structure	Station	Type (mm)	Top Elev. (m)	Outlet Pipe Elev. (m)	Inlet Pipe Elev. (m)
JB #1	0+157	900x1200	205.50	204.80 (N) 600	204.82 (E) / 204.90 (S) 600 / 200

The junction boxes shall be square precast concrete structures as noted above.

The junction boxes shall be made with the top sections separate from the base sections in order to allow riser sections to be installed or removed as necessary (i.e. the base section shall not extend for more than 150mm above the top of the highest opening in the base section). The wall thickness of all structures shall be 115mm and each shall have a 300mm sump. The top of junction boxes shall be set a minimum of 600mm below grade to accommodate farm tillage practices.

The junction boxes shall be set on a layer of clear stone. The clear stone shall be extended up to the top of the inlet and outlet pipe connections

The tile at the connection to the junction boxes 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.

The Drainage Superintendent may change a concrete lid on a junction box to a birdcage type grate creating a catch basin at the request of a Landowner.

24. Seeding/Restoration

All grass areas disturbed by construction, shall be restored with 100mm of screened topsoil and hydro seeded. The timing of the seeding shall be approved by the Drainage Superintendent or Engineer.

All disturbed side slopes of the channel shall be restored with straw matting and seed.

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.

25. Subsurface Drainage

All existing subsurface drains encountered during construction shall be reconnected to the open channel and tile drain unless otherwise noted on the drawings or as directed by the Drainage Superintendent.

A suitable length of equivalent sized PE agricultural tubing shall be used to connect the drain to the open channel and tile drain. Manufactured fittings shall connect the PE tile to the existing drain and to the concrete tile. The connections shall be carefully backfilled to

ensure there is adequate support under the pipe and large clumps of clay do not displace the tile.

26. 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.

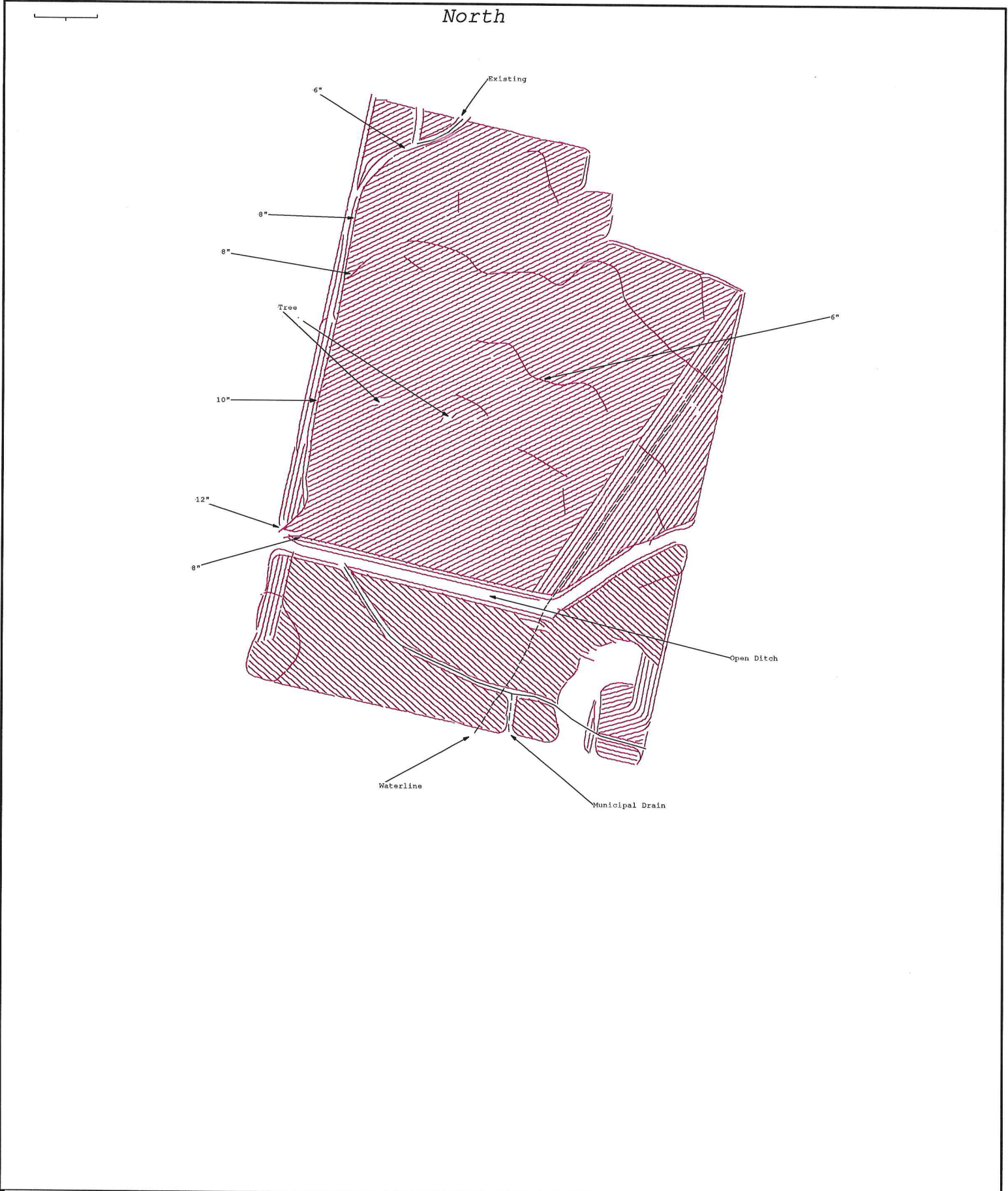
TILE MAPS



Kustermans Farms

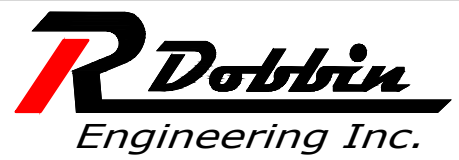
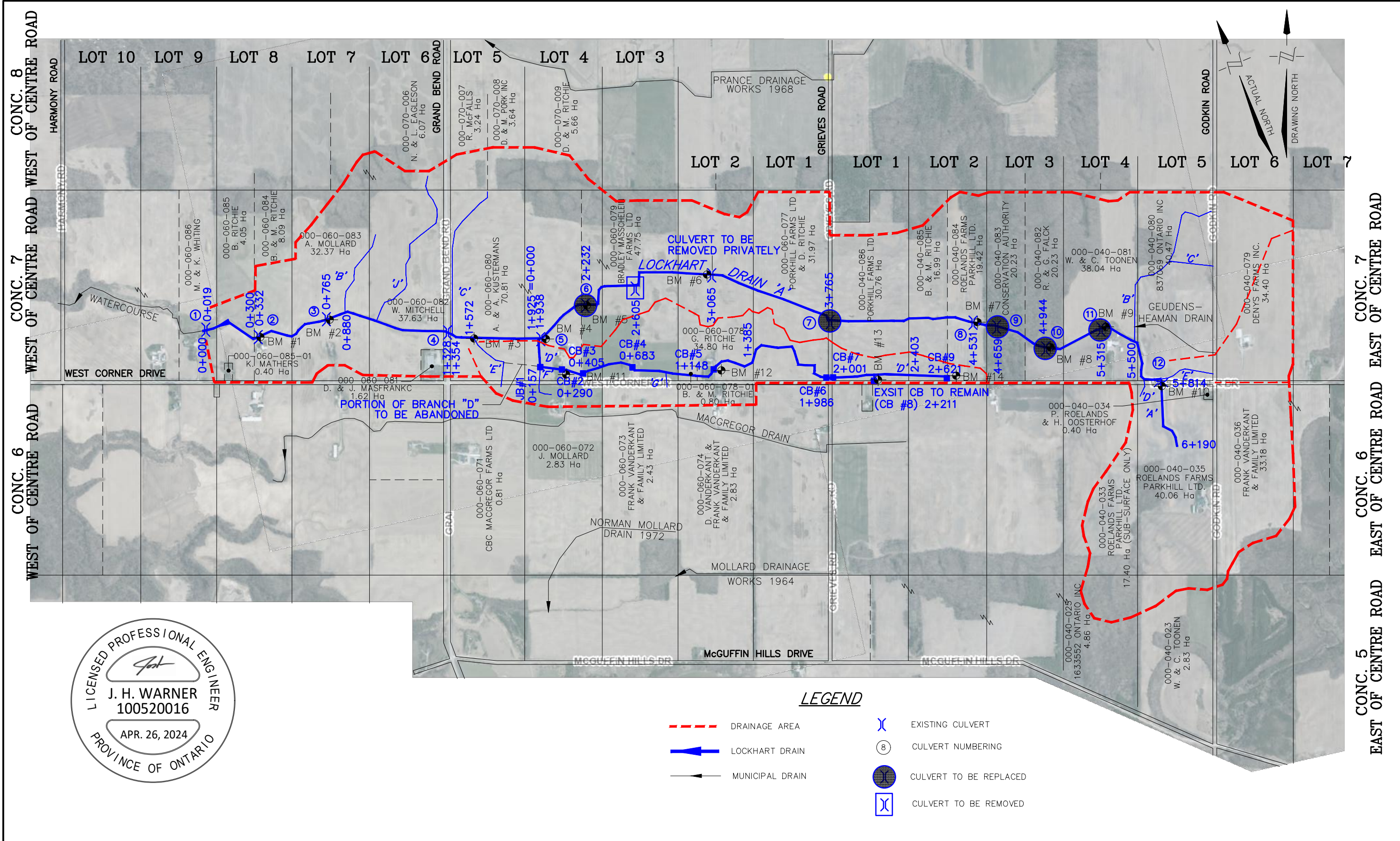


This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.



Customer: Kustermans Farms			
Location: W Corner Drive			
Scale: 350 feet	Spacing: 25'	Date: 2020	
A.G Hayter Contracting Ltd			

WATERMAIN DRAWING



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

DRAWING NAME:
 Lockhart Drain Plan

PROJECT No.
 2022-1463

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

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APR. 26, 2024	CS

SCALE: 1:20,000

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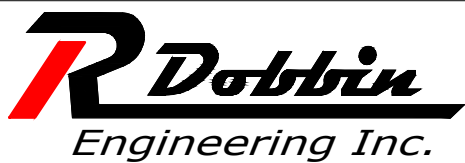
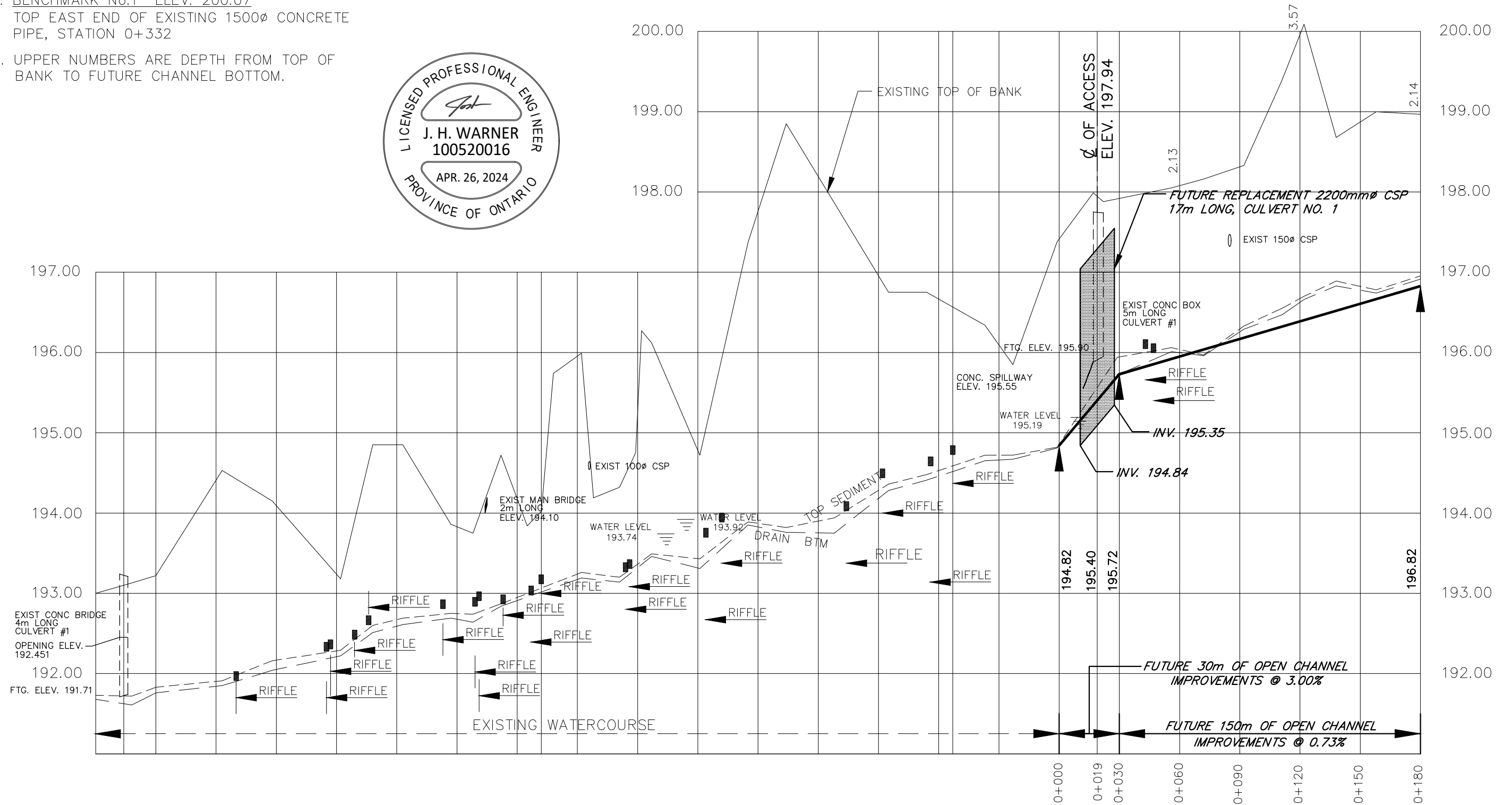
MUNICIPALITY of NORTH MIDDLESEX

LOCKHART DRAIN PLAN

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.1 ELEV. 200.07
TOP EAST END OF EXISTING 1500Ø CONCRETE PIPE, STATION 0+332
- UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



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

DRAWING NAME:
Lockhart Drain "A" Profile 1

PROJECT No.
2022-1463

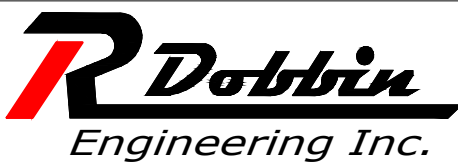
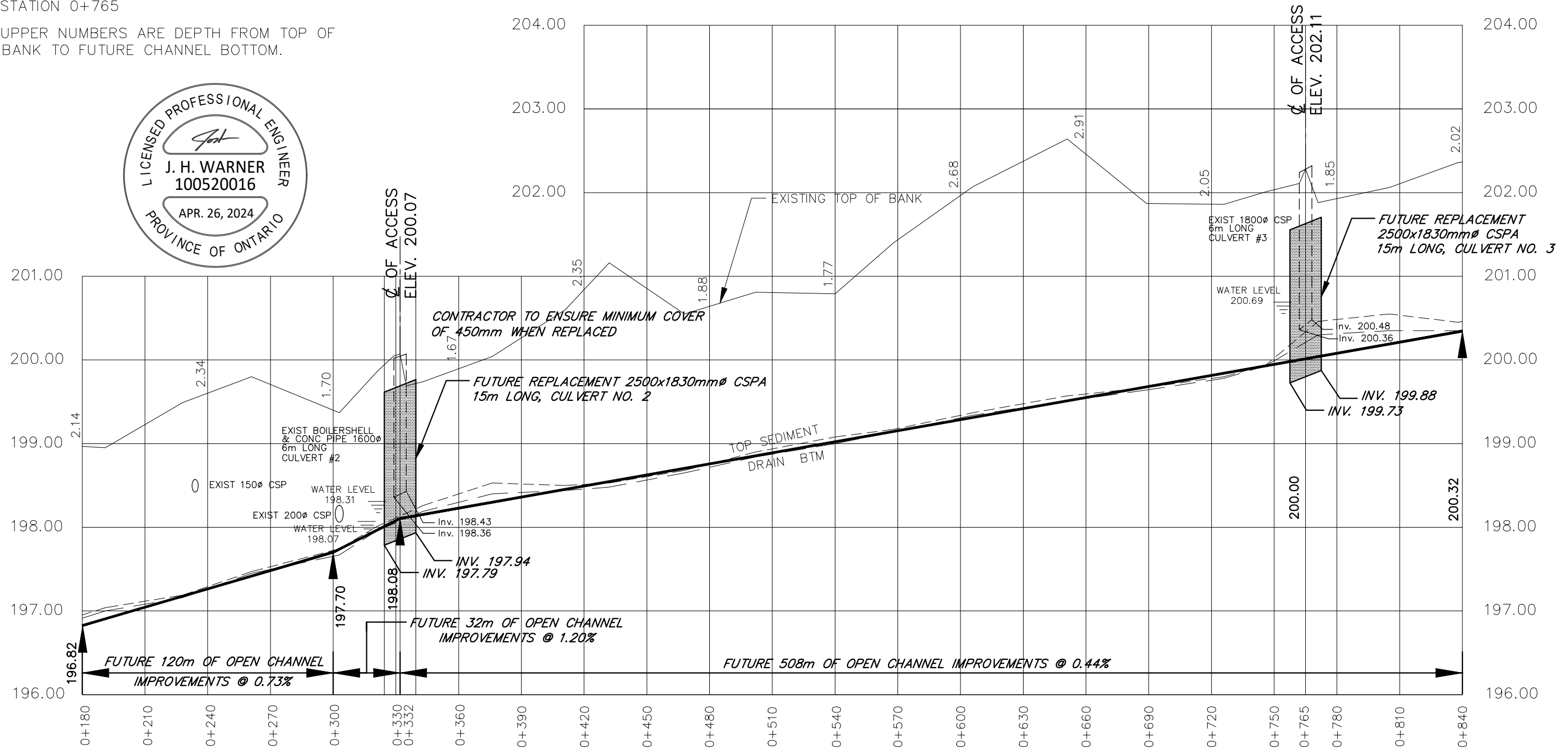
APPROVED J. WARNER	NO.	REVISIONS	DATE	BY
CHECKED B. VAN RUITENBURG	1	FINAL REPORT	APRIL 26, 2024	CS
DRAWN C. SAUNDERS	SCALE: 1:2,000 0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

2
OF 18

GENERAL NOTES

- BENCHMARK No.1 ELEV. 200.07
TOP EAST END OF EXISTING 1500Ø CONCRETE PIPE, STATION 0+332
- BENCHMARK No.2 ELEV. 202.32
TOP EAST END OF EXISTING 1800Ø CSP STATION 0+765
- UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



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

DRAWING NAME:
Lockhart Drain "A" Profile 2

PROJECT No.
2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

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

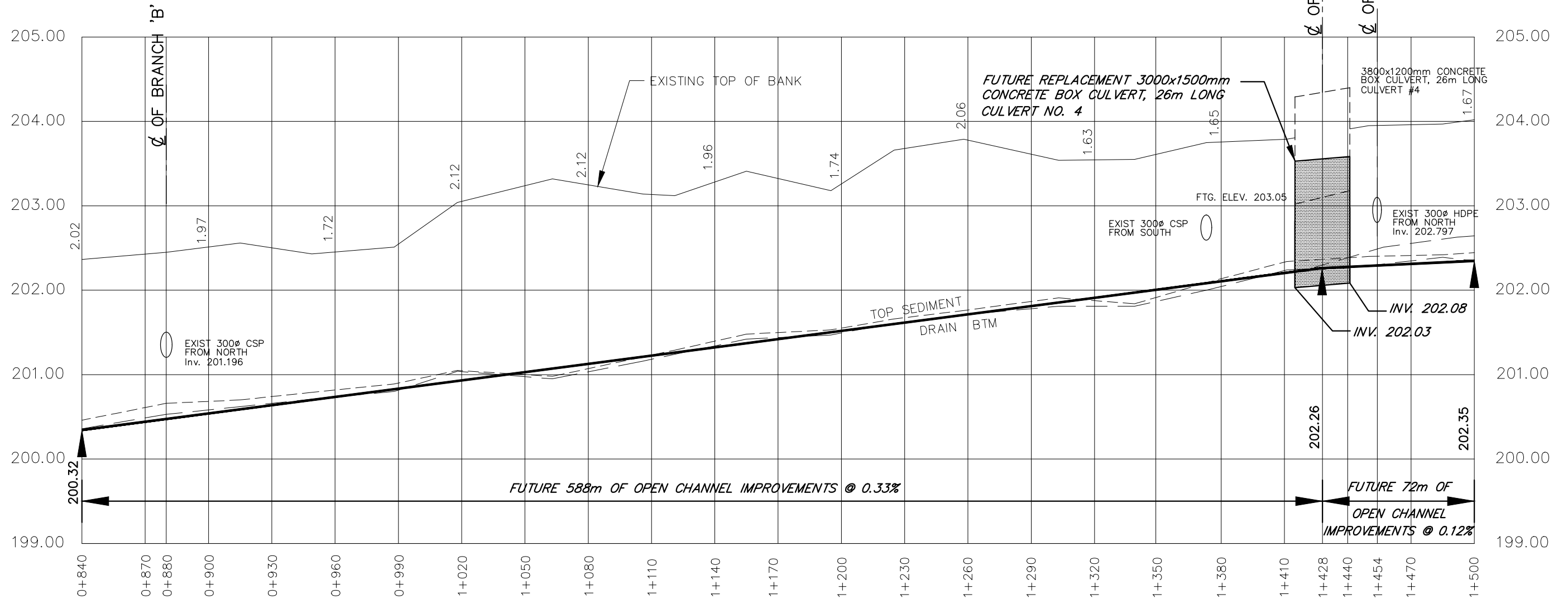
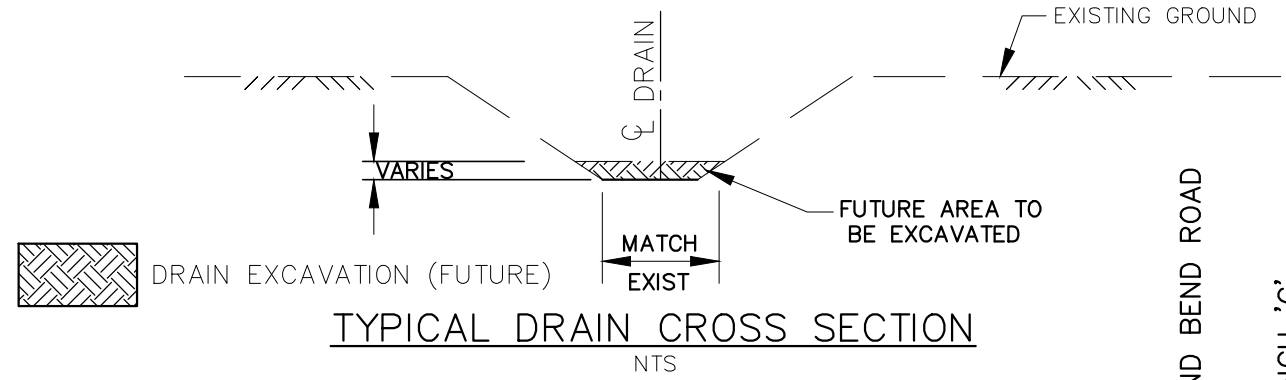
MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

3
OF 18

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.2 ELEV. 202.32
TOP EAST END OF EXISTING 1800Ø CSP
STATION 0+765
BENCHMARK No.3 ELEV. 203.24
TOP NORTH END OF EXISTING 500Ø CSP
STATION 1+572 (AT BRANCH "D")
- UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 3

PROJECT No.
2022-1463

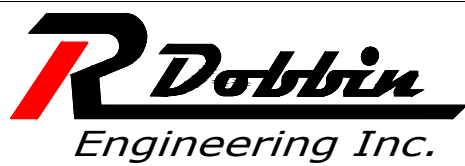
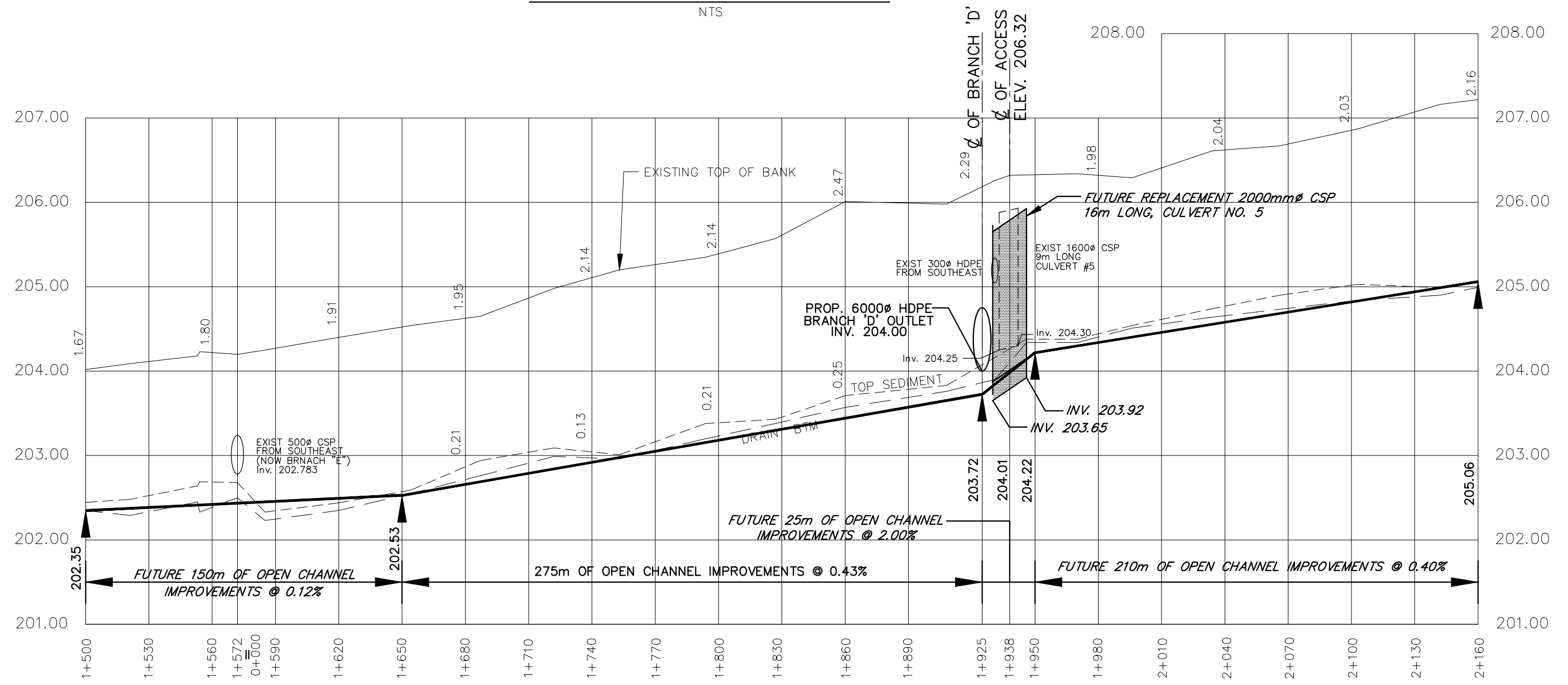
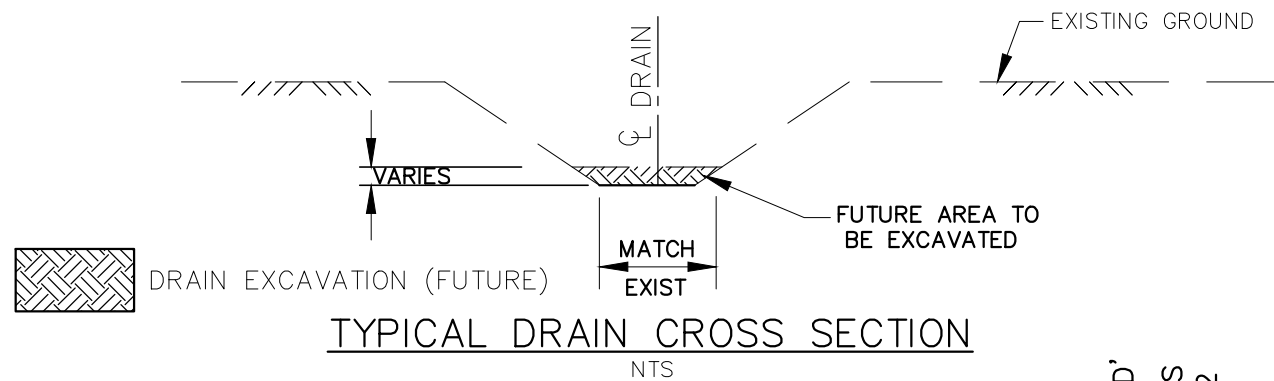
APPROVED J. WARNER	NO.	REVISIONS	DATE	BY
CHECKED B. VAN RUITENBURG	1	FINAL REPORT	APRIL 26, 2024	CS
DRAWN C. SAUNDERS	SCALE: 1:2,000			
0 20 40 60m				

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

4
OF 18

GENERAL NOTES

- BENCHMARK No.3 ELEV. 203.24
TOP NORTH END OF EXISTING 500Ø CSP
STATION 1+572 (AT NOW BRANCH "E")
BENCHMARK No.4 ELEV. 205.93
TOP EAST END OF EXISTING 1600Ø CSP
STATION 1+938
- UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 4

PROJECT No.
2022-1463

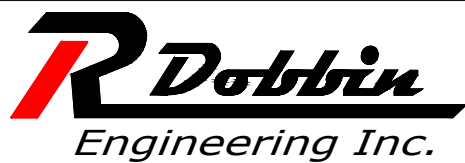
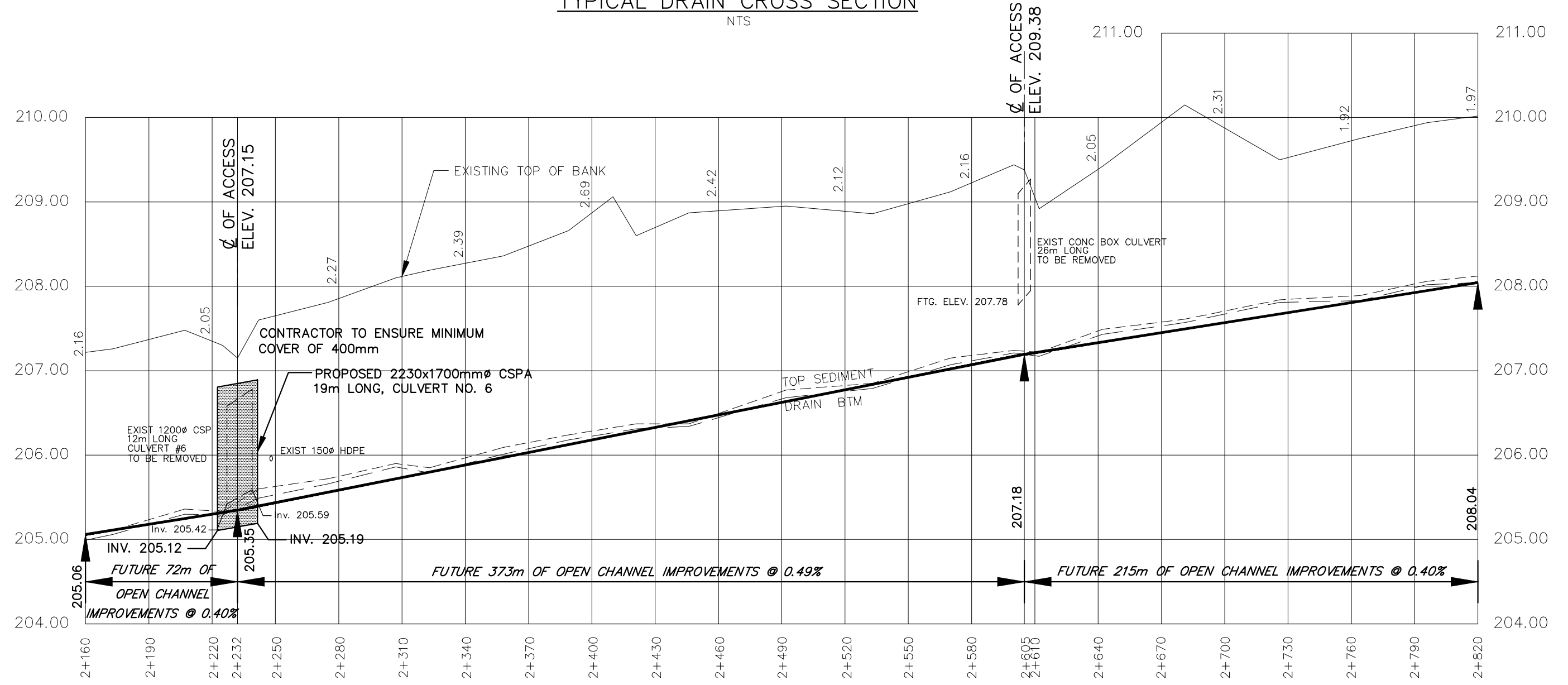
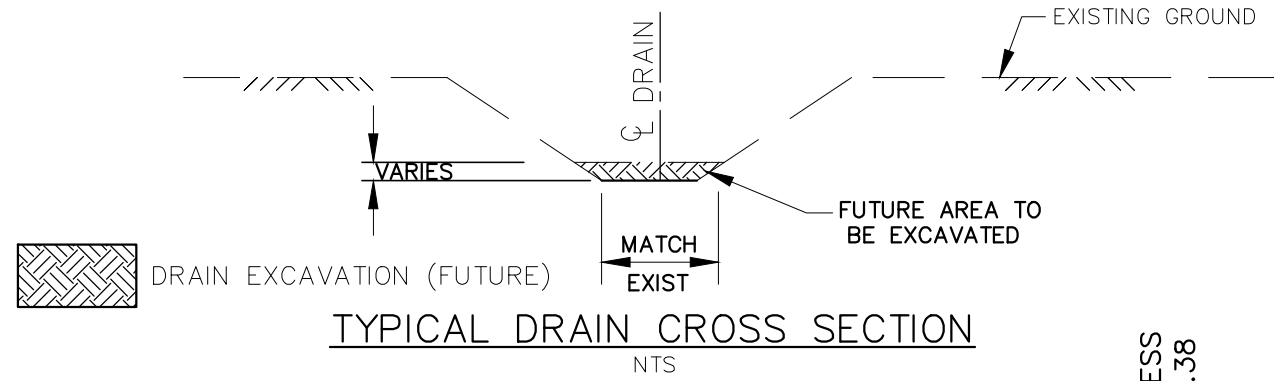
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J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.5 ELEV. 206.78
TOP EAST END OF EXISTING 1200Ø CSP
STATION 2+232
- UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 5

PROJECT No.
2022-1463

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J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

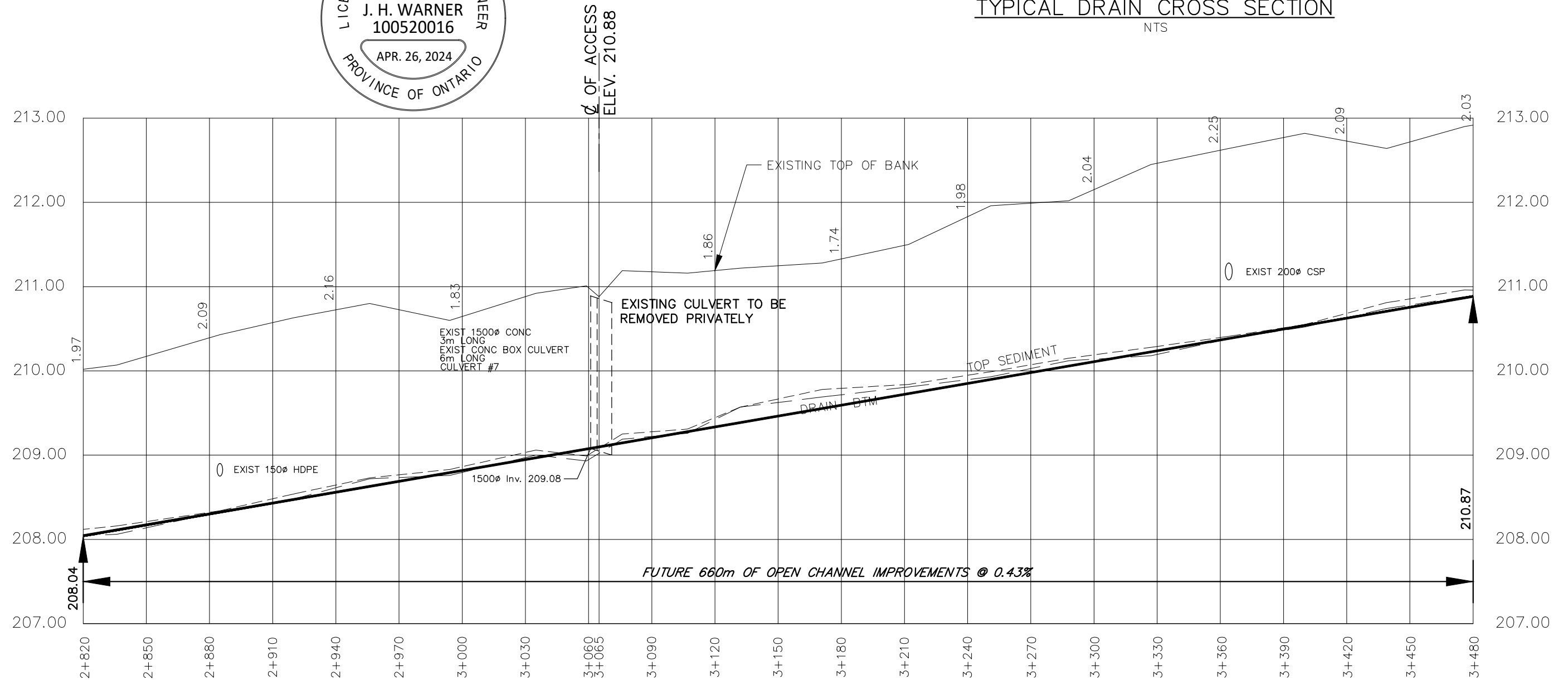
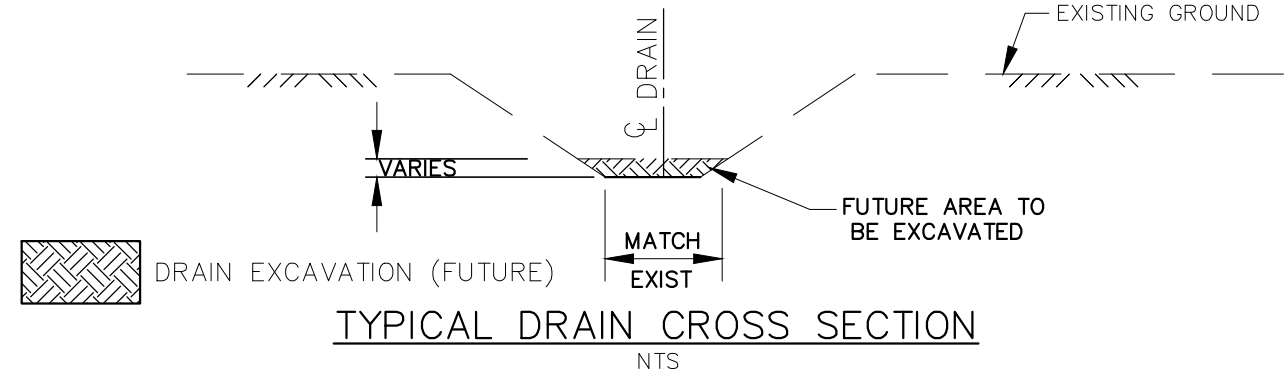
MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

6
OF 18

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.6 ELEV. 209.08
INVERT WEST END OF EXISTING 1500Ø CONCRETE PIPE, STATION 3+065
- UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 6

PROJECT No.
2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

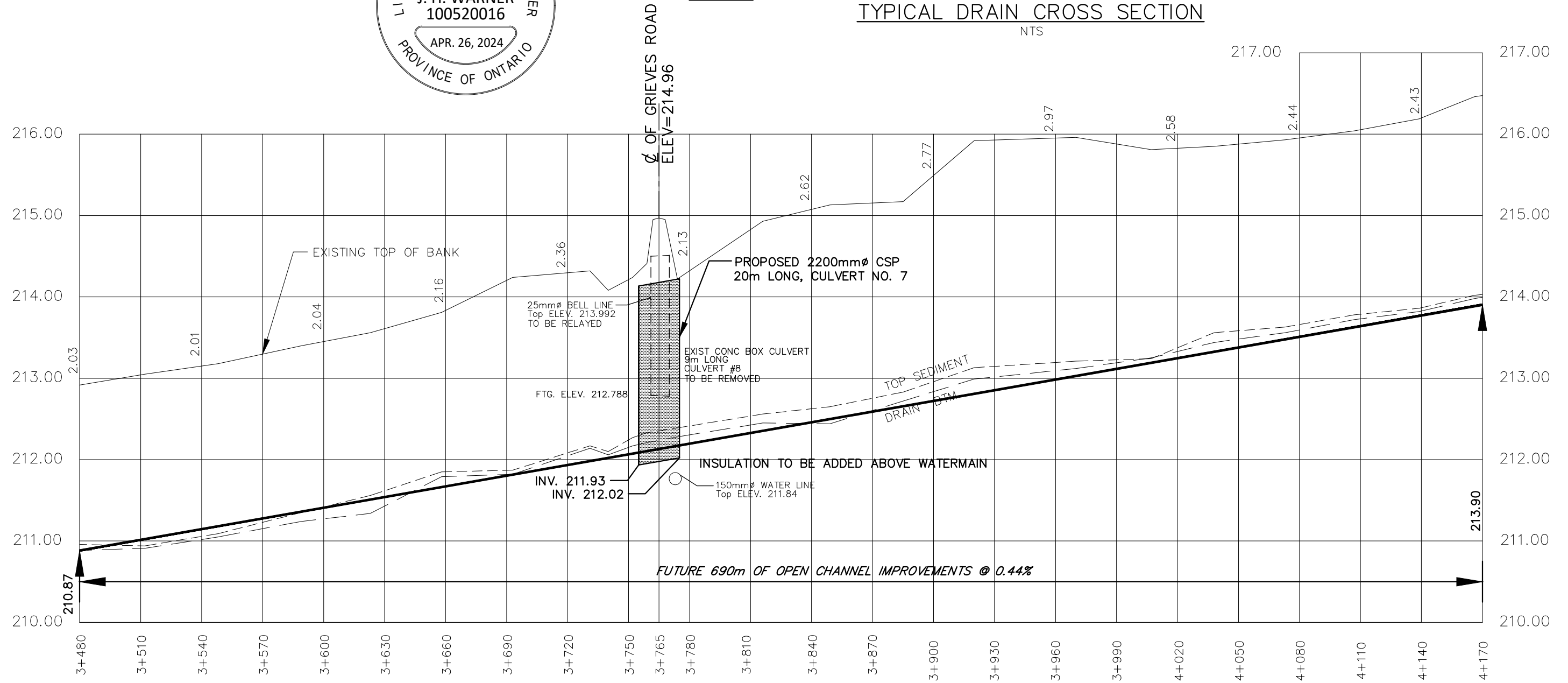
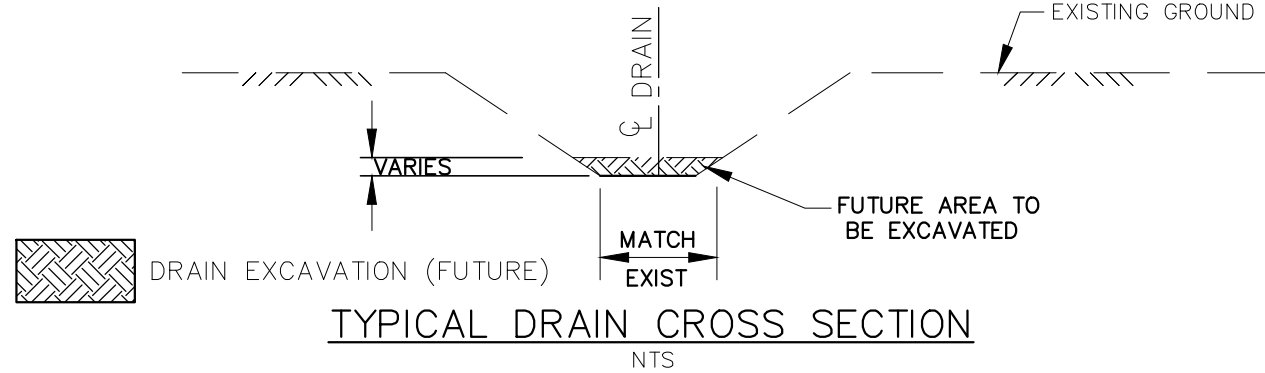
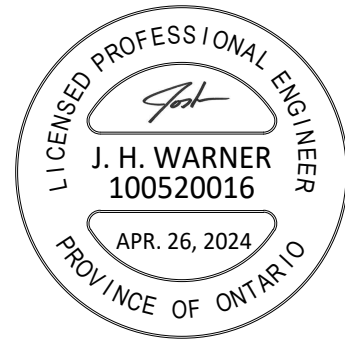
SCALE: 1:2,000
0 20 40 60m

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

7
OF 18

GENERAL NOTES

- BENCHMARK No.6 ELEV. 209.08
INVERT WEST END OF EXISTING 1500Ø CONCRETE PIPE, STATION 3+065
- UPPER NUMBERS ARE DEPTH FROM TOP OF BANK TO FUTURE CHANNEL BOTTOM.



R Dobbin Engineering Inc.
 4218 Oil Heritage Road
 Petrolia Ontario, N0N 1R0
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DRAWING NAME:
Lockhart Drain "A" Profile 7

PROJECT No.
2022-1463

APPROVED J. WARNER	NO.	REVISIONS	DATE	BY
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DRAWN C. SAUNDERS	SCALE: 1:2,000 0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX

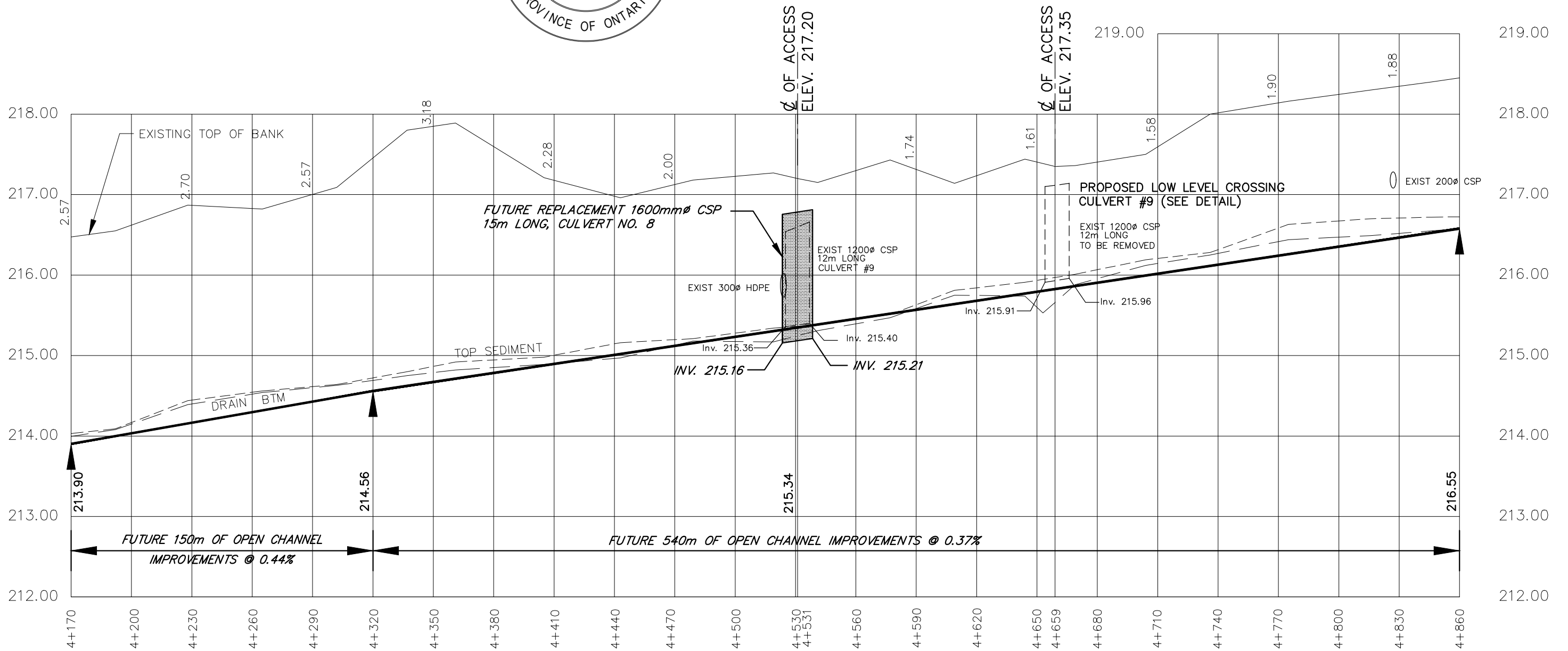
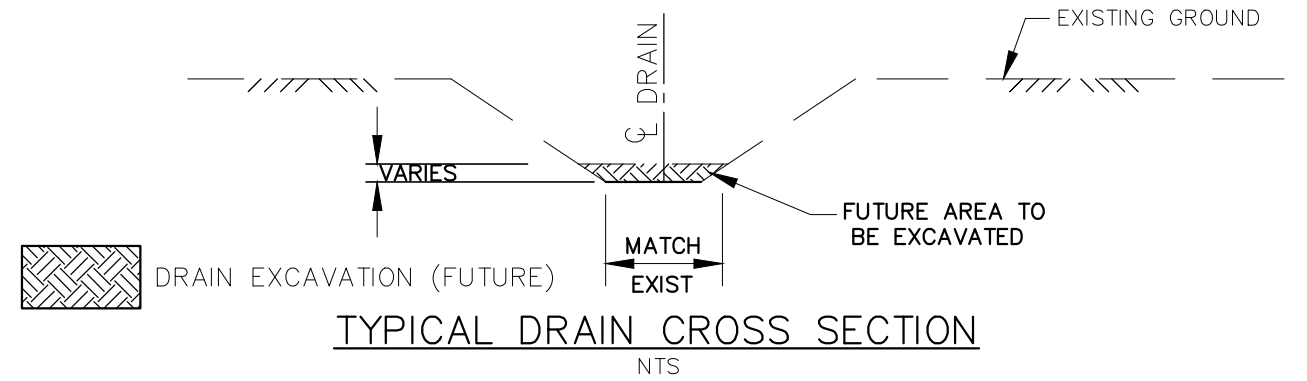
LOCKHART DRAIN "A" PROFILE

8 OF 18

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.7 ELEV. 216.66
TOP EAST END OF EXISTING 1200Ø CSP
STATION 4+531
- UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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PROJECT No.
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J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

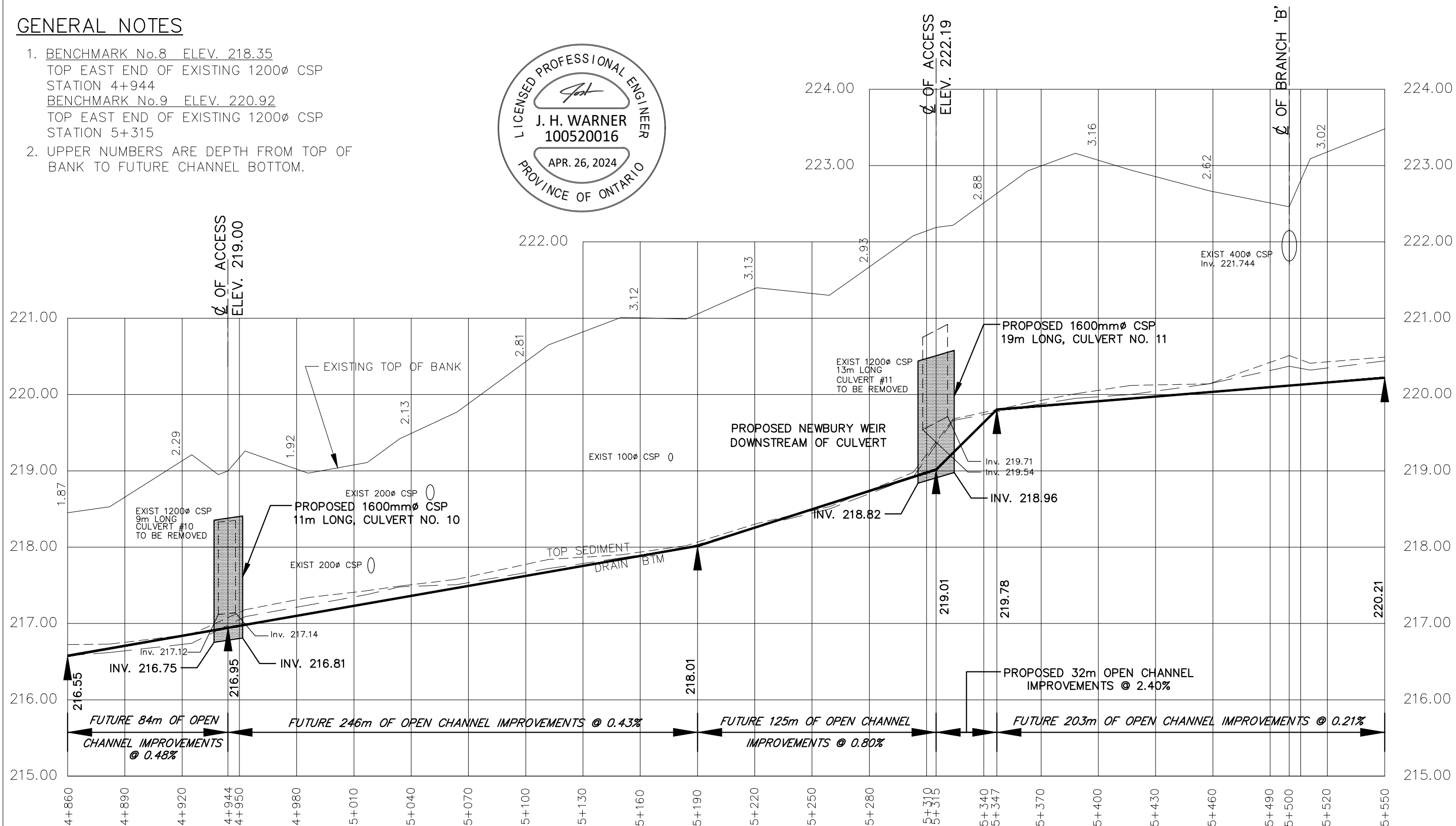
MUNICIPALITY of NORTH MIDDLESEX LOCKHART DRAIN "A" PROFILE

DRAWING NAME:
Lockhart Drain "A" Profile 8

Lockhart Drain "A" Profile 8.dwg 02/20/24

GENERAL NOTES

- BENCHMARK No.8 ELEV. 218.35
TOP EAST END OF EXISTING 1200Ø CSP
STATION 4+944
BENCHMARK No.9 ELEV. 220.92
TOP EAST END OF EXISTING 1200Ø CSP
STATION 5+315
- UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 9

PROJECT No.
2022-1463

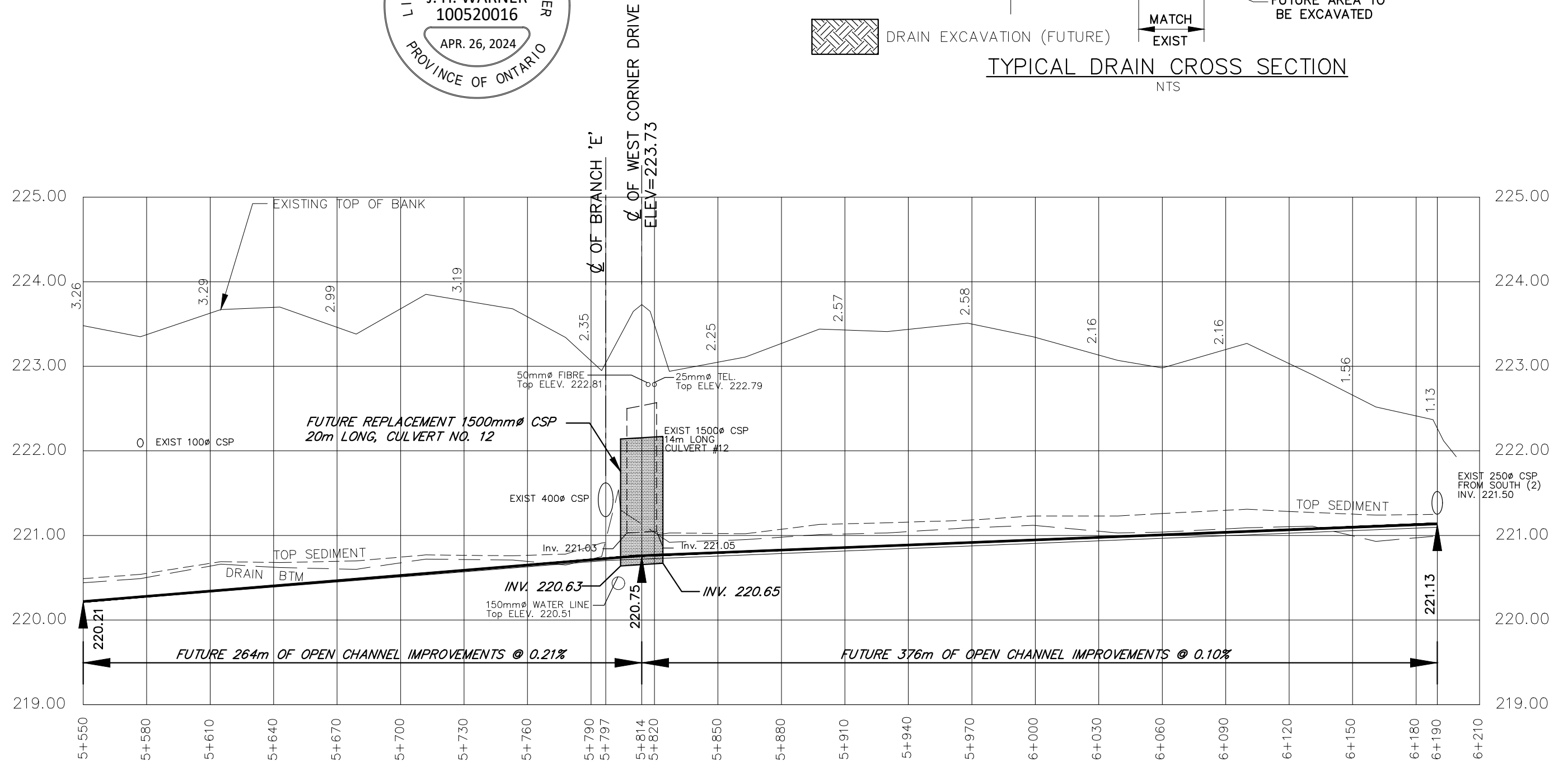
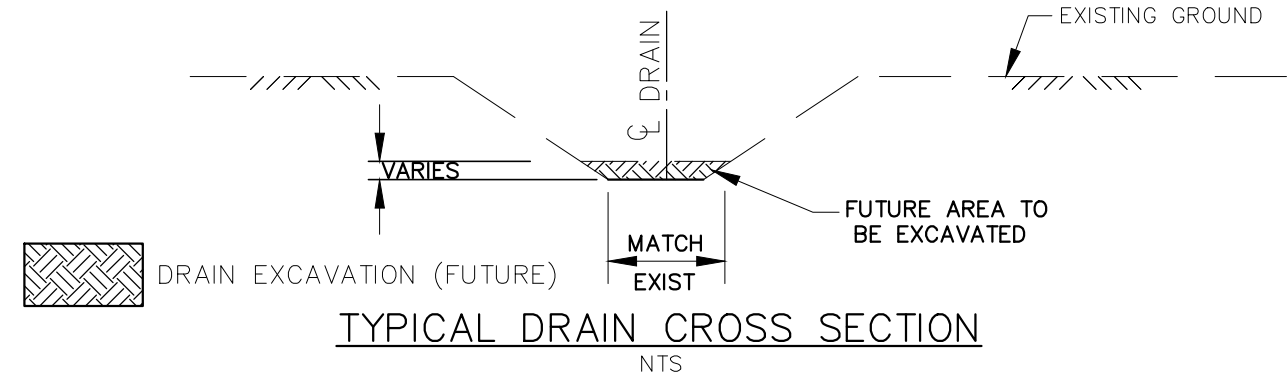
APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN	SCALE: 1:2,000			
C. SAUNDERS	0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX LOCKHART DRAIN "A" PROFILE

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OF 18

GENERAL NOTES

1. BENCHMARK No.10 ELEV. 222.57
TOP EAST END OF EXISTING 1500 ϕ CSP
STATION 5+814
2. UPPER NUMBERS ARE DEPTH FROM TOP OF
BANK TO FUTURE CHANNEL BOTTOM.



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DRAWING NAME:
Lockhart Drain "A" Profile 10

PROJECT No.
2022-1463

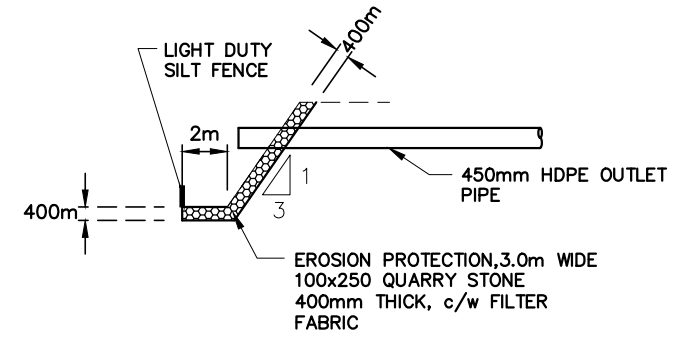
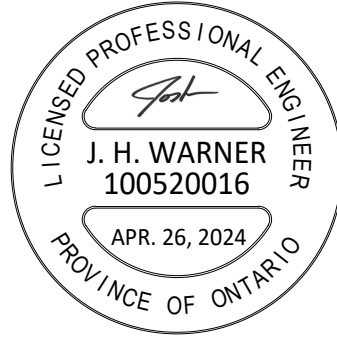
APPROVED	J. WARNER		
CHECKED	B. VAN RUITENBURG		
DRAWN	C. SAUNDERS		
NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS
SCALE: 1:2,000			
0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
PROFILE

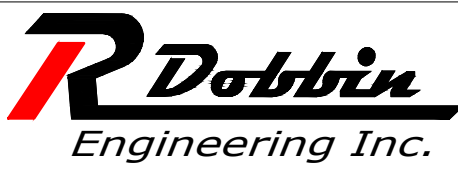
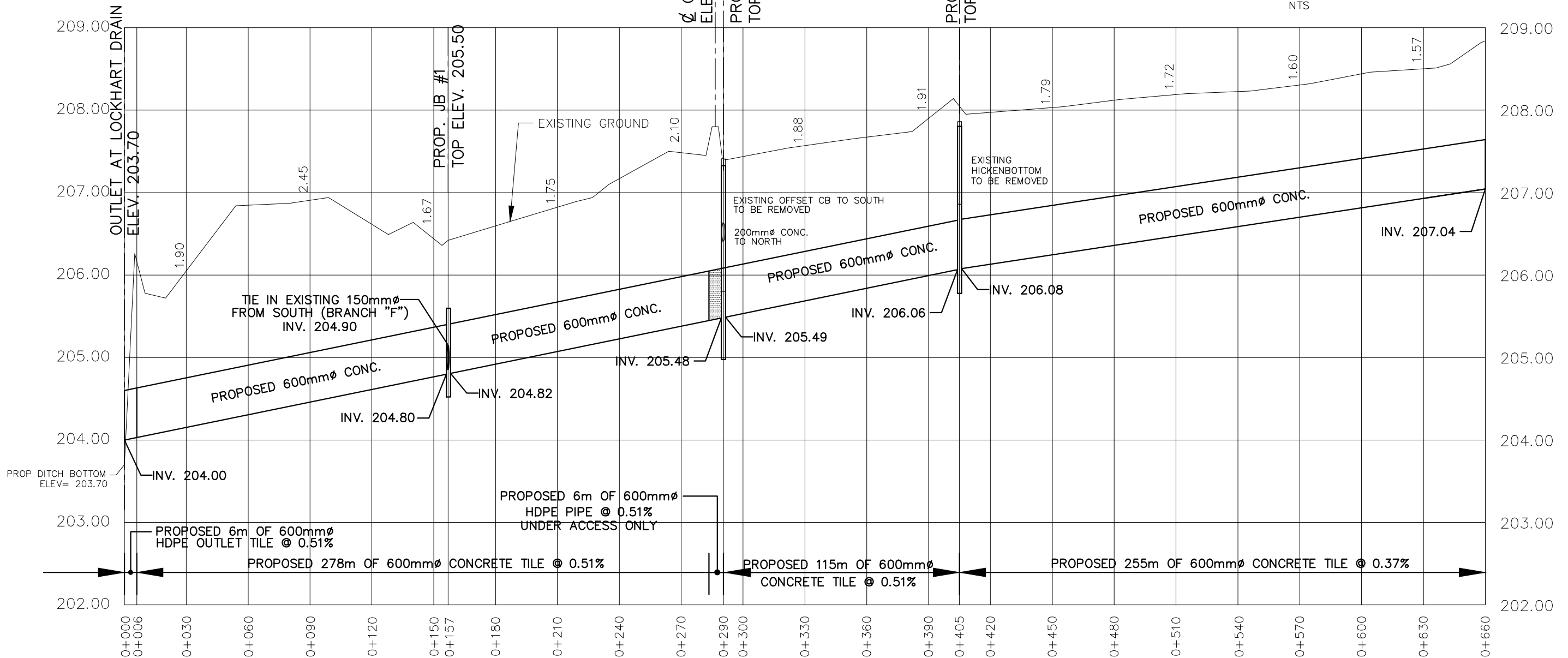
11
OF 18

GENERAL NOTES

- BENCHMARK No.4 ELEV. 205.93
TOP EAST END OF EXISTING 1600 ϕ CSP STATION 1+938 OF DRAIN "A" JUST EAST OF BRANCH "D" OUTLET
- NUMBERS ARE DEPTH FROM GROUND TO THE INVERT OF THE PROPOSED TILE.



OUTLET DETAIL
NTS



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DRAWING NAME:
Lockhart Drain Branch 'D' Profile 1

PROJECT No.
2022-1463

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DRAWN C. SAUNDERS	SCALE: 1:2,000 0 20 40 60m			

MUNICIPALITY of NORTH MIDDLESEX

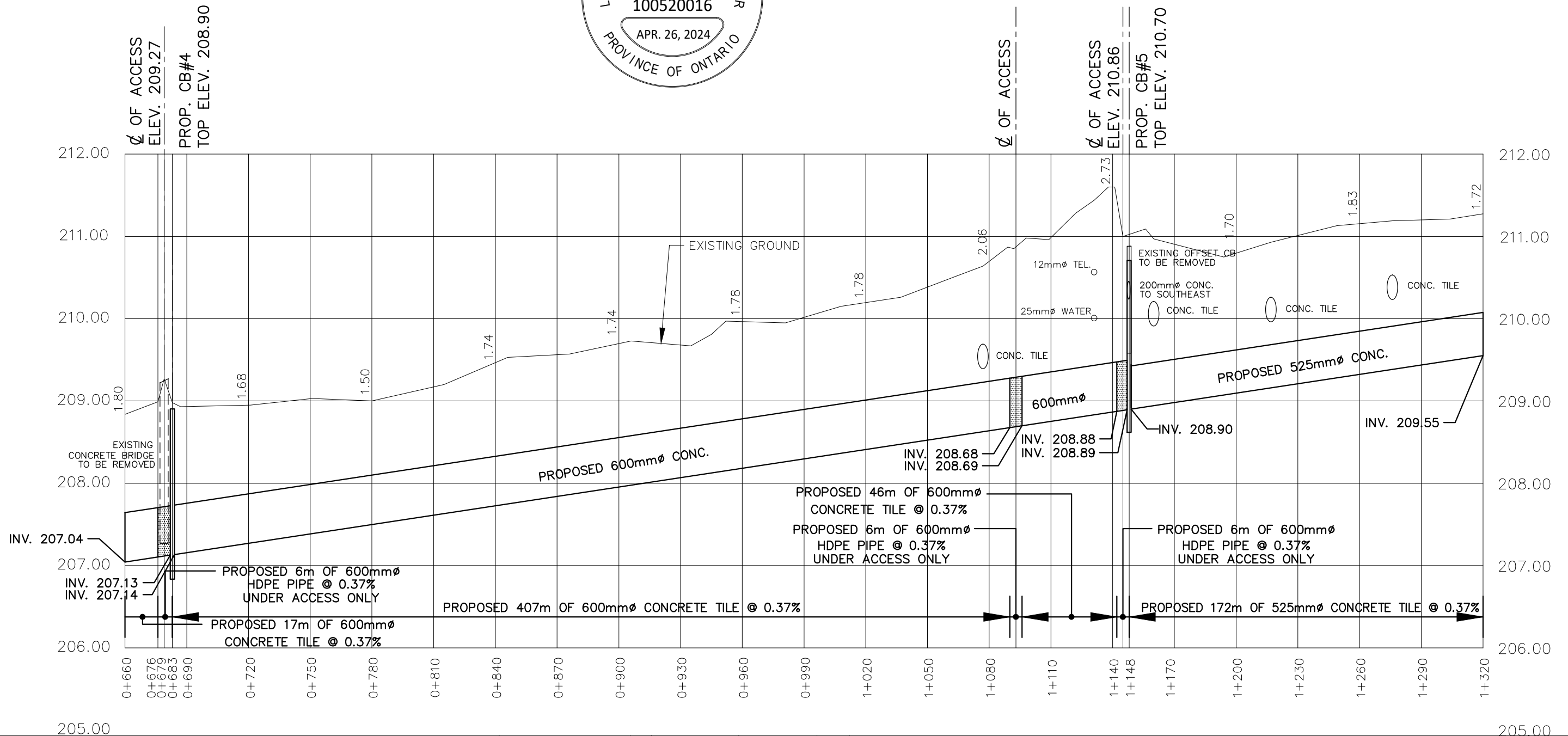
LOCKHART DRAIN "D" PROFILE

12 OF 18

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.11 ELEV. 207.41
TOP OF EXISTING CB LOCATED 9m SOUTH
OF EXISTING OFFSET CATCH BASIN AT ST. 0+290
- NUMBERS ARE DEPTH FROM GROUND
TO THE INVERT OF THE PROPOSED TILE.



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DRAWING NAME:
Lockhart Drain Branch 'D' Profile 2

PROJECT No.
2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
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B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

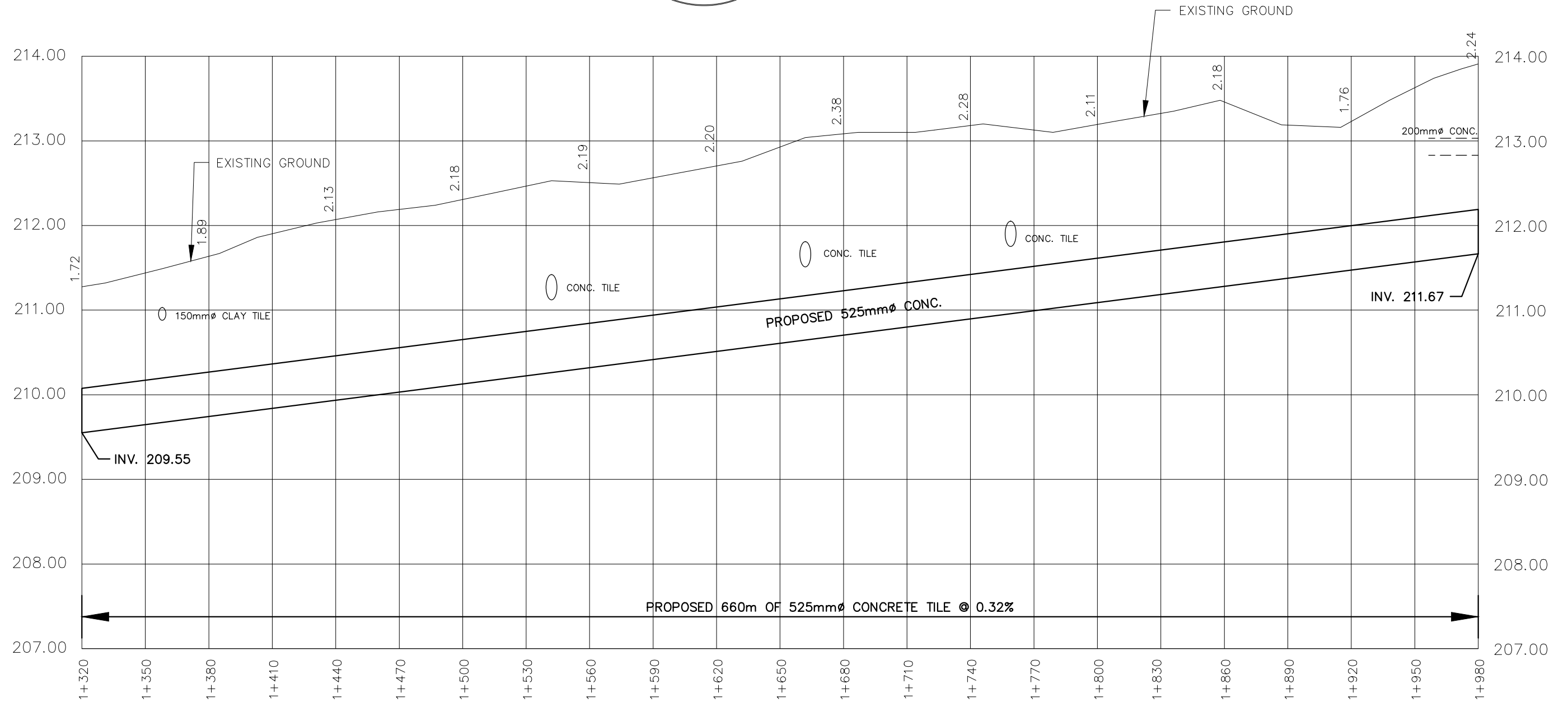
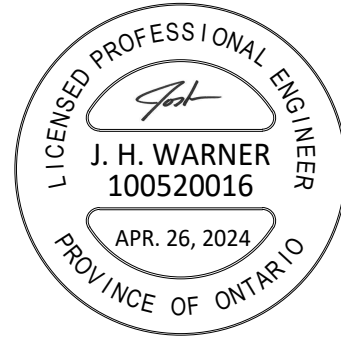
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MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "D"
PROFILE

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.12 ELEV. 210.88
TOP OF EXISTING OFFSET CATCHBASIN
AT STATION 1+148
- NUMBERS ARE DEPTH FROM GROUND
TO THE INVERT OF THE PROPOSED TILE.



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DRAWING NAME:
Lockhart Drain Branch 'D' Profile 3

PROJECT No.
2022-1463

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DRAWN	C. SAUNDERS

NO.	REVISIONS	DATE	BY
1	FINAL REPORT	APRIL 26, 2024	CS

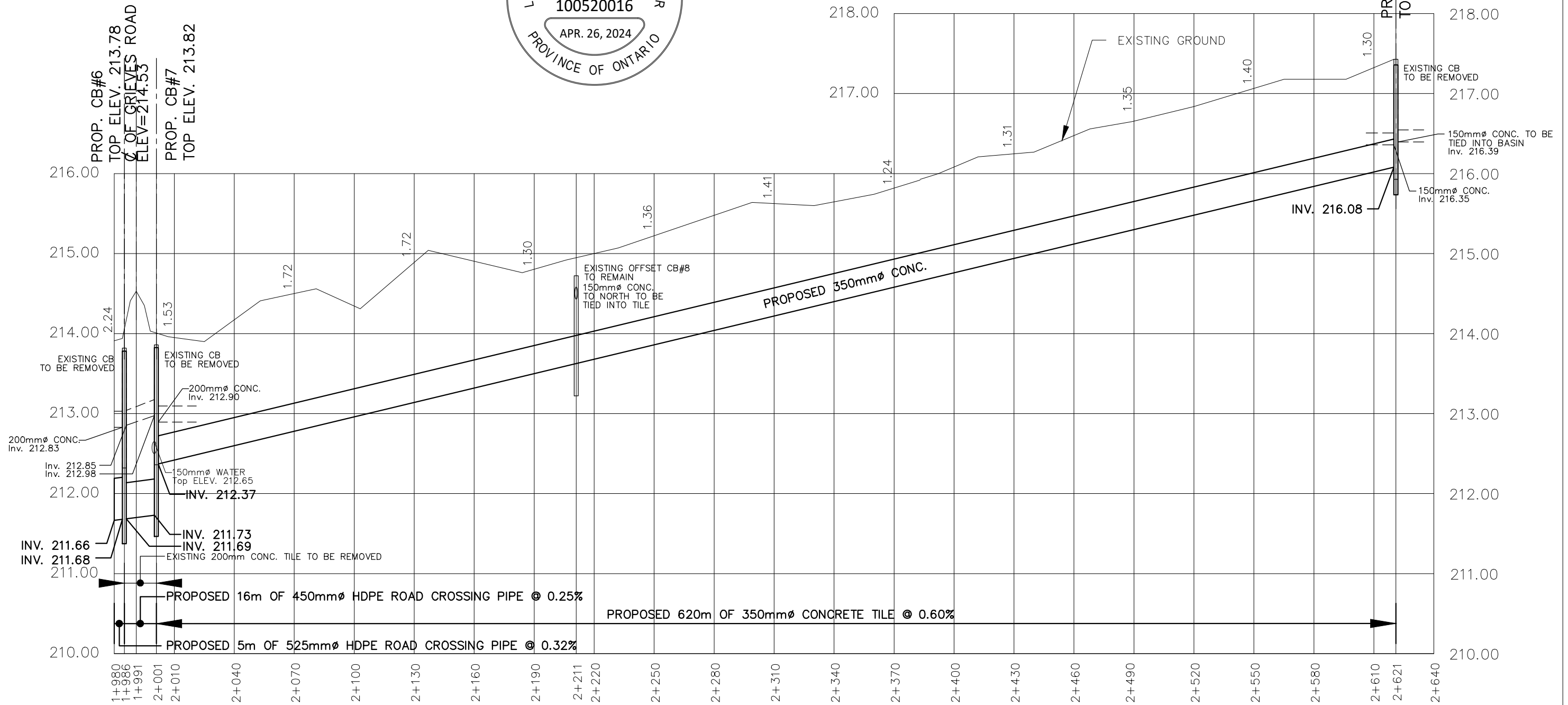
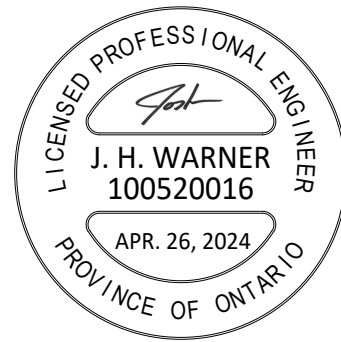
SCALE: 1:2,000
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MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "D"
PROFILE

Last Updated: April 26, 2024

GENERAL NOTES

- BENCHMARK No.13 ELEV. 214.72
TOP OF EXISTING OFFSET CATCHBASIN
LOCATED AT STATION 2+211
- NUMBERS ARE DEPTH FROM GROUND
TO THE INVERT OF THE PROPOSED TILE.



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DRAWING NAME:
Lockhart Drain Branch 'D' Profile 4

PROJECT No.
2022-1463

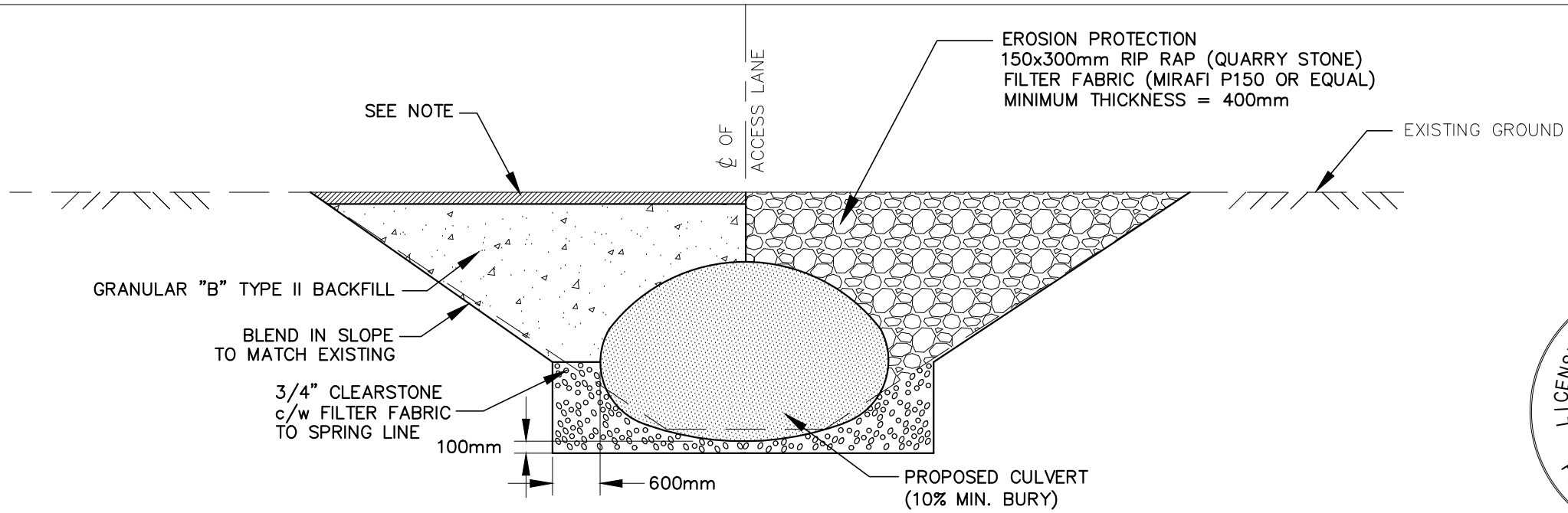
APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED	1	FINAL REPORT	APRIL 26, 2024	CS
B. VAN RUITENBURG				
DRAWN				
C. SAUNDERS				

SCALE: 1:2,000
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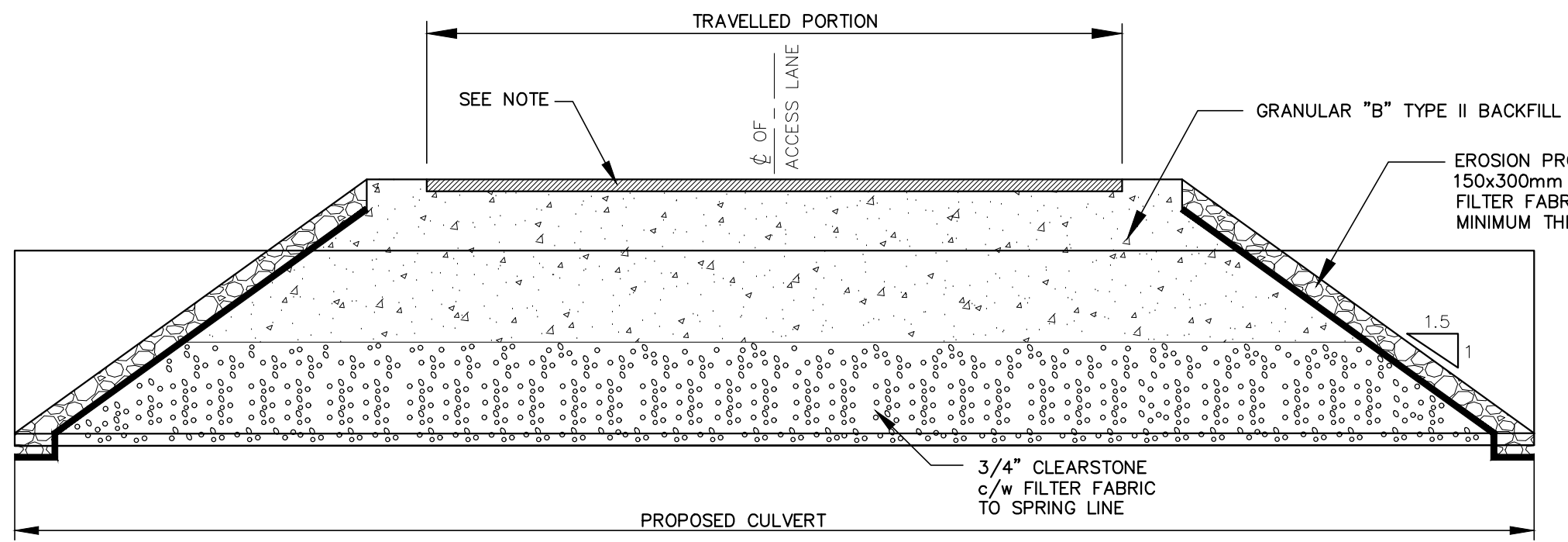
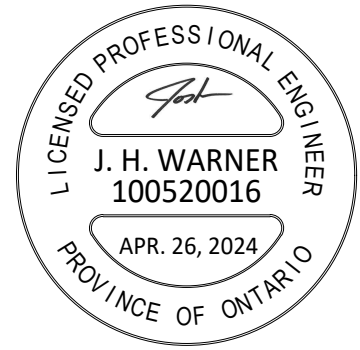
MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "D"
PROFILE

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OF 18

Last Updated: April 26, 2024



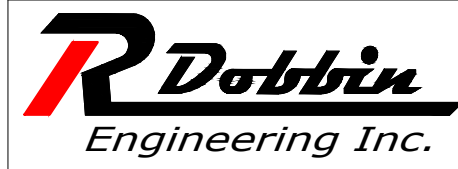
PROPOSED PIPE END SECTION



PROPOSED CROSS-SECTION

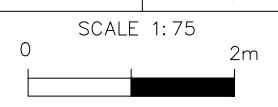
NOTES:

- ALL BACKFILL COMPACTED TO 95% MODIFIED PROCTOR DENSITY
- CONTRACTOR SHALL ENSURE MINIMUM COVER IS MET PRIOR TO CROSSING
- ASPHALT ROAD**
- HL3 AND HL4 TO MATCH EXISTING THICKNESS
- 300mm OF 100% CRUSHED GRAN "A" EXTENDING TO SHOULDER
- GRAVEL ROAD**
- 200mm OF OPS GRANULAR "M" (CRUSHED DOLOMITE SOURCE) TO MATCH EXISTING ROAD WIDTH
- ACCESS CULVERT**
- 150mm OF 100% CRUSHED GRANULAR "A"



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B. VAN RUITENBURG				
DRAWN				
J. WARNER				

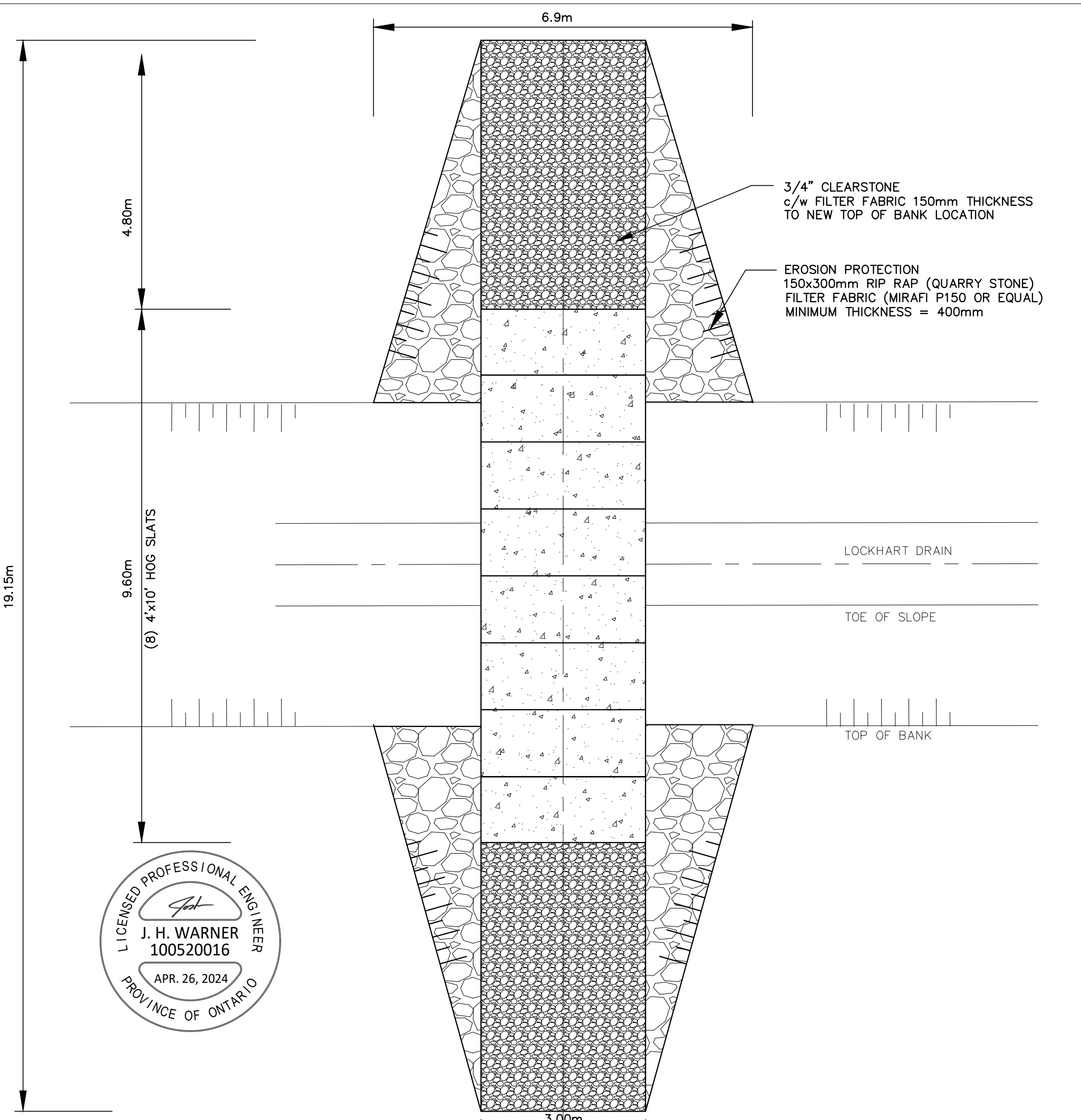


MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN
TYPICAL CULVERT DETAIL

Last Updated: February 14, 2024

DRAWING NAME:
Lockhart Drain Culvert Detail

PROJECT No.
2022-1463



19.15m

4.80m

6.9m

9.60m

(B) 4'x10' HOG SLATS

3/4" CLEARSTONE
c/w FILTER FABRIC 150mm THICKNESS
TO NEW TOP OF BANK LOCATION

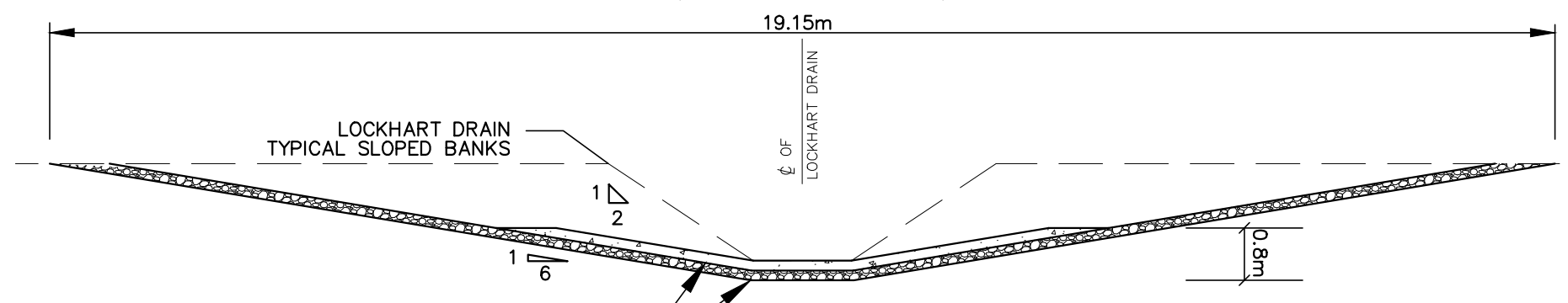
EROSION PROTECTION
150x300mm RIP RAP (QUARRY STONE)
FILTER FABRIC (MIRAFI P150 OR EQUAL)
MINIMUM THICKNESS = 400mm

LOCKHART DRAIN

TOE OF SLOPE

TOP OF BANK

3.00m



4'x10' HOG SLATS
3/4" CLEARSTONE
c/w FILTER FABRIC 100mm THICKNESS
TO NEW TOP OF BANK LOCATION



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DRAWING NAME:
Lockhart Drain Culvert #9 Detail

PROJECT No.
2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
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B. VAN RUITENBURG				
DRAWN	SCALE 1:75			
C. SAUNDERS				

MUNICIPALITY of NORTH MIDDLESEX

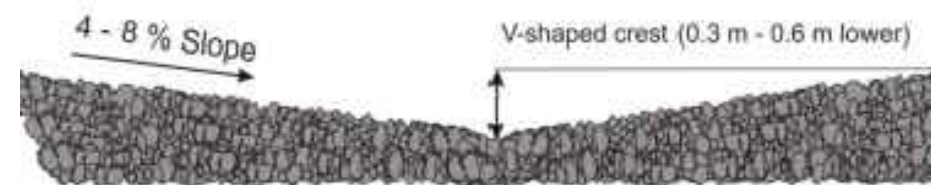
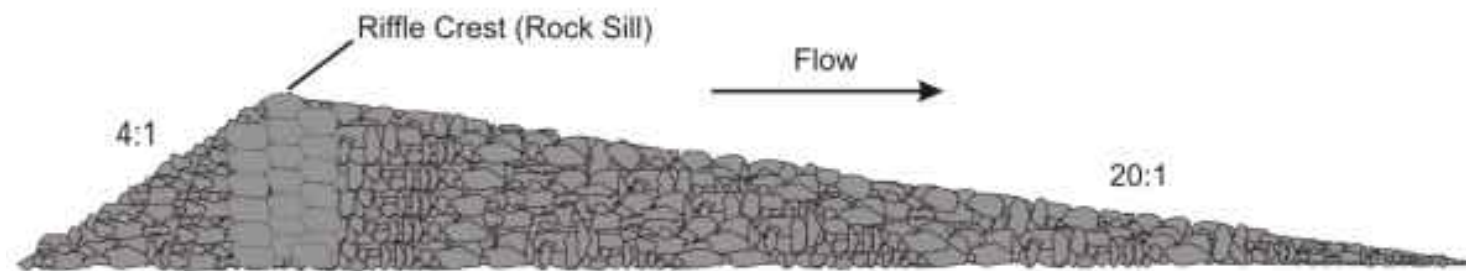
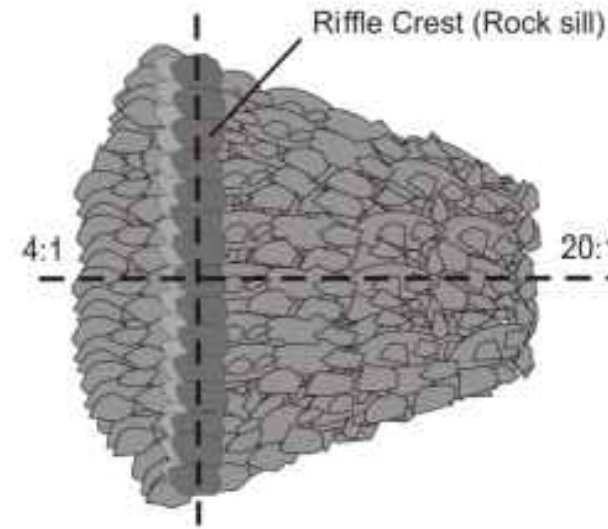
LOCKHART DRAIN
CULVERT #9 DETAIL

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of 18

Last Updated: April 26, 2024

GENERAL NOTES

1. TOP OF THE WEIR CREST (ROCK SILL) SHALL BE 0.30m ABOVE THE PROPOSED CHANNEL BOTTOM.
2. THE AREA TO RECEIVE THE RIP RAP SHALL BE GRADED TO A DEPTH OF 300mm BELOW FINISHED GRADE. FILTER FABRIC SHALL THEN BE PLACED WITH ANY JOINTS OVERLAPPED A MINIMUM OF 600mm.
3. RIP RAP SHALL EXTEND FROM THE DITCH BOTTOM TO 1m ABOVE THE DITCH BOTTOM ON BOTH SIDES.
4. THE LARGEST RIP RAP SHALL BE USED AT THE RIFFLES CREST AND ON THE DOWNSTREAM SLOPE OF THE RIFFLE. ON THE DOWNSTREAM SLOPE THE RIP RAP SHALL BE SPACED 200 TO 300mm APART.
5. SMALLER RIP RAP SHALL BE PLACED ON THE SURFACE OF THE RIFFLE AND ALIGNED AND SPACED SO THAT THEY BREAK THE FLOW INTO PATHS THAT CAN BE FOLLOWED UP THE RIFFLE FACE BY MIGRATING FISH.
6. RIP RAP SHALL BE 150mm TO 300mm QUARRY STONE. AND SHALL EXTEND 0.50m ABOVE THE BOTTOM OF THE CHANNEL.



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DRAWING NAME:
 Lockhart Drain Newbury Weir Detail

PROJECT No.
 2022-1463

APPROVED	NO.	REVISIONS	DATE	BY
J. WARNER				
CHECKED B. VAN RUITENBURG	1	FINAL REPORT	APR. 26, 2024	JW
DRAWN J. WARNER	SCALE 1:50			

MUNICIPALITY of NORTH MIDDLESEX
LOCKHART DRAIN "A"
NEWBURY WEIR DETAIL

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OF 18