BARRETTE DRAIN

Repairs and Improvements

Geographic Township of Colchester North

TOWN OF ESSEX
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Project REI2020D009
2021-01-25

Rood Engineering Inc.

Consulting Engineers

January 25th, 2021

Mayor and Municipal Council
Corporation of the Town of Essex
33 Talbot Street South
Essex, Ontario
N8M 1A8

Mayor Snively and Members of Council:

BARRETTE DRAIN
Repair and Improvements
Geographic Twp. of Colchester North
Project REI2020D009
Town of Essex, County of Essex

I. INTRODUCTION

In accordance with the instructions confirmed by letter of April 20th, 2020, from your Drainage Superintendent, Lindsay Dean, we have prepared the following report that provides for repair and improvements of the open drain, along with bridge repairs and improvements along the drain together with ancillary work. The Barrette Drain comprises of an open drain generally located along the north side of the 13th Concession Road extending from an outlet in the Hyland Sideroad Drain located on the east side of Hyland Road, in the geographic township of Colchester North, Town of Essex. A plan showing the Barrette Drain, as well as the general location of the bridges along the drain, is included herein as part of the report.

Our appointment and the works relative to the repair and improvements to the Barrette Drain, proposed under this report, is in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010". We have performed all of the necessary survey, investigations, etcetera, for the proposed repairs and improvements to the bridges and drain, and we report thereon as follows.

II. BACKGROUND

From our review of the information provided from the Town's drainage files we have established the following report that we utilized as reference for carrying out this project:

1) November 4th, 1966 Barrette Drain Report & Plans C.G.R. Armstrong, P.Eng.

The 1966 report by C.G.R. Armstrong, P.Eng. provided for general repairs and improvements to the entire length of the drain and has the latest profile for the grading of the drain.

We arranged with the Town to provide us with the updated assessment roll information for the affected parcels. We also reviewed reports for the abutting drains and spoke to the owners to help in establishing the current watershed limit for the Barrette Drain.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the available drainage information and documentation provided by the Drainage Superintendent, we arranged with Town staff to schedule a virtual on-site meeting for July 1st, 2020. The following people participated in said meeting: Justin Pulleyblank, Ed Lepain, Kim Verbeek, Evan Belanger, Brendan Byrne, Kirk Carter (Drainage Board), Dan Boudreau (Drainage Board), Tanya Tuzlova (Drainage Clerk), Norm Nussio (Manager Operations & Drainage), Lindsay Dean (Drainage Superintendent), Kayla Daguerre (Rood Engineering) and Gerard Rood (Rood Engineering).

Ms. Dean did an introduction of the purpose of the meeting and introduced all participants. She shared her computer screen with an aerial map of the Barrette Drain and noted that the outlet was into the Hyland Sideroad Drain. She went on to advise that there have been a lot of severances since the 1966 drainage report and plan and shared the plan on her computer screen. The intent is to have the whole drain looked at along with the bridges for maintenance works. She advised that Mr. Rood will look at the drain assessment schedule to provide an update reflecting the changes since the 1966 report.

Mr. Rood explained the process of preparing a drainage report and explained the details for bridges based on current practices. Mr. Pulleyblank asked about the timeline and Mr. Rood outlined the usual procedure and estimated time. Mr. Byrne asked why the drain was being looked at. Ms. Dean explained that there are only 2 bridge culverts that are legal parts of the drain and this limits the maintenance of the drain by the Town. Mr. Pulleyblank questioned why some culverts were repaired if not legal structures. Ms. Dean advised that they have not been able to locate any information on this. The drainage report will legalize all structures and provide for cost sharing of maintenance work when needed. Mr. Pulleyblank stated that he has shared on previous costs. Mr. Nussio responded that the 2 culverts replaced were likely the only legal ones and assessed per the old drainage report. Culvert replacements are much more expensive now. It was advised by Mr. Pulleyblank that other bridges were done too, and Mr. Nussio replied that the Town will look into bridge works.

Mr. Byrne noted that he has looked into costs of proceeding with a drainage report and there are a lot of additional costs versus just doing the work. He suggested a need to review costs and fees and offsetting them needs to be reasonable. A neighbor has installed a bridge and did it out of pocket. The procedure can be tiresome. Mr. Rood explained the advantages of bridges being legal

components of the drainage works and the requirements that have to be met so that no adverse impacts are caused to neighboring lands and roads and liability issues are addressed. Mr. Byrne responded that he understands this, and costs are a concern and he questioned how to legalize a bridge. Ms. Dean said the Town will have to check their records and all bridges will be made legal with cost sharing for future maintenance. She can call owners to discuss information with them and the Town can email them with extra information that they want. Mr. Pulleyblank asked about what has been done in the past and would like to know any sharing that has been done in the past. Ms. Dean asked the owners to contact the Town Drainage Department with any further questions that they have.

Mr. Rood asked the Town and owners to provide information on any drainage changes that they might be aware of. The last report assessed most of the area immediately to the north of the drain.

It was discussed that all trees within the drain cross section from top of bank to top of bank will be removed to prevent obstruction of drainage. The north side of the drain will be basically cleared for access to carry out the work and dispose of material; however, some mature trees may be able to be saved if the Contractor can work around them. Material excavated along lawn areas will be done from the road side and will be trucked away. It was clarified that owners pay a portion of the cost if adjacent to the work area or upstream of the work. The Town wants to restore the drain to an adequate capacity and wants a more accurate and fair assessment schedule for drain maintenance.

We advised the owners that the minimum standard top width for access bridges is 6.10 metres (20 ft.) and that the bridge centreline locations will be established based on the existing bridges. The owners were also advised that for any bridges that are replaced, the cost of the replacement access bridge construction and the future maintenance costs would be shared by the owner and upstream affected lands and roads. Any cost for additional top width will be borne by the owner. We went on to discuss that quarried limestone on filter cloth sloped ends for the installation, like those on other newer bridges, were expected to be an economical end treatment for replacement bridges, but the Engineer would contact the owner if necessary, to advise if there was any change to this.

The overall drainage report procedure, future maintenance processes and grant eligibility were generally reviewed with the owners. They were also advised that the works will be subject to the approval of the Department of Fisheries and Oceans (D.F.O.), the Ministry of Natural Resources and Forestry (M.N.R.F.), the Ministry of Environment, Conservation and Parks (M.E.C.P.), and the Essex Region Conservation Authority (E.R.C.A.). We further discussed bridge maintenance, sizing, and material of the proposed bridge, noting that aluminized corrugated steel pipe is typically the most cost effective.

IV. FIELD SURVEY AND INVESTIGATIONS

Following the on-site meeting we arranged for our survey crew to attend at the site and perform a topographic survey, including taking the necessary levels and details to establish the design parameters for the installation of any new replacement access bridges.

A benchmark was looped from previous work carried out on the drain and was utilized in establishing a site benchmark near the location of the bridges. We surveyed the entire length of the drain and picked up the existing bridges and culvert elevations in order to establish a design grade profile for the drain repair and installation of any new bridges. We also took cross-sections of the Barrette Drain, as necessary for us to complete our design calculations, estimates and specifications.

The Town made initial submissions to the Essex Region Conservation Authority (E.R.C.A.) regarding their requirements or any D.F.O. requirements for work that would be proposed to be carried out on the Barrette Drain to be repaired and improved. A response from the Conservation Authority was received via email on May 7th, 2020. E.R.C.A. stated that the Barrette Drain is located within a regulated area administered by E.R.C.A. and accordingly, a permit or approval will be required by E.R.C.A. for any repairs and/or maintenance works to the Barrette Drain.

Former Ministry of Natural Resources & Forestry (M.N.R.F.) agreements are replaced with new legislation provisions under Ontario Regulation 242/08, Section 23.9 administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.), which allows repairs, maintenance, and improvements to be conducted by the Town within existing municipal drains. These works are exempt from Sections 9 and 10 of the Endangered Species Act provided that the rules in the regulations are followed by the Town and their contractor. When eligible, the new regulations allow Municipalities to give notice to M.N.R.F. by registering their drainage activities through an online registry system.

For the purposes of establishing the watershed area of the Barrette Drain, and determining the drain repairs required, we investigated and reviewed the past drainage report on the Barrette Drain and online mapping contour information.

V. BRIDGES REVIEW

As part of our investigations, we made detailed inspections of all of the bridges along the open drain. Their condition and proposed work if any are summarized as follows:

1. This bridge serves parcel 570-01900 owned by Edward Lepain. It was found to be in very good condition with work done approximately 1 year ago as discussed with the owner. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
2. This bridge is shared and serves parcel 570-01700 owned by Evan & Laura Belanger and parcel 570-01800 owned by Leo Chauvin & Eileen Matte. The bridge is in good condition

but has significant sediment and vegetation accumulated to almost half the pipe diameter. The report and plans will provide the Town with the details needed for current cleaning of the bridge pipe and for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.

3. This bridge serves parcel 570-01600 owned by Mark & Margaret Bosse. It was found to be in very good condition with work appearing to have been done recently. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
4. This bridge enclosure serves parcels 570-01500 owned by Laura Amlin. The structure comprises corrugated steel pipe (C.S.P.) and is in fair condition. It was established that some headwall repairs would be provided as needed and the bridge pipe would be left for now. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
5. This bridge serves parcel 570-01400 owned by Roy & Lynn Tetler. The bridge is in fair condition and comprises corrugated steel pipe. In discussions with the owner, it was established that some sloped end treatment repairs would be provided as needed and the bridge would be left for now. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
6. This bridge serves parcel 570-01300 owned by Douglas & Michele Barron. The bridge is in fair condition and comprises C.S.P. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
7. This bridge serves parcel 570-02100 owned by Ralph Giles & Annette Wiper. The bridge appears to be in fair condition and has a slightly narrower top width than a standard bridge. Because of the collapsing headwalls and extreme rusting of the pipe it is recommended that the bridge be replaced as set out in this report. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
8. This bridge serves parcel 570-01100 owned by Kyle & Natalie Tetler. The bridge is in good condition. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
9. This bridge serves parcel 570-01000 owned by Philip Lemieux & Laurie Raymont. The bridge is in poor condition showing rotting out at the haunches. It is recommended that the bridge be replaced as set out in this report. The report and plans will also provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
10. This bridge serves parcel 570-00900 owned by Rose Renaud. The bridge is in poor condition showing rotting at the pipe haunches. It is recommended that the bridge be replaced as set out in this report. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
11. This bridge serves parcel 570-00800 owned by James & Kimberly Battersby. The bridge is in poor condition showing rotted pipe haunches and an open joint with backfill migration

into the pipe. It is recommended that the bridge be replaced as set out in this report. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.

12. This bridge serves parcel 570-00700 owned by Justin Pulleyblank. The bridge appears to be in fair condition but irregularities in the surface over the pipe suggest problems may arise in the near future. It is recommended that the bridge be replaced as set out in this report. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
13. This bridge serves parcel 570-00600 owned by Donald Brillinger. The bridge is in fair condition, but some severe corrosion was noted at the pipe haunches. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.
14. This bridge serves parcel 570-00500 owned by Brendan Byrne. The bridge appears to be in very bad condition with collapsed headwalls and a very narrow top width. It is recommended that the bridge be replaced as set out in this report. The report and plans will provide the Town with the details needed for future work on the bridge pursuant to the maintenance provisions of the Drainage Act.

VI. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the 1966 report plans by engineer C.G.R. Armstrong provides a good fit to the existing profile of the drain. Said report provided for improvements to the open drain that still appear to suit the current conditions of the watershed.

Based on our detailed survey, investigations, examinations, and discussions with the affected property owners, we would recommend that the Barrette Drain be repaired and improved to the general parameters as established in our design drawings attached herein. We further recommend that when work is carried out on the existing bridges, the following parameters be utilized that include allowance for embedment of the pipe:

Bridge No.				**Req'd**
Ex. Structure	**Roll No.**	**Owners**	**Notes**	**Size**
1. 900mm C.S.P.	570-01900	Edward Lepain	Precast concrete headwalls	1200mm C.S.P.
2. 1100mm C.S.P.	570-01700	Evan & Laura Belanger	Concrete filled jute bag headwalls	1200mm C.S.P.
	570-01800	Leo Chauvin & Eileen Matte		
3. 1050mm C.S.P.	570-01600	Mark & Margaret Bosse	Precast concrete headwalls	1200mm C.S.P.
4. 1050mm C.S.P.	570-01500	Laura Amlin	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.

5. 1050mm C.S.P.	570-01400	Roy & Lynn Tetler	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.
6. 1000mm C.S.P.	570-01300	Douglas & Michele Barron	Precast concrete headwalls	1200mm C.S.P.
7. 1100mm C.S.P.	570-02100	Ralph Giles & Annette Wiper	Concrete pieces headwalls – replace with sloped ends	1200mm C.S.P.
8. 1000m C.S.P.	570-01100	Kyle & Natalie Tetler	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.
9. 900mm C.S.P.	570-01000	Phillip Lemieux & Laurie Raymont	Poured concrete and cinder blocks – replace with sloped ends	1200mm C.S.P.
10. 900mm C.S.P.	570-00900	Rose Renaud	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.
11. 1000mm C.S.P.	570-00800	James & Kimberly Battersby	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.
12. 1050mm C.S.P.	570-00700	Justin Pulleyblank	Stacked concrete blocks – replace with sloped ends	1200mm C.S.P.
13. 900mm C.S.P.	570-00600	Donald Brillinger	Poured concrete headwalls – replace with sloped ends	1200mm C.S.P.
14. 900mm C.S.P.	570-00500	Brendan Byrne	Collapsed concrete blocks – replace with sloped ends	900mm C.S.P.

During the course of our investigations, this drainage project was discussed and reviewed with E.R.C.A., to deal with any Authority issues and comments related to this Municipal drain. In the interest of maintaining ongoing protection, E.R.C.A. requires that to prevent flooding and adverse impacts upstream, any new structure needs to provide an equivalent level of service to the adjacent structures. Therefore, based on this, we have made provisions to use corrugated steel pipe culverts as set out below, similar to the structures a short distance upstream and downstream. The Barrette Drain is located within the Regulated Area and is under the jurisdiction of the E.R.C.A., and therefore all work has to comply with the current mitigation provisions of the E.R.C.A. Details of these mitigation measures are included in the Specifications and **Appendix "REI-A"** forming part of this report.

As part of our investigations, a D.F.O. self screening assessment of the project was carried out. The mapping indicated no species at risk or critical habitat for the area of the drain work. In the interest of fish habitat and migration, D.F.O. requires that the invert of any new bridge be

embedded below the design or existing bottom of the drain a minimum of 10% of the bridge opening height to ensure a continued path for fish migration through the access bridge. The D.F.O. Species at Risk screening maps confirm that there are no Species at Risk Fish or Mussels identified in this area. Should any species be encountered, details of required mitigation measures are included in the Specifications and **Appendix "REI-A"** forming part of this report.

As is now required under the new Endangered Species Act, 2007 Provincial Legislation, we have reviewed the former M.N.R.F. agreement with the Town. The M.N.R.F. mapping has basically confirmed that there are no foreseen impacts to natural heritage features or endangered or threatened species on this project; therefore, a permit or agreement under the E.S.A. 2007 is not necessary at this time. Because turtles and snakes are mobile and snakes are indicated as sensitive in the area, we have included herein a copy of the M.N.R.F. mitigation requirements for them in **Appendix "REI-B"**.

Providing mitigation requirements are implemented it was concluded that present wildlife Species at Risk will be protected from negative impacts and will not contravene with Section 9 (species protection) or Section 10 (habitat protection) of the Endangered Species Act, 2007. Based on this information we find that the Town can proceed with the eligible repairs, maintenance, and improvements to the drain as they are exempt under Sections 9 and 10 of the Act, provided that they follow the rules within Ontario Regulation 242/08. To address these requirements the Town has established comprehensive mitigation measures as well as species identification guides for reference. Copies of the measures and guides shall be provided to the successful Tenderer for use during construction, and these documents are available for viewing by any interested parties at the Town office.

We would also recommend that the access bridges presently found in the drain, for which the maintenance costs are to be shared with the upstream lands and roads within the watershed, be maintained by the Town and that said maintenance would include works to the bridge culvert, bedding, backfill and end treatment. When concrete or asphalt driveway surfaces over these bridge culverts require removal as part of the maintenance works, these surfaces shall be repaired or replaced as part of the work. Likewise, if any fencing, gate, decorative walls, guard rails or special features exist that will be impacted by the maintenance work, they are also to be removed and restored or replaced as part of the bridge maintenance work. However, the cost of the supply and installation of any surface material other than granular "A" material, and the cost of the removal and restoration or replacement if necessary, of any special features, shall be totally assessed to the benefiting adjoining owner(s) served by said access bridge.

Since the work on these access bridges will generally be limited to the area of the drain and the adjacent roadway, and since all damaged areas are to be restored as set out in the Specifications, we find that there is no requirement for allowances pursuant to Section 29 and 30 of the Drainage Act for work done on the bridges.

Based on all of the above, we recommend that the Barrette Drain be repaired and improved, in accordance with this report, the attached specifications and the accompanying drawings, and that all works associated with same be carried out in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

VII. ALLOWANCES

We have provided that all of the work on the open drain will generally be completed from the north side of the drain. The Contractor will be required to restore any existing grassed buffer and driveway areas damaged by the work. We recommend that any materials removed from the open drain or existing bridges, be spread on the adjacent open lands to the north of the drain for disposal by the Contractor, beyond the limits of any existing grass buffer or driveway access. Based on all of the above we find that allowances for damages are payable pursuant to Sections 29 and 30 of the Drainage Act.

We find that the provision of access along the north bank of the drain and disposal of excavated material on the abutting farm and non-residential lands requires payment for the land necessary to carry out same. We therefore recommend that the following owner be compensated for all work areas that will be impacted, including for the access to the drain and for damages to lands and crops, if any, as follows, namely:

1)	Brendan Byrne, (570-00500),	Owner,	Part of Lot 14, Concession 13,	$	1,465.00
TOTAL FOR ALLOWANCES AND DAMAGES				**$**	**1,465.00**

These values for allowances and damages are based on a strip of land parallel to and immediately adjacent to the drain or grassed buffer and driveway, for the parcel abutting the north side of the Municipal drain and are based on a value of $1,225.00 per acre ($3,027.00 per hectare) for the affected lands and crops, if any. These allowances provide for a spread depth of 100mm and are calculated using a rate per acre of $700.00 for year one, $350.00 for year two and $175.00 for the third year. The impact after 3 years is considered negligible.

We have provided for this in our estimate as is provided for under Sections 29 and 30 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2010".

VIII. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **ONE HUNDRED FIFTY THREE THOUSAND SIX HUNDRED FIFTY DOLLARS ($153,650.00)**, made up as follows:

CONSTRUCTION

Item 1)	**Station 0+000 to Station 1+200**; Carry out excavation of the drain to remove accumulated sediment and restore the drain to the profile grade shown on the plans, including leveling of material; all loading, hauling, and disposal where required; approximately 1200 metres (approximately 580 cubic metres).	Lump Sum	$	17,550.00
Item 2)	**Station 0+000 to Station 1+200;** Supply and install new heavy duty H.D.P.E. plastic tile main extensions, including connections, rodent grate, removal of any deleterious materials, excavation, backfill, compaction and restoration, complete:			
	a) 3.0 metres (10') of 150mm (6") diameter pipe for 150mm diameter tiles: 1 required at $200.00 each		$	200.00
Item 3)	**Station 0+000 to Station 1+200;** Supply and install approximately 5 lateral tile drain extensions to outlet end of damaged existing 100mm diameter lateral tiles entering the drain, including excavation, rodent grate, backfill, compaction, topsoil placement, and seed and mulch, complete at $100.00 each.		$	500.00
Item 4)	**Station 0+000 to Station 1+200;** Supply and install approximately 40 tonnes of quarried limestone rip rap for rock chute spillways and general erosion protection, complete at $65.00 per tonne.		$	2,600.00
Item 5)	**Station 0+000 to Station 1+200;** Supply and install approximately 80 square metres of synthetic filter mat for rock chute spillways and general erosion protection, complete at $3.00 per square metre.		$	240.00
Item 6)	Brushing and grubbing including all disposal and clean up (approximately 1200 lineal metres), removing and replacing fences, complete.	Lump Sum	$	12,000.00
Item 7)	Spread scavenged topsoil; carry out seeding and mulching on all newly excavated side slopes including all harrowing, raking, preparation, and clean up, complete.	Lump Sum	$	5,200.00

Item 8)	**Bridge No. 7**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 12 metres of 1200mm diameter, 2.0mm thick aluminized steel pipe with 125X25mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Ralph Giles & Annette Wiper)	Lump Sum	$	12,100.00
Item 9)	**Bridge No. 9**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 12 metres of 1200mm diameter, 2.0mm thick aluminized steel pipe with 125X25mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Philip Lemieux & Laurie Raymont)	Lump Sum	$	12,200.00
Item 10)	**Bridge No. 10**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 12 metres of 1200mm diameter, 2.0mm thick aluminized steel pipe with 125X25mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Rose Renaud)	Lump Sum	$	12,000.00
Item 11)	**Bridge No. 11**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 12 metres of 1200mm diameter, 2.0mm thick aluminized steel pipe with			

	125X25mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (James & Kimberly Battersby)	Lump Sum	$	12,000.00
Item 12)	**Bridge No. 12**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 13 metres of 1200mm diameter, 2.0mm thick aluminized steel pipe with 125X25mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Justin Pulleyblank)	Lump Sum	$	12,000.00
Item 13)	**Bridge No. 14**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 12 metres of 900mm diameter, 2.0mm thick aluminized steel pipe with 68X13mm corrugations, 9C bolted coupler, including Granular 'B' backfill, Granular 'A' travel surface; excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Brendan Byrne)	Lump Sum	$	10,200.00
Item 14)	**Bridge No. 4**; Repair existing sloped end treatments on the bridge in accordance with the standard bridge specifications including excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Laura Amlin)	Lump Sum	$	1,500.00

Item 15)	**<u>Bridge No. 5</u>**; Repair existing sloped end treatments on the bridge in accordance with the standard bridge specifications including excavation, placement, compaction, grading; 305mm thick quarried limestone on filter cloth sloped end protection; topsoil placement, seeding and mulching, and restoration and clean up, complete. (Roy & Lynn Tetler)	Lump Sum	$	1,500.00
Item 16)	Estimated net Harmonized Sales Tax (1.76% H.S.T.) on construction items above.	Lump Sum	$	1,968.00
Item 17)	Contingency amount for construction.	Lump Sum	$	1,242.00
	TOTAL FOR CONSTRUCTION		**$**	**115,000.00**

<u>INCIDENTALS</u>

1)	Report, Estimate, & Specifications	$	10,500.00
2)	Survey, Assistants, Expenses, and Drawings	$	16,500.00
3)	Duplication Cost of Report and Drawings	$	500.00
4)	Estimated Cost of Letting Contract	$	1,000.00
5)	Estimated Cost of Layout and Staking	$	1,200.00
6)	Estimated Cost of Part-Time Supervision and Inspection During Construction (based on 8 day duration)	$	5,480.00
7)	Net H.S.T. on Incidental Items Above (1.76%)	$	619.00
8)	Estimated Cost of E.R.C.A. Permit	$	800.00

9)	Contingency Allowance	$	586.00
	TOTAL FOR INCIDENTALS	**$**	**37,185.00**
	TOTAL FOR ALLOWANCES (brought forward)	**$**	**1,465.00**
	TOTAL FOR CONSTRUCTION (brought forward)	**$**	**115,000.00**
	TOTAL ESTIMATE	**$**	**153,650.00**

IX. DRAWINGS AND SPECIFICATIONS

As part of this report, we have attached design drawings for the construction of the drain improvements. The design drawings show the subject improvement locations and the details of the work, as well as the approximate location within the watershed area. The drain design drawings are attached to the back of this report and are labelled **Appendix "REI-E"**.

Also attached, we have prepared Specifications which set out the required construction details for the drain repair and improvements, which also include Standard Specifications labelled therein as **Appendix "REI-C".**

X. SCHEDULE OF ASSESSMENT

We would recommend that the Total Cost for construction of this project, including incidental costs, be charged against the lands and roads affected in accordance with the attached Schedule of Assessment. On September 22nd, 2005, the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) issued Administrative Policies for the Agricultural Drainage Infrastructure Program (A.D.I.P.). This program has re-instated financial assistance for eligible costs and assessed lands pursuant to the Drainage Act. Sections 85 to 90 of the Drainage Act allow the Minister to provide grants for various activities under said Act. Sections 85 and 87 make it very clear that grants are provided at the discretion of the Minister. Based on the current A.D.I.P., "lands used for agricultural purposes" may be eligible for a grant in the amount of 1/3 of their total assessment. The new policies define "lands used for agricultural purposes" as those lands eligible for the "Farm Property Class Tax Rate". The Town provides this information to the Engineer from the current property tax roll. Properties that do not meet the criteria are not eligible for grants. In accordance with same we expect that this project will be qualified for the grant normally available for agricultural lands. The Ministry, however, is continually reviewing their policy for grants, and we recommend that the Town monitor the policies, and make application to the Ministry for any grant should same become available through the A.D.I.P.

program or other available funds. Where a bridge structure has increased top width beyond the standard 6.10 metre (20.0 ft.) top width, all of the increased costs resulting from same are assessed 100% to the Owner, as provided for in the cost sharing set out in the attached Schedule of Assessment.

XI. FUTURE MAINTENANCE

When maintenance work is carried out in the future on the open drain portion, the cost for said future maintenance shall be assessed in accordance with the attached Schedule of Assessment excluding any Special Benefit. When future maintenance work is carried out on the drain, the assessment to the affected Owners shall be based on the actual future maintenance cost shared on a pro-rata basis with the Benefit and Outlet Liability values shown in this assessment schedule.

When maintenance work is carried out on any bridges in the future, we recommend that part of the cost be assessed as a Benefit to the abutting parcel served by the access bridge, and the remainder shall be assessed to the upstream lands and roads based on their affected area and Outlet Liability assessments as set out in the attached Schedule of Assessment. The share for Benefit and Outlet Liability shall be as set out in the Bridge Cost Sharing table below. For Bridge 2 the Benefit assessment shall be split equally between the two parcels served by the structure.

BRIDGE COST SHARING

Bridge	Owners	Benefit to Owner	Outlet Upstream
1	Edward Lepain, (570-01900),	85.9%	14.1%
2	Evan & Laura Belanger, (570-01700),	42.5%	15.0%
	Leo Chauvin & Eileen Matte, (570-01800)	42.5%	
3	Mark & Margaret Bosse, (570-01600),	87.3%	12.7%
4	Laura Amlin, (570-01500),	85.0%	15.0%
5	Roy & Lynn Tetler, (570-01100),	85.0%	15.0%

6	Douglas & Michelle Barron, (570-01300),	85.0%	15.0%
7	Ralph Giles & Annette Wiper, (570-02100),	85.0%	15.0%
8	Kyle & Natalie Tetler, (570-01100),	85.0%	15.0%
9	Phillip Lemieux & Laurie Raymont, (570-01000),	85.0%	15.0%
10	Rose Renaud, (570-00900),	85.0%	15.0%
11	James & Kimberly Battersby, (570-00800),	85.0%	15.0%
12	Justin Pulleyblank, (570-00700),	85.0%	15.0%
13	Donald Brillinger, (570-00600),	85.3%	14.7%
14	Brendan Byrne, (570-00500),	85.0%	15.0%

We recommend that the bridge structures as identified herein, be maintained in the future as part of the drainage works. We would also recommend that the bridge, for which the maintenance costs are to be shared with the upstream lands and roads within the watershed, be maintained by the Town and that said maintenance would include works to the bridge culvert, bedding, backfill and end treatment. Should concrete, asphalt, or other decorative driveway surfaces over these bridge culverts require removal as part of the maintenance works, these surfaces shall also be repaired or replaced as part of the works. Likewise, if any fencing, gate, decorative walls, guardrails, or other special features exist that will be impacted by the maintenance work, they are also to be removed and restored or replaced as part of the bridge maintenance work. However, the cost of the supply and installation of any surface materials other than Granular “A” material and the cost of removal and restoration or replacement, if necessary, of any special features, shall be totally assessed to the benefiting adjoining Owner(s) served by said access bridge.

Report – Barrette Drain 2021-01-25
(Geographic Township of Colchester North)
Town of Essex - REI2020D009

We further recommend that the maintenance cost sharing as set out above shall remain as aforesaid until otherwise determined and re-established under the provisions of the “Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2010".

All of which is respectfully submitted.

Rood Engineering Inc.

Gerard Rood

Gerard Rood, P.Eng.

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att.

ROOD ENGINEERING INC.
Consulting Engineers
9 Nelson Street
LEAMINGTON, Ontario N8H 1G6

SCHEDULE OF ASSESSMENT
BARRETTE DRAIN
Town of Essex

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
		13th Concession Road	2.91	1.177		Town of Essex	$ 4,502.00	$ 2,535.00	$ 1,202.00	$ 8,239.00
		Total on Municipal Lands					**$ 4,502.00**	**$ 2,535.00**	**$ 1,202.00**	**$ 8,239.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
570-00600	13	13	0.194	0.48	0.194	Donald Brillinger	$ 370.00	$ 276.00	$ 1,810.00	$ 2,456.00
570-00700	13	13	0.194	0.48	0.194	Justin Pulleyblank	$ 371.00	$ 270.00	$ 13,568.00	$ 14,209.00
570-00800	13	13	0.194	0.48	0.194	James & Kimberly Battersby	$ 371.00	$ 268.00	$ 12,796.00	$ 13,435.00
570-00900	13	13	0.194	0.48	0.194	Rose Renaud	$ 371.00	$ 265.00	$ 12,753.00	$ 13,389.00
570-01000	13	13	0.194	0.48	0.194	Phillip Lemieux & Laurie Raymont	$ 372.00	$ 255.00	$ 12,915.00	$ 13,542.00
570-01100	13	13	0.194	0.48	0.194	Kyle & Natalie Tetler	$ 372.00	$ 253.00	$ 1,630.00	$ 2,255.00
570-01300	13	13	0.663	1.64	0.663	Douglas & Michele Barron	$ 1,267.00	$ 608.00	$ 1,623.00	$ 3,498.00
570-01400	13	13	0.195	0.48	0.195	Roy & Lynn Tetler	$ 372.00	$ 239.00	$ 1,589.00	$ 2,200.00
570-01500	13	13	0.585	1.45	0.585	Laura Amlin	$ 1,118.00	$ 527.00	$ 1,602.00	$ 3,247.00
570-01600	13	13	0.390	0.96	0.390	Mark & Margaret Bosse	$ 745.00	$ 400.00	$ 1,588.00	$ 2,733.00
570-01700	13	13	0.585	1.44	0.585	Evan & Laura Belanger	$ 1,117.00	$ 514.00	$ 801.50	$ 2,432.50
570-01800	13	13	0.194	0.48	0.194	Leo Chauvin & Eileen Matte	$ 371.00	$ 227.00	$ 789.50	$ 1,387.50
570-01900	13	13	0.209	0.52	0.209	Edward Lepain	$ 399.00	$ 234.00	$ 1,573.00	$ 2,206.00
		Total on Privately Owned - Non-Agricultural Lands					**$ 7,616.00**	**$ 4,336.00**	**$ 65,038.00**	**$ 76,990.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Hectares Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
570-00500	13	14	31.667	78.25	31.667	Brendan Byrne	$ 12,108.00	$ 13,428.00	$ 23,443.00	$ 48,979.00
570-02100	13	13	13.881	20.16	8.157	Ralph Giles & Annette Wiper	$ 3,119.00	$ 2,995.00	$ 13,328.00	$ 19,442.00
		Total on Privately Owned - Agricultural Lands (grantable).....					**$ 15,227.00**	**$ 16,423.00**	**$ 36,771.00**	**$ 68,421.00**
		TOTAL ASSESSMENT	111.16		44.99		**$ 27,345.00**	**$ 23,294.00**	**$ 103,011.00**	**$ 153,650.00**

1 Hectare = 2.471 Acres
Project No.REI2020D009
January 25th, 2021

SPECIFICATIONS

BARRETTE DRAIN

Repairs & Improvements

(Geographic Township of Colchester North)

TOWN OF ESSEX

I. GENERAL SCOPE OF WORK

The Barrette Drain comprises of an open drain generally located along the north side of the 13th Concession Road extending easterly from an outlet in the Hyland Sideroad Drain located on the east side of Hyland Road, in the geographic township of Colchester North, Town of Essex. The work under this project generally comprises of repairs and improvements to the open drain, bridge repairs as needed and ancillary work. The work on the drain being repaired and improved includes brushing and tree removal, the removal of the excess sediment in the drain bottom along with deepening and widening of the open channel to its original design; the installation of rock erosion protection comprising of sloped quarried limestone on filter cloth; topsoil placement, seeding and mulching on slopes, buffer strips and disturbed areas; culvert replacement installations with end treatments, cleaning out of all bridge culverts, and ancillary work.

All work shall be carried out in accordance with these specifications, the plans forming part of this drainage project, as well as the Standard Details included in **Appendix "REI-C"**. The repairs and improvements and culvert replacement installations shall be of the size, type, depth, etcetera, as is shown in the accompanying drawings, as determined from the Benchmarks, and as may be further laid out at the site at the time of construction. All work carried out under this project shall be completed to the full satisfaction of the Town Drainage Superintendent and the Consulting Engineer.

II. E.R.C.A. AND D.F.O. CONSIDERATIONS

The Contractor will be required to implement stringent erosion and sedimentation controls during the course of the work to help minimize the amount of silt and sediment being carried downstream into the outlet. It is intended that work on this project be carried out during relatively dry weather to ensure proper site and drain conditions and to avoid conflicts with sediment being deposited into the outlet drainage system. All disturbed areas shall be restored as quickly as possible with grass seeding and mulching installed to ensure a protective cover and to minimize any erosion from the work sites subsequent to construction. The Contractor may be

required to provide temporary silt fencing and straw bales as outlined further in these specifications.

All of the work shall be carried out in accordance with any permits or authorizations issued by the Essex Region Conservation Authority (E.R.C.A.) or the Department of Fisheries and Oceans (D.F.O.), copies of which will be provided, if available, and the notes in **Appendix "REI-A"**. The Contractor is advised that no work may be carried out in the existing drain from March 15th to June 30th of any given year because the drain is directly connected to a downstream area that is classified as sensitive to impacts on aquatic life and habitat by E.R.C.A. and D.F.O.

As part of its work, the Contractor will implement the following measures that will ensure that any potential adverse effects on fish and fish habitat will be mitigated:

a) As per standard requirements, work will not be conducted at times when flows in the drain are elevated due to local rain events, storms, or seasonal floods. Work will be done in the dry.

b) All disturbed soils on the drain banks and within the channel, including spoil, must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better condition to what existed prior to the works. The spoil material must be hauled away and disposed of at a suitable site; or spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.

c) To prevent sediment entry into the Drain, in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with related Ontario Provincial Standards. It is incumbent on the proponent and their Contractors to ensure that sediment and erosion control measures are functioning properly and are maintained and upgraded as required.

d) Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.

e) All activities including maintenance procedures should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicular refuelling and maintenance should be conducted away from the water.

III. M.N.R.F. – M.E.C.P. CONSIDERATIONS

The Contractor is to note that the Ministry of Natural Resources and Forestry (M.N.R.F.) screening process by way of a Species at Risk (S.A.R.) review of the M.N.R.F. "Endangered Species Act, 2007" (E.S.A.) that is now administered by the Ministry of Environment and Parks (M.E.C.P.) will be completed as a self-assessment by the Town pursuant to Section 23.9 of the E.S.A. prior to

construction. This Section allows the Town to conduct eligible works of repair, maintenance, and improvement to existing municipal drains under the Drainage Act, and exemptions from Sections 9 and 10 of the E.S.A., provided that the requirements are followed in accordance with Ontario Regulation 242/08. The results of the review will be provided to the Contractor and copies of the mitigation measures, habitat protection and identification sheets will be included within **Appendix "REI-B"**.

The Contractor is to review **Appendix "REI-B"** in detail and is required to comply in all regards with the contents of said M.N.R.F. measures, and follow the special requirements therein included during construction. Throughout the course of construction, the Contractor will be responsible to ensure that all necessary provisions are undertaken to protect all species at risk and their habitats. If a threatened or sensitive species is encountered, the Contractor shall notify the Town and M.N.R.F. – M.E.C.P. and provide all the equipment and materials stipulated by the mitigation requirements for handling the species and cooperate fully with the Town and M.N.R.F. – M.E.C.P. staff in the handling of the species.

IV. ACCESS TO WORK

The Contractor is advised that the majority of the work to be carried out on this project extends along the north side of the 13th Concession Road. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works. The Contractor may utilize the right-of-way as necessary, to permit the completion of all of the work required to be carried out for this project. The Contractor shall also have access into the driveways as necessary to carry out the repairs and improvements to the drain and any new replacement access bridges, as set out on the plans and in these specifications, along with a sufficient area in the vicinity of the bridges to carry out the required construction of the removal and new structure installation and ancillary work. Where the drain abuts agricultural lands, the Contractor shall carry out the drain cleaning from the north side of the drain in a minimum 8 metre wide corridor and spread the excavated material on the lands to a depth not exceeding 100mm in thickness.

The Contractor shall ensure that the traveling public is protected at all times while utilizing the roadway for its access. The Contractor shall provide traffic control, including flag persons when required. Should the Contractor have to close 13th Concession Road for the proposed works, it shall obtain the permission of the Town Drainage Superintendent or Consulting Engineer and arrange to provide the necessary notification of detours around the site. The Contractor shall also ensure that all emergency services, school bus companies, etcetera are contacted about the disruption to access at least 48 hours in advance of same. All detour routes shall be established in consultation with the Essex Works Department.

Throughout the course of the work, it is imperative that the Contractor protect as much landscaping and vegetation as possible when accessing along the drain. This will be of particular concern along the lawn areas of residential properties. Due to the extent of the work and the area for carrying out the work, the Contractor will be required to carry out all of the necessary

steps to direct traffic and provide temporary diversion of traffic around work sites, including provision of all lights, signs, flag persons, and barricades required to protect the safety of the traveling public. Any accesses or areas used in carrying out the works are to be fully restored to their original conditions by the Contractor at its cost, including topsoil placement and lawn restoration as directed by the Town Drainage Superintendent and the Consulting Engineer. Restoration shall include but not be limited to all necessary levelling, grading, shaping, topsoil, seeding, mulching, and granular placement required to make good any damage caused.

V. REMOVAL OF BRUSH, TREES AND RUBBISH

Where there is any brush, trees, or rubbish along the course of the drainage works, including the full width of the work access, all such brush, trees or rubbish shall be close cut and grubbed out, and the whole shall be chipped up for recycling, burned or otherwise satisfactorily disposed of by the Contractor. The brush and trees removed along the course of the work are to be put into piles by the Contractor in locations where they can be safely chipped and disposed of, or burned by it, or hauled away and disposed of by the Contractor to a site to be obtained by it at its expense. Prior to and during the course of any burning operations, the Contractor shall comply with the guidelines prepared by the Air Quality Branch of the Ontario Ministry of the Environment; and shall ensure that the Environmental Protection Act is not violated. The Contractor will be required to notify the local fire authorities to obtain any permits and co-operate with them in the carrying out of any work. The removal of brush and trees shall be carried out in close consultation with the Town Drainage Superintendent or Consulting Engineer to ensure that no decorative trees or shrubs are disturbed by the operations of the Contractor that can be saved. It is the intent of this project to save as many trees and bushes as practical within the roadway allowances and on private lands. Where decorative trees or shrubs are located directly over drainage pipes, the Contractor shall carefully extract same and turn them over to the Owner when requested to do so and shall cooperate with the Owner in the reinstallation of same if required.

The Contractor shall protect all other trees, bushes, and shrubs located along the length of the drainage works except for those trees that are established, in consultation with the Town Drainage Superintendent, the Consulting Engineer, and the Owners, to be removed as part of the works. The Contractor shall note that protecting and saving the trees may require the Contractor to carry out hand work around the trees, bushes, and shrubs to complete the necessary final site grading and restoration.

Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.

The Contractor shall remove all deleterious materials and rubbish along the course of the open drain in the location of the work areas and any such materials located in the bridge culverts and

enclosures while carrying out its cleaning of same. All such deleterious materials and rubbish shall be loaded up and hauled away by the Contractor to a site to be obtained by it at its cost.

VI. FENCING

Where it is necessary to take down any fence to proceed with the work, the same shall be done by the Contractor across or along that portion of the work where such fence is located. The Contractor will be required to exercise extreme care in the removal of any fencing so as to cause a minimum of damage to same. The Contractor will be required to reinstall any fence that is taken down in order to proceed with the work, and the fence shall be reinstated in a neat and workmanlike manner. The Contractor will not be required to procure any new materials for rebuilding the fence provided that it has used reasonable care in the removal and replacement of same. When any fence is removed by the Contractor, and the Owner thereof deems it advisable and procures new material for replacing the fence so removed, the Contractor shall replace the fence using the new materials and the materials from the present fence shall remain the property of the Owner.

VII. DETAILS OF OPEN DRAIN WORK

The open drain shall be excavated to the lines, levels, grades, and cross-sections as shown on the accompanying drawings, or as may be further established by the Town Drainage Superintendent or the Engineer at the time of the work. The drain shall be carefully excavated so as not to disturb the existing banks, rock protection and vegetation, except for those portions of the drain where widening or restoration of a stable drain bank configuration is required. The bottom width of the drain and the sideslopes of the excavation shall conform to the dimensions given on the drawings.

The drain shall be of the size, type, depth, etcetera as shown on the accompanying drawings. When completed, the drain shall have a uniform and even bottom and in no case shall such bottom project above the grade line, as shown on the accompanying drawings, and as determined from the Benchmarks. The finished side slopes of the drain shall be 1.5 metres horizontal to 1.0 metre vertical.

The excavated material to be cast onto the adjoining lands shall be well and evenly spread over a sufficient area so that no portion of the excavated earth is more than 100mm in depth. The material shall be kept at least 1.2 metres clear from the finished edge of the drain, care being taken not to fill up any existing tiles, ditches, furrows or drains with the excavated material. The excavated material to be spread upon the lands shall be free from rocks, cobbles, boulders, stumps, rubble, rubbish or other similar material and these materials, if encountered, shall be hauled away by the Contractor, and disposed of at a site to be obtained by it at its expense.

Where the drain crosses any lawn, garden, orchard, parking, roadway or driveway areas, the excavated material for the full width of the above-mentioned areas shall be hauled away by the Contractor and disposed of to a site to be obtained by the Contractor at its expense and in accordance with legislative requirements for excess soil management. All work at the disposal site shall be established between the Contractor and the site owner. The Contractor shall be responsible for any permits required and shall provide copies of same to the Town and Consulting Engineer when requested.

Where there is any brush or rubbish in the course of the drain, including both side slopes of the drain, all such brush or rubbish shall be close cut and grubbed out. Where there is any brush or rubbish where the earth is to be spread, or on that strip of land between where the earth is to be spread and the edge of the drain, all such brush or rubbish shall be close cut and grubbed out. The whole is to be burned, chipped, or otherwise satisfactorily disposed of by the Contractor.

VIII. DETAILS OF BRIDGE WORK

The Contractor shall provide all material, labour, and equipment to repair and improve the existing access bridges in the Drain requiring work, along with endwall repairs and other improvements as noted.

The existing bridges slated to be repaired and improved shall be replaced with new aluminized steel Type II Hel-Cor pipe. All piping sections shall be connected by the use of 9 corrugation (9-C) bolted couplers installed around the complete circumference of the pipe in accordance with the manufacturer's recommendation. Each coupler shall be wrapped in filter cloth material around the complete circumference to ensure that there will be no soil migration through the joints and into the pipe through said connections.

The culvert pipe replacement and new pipe installations on this project shall be set to the grades as shown on the plans or as otherwise established herein and the Town Drainage Superintendent or the Consulting Engineer may make minor changes to the bridge alignment as they deem necessary to suit the site conditions. All work shall be carried out in general accordance with the items in the "**STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"** attached to this report and labelled **Appendix "REI-C"**.

IX. CORRUGATED STEEL PIPE INSTALLATION

The new corrugated steel pipe (CSP) to be installed on this project is required to be provided in the longest lengths that are available and shall not be less than 3.0 metres. Where the overall access pipe length exceeds the standard pipe lengths, the Contractor shall connect the pipe sections together by use of a manufactured 9-C bolted coupler installed in accordance with the manufacturer's recommendations. All coupler joints shall be wrapped with a layer of filter cloth

around the complete circumference so that it extends a minimum of 100mm beyond the coupler on each end, to ensure a positive seal against soil migration through the joints.

The Contractor shall note that the placement of any new culvert pipe shall be performed totally in the dry and it shall be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. As part of the work, the Contractor will be required to clean out the drain along the full length of the pipe and for a distance of 3.05 metres (10 ft.) upstream and downstream of the pipe. The Contractor shall note that the pipe inverts are set at least 10% of the pipe diameter (or the pipe rise) below the drain bottom to provide the embedment required by E.R.C.A. and D.F.O. and to meet the minimum cover requirements for the pipe.

The installation of the complete length of the new culvert pipe, including all appurtenances, shall be completely inspected by the Town Drainage Superintendent or the Consulting Engineer's Inspector prior to backfilling any portions of same. Under no circumstance shall the Contractor commence the construction or backfill of the new culvert pipe without the site presence of the Town Drainage Superintendent or the Consulting Engineer's Inspector to inspect and approve said installation. The Contractor shall provide a minimum of two (2) working days' notice to the Town Drainage Superintendent or the Consulting Engineer prior to commencement of the work. The installation of the new culvert structure is to be performed during normal working hours of the Town Drainage Superintendent and the Consulting Engineer from Monday to Friday unless written authorization is provided by them to amend said working hours.

For the access bridge installation, once the new aluminized steel type II corrugated pipe has been satisfactorily set in place, the Contractor shall completely backfill same with granular material M.T.O. Type "B" O.P.S.S. Form 1010 with the following exception. The top 305mm (12") of the backfill material for the full top width of the access, and the full top width of the drain or the excavated trench, and any approaches to the south and transitions to the north shall be granular material M.T.O. Type "A" O.P.S.S. Form 1010. All of the driveway approach areas extending from the Town roadway to the south face of the new bridge culvert shall be backfilled with compacted granular material M.T.O. Type "A" O.P.S.S. Form 1010, but only after all topsoil material has been completely removed and disposed of, and the minimum thickness of this granular material shall be 305mm (12"). All areas outside of the access driveway shall be backfilled with native material compacted to 95% of Standard Proctor Density and topped with a minimum of 50mm of topsoil and shall be seeded and mulched.

For hard surface driveway crossings, the top 305mm (12") of the backfill over the pipe below the hard surface treatment shall comprise granular material M.T.O. Type "A" O.P.S.S. Form 1010 compacted to a minimum of 100% Standard Proctor Density. The Contractor shall at all times be very careful when performing its backfilling and compaction operations so that no damage is caused to the pipe. To ensure that no damage is caused to the proposed pipe, alternative methods of achieving the required backfill compaction shall be submitted to the Consulting Engineer or the Town Drainage Superintendent for their approval prior to the commencement of this work. The Contractor shall restore the asphalt surface by placing a minimum of the existing thickness or a

90mm minimum thickness of Type HL-4 or equivalent Superpave hot mix asphalt. The asphalt shall be supplied and placed in two (2) approximately equal lifts compacted to a value ranging from 92% to 96% of maximum relative density as per O.P.S.S. 310. For existing concrete driveways, the Contractor shall carefully remove the concrete to the nearest expansion joint. The concrete driveway shall be restored to the original length and width that was removed and include 150mm thick, 30mPa concrete, with 6% ±1% air entrainment and 6x6-6/6 welded wire fabric reinforcing installed at the midpoint of the slab. All slab surfaces shall be finished to provide an appearance approximating the finish on the existing concrete driveway abutting the replacement.

The Contractor will be responsible to restore any damage caused to the roadways at its cost. All damaged hard surface roadway areas shall be neatly saw cut and the damaged materials removed and disposed of by the Contractor prior to carrying out any restoration work. The extent of the repairs shall be established in consultation with the Town Drainage Superintendent, the Road Authority, and the Consulting Engineer and the repairs shall be completed to their full satisfaction.

The Contractor is to note that any intercepted pipes or tiles along the length of the proposed culvert are to be extended and connected at its cost to the open drain at the end of the new culvert unless otherwise noted in the accompanying drawings.

The Contractor shall also note that the placing of the new access bridge culvert shall be completed so that it totally complies with the parameters established and noted in the Bridge Details and Tables for the culvert replacement. The culvert shall be set on an even grade and the placement shall be performed totally in the dry, and the Contractor should be prepared to take whatever steps are necessary to ensure same, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor shall also be required to supply a minimum of 100mm (4”) of 20mm (3/4”) clear stone bedding underneath the culvert pipe extending from the bottom of the drain to the culvert invert grade, all to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. Furthermore, if an unsound base is encountered, it must be removed and replaced with 20mm (3/4”) clear stone satisfactorily compacted in place to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The Contractor is to note that when replacing an access bridge or enclosure culvert, it shall be required to excavate a trench having a width not less than the new pipe outside diameter plus a 600mm working width on both sides of the new pipe to allow for proper installation of granular backfill and compaction of same. The Contractor shall also note that all culvert pipe installations are to be carried out with a minimum of 10% of their diameter or rise embedded below the drain design bottom, as shown, and noted on the plan for each of the access bridge installations.

X. REMOVALS

Where existing access bridges and enclosures are to be completely removed and replaced, the Contractor shall be required to excavate and completely extract the existing structure or culvert

pipe and the existing endwalls in their entirety, as well as any other deleterious materials that may be encountered in removing same, excluding poured concrete headwalls that are to be reused. The Contractor shall neatly saw cut any concrete or asphalt surfaces over the pipes for a sufficient width to allow for the safe removal of same or go to the nearest expansion joint panel of the concrete driveways. The Contractor shall also be required to completely dispose of all removed materials to a site to be obtained by it at its own expense. The Contractor shall note that when headwalls are shown to be left in place, the Contractor shall protect same and carry out its work for the pipe replacement as noted above and dispose of any debris resulting from the work.

All unsuitable and deleterious materials from the excavation and removal of the existing bridge and enclosure culverts and drain cleaning shall be hauled away and disposed of by the Contractor to a site to be obtained by it at its expense in accordance with any requirements for excess soil management. Likewise, any material excavated to allow for the granular approaches to the bridge, driveway transitions, or installation of new headwalls shall also be hauled away and disposed of by the Contractor.

XI. CONCRETE FILLED JUTE BAG, PRECAST CONCRETE BLOCK OR SLOPED END PROTECTION

Unless otherwise shown or noted, the Contractor is to provide new concrete filled jute bag headwalls, precast concrete block, or sloped quarried limestone on non-woven filter cloth end protection for the access bridges and enclosures being replaced or constructed on this drain.

The concrete filled jute bags are to be provided and laid out as is shown and detailed in the drawings provided by the Town and as noted in the Standard Specifications in **Appendix "REI-C"**. In all cases, the concrete filled jute bag headwalls shall be topped with a minimum 100mm (4") thick continuous concrete cap comprising 30mPa concrete with 6% ±1% air entrainment for the entire length of the headwalls. The headwalls shall be installed on an inward batter to be not less than 1 horizontal to 5 vertical, and under no circumstances shall this batter, which is measured from the top of the headwall to the projection of the end of the pipe, be less than 305mm (12"). From the midpoint of the pipe height down to the concrete footing, the wall shall be a double concrete filled jute bag installation. On the road side the walls shall be deflected as shown to provide daylighting and a better approach across the new bridge.

The installation of the concrete filled jute bag headwalls, unless otherwise specified, shall be provided in total compliance with the Items 1, 3, and 4 included in the **"STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION"**. These are attached to the back of these specifications and labelled **Appendix "REI-C"**. The Contractor shall comply in all respects with the General Conditions included in Item 4 and the **"Typical Concrete Filled Jute Bag Headwall End Protection"** detail also shown therein.

The Contractor shall install interlocking precast concrete blocks with filter cloth backing for walls on both ends of the bridges requiring same. The blocks shall be minimum 600X600X1200mm in

size as available from Underground Specialties - Wolseley, Windsor, Ontario, or equal, and installed as set out in **Appendix "REI-C"**. Vertical joints shall be staggered by use of half blocks where needed and wingwall deflections when required shall employ 45-degree angled blocks. Voids between the blocks and the pipe shall be grouted with 30mPa concrete having 6% ±1% air entrainment and extend for the full thickness of the wall and have a smooth uniform finish on the face that blends with the precast blocks. The installation of the endwalls, as well as the backfilling of the pipe where applicable, shall be provided in compliance with Items 1), 3), and 4) of the "Standard Specifications for Access Bridge Construction" attached within **Appendix "REI-C"** and in total compliance and in all respects with the General Conditions included in said Appendix. The Contractor shall submit shop drawings for approval of the wall installation that includes details for a minimum 300mm thick concrete footing that extends from the pipe invert downward. The footing shall extend into the drain banks each side for the required embedment of the blocks and be constructed to ensure that the completed wall will be completely vertical or tipped slightly back towards the driveway. Where the block walls extend more than 1.8 metres in height, the supplier shall provide the Contractor with uni-axial geogrid (SG350 or equivalent) reinforcement for installation to tie the wall back into the granular backfill. The Contractor, in all cases, shall comply with these specifications and upon completion of the stacked precast concrete end protection installation shall restore the adjacent areas to their original conditions. The Contractor shall supply quarried limestone on filter cloth rock protection adjacent to the headwalls at each corner of the bridge. All rock protection shall be 1.0 metres wide and 305mm (12”) thick, installed on non-woven filter cloth, and shall be installed in accordance with Item 2) of the "Standard Specifications for Access Bridge Construction". The synthetic filter mat to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products through Underground Specialties - Wolseley in Windsor, Ontario or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Industries Amherst Quarries, in Amherstburg, Ontario, or equal.

Where sloped end protection is specified, the top 305mm (12”) of backfill material over the ends of the access pipe, from the invert of said pipe to the top of the driveway elevation of the access bridge or enclosure, shall be quarried limestone. The quarried limestone shall be provided as shown and detailed on the plans or as indicated in the Standard Specifications in **Appendix “REI-C”** and shall be graded in size from a minimum of 100mm (4”) to a maximum of 250mm (10”). The quarried limestone to be placed on the sloped ends of an access bridge or enclosure shall be underlain with a synthetic **non-woven** geotextile filter fabric. The sloped quarried limestone protection is to be rounded as shown on the plan details and shall also extend along the drain side slopes to a point directly in line with the ends of the culvert pipe. The road side approach to the entrance shall be provided with a minimum 5.0m radius at each end of the driveway entrance. All work shall be completed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer.

The installation of the sloped quarried limestone end protection, unless otherwise specified herein, shall be provided in total compliance with Item 2), 3), and 4) of the **“STANDARD SPECIFICATIONS FOR ACCESS BRIDGE CONSTRUCTION”**. These are attached to the back of these

specifications and labelled **Appendix "REI-C"**. The Contractor shall comply in all respects with the General Conditions included in Item 4 and the **"Typical Quarried Limestone End Protection Detail"** also in **Appendix "REI-C"**.

The quarried limestone erosion protection shall be embedded into the sideslopes of the drain a minimum thickness of 305mm and shall be underlain in all cases with non-woven synthetic filter mat. The filter mat shall not only be laid along the flat portion of the erosion protection, but also contoured to the exterior limits of the quarried limestone and the unprotected slope. The width of the erosion protection shall be as established in the accompanying drawings or as otherwise directed by the Town Drainage Superintendent or the Consulting Engineer during construction. In placing the erosion protection, the Contractor shall carefully tamp the quarried limestone pieces into place with the use of the excavator bucket so that the erosion protection when completed will be consistent, uniform and tightly laid. In no instance shall the quarried limestone protrude beyond the exterior contour of the unprotected drain sideslopes along either side of said protection. The synthetic filter mat fabric to be used shall be non-woven geotextile GMN160 conforming to O.P.S.S. 1860 Class I, as available from Armtec Construction Products, or equal. The quarried limestone to be used shall be graded in size from a minimum of 100mm to a maximum of 250mm, and is available from Walker Aggregates Amherst Quarries, in Amherstburg, Ontario, or equal.

XII. BENCHMARKS

Also, for use by the Contractor, we have established Benchmarks along the course of the work and especially at the locations where existing access bridges are being replaced or new bridges are being constructed.

For each of the bridge replacements and new bridges, the plans include details illustrating the work to be carried out. For each bridge detail a Benchmark has been indicated and the Elevation has been shown and may be utilized by the Contractor in carrying out its work. The Contractor shall note that in each case a specific design elevation grade has been provided for the invert at each end of the pipe in the table accompanying each detail. The table also sets out the pipe size, materials, and other requirements relative to the installation of the culvert structure. In all cases, the Contractor is to utilize the specified drain grade to set any new pipe installation. The Contractor shall ensure that it takes note of the direction of flow and sets all pipes to assure that all grades flow from east to west to match the direction of flow within the drain. The Contractor's attention is drawn to the fact that the pipe invert grades established herein provide for the pipes to be set at least 10% of their diameter or pipe rise below the existing drain bottom or the design grade of the drain, whichever is lower.

XIII. ANCILLARY WORK

During the course of any work to the bridges and enclosures along the length of the project, the Contractor will be required to protect or extend any existing tile ends or swales and connect them

to the drainage works to maintain the drainage from the adjacent lands. All existing tiles shall be extended utilizing solid Big 'O' "standard tile ends" or equal plastic pipe of the same diameter as the existing tile and shall be installed in accordance with the **"Standard Lateral Tile Detail"** included in the plans, unless otherwise noted. Connections shall be made using a manufacturer's coupling where possible. Wherever possible, tiles shall be extended to outlet beyond the end of any access culverts. When required, openings into new pipes shall be neatly bored, saw cut or burned with a torch to the satisfaction of the Town Drainage Superintendent or the Consulting Engineer. All cuts to steel pipes shall be touched up with a thick coat of zinc rich paint (Galvicon or equal) in accordance with the manufacturer's recommendations. For other connections, the Contractor shall utilize a grouted connection. Grouted mortar joints shall be composed of premixed bags or three (3) parts of clean, sharp sand to one (1) part of Portland cement with just sufficient water added to provide a stiff plastic mix, and the mortar connection shall be performed to the full satisfaction of the Town Drainage Superintendent or the Consulting Engineer. The mortar joint shall be of a sufficient mass around the full circumference of the joint on the exterior side to ensure a tight, solid seal. The Contractor is to note that any intercepted pipes along the length of the existing culverts and enclosures are to be extended and connected to the open drain unless otherwise noted in the accompanying drawings.

Where the bridge or enclosure installation interferes with the discharge of an existing swale, the Contractor shall re-grade the existing swales to allow for the surface flows to freely enter the drain. Any disturbed grass areas shall be fully restored with topsoil, seed, and mulch.

All granular backfill for the bridge and enclosure installations shall be satisfactorily compacted in place to a minimum Standard Proctor Density of 98% by means of mechanical compaction equipment. All other good, clean, native fill material or topsoil to be utilized, where applicable, shall be compacted in place to a minimum Standard Proctor Density of 95%. All of the backfill material, equipment used, and method of compacting the backfill material shall be provided and performed to the full satisfaction of the Town Drainage Superintendent or Consulting Engineer.

Where the Contractor removes concrete or asphalt hard surfaces over the pipes, the Contractor shall restore the hard surfaces as previously outlined. The Contractor will be responsible to restore any damage caused to these driveways at its cost. All damaged hard surface driveway areas shall be neatly saw cut and the damaged materials removed and disposed of by the Contractor prior to carrying out any restoration work.

The new corrugated aluminized steel type II pipes for these installations are to be provided with a minimum depth of cover measured from the top of the pipe of 305mm (12") for a round pipe and 500mm for a pipe arch. If the bridge culvert pipes are placed at their proper elevations, same should be achieved. If the Contractor finds that the minimum cover is not being met, they shall notify the Town Drainage Superintendent and the Consulting Engineer immediately so that steps can be taken to rectify the condition prior to the placement of any backfill. The minimum cover requirement is **critical** and must be attained. In order for these new access bridge culverts to properly fit the channel parameters, **all of the design grade elevations must be strictly adhered to**.

As a check, all of the above access bridge and enclosure culvert design grade elevations should be confirmed before commencing to the next stage of the access bridge or enclosure installation. The Contractor is also to check that the pipe invert grades are correct by referencing the Benchmark.

Although it is anticipated that the culvert installation at each site shall be undertaken in the dry, the Contractor shall supply and install a temporary straw bale or silt curtain check dam in the drain bottom immediately downstream of each culvert site during the time of construction. The straw bale or silt curtain check dam shall be to the satisfaction of the Town Drainage Superintendent or Consulting Engineer and must be removed upon completion of the construction. The check dam materials may be reused at each site subject to their condition. All costs associated with the supply and installation of this straw bale or silt curtain check dam shall be included in the cost bid for the bridge replacements.

XIV. TOPSOIL, SEED AND MULCH

The Contractor shall be required to restore all existing grassed areas and drain side slopes damaged by the structure replacements, construction or cutting of the drain cross section, by placing topsoil, and then seed and mulch over said areas including any specific areas noted on the bridge details. The Contractor shall be required to provide all the material and to cover the above mentioned surfaces with approximately 50mm of good, clean, dry topsoil on slopes and 100mm of good, clean, dry topsoil on horizontal surfaces, fine graded and spread in place ready for seeding and mulching. The placing and grading of any topsoil shall be carefully and meticulously carried out in accordance with Ontario Provincial Standard Specifications, Form 802 dated November 2010, or as subsequently amended, or as amended by these specifications and be readied for the seeding and mulching process. The seeding and mulching of all of the above mentioned areas shall comply in all regards to Ontario Provincial Standard Specifications, Form 803 dated November 2010 and Form 804, dated November 2013, or as subsequently amended, or as amended by these specifications. The seeding mixture shall be the Standard Roadside Mix (Canada No. 1 Lawn Grass Seed Mixture) as set out in O.P.S.S. 804. All cleanup and restoration work shall be performed to the full satisfaction of the Town Drainage Superintendent or Engineer.

When all of the work for this installation has been completed, the Contractor shall ensure that positive drainage is provided to all areas; and shall ensure that the site is left in a neat and workmanlike manner, all to the full satisfaction of the Town Drainage Superintendent or Engineer.

XV. SPECIAL PROVISIONS FOR REPLACEMENT, REPAIR, AND IMPROVEMENTS

The Contractor shall provide for the construction and improvements to the access bridges and enclosures along the Barrette Drain, for the structures noted, as follows:

Bridges # 4 and 5

The Contractor shall completely restore the existing headwalls and any end protection that currently exists. The Contractor shall load up, haul away, and dispose of any unsuitable materials. The bridge end treatments shall be repaired in accordance with the requirements in **Appendix "REI-C"** with the Contractor providing all labour, additional materials, and equipment necessary for the works. All disturbed areas shall be restored with topsoil, seed and mulch as set out above.

New Replacement Bridges # 7, 9, 10, 11, 12, and 14

The Contractor shall completely remove the existing topsoil and vegetation in the area of the proposed new replacement bridge and clean out the drain bottom. The Contractor shall completely remove the existing bridge, headwalls and any end protection that currently exists. The Contractor will then be required to install the new aluminized steel pipe as set out in the chart forming part of the details for the bridge on the plans and the specifications noted above. The Contractor shall install sloped quarried limestone on filter cloth protection on each end. The Contractor shall protect any tile outlets on the banks at each end of the structure and divert and extend same as necessary to accommodate the replacement culvert. All work shall be carried out in accordance with these specifications and the requirements in **Appendix "REI-C"**.

All other bridges shall be completely cleaned out to restore their capacity with all removed materials loaded up, hauled away, and disposed of by the Contractor at its expense as part of the drain cleaning work, and in accordance with excess soil management requirements.

XVI. GENERAL CONDITIONS

a) The Town Drainage Superintendent or Consulting Engineer shall have authority to carry out minor changes to the work where such changes do not lessen the efficiency of the work.

b) The Contractor shall satisfy itself as to the exact location, nature and extent of any existing structure, utility, or other object which it may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town of Essex and the Consulting Engineer and their representatives for any damages which it may cause or sustain during the progress of the work. It shall not hold the Town of Essex or the Consulting Engineer liable for any legal action arising out of any claims brought about by such damage caused by it.

c) The Contractor shall provide a sufficient number of layout stakes and grade points so that the Drainage Superintendent and Consulting Engineer can review same and check that the work will generally conform to the design and project intent.

d) The Contractor will be responsible for any damage caused by it to any portion of the Town road system, especially to the travelled portion. When excavation work is being carried out and the excavation equipment is placed on the travelled portion of the road, the travelled

portion shall be protected by having the excavation equipment placed on satisfactory timber planks or timber pads. If any part of the travelled portion of the road is damaged by the Contractor, the Town shall have the right to have the necessary repair work done by its' employees and the cost of all labour and materials used to carry out the repair work shall be deducted from the Contractor's contract and credited to the Town. The Contractor, upon completing the works, shall clean all debris and junk, etcetera, from the roadside of the drain, and leave the site in a neat and workmanlike manner. The Contractor shall be responsible for keeping all public roadways utilized for hauling materials free and clear of mud and debris.

e) The Contractor shall provide all necessary lights, signs, and barricades to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, signing is to comply with the M.T.O. Manual of Uniform Traffic Control Devices (M.U.T.C.D.) for Roadway Work Operations and Ontario Traffic Manual Book 7.

f) During the course of the work the Contractor shall be required to connect existing drainage pipes to the Municipal Drain. In the event that polluted flows are discovered, the Contractor shall delay the connection of the pipe and leave the end exposed and alert the Town, the Drainage Superintendent, and the Consulting Engineer so that steps can be taken by the Town to address the concern with the owner and the appropriate authorities. Where necessary the Contractor shall cooperate with the Town in providing temporary measures to divert the drain or safely barricade same. Should the connection be found acceptable by the authorities, the Contractor shall complete the connection of the drain as provided for in the specifications, at no extra cost to the project.

g) Following the completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which are to remain standing, and it shall dispose of said branches along with other brush, thus leaving the trees in a neat and tidy condition.

h) The whole of the work shall be satisfactorily cleaned up, and during the course of the construction, no work shall be left in any untidy or incomplete state before subsequent portions are undertaken.

i) During the course of the project the Contractor shall deal with any excess soil management from the project in accordance with Ontario Reg 406/19 pursuant to the Environmental Protection Act, R.S.O. 1990, c. E.19 and any subsequent amendments to same.

j) All driveways, laneways and access bridges, or any other means of access on to the job site shall be fully restored to their former condition at the Contractor's expense. Before authorizing Final Payment, the Town Drainage Superintendent and the Consulting Engineer shall inspect the work in order to be sure that the proper restoration has been performed. In the event that the Contractor fails to satisfactorily clean up any portion of these accesses,

the Consulting Engineer shall order such cleanup to be carried out by others and the cost of same be deducted from any monies owing to the Contractor.

k) The Contractor will be required to submit to the Town, a Certificate of Good Standing from the Workplace Safety and Insurance Board prior to the commencement of the work and the Contractor will be required to submit to the Town, a Certificate of Clearance for the project from the Workplace Safety and Insurance Board before Final Payment is made to the Contractor.

l) The Contractor shall furnish a Performance and Maintenance Bond along with a separate Labour and Material Payment Bond within ten (10) days after notification of the execution of the Agreement by the Town. One copy of said bonds shall be bound into each of the executed sets of the Contract. Each Performance and Maintenance Bond and Labour and Material Payment Bond shall be in the amount of 100% of the total Tender Price. All Bonds shall be executed under corporate seal by the Contractor and a surety company, authorized by law to carry out business in the Province of Ontario. The Bonds shall be acceptable to the Town in every way and shall guarantee faithful performance of the contract during the period of the contract, including the period of guaranteed maintenance which will be in effect for twelve (12) months after substantial completion of the works.

The Tenderer shall include the cost of bonds in the unit price of the Tender items as no additional payment will be made in this regard.

m) The Contractor shall be required, as part of this Contract, to provide Comprehensive Liability Insurance coverage for not less than $5,000,000.00 on this project; and shall name the Town of Essex and its' officials and the Consulting Engineer and their staff as additional insured under the policy. The Contractor must submit a copy of this policy to both the Town Clerk and the Consulting Engineer prior to the commencement of work.

n) Monthly progress orders for payment shall be furnished the Contractor by the Town Drainage Superintendent. Said orders shall be for not more than 90% of the value of the work done and the materials furnished on the site. The paying of the full 90% does not imply that any portion of the work has been accepted. The remaining 10% will be paid 60 days after the final acceptance and completion of the work and payment shall not be authorized until the Contractor provides the following:

i) a Certificate of Clearance for the project from the Workplace Safety and Insurance Board

ii) proof of advertising

iii) a Statutory Declaration, in a form satisfactory to the Engineer and the Town, that all liabilities incurred by the Contractor and its Sub-Contractors in carrying out the Contract have been discharged and that all liens in respect of the Contract and Sub-

Contracts thereunder have expired or have been satisfied, discharged, or provided for by payment into Court.

The Contractor shall satisfy the Consulting Engineer or Town that there are no liens or claims against the work and that all of the requirements as per the Construction Act, 2018 and its' subsequent amendments have been adhered to by the Contractor.

o) In the event that the Specifications, Information to Tenderers, or the Form of Agreement do not apply to a specific condition or circumstance with respect to this project, the applicable section, or sections from the Canadian Construction Documents Committee C.C.D.C.2 shall govern and be used to establish the requirements of the work.

p) Should extra work be required by the Town Drainage Superintendent or Consulting Engineer and it is done on a time and material basis, the actual cost of the work will be paid to the Contractor with a 15% markup on the total actual cost of labour, equipment and materials needed to complete the extra work.

APPENDIX “REI-A”

STANDARD E.R.C.A. AND D.F.O. MITIGATION REQUIREMENTS

As part of its work, the Contractor will implement the following measures that will ensure that any potential adverse effects on fish and fish habitat will be mitigated:

1. As per standard requirements, work will not be conducted at times when flows in the drain are elevated due to local rain events, storms, or seasonal floods. Work will be done in the dry.

2. All disturbed soils on the drain banks and within the channel, including spoil, must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better condition to what existed prior to the works. The spoil material must be hauled away and disposed of at a suitable site, or spread an appropriate distance from the top of the drain bank to ensure that it is not washed back into the drain.

3. To prevent sediment entry into the drain in the event of an unexpected rainfall, silt barriers and/or traps must be placed in the channel during the works and until the site has been stabilized. All sediment and erosion control measures are to be in accordance with the related Ontario Provincial Standards. It is incumbent on the proponent and Contractors to ensure that sediment and erosion control measures are functioning properly and maintained/upgraded as required.

4. Silt or sand accumulated in the barrier traps must be removed and stabilized on land once the site is stabilized.

5. All activities including maintenance procedures should be controlled to prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water. Vehicular refuelling and maintenance should be conducted away from the water.

6. Any drain banks trimmed outside of the July 1st to September 15th timing window will require erosion control blankets to be installed to promote re-vegetation and to protect the slope from erosion in the interim.

Measures to Avoid Causing Harm to Fish and Fish Habitat

If you are conducting a project near water, it is your responsibility to ensure you avoid causing serious harm to fish in compliance with the *Fisheries Act*. The following advice will help you avoid causing harm and comply with the *Act*.

PLEASE NOTE: This advice applies to all project types and replaces all "Operational Statements" previously produced by DFO for different project types in all regions.

Measures

- Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- Minimize duration of in-water work.
- Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

- Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.
- Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation.
- Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.
- Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

- Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

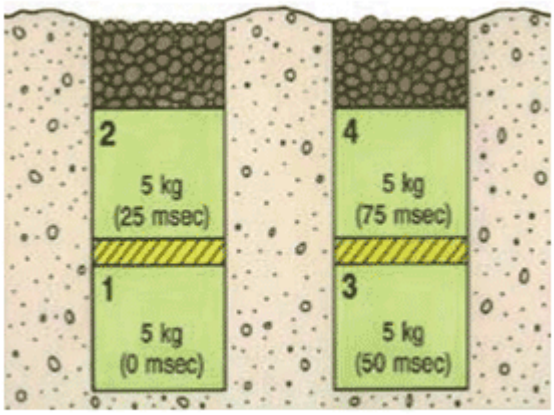
- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:
    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
    - Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
    - Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation).
    - Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
    - Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
    - Repairs to erosion and sediment control measures and structures if damage occurs.
    - Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

- Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting.
- Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
- Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

- Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows.
- Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
- Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.
    - In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:
        - Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
        - Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
        - The screen face should be oriented in the same direction as the flow.
        - Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.
        - Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
        - Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
        - Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
        - Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
        - Provision should be made for the removal, inspection, and cleaning of screens.
        - Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
        - Pumps should be shut down when fish screens are removed for inspection and cleaning.
- Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
    - If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a dam or water intake), the potential for impacts to fish and fish habitat should be minimized by implementing the following measures:

- Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows.
- Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
- Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting
- Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).
- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products.
- Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes; and decking of charges within holes.

- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

- Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.
- Limit machinery fording of the watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
- Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
- Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

Date modified:

2013-11-25

APPENDIX “REI-B”

SCHEDULE C

MITIGATION PLAN

The Municipality shall undertake measures to minimize adverse effects on species at risk in accordance with the general conditions described in Part B and taxa-specific conditions described in Part C, and the monitoring and reporting requirements described in Part D of this Mitigation Plan.

PART A. DEFINITIONS

1. Definitions:

1.1. In this Schedule, the following words shall have the following meanings:

"DFO" means Fisheries and Oceans Canada;

"MNR" means the Aylmer District Office of the Ministry of Natural Resources;

"Contact" means to contact the MNR in accordance with the notification/contact schedule provided to the Municipality by the MNR Designated Representative from time to time;

"Holding Tub" means a large, light-coloured container fitted with a non-airtight latchable lid approved by the MNR for the temporary storage of captured snakes, turtles, amphibians, birds or eggs;

"Interagency Notification Form" means the form issued by DFO, available at www.dfo-mpo.gc.ca, which is required to be completed when a drain is being maintained or constructed;

"Monitoring and Reporting Form" means the document that must be completed by the Municipality in accordance with Part D to this Schedule and will be provided to the Municipality;

"Ontario Operational Statement" means one of the documents issued by DFO, available at www.dfo-mpo.gc.ca, that sets out the conditions and measures to be incorporated into a project in order to avoid negative impacts to fish and fish habitat in Ontario, as modified from time to time;

"Process Charts" means the charts attached as Part E to this Schedule which describe the steps set out in this Mitigation Plan;

"Seasonal Timing Windows Chart" means the chart attached as Part G to this schedule which describes the Sensitive Periods applicable to each Taxonomic Group;

"Sensitive Area" means a geographic area in the Municipality where additional mitigation measures are required to be undertaken for one or more Taxonomic Groups;

"Sensitive Areas Map" means any one of the maps attached as Part F to this schedule which sets out the applicable Sensitive Areas;

"Sensitive Period" means a time of year set out in the Seasonal Timing Windows Chart during which taxa-specific mitigation measures are required to be undertaken for a Taxonomic Group because of ambient air/water temperatures, water-levels or important life-history stages;

"Taxonomic Group" means the distinct group comprising one or more Species based on their taxonomic relationship and common approaches to mitigating adverse effects (i.e., fish, mussels, turtles, snakes, amphibians, birds or plants); and

"Work Zone" means the geographic area in the Municipality where an Activity in respect of one of the Drainage Works is being conducted.

1.2. For greater certainty, any defined terms that are not defined in section 1.1 have the same meanings as in the Agreement.

PART B. GENERAL MEASURES TO MINIMIZE ADVERSE EFFECTS

2. Process Charts

2.1. The general steps set out in this Part B are visually described in the Process Charts (Part E).

3. Review of Documentation

3.1. Prior to conducting any Activities in respect of the Drainage Works the Municipality shall determine if conditions apply to the place, time or manner in which the Municipality wishes to pursue them by reviewing:

(a) the Sensitive Areas Maps (Part F) to determine if the Work Zone for the proposed Activities will occur within a Sensitive Area;

(b) the DFO Reference Guide for Fish and Mussel Species at Risk Distribution Maps: A Referral Review Tool for Projects Affecting Aquatic Species at Risk;

(c) the Seasonal Timing Windows Chart (Part G) to determine if the proposed Activities will occur during a Sensitive Period for one or more of the Taxonomic Groups; and

(d) the Process Charts to determine if prior notification is required;

(e) the mitigation measures for each applicable Taxonomic Group in Part C to determine what additional site-specific mitigation measures, if any, are required.

3.2. The Municipality shall document the results of the review undertaken in accordance with section 3.1 using the Monitoring and Reporting Form.

4. Sensitive Areas Maps

4.1. The Sensitive Areas Maps contain sensitive information about the distribution of species at risk, are provided for the sole purpose of informing this Agreement and are not to be copied or distributed for any other purposes or to any other party without the prior written authorization of the MNR Designated Representative.

5. Prior Notification to Seek Direction

5.1. If, after completing the review of documents described in section 3.1, the Municipality determines that the proposed Activities will be undertaken:

(a) in a place;

(b) at a time; or

(c) in a manner,

that requires prior notification in accordance with the Process Charts, the Municipality shall provide prior notification to the MNR in order for the MNR to determine if the Municipality must undertake additional site-specific or Species-specific mitigation

measures to minimize adverse effects on the Species and, if applicable, to identify such measures.

5.2. The prior notification under section 5.1 shall include a completed Interagency Notification Form:

(a) in respect of maintenance/repair where the proposed Activities are being undertaken pursuant to subsection 3(18) or section 74 of the *Drainage Act*; or

(b) in respect of construction/improvement where the proposed Activities are being undertaken pursuant to section 77 or 78 of the *Drainage Act*.

5.3. Where an Activity is undertaken in accordance with section 124 of the *Drainage Act* and would otherwise have required prior notification under section 5.1, the Municipality shall Contact the MNR by email prior to the commencement of the Activity, and complete and submit the applicable Interagency Notification Form within one week of the Activity's completion, unless otherwise directed in writing by the MNR Designated Representative.

6. General Mitigation Measures

6.1. Notwithstanding that prior notification or additional mitigation measures may be required in accordance with this schedule, in undertaking any Activity at any time in respect of the Drainage Works the Municipality shall:

(a) undertake the mitigation measures for sediment control and for erosion control and bank stabilization set out in The Drain Primer (Cliff Evanitski 2008) published by DFO (ISBN 978-0-662-48027-3), unless otherwise authorized in writing by the MNR Designated Representative;

(b) use net free, 100% biodegradable erosion control blanket for all erosion control or bank stabilization done in conjunction with their Activities or, if authorized in writing by the MNR Designated Representative, alternative erosion control blankets that provide equal or greater protection to individual Species; and

(c) where applicable, follow the guidelines set out in the following Ontario Operational Statements:

(i) Beaver Dam Removal;

(ii) Bridge Maintenance;

(iii) Culvert Maintenance;

(iv) Isolated Pond Construction;

(v) Maintenance of Riparian Vegetation in Existing Right of Ways; and

(vi) Temporary Stream Crossing.

PART C. TAXA-SPECIFIC MEASURES TO MINIMIZE ADVERSE EFFECTS

ADDITIONAL MITIGATION MEASURES FOR MUSSEL SPECIES

7. Activities undertaken in Sensitive Areas for Mussels

7.1. Subject to section 7.2. where a proposed Activity will occur in a Sensitive Area for a mussel Species, the Municipality shall Contact the MNR to seek further direction.

7.2. Section 7.1 does not apply where the applicable Drainage Works are:

(a) in a naturally dry condition;

(b) classified as a Class F drain in DFO's *Class Authorization System for the Maintenance of Agricultural Municipal Drains in Ontario* (ISBN 0-662-72748-7); or

(c) a closed drain.

ADDITIONAL MITIGATION MEASURES FOR TURTLE SPECIES

8. Training and Required On Site Materials for Turtles

8.1. The Municipality will ensure any person:

(a) involved in the capture, temporary holding, transfer and release of any turtle Species has received training in proper turtle handling procedures; and

(b) who undertakes an Activity has a minimum of two Holding Tubs and cotton sacks on site at all times.

9. Activities undertaken in Sensitive Areas and Sensitive Periods for Turtles

9.1. Subject to section 9.2, where a proposed Activity will occur in a Sensitive Area for any turtle Species and during a Sensitive Period for that Species, the Municipality shall:

(a) not undertake any Activities that include the excavation of sediment or disturbance to banks during the applicable Sensitive Period unless otherwise authorized;

(b) undertake Activities in accordance with any additional site-specific measures provided in writing by the MNR Designated Representative;

(c) avoid draw-down and de-watering of the Sensitive Area during the applicable Sensitive Period; and

(d) if authorized by the MNR Designated Representative under (a) above to undertake Activities that include excavation of sediment or disturbance of banks, in addition to any other measures required under (b) above, ensure any person undertaking an Activity has at least two Holding Tubs on site at all times.

9.2. Section 9.1 does not apply where the applicable Drainage Works are:

(a) in a naturally dry condition;

(b) classified as a Class F drain in DFO's *Class Authorization System for the Maintenance of Agricultural Municipal Drains in Ontario* (ISBN 0-662-72748-7); or

(c) a closed drain.

10. Measures for Encounters with Turtles During a Sensitive Period

10.1. Where one or more individuals belonging to a turtle Species is encountered in the undertaking of an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:

(a) capture and transfer all uninjured individuals of that Species into a Holding Tub;

(b) capture and transfer all individuals injured as a result of the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals;

(c) ensure that the Holding Tubs with the captured individuals are stored at a cool temperature to prevent freezing until the individuals can be transferred; and

(d) immediately Contact the MNR to seek direction and to arrange for the transfer of the individual turtles.

11. Measures for Encounters with Turtles Laying Eggs or Nest Sites

11.1. Where one or more individuals belonging to a turtle Species laying eggs, or an active nest site of any turtle Species, is encountered in undertaking an Activity in a Work Zone, the Municipality shall:

(a) not disturb a turtle encountered laying eggs and not conduct any Activities within 20 metres of the turtle while it is laying eggs;

(b) collect any displaced or damaged eggs and capture any injured dispersing juveniles and transfer them to a Holding Tub;

(c) store all captured injured individuals and collected eggs out of direct sunlight;

(d) immediately Contact the MNR to seek direction and to arrange for the transfer of any injured individuals and eggs;

(e) immediately stop any disturbance to the nest site and recover exposed portions with soil or organic material to protect the integrity of the remaining individuals;

(f) not drive any equipment over the nest site or conduct any Activities within 5 metres of the nest site;

(g) not place any dredged materials removed from the Drainage Works on top of the nest site;

(h) mark out the physical location of the nest site for the duration of the project but not by any means that might increase the susceptibility of the nest to predation or poaching; and

(i) where there are no collected eggs or captured individuals, record relevant information and Contact the MNR within 72 hours to provide information on the location of the nest site.

12. Measures for Encounters with Turtles Outside of a Sensitive Period

12.1. Where one or more individuals belonging to a turtle Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:

(a) briefly stop the Activity for a reasonable period of time to allow any uninjured individual turtles of that Species to leave the Work Zone;

(b) where individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (a) above, capture all uninjured individuals and release them in accordance with section 13.1;

(c) where circumstances do not allow for their immediate release, transfer captured uninjured individuals for a maximum of 24 hours into a Holding Tub which shall be stored out of direct sunlight and then release them in accordance with section 13.1;

(d) capture and transfer any individuals that have been injured into a Holding Tub separate from any Holding Tub containing uninjured individuals; and

(e) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

13. Release of Captured Individuals Outside of a Sensitive Period

13.1. Where uninjured individuals are captured under section 12.1, they shall be released:

(a) within 24 hours of capture;

(b) in an area immediately adjacent to the Drainage Works;

(c) in an area that will not be further impacted by the undertaking of any Activity; and

(d) not more than 250 metres from the capture site.

13.2. Following a release under section 13.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

14. Measures for Dead Turtles

14.1. Where one or more individuals of a turtle Species is killed as a result of an Activity in a Work Zone, or if a person undertaking an Activity finds a deceased individual of a turtle Species within the Work Zone, the Municipality shall:

(a) place any dead turtles in a Holding Tub outside of direct sunlight; and

(b) Contact the MNR within 72 hours to seek direction and to arrange for the transfer of the dead individuals.

ADDITIONAL MITIGATION MEASURES FOR SNAKE SPECIES

15. Training and Required On Site Materials for Snakes

15.1. The Municipality will ensure any person:

(a) involved in the capture, temporary holding, transfer and release of any snake Species has received training in proper snake handling procedures; and

(b) who undertakes an Activity has a minimum of two Holding Tubs and cotton sacks on site at all times.

16. Activities undertaken in Sensitive Areas and Sensitive Periods for Snakes

16.1. Where a proposed Activity involves physical infrastructure (e.g., culverts, pump houses, etc.) and will occur in a Sensitive Area for any snake Species and during a *Sensitive Period – Hibernation* for that Species, the Municipality shall undertake the Activity outside of the Sensitive Period, unless otherwise authorized by and in accordance with any site-specific measures provided in writing by the MNR Designated Representative.

16.2. Where a proposed Activity will occur at or adjacent to a known hibernacula (as identified by the MNR) for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall:

(a) erect effective temporary snake barriers approved by the MNR that will not pose a risk of entanglement for snakes and that shall be secured so that individual snakes may not pass over or under the barrier or between any openings to enter or re-enter the Work Zone;

(b) inspect the temporary snake barriers daily during periods when snakes are active, capture any individuals incidentally encountered within the area bounded by the snake barrier and release the captured individuals in accordance with section 20.1; and

(c) remove the temporary snake barriers immediately upon completion of the Activity.

16.3. Where a proposed Activity that does not involve physical infrastructure will occur in a Sensitive Area for any snake Species and during a *Sensitive Period – Staging* for that Species, the Municipality shall undertake the Activity outside of the Sensitive Period, unless otherwise authorized by and in accordance with any site-specific measures provided in writing by the MNR Designated Representative.

17. Measures for Encounters with Snakes During a Sensitive Period

17.1. Where one or more individuals belonging to a snake Species is encountered, or should an active hibernacula be uncovered, while conducting an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) during a Sensitive Period for that Species, the Municipality shall:

(a) capture and transfer all injured and uninjured individual snakes of that Species into individual light-coloured, drawstring cotton sacks;

(b) place all cotton sacks filled with the captured individuals into a Holding Tub;

(c) ensure that the Holding Tub with the captured individuals is stored at a cool temperature to protect the snakes from freezing until the individuals can be retrieved or transferred;

(d) if an active hibernacula is uncovered, cease all Activities at the hibernacula site; and

(e) immediately Contact the MNR to seek direction and to arrange for the transfer and/or retrieval.

18. Measures for Encounters with Snake Nests

18.1. Where an active nest of any of the snake Species is encountered and disturbed while undertaking an Activity in any part of a Work Zone, the Municipality shall:

(a) collect any displaced or damaged eggs and transfer them to a Holding Tub;

(b) capture and transfer all injured dispersing juveniles of that Species into a light-coloured drawstring cotton sack;

(c) place all cotton sacks with the captured injured individuals into a Holding Tub;

(d) ensure that the Holding Tub with the captured injured individuals is stored out of direct sunlight;

(e) immediately Contact the MNR to seek direction and to arrange for the transfer of the injured individuals;

(f) immediately stop any disturbance to the nest site and loosely cover exposed portions with soil or organic material to protect the integrity of the remaining individuals;

(g) not drive any equipment over the nest site or conduct any Activities within 5 metres of the nest site;

(h) not place any dredged materials removed from the Drainage Works on top of the nest site;

(i) mark out the physical location of the nest site but not by any means that might increase the susceptibility of the nest to predation or poaching; and

(j) where there are no collected eggs or captured individuals, Contact the MNR within 72 hours to provide information on the location of the nest site.

19. Measures for Encounters with Snakes Outside of a Sensitive Period

19.1. Where one or more individuals belonging to a snake Species is encountered while undertaking an Activity in any part of a Work Zone (including, but not limited to, a Sensitive Area) but outside of any Sensitive Period for that Species, the Municipality shall:

(a) follow the requirements in section 15;

(b) briefly stop the Activity for a reasonable period of time to allow any uninjured individual snakes of that Species to leave the Work Zone;

(c) if the individuals do not leave the Work Zone after the Activity is briefly stopped in accordance with (b) above, capture all uninjured individuals and release them in accordance with section 20.1;

(d) where circumstances do not allow for the immediate release of captured uninjured individuals, they may be transferred into individual, light-coloured, drawstring cotton sacks before placing them in a Holding Tub which shall be stored out of direct sunlight for a maximum of 24 hours before releasing them in accordance with section 20.1;

(e) capture and transfer any individuals injured as a result of conducting the Activities into a Holding Tub separate from any Holding Tub containing uninjured individuals; and

(f) store all captured injured individuals out of direct sunlight and immediately Contact the MNR to seek direction and to arrange for their transfer.

20. Release of Captured Individuals Outside of a Sensitive Period

20.1. Where uninjured individuals are captured under section 19.1, they shall be released:

(a) within 24 hours of capture;

(b) in an area immediately adjacent to the Drainage Works where there is natural vegetation cover;

(c) in an area that will not be further impacted by the undertaking of any Activity; and

(d) not more than 250 metres from the capture site.

20.2. Following a release under section 20.1, the Municipality shall Contact the MNR within 72 hours of the release to provide information on the name of the Drainage Works, the location of the encounter and the location of the release site.

21. Measures for Dead Snakes

21.1. Where one or more individuals belonging to a snake Species is killed as a result of an Activity in a Work Zone, or if a person undertaking an Activity finds a deceased individual of a snake Species within the Work Zone, the Municipality shall:

(a) collect and transfer any dead individuals into a Holding Tub outside of direct sunlight; and

(b) Contact the MNR within 72 hours to seek direction and to arrange for the transfer of the carcasses of the dead individuals.

ADDITIONAL MITIGATION MEASURES FOR HERBACEOUS PLANTS

22. Activities Undertaken in Sensitive Areas for Herbaceous Plants

22.1. Where a proposed Activity will occur that involves physical disturbance to vegetated banks or the killing and/or removal of vegetation through chemical or mechanical means in a Sensitive Area for any herbaceous plant Species, the Municipality shall:

(a) undertake the Activity outside of the Sensitive Period, unless otherwise authorized;

(b) limit equipment access and operations to the side of the Drainage Works that will minimize disturbances where any of the plant Species occur;

(c) locate temporary storage sites for excavated sediments or bank materials on areas of open soil away from where any of the plant Species are likely to occur;

(d) not use any broad spectrum herbicides in Sensitive Areas; and

(e) undertake Activities in accordance with any additional site-specific measures provided in writing by the MNR Designated Representative.

ADDITIONAL MITIGATION MEASURES FOR TREE SPECIES

23. Additional Measures for Butternut

23.1. Where Butternuts may exist in a Work Zone and may be affected by an Activity, the Municipality shall:

(a) identify and mark as retainable trees all individual Butternut trees within the Work Zone during work planning site visits unless the individual Butternut has been assessed as a non-retainable tree due to infection by Butternut canker by a person designated by the Minister as a Butternut Health Assessor;

(b) retain and avoid disturbance to all individuals identified under (a) above that have been identified as retainable trees or that have not been assessed, unless otherwise authorized in writing by the MNR Designated Representative;

(c) conduct Activities by:

(i) limiting equipment access and operations to the side of the Drainage Works that will minimize disturbance to where any of the individual Butternut trees occur,

(ii) working around trees,

(iii) avoiding compacting and/or disturbing the soil by keeping excavation and other heavy equipment a minimum of 2 metres away from the main stem of retained individuals to avoid damaging roots and stems,

(iv) placing excavated materials on areas not within 2 metres of the main stem of retained individuals; and

(v) where branches are required to be removed to allow for safe operation of equipment, removing them using appropriate equipment, such as pruning saws, chain saws or lopping shears, in accordance with good forestry practices.

24. Measures for Other Trees

24.1. Where Kentucky Coffee-tree, Common Hoptree, Eastern Flowering Dogwood and American Chestnut may exist in a Work Zone and may be affected by an Activity, the Municipality shall:

(a) identify and mark all individual Kentucky Coffee-tree, Common Hoptree, Eastern Flowering Dogwood and American Chestnut within the Work Zone during work planning site visits;

(b) avoid disturbance to all individuals identified under (a) above, unless otherwise authorized in writing by the MNR Designated Representative;

(c) conduct Activities by:

(i) limiting equipment access and operations to the side of the Drainage Works that will minimize disturbance where any of the individuals occur,

(ii) working around trees,

(iii) avoiding compacting and/or disturbing the soil by keeping excavation and other heavy equipment a minimum of 2 metres away from the main stem of retained individuals to avoid damaging roots and stems, and

(iv) placing excavated materials on areas not within 2 metres of the main stem of retained individuals; and

(d) where branches are required to be removed to allow for safe operation of equipment, remove them using appropriate equipment, such as pruning saws, chain saws or lopping shears, in accordance with good forestry practices.

PART D. MONITORING AND REPORTING REQUIREMENTS

25. Compliance Monitoring.

25.1. The Municipality shall inspect the undertaking of the Activities at the locations described in Part F of this Schedule C, and shall record the results of the inspections in the Monitoring and Reporting Form.

25.2. The Municipality shall record all encounters with Species and the resulting mitigation measures taken by the Municipality in the Monitoring and Reporting Form.

26. Reporting

26.1. Prior to March 31 of each year the Mitigation Plan is in effect, the Municipality shall submit a completed Monitoring and Reporting Form containing all of the information collected under sections 25.1 and 25.2 during the previous twelve months to the MNR Designated Representative.

27. Review

27.1. Within six months of the expiry of this Mitigation Plan but no later than three months from the time of its expiry, the Parties shall meet to review the measures and actions taken and the Activities undertaken during its term and to discuss the terms and conditions of the next Mitigation Plan.

APPENDIX “REI-C”

STANDARD SPECIFICATIONS
FOR ACCESS BRIDGE CONSTRUCTION

1. PRECAST CONCRETE BLOCK & CONCRETE FILLED JUTE BAG HEADWALLS

After the Contractor has set the endwall foundations and the new pipe in place, it shall completely backfill same and install new precast concrete blocks or concrete filled jute bag headwalls at the locations and parameters indicated on the drawing. All concrete used for headwalls shall be a minimum of 30 mPa at 28 days and include 6% +/- 1% air entrainment.

Precast concrete blocks shall be interlocking and have a minimum size of 600mmX600mmX1200mm. Half blocks shall be used to offset vertical joints. Cap blocks shall be a minimum of 300mm thick. A foundation comprising minimum 300mm thick poured concrete or precast blocks the depth of the wall and the full bottom width of the drain plus 450mm embedment into each drain bank shall be provided and placed on a firm foundation as noted below. The Contractor shall provide a levelling course comprising a minimum thickness of 150mm Granular “A” compacted to 100% Standard Proctor Density or 20mm clear stone, or a lean concrete as the base for the foundation. The base shall be constructed level and flat to improve the speed of installation. Equipment shall be provided as required and recommended by the block supplier for placing the blocks such as a swift lift device for the blocks and a 75mm eye bolt to place the concrete caps,. The headwall shall extend a minimum of 150mm below the invert of the access bridge culvert with the top of the headwall set to match the finished driveway grade, unless a 150mm high curb is specified at the edge of the driveway. To achieve the required top elevation, the bottom course of blocks and footing may require additional embedment into the drain bottom. The Contractor shall provide shop drawings of the proposed wall for approval by the Drainage Superintendent or Engineer prior to construction.

Blocks shall be placed so that all vertical joints are staggered. Excavation voids on the ends of each block course shall be backfilled with 20mm clear stone to support the next course of blocks above. Walls that are more than 3 courses in height shall be battered a minimum of 1 unit horizontal for every 5 units of vertical height. The batter shall be achieved by careful grading of the footing and foundation base, or use of pre-battered base course blocks. Filter cloth as specified below shall be placed behind the blocks to prevent the migration of any fill material through the joints. Backfill material shall be granular as specified below. Where the wall height exceeds 1.8 metres in height, a uni-axial geogrid SG350 or equivalent shall be used to tie back the walls and be installed in accordance with the manufacturer’s recommendations. The wall face shall not extend beyond the end of the access bridge pipe. Non-shrink grout shall be used to fill any gaps between the blocks and the access bridge pipe for the full depth of the wall. The grout face shall be finished to match the precast concrete block walls as closely as possible.

When constructing the concrete filled jute bag headwalls, the Contractor shall place the bags so that the completed headwall will have a slope inward from the bottom of the pipe to the top of the finished headwall. The slope of the headwall shall be one unit horizontal to five units vertical. The Contractor shall completely backfill behind the new concrete filled jute bag headwalls with Granular "B" and Granular "A" material as per O.P.S.S. Form 1010 and the granular material shall be compacted in place to a Standard Proctor Density of 100%. The placing of the jute bag headwalls and the backfilling shall be performed in lifts simultaneously. The granular backfill shall be placed and compacted in lifts not to exceed 305mm (12") in thickness.

The concrete filled jute bag headwalls shall be constructed by filling jute bags with concrete. All concrete used to fill the jute bags shall have a minimum compressive strength of 25 MPa in 28 days and shall be provided and placed only as a wet mix. Under no circumstance shall the concrete to be used for filling the jute bags be placed as a dry mix. The jute bags, before being filled with concrete, shall have a dimension of 460mm (18") x 660mm (26"). The jute bags shall be filled with concrete so that when they are laid flat, they will be approximately 100mm (4") thick, 305mm (12") to 380mm (15") wide and 460mm (18") long.

The concrete jute bag headwall to be provided at the end of the bridge pipe shall be a single or double bag wall construction as set out in the specifications. The concrete filled bags shall be laid so that the 460mm (18") dimension is parallel with the length of the new pipe. The concrete filled jute bags shall be laid on a footing of plain concrete being 460mm (18") wide, and extending for the full length of the wall, and 305mm (12") thick extending below the bottom of the culvert pipe.

All concrete used for the footing, cap and bags shall have a minimum compressive strength of 30 mPa at 28 days and shall include 6% ± 1% air entrainment.

Upon completion of the jute bag headwall the Contractor shall cap the top row of concrete filled bags with a layer of plain concrete, minimum 100mm (4”) thick, and hand trowelled to obtain a pleasing appearance. If the cap is made more than 100mm thick, the Contractor shall provide two (2) continuous 15M reinforcing bars set at mid-depth and equally spaced in

the cap. The Contractor shall fill all voids between the concrete filled jute bags and the corrugated steel pipe with concrete, particular care being taken underneath the pipe haunches to fill all voids.

The completed jute bag headwalls shall be securely embedded into the drain bank a minimum of 450mm (18") measured perpendicular to the sideslopes of the drain.

As an alternate to constructing a concrete filled jute bag headwall, the Contractor may construct a grouted concrete rip rap headwall. The specifications for the installation of a concrete filled jute bag headwall shall be followed with the exception that broken pieces of concrete may be substituted for the jute bags. The concrete rip rap shall be approximately 460mm (18") square and 100mm (4") thick and shall have two (2) flat parallel sides. The concrete rip rap shall be fully mortared in place using a mixture composed of three (3) parts of clean sharp sand and one (1) part of Portland cement.

The complete placement and backfilling of the headwalls shall be performed to the full satisfaction of the Drainage Superintendent and the Engineer.

2. QUARRIED LIMESTONE ENDWALLS

The backfill over the ends of the corrugated steel pipe shall be set on a slope of 1-½ units horizontal to 1 unit vertical from the bottom of the corrugated steel pipe to the top of each end slope and between the drain banks. The top 305mm (12") in thickness of the backfill over the ends of the corrugated steel pipe shall be quarried limestone. The quarried limestone shall also be placed on a slope of 1-½ units horizontal to 1 unit vertical from the bottom of the corrugated steel pipe to the top of each bank of the drain adjacent each end slope. The quarried limestone shall have a minimum dimension of 100mm (4") and a maximum dimension of 250mm (10"). The end slope protection shall be placed with the quarried limestone pieces carefully tamped into place with the use of a shovel bucket so that, when complete, the end protection shall be consistent, uniform, and tightly laid in place.

Prior to placing the quarried limestone end protection over the granular backfill and on the drain banks, the Contractor shall lay non-woven geotextile filter fabric "GMN160" conforming to O.P.S.S. 1860 Class I or approved equal. The geotextile filter fabric shall extend from the bottom of the corrugated steel pipe to the top of each end slope of the bridge and along both banks of the drain to a point opposite the ends of the pipe.

The Contractor shall take extreme care not to damage the geotextile filter fabric when placing the quarried limestone on top of the filter fabric.

3. BRIDGE BACKFILL

After the corrugated steel pipe has been set in place, the Contractor shall backfill the pipe with Granular "B" material, O.P.S.S. Form 1010 with the exception of the top 305mm (12") of the backfill. The top 305mm (12") of the backfill for the full width of the excavated area (between each bank of the drain) and for the top width of the driveway, shall be Granular "A" material, O.P.S.S. Form 1010. The granular backfill shall be compacted in place to a Standard Proctor Density of 100% by means of mechanical compactors. All of the backfill material, equipment used, and method of compacting the backfill material shall be inspected and approved and meet with the full satisfaction of the Drainage Superintendent and Engineer.

4. GENERAL

Prior to the work commencing, the Drainage Superintendent and Engineer must be notified, and under no circumstances shall work begin without one of them being at the site. Furthermore, the grade setting of the pipe must be checked, confirmed, and approved by the Drainage Superintendent or Engineer prior to continuing on with the bridge installation.

The alignment of the new bridge culvert pipe shall be in the centreline of the existing drain, and the placing of same must be performed totally in the dry.

Prior to the installation of the new access bridge culvert, the existing sediment build-up in the drain bottom must be excavated and completely removed. This must be done not only along the drain where the bridge culvert pipe is to be installed, but also for a distance of 3.05 metres (10 ft.) both upstream and downstream of said new access bridge culvert. When setting the new bridge culvert pipe in place it must be founded on a good undisturbed base. If unsound soil is encountered, it must be totally removed and replaced with 20mm (3/4") clear stone, satisfactorily compacted in place.

When doing the excavation work or any other portion of the work relative to the bridge installation, care should be taken not to interfere with, plug up, or damage any existing surface drains, swales, and lateral or main tile ends. Where damage is encountered, repairs to correct same must be performed immediately as part of the work.

The Contractor and/or landowner performing the bridge installation shall satisfy themselves as to the exact location, nature and extent of any existing structure, utility or other object that they may encounter during the course of the work. The Contractor shall indemnify and save harmless the Town, or the Municipality, the Engineer, and their staff from any damages which it may cause or sustain during the progress of the work. It shall not hold them liable for any legal action arising out of any claims brought about by such damage caused by it.

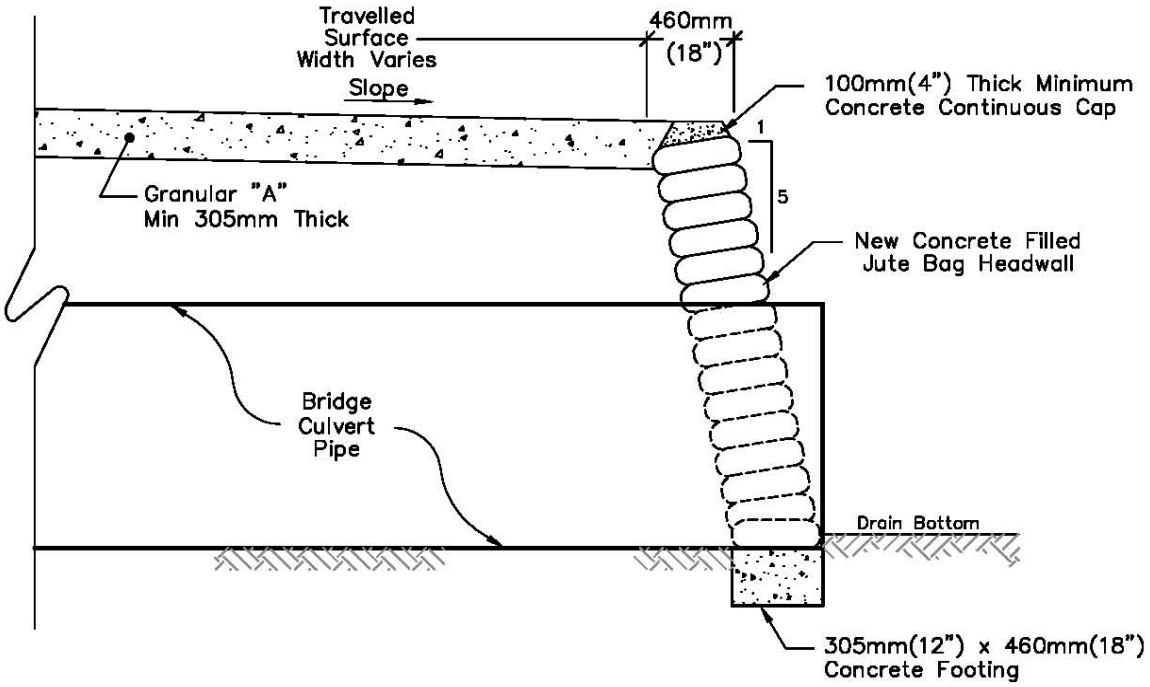
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original condition upon completion of the works.

When working along a municipal roadway, the Contractor shall provide all necessary lights, signs, barricades and flagpersons as required to protect the public. All work shall be carried out in accordance with the requirements of the Occupational Health and Safety Act, and latest amendments thereto. If traffic control is required on this project, it is to comply with the M.T.O. Traffic Control Manual for Roadway Work Operations and Ontario Traffic Manual Book 7.

Once the bridge installation has been completed, the drain sideslopes directly adjacent the new headwalls and/or endwalls are to be completely restored including revegetation, where necessary.

All of the work required towards the installation of the bridge shall be performed in a neat and workmanlike manner. The general site shall be restored to its' original condition, and the general area shall be cleaned of all debris and junk, etc. caused by the work

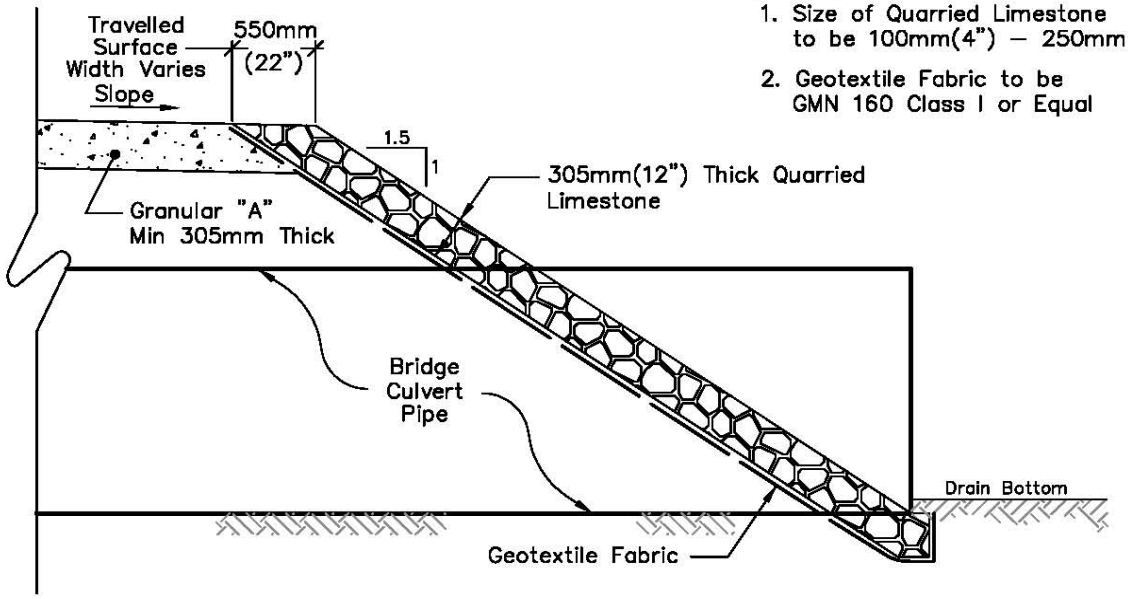
All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Drainage Superintendent and Engineer.



Typical Jute Bag Headwall

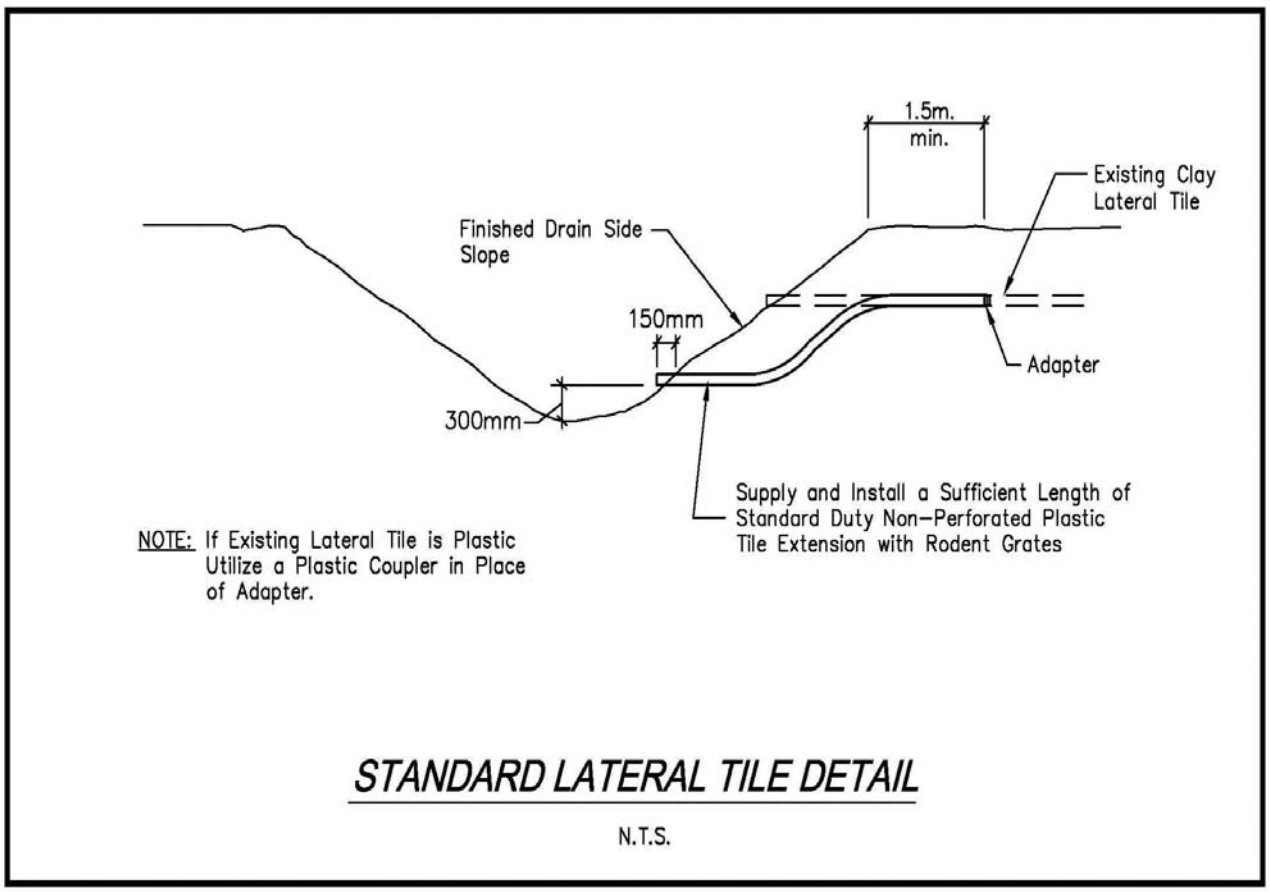
NOTE:

1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 Class I or Equal



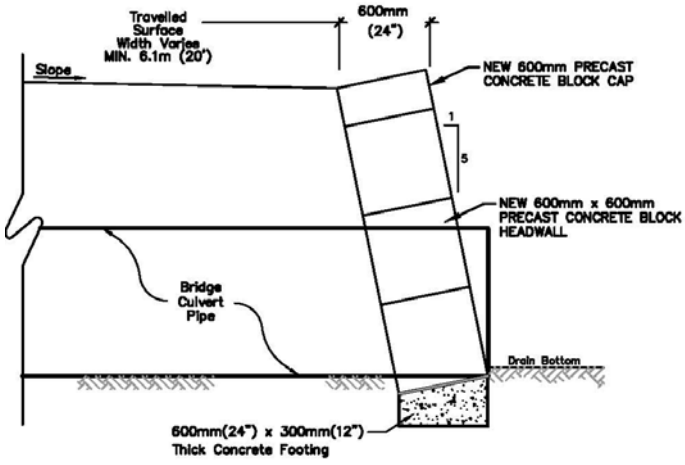
Typical Quarried Limestone End Protection

Rood Engineering Inc.
Consulting Engineers
9 Nelson Street
Leamington, Ontario N8H 1G6
519-322-1621



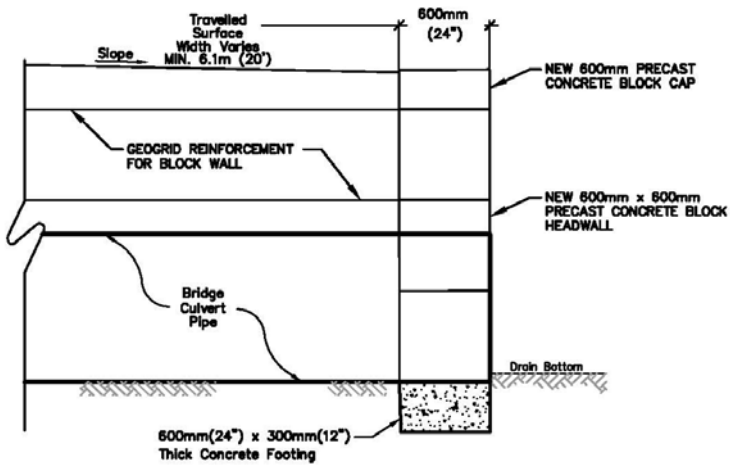
STANDARD LATERAL TILE DETAIL

N.T.S.



TYPICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.

APPENDIX “REI-D”

Appendix D – General Conditions and Specifications not required.

APPENDIX “REI-E”

WATERSHED PLAN, BRIDGE DETAILS, DRAIN PLANS, PROFILES, AND SECTIONS

OF THE

BARRETTE DRAIN

(Geographic Township of Colchester North)

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

Gerard Rood

GERARD ROOD, P.ENG.

REGISTERED PROFESSIONAL ENGINEER G.ROOD 2021-01-25 PROVINCE OF ONTARIO

ROOD ENGINEERING INC.

CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: JANUARY 25TH, 2021

TOWN OF ESSEX

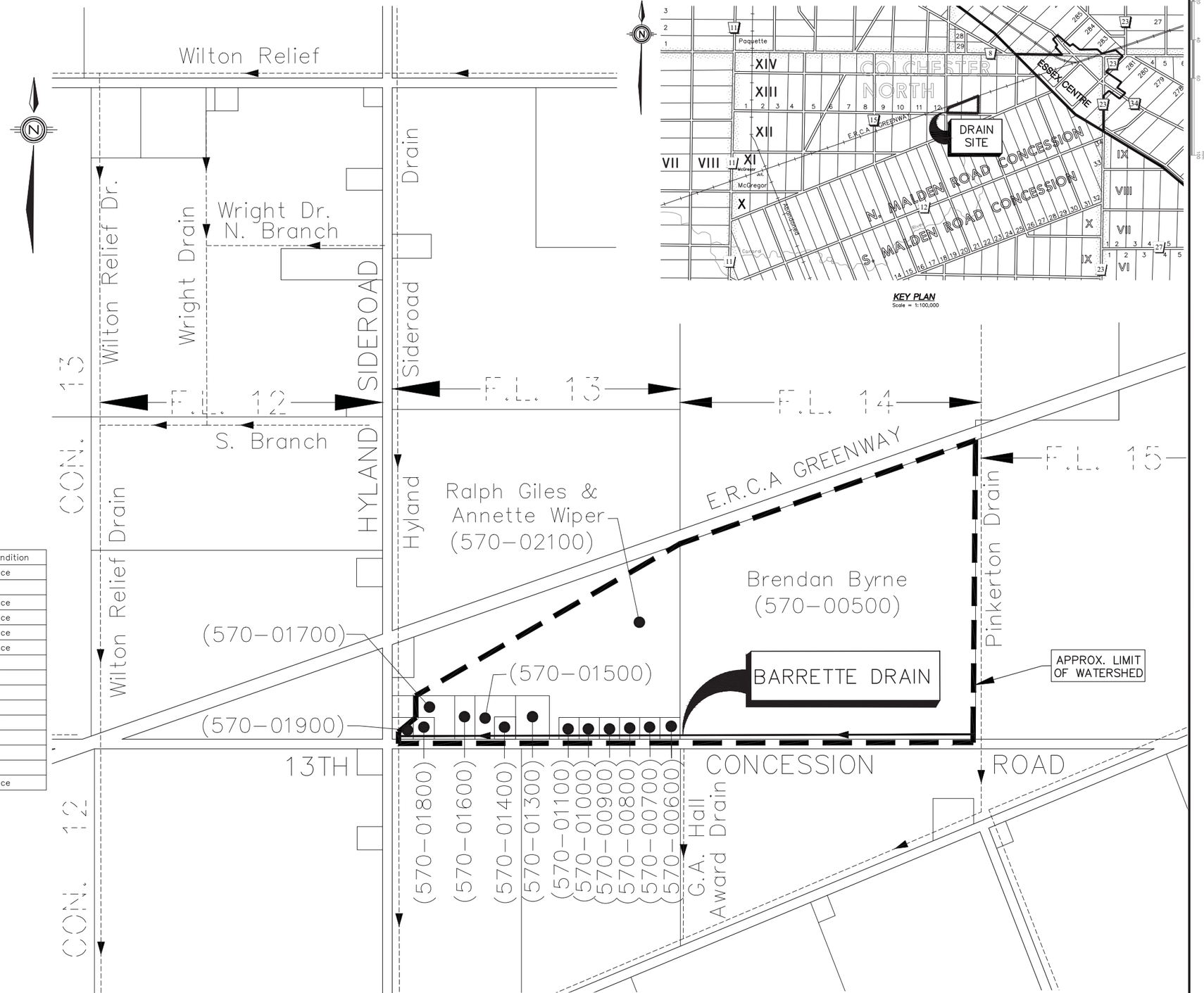
MAYOR: Larry Snively
CLERK: Robert Auger
DRAINAGE SUPERINTENDENT: Lindsay Dean, B.Sc.

BENCHMARKS:

1. NORTH EAST HEADWALL OF BRIDGE OVER HYLAND SIDEROAD DRAIN. APPROXIMATELY 36M WEST OF MN 13482 DOWNSTREAM PIPE. 3.05M SPAN, 7.92M WIDE. **ELEV: 193.156m**
2. TOP OF NUT OF FIRE HYDRANT, LOCATED ACROSS THE ROAD FROM MN 13482, APPROXIMATELY 26M EAST OF THE INTERSECTION BETWEEN HYLAND ROAD & 13 CONCESSION ROAD. **ELEV: 193.411m**
3. TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490. **ELEV: 192.286m**

No.	Roll No.	Owner/s	Bridge No.	Bridge Condition
1	570-00500	Brendan Byrne (MN 13534)	14	Replace
2	570-00600	Donald Brillinger (MN 13520)	13	OK
3	570-00700	Justin Pulleyblank (MN 13516)	12	Replace
4	570-00800	James & Kimberly Battersby (MN 13510)	11	Replace
5	570-00900	Rose Renaud (MN 13514)	10	Replace
6	570-01000	Phillip Lemieux & Laurie Raymont (MN 13508)	9	Replace
7	570-01100	Kyle & Natalie Tetler (MN 13506)	8	OK
8	570-01300	Douglas & Michele Barron (MN 13500)	6	OK
9	570-01400	Roy & Lynn Tetler (MN 13496)	5	OK
10	570-01500	Laura Amlin (MN 13494)	4	OK
11	570-01600	Mark & Margaret Bosse (MN 13490)	3	OK
12	570-01700	Evan & Laura Belanger (MN 13488)	2 (Shared)	OK
13	570-01800	Leo Chauvin & Eileen Matte (MN 13484)	2 (Shared)	OK
14	570-01900	Edward Lepain (MN 13482)	1	OK
15	570-02100	Ralph Giles & Annette Wiper (MN 13007)	7	Replace

WATERSHED PLAN - ROLL INFO



KEY PLAN
Scale = 1:100,000

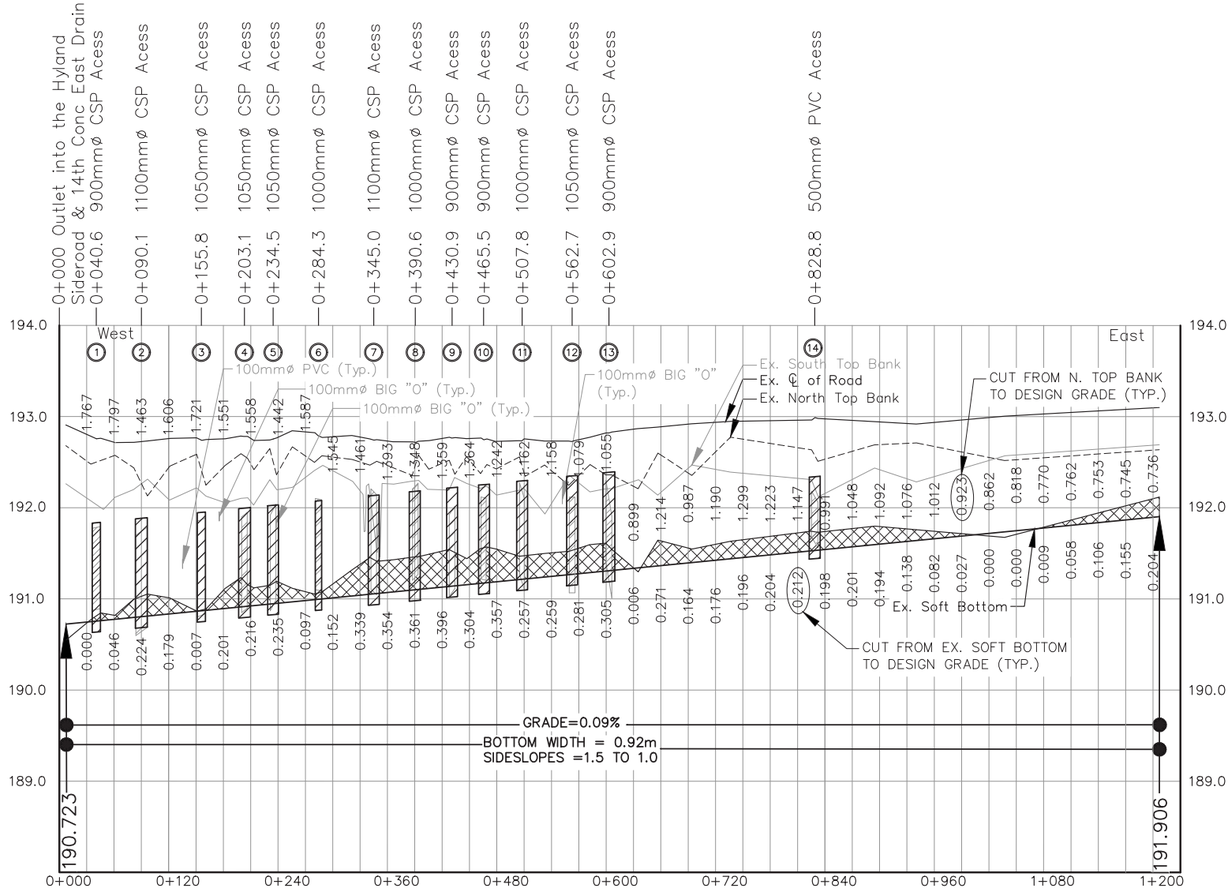
WATERSHED PLAN
Scale = 1:4,000

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

FILE No.: REI2020D009

SHEET No.: 1 OF 8



PROFILE BARRETTE DRAIN

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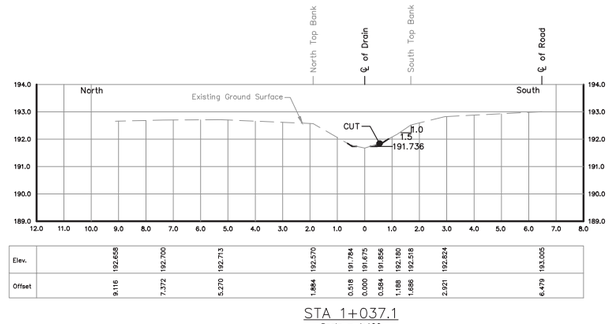
1:30 vert.



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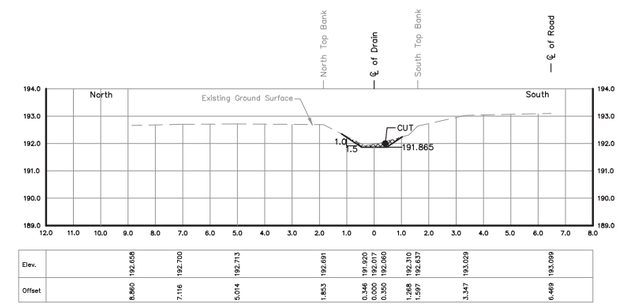


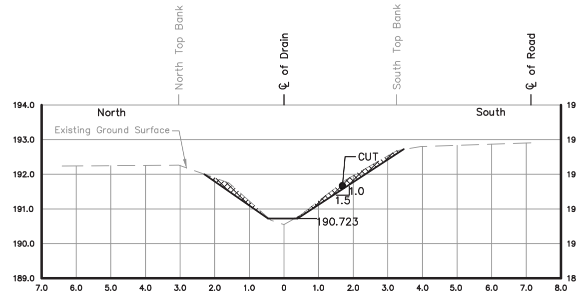
STA 1+168.4
Scale = 1:100

PIPE LEGEND:

1. 900mmø CSP, 9.20m (30.2ft) length
2. 1100mmø CSP, 11.60m (38.1ft) length
3. 1050mmø CSP, 9.00m (29.5ft) length
4. 1050mmø CSP, 6.15m (20.2ft) length
5. 1050mmø CSP, 6.20m (20.3ft) length
6. 1000mmø CSP, 6.60m (21.7ft) length
7. 1100mmø CSP, 6.10m (20.0ft) length
8. 1000mmø CSP, 6.15m (20.2ft) length
9. 900mmø CSP, 6.20m (20.3ft) length
10. 900mmø CSP, 5.50m (18.0ft) length
11. 1000mmø CSP, 5.60m (18.4ft) length
12. 1050mmø CSP, 6.10m (20.0ft) length
13. 900mmø CSP, 6.20m (20.3ft) length
14. 500mmø PVC, 4.00m (13.1ft), buried, approx. length

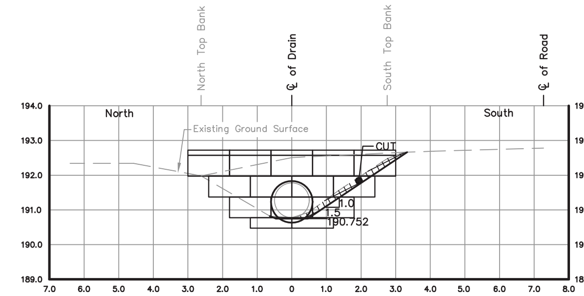
DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

FILE No.: REI2020D009



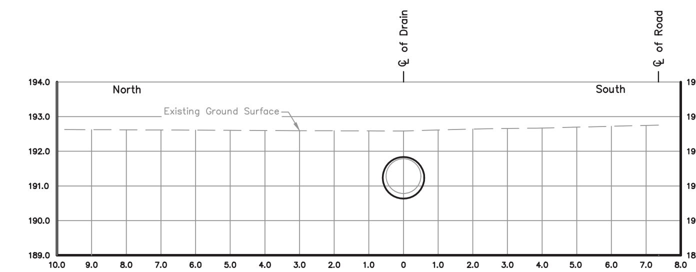
Elev.	192.237	192.263	191.751	190.674	190.548	190.808	191.843	192.680	192.800	192.908
Offset	6.407	3.037	1.588	0.376	0.000	0.459	1.794	3.256	3.959	7.134

STA 0+007.4
Scale = 1:100



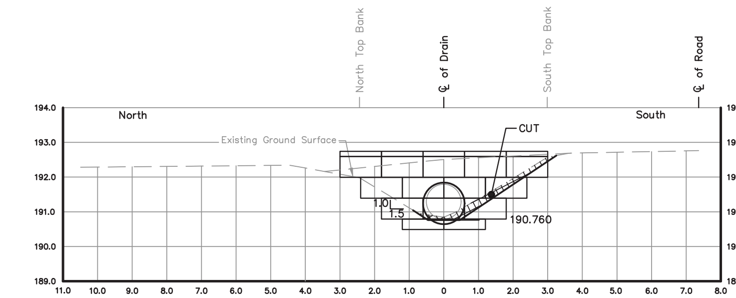
Elev.	192.341	192.341	191.981	190.822	190.774	190.932	191.547	192.478	192.661	192.692	192.781
Offset	6.407	4.568	2.622	0.635	0.000	0.488	1.334	2.755	3.257	4.107	7.273

STA 0+036.0
Scale = 1:100



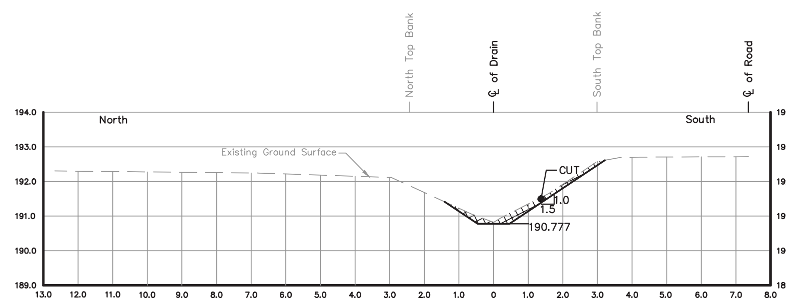
Elev.	192.629	192.596	192.586	192.651	192.668	192.757
Offset	9.780	3.100	0.000	2.327	3.829	7.357

STA 0+040.0
Scale = 1:100



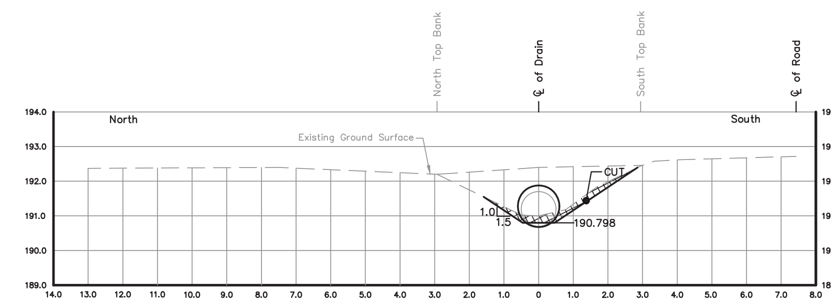
Elev.	192.283	192.341	191.981	190.951	190.845	190.990	191.920	192.570	192.688	192.699	192.761
Offset	10.491	4.446	2.436	0.732	0.000	0.339	1.938	2.985	3.612	4.125	7.359

STA 0+044.5
Scale = 1:100



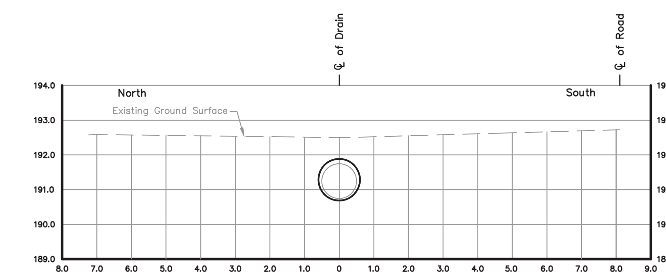
Elev.	192.304	192.243	192.114	191.057	190.818	190.947	191.654	192.575	192.693	192.704	192.714
Offset	12.673	6.771	2.952	0.634	0.000	0.210	1.599	2.993	3.663	4.231	7.362

STA 0+060.9
Scale = 1:100



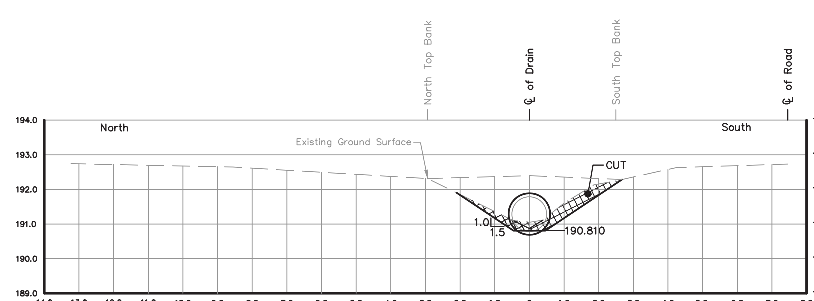
Elev.	192.371	192.398	192.199	191.024	190.997	191.178	191.835	192.575	192.618	192.717
Offset	13.006	7.516	2.933	0.501	0.000	0.779	1.683	3.330	4.042	7.430

STA 0+083.5
Scale = 1:100



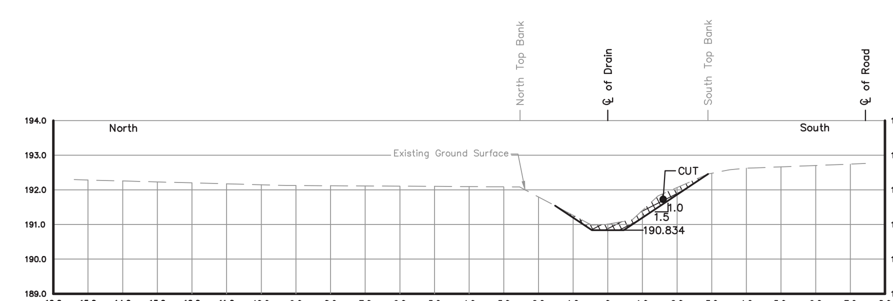
Elev.	192.577	192.585	192.520	192.493	192.625	192.745
Offset	7.238	7.050	1.5887	0.000	4.632	8.078

STA 0+090.0
Scale = 1:100



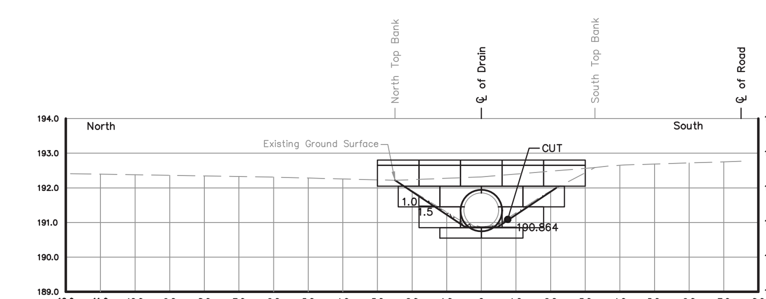
Elev.	192.743	192.645	192.313	191.101	191.052	191.116	191.590	192.129	192.247	192.631	192.732
Offset	13.230	8.553	2.936	0.467	0.000	0.392	0.981	1.857	2.498	4.246	7.458

STA 0+096.5
Scale = 1:100



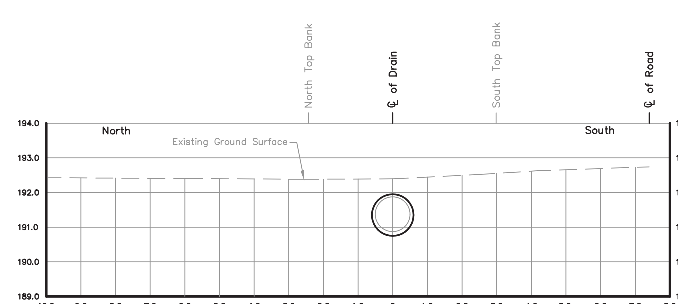
Elev.	192.295	192.127	192.084	190.981	191.011	191.134	191.826	192.456	192.580	192.622	192.760
Offset	15.400	9.288	2.546	0.461	0.000	0.705	1.451	2.890	3.519	3.963	7.435

STA 0+121.0
Scale = 1:100



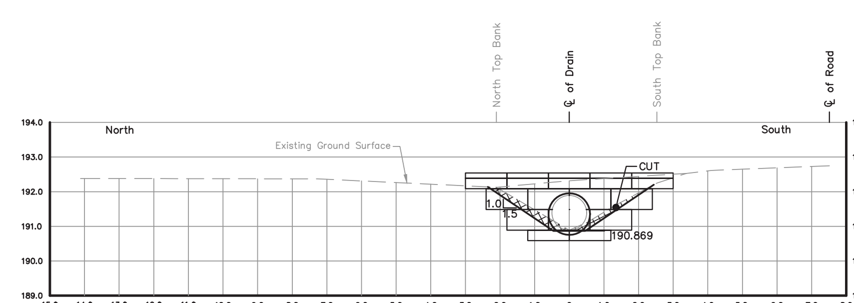
Elev.	192.410	192.317	192.218	191.071	190.866	190.942	191.797	192.587	192.627	192.662	192.767
Offset	11.865	6.255	2.495	0.626	0.000	0.475	1.795	3.280	3.624	4.155	7.500

STA 0+151.5
Scale = 1:100



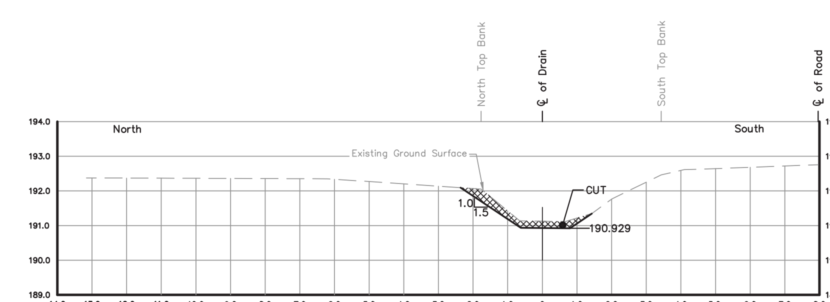
Elev.	192.426	192.402	192.381	192.394	192.530	192.631	192.740
Offset	9.925	5.950	2.552	0.000	2.666	4.227	7.414

STA 0+156.0
Scale = 1:100



Elev.	192.381	192.370	192.127	191.193	190.889	191.139	191.588	192.247	192.528	192.613	192.748
Offset	14.113	7.268	2.104	0.517	0.000	0.562	1.293	2.529	3.382	4.095	7.513

STA 0+160.5
Scale = 1:100



Elev.	192.375	192.349	192.053	191.138	191.113	191.345	191.770	192.463	192.613	192.624	192.756
Offset	13.159	6.193	1.767	0.654	0.654	1.430	2.002	3.432	4.095	4.519	7.961

STA 0+181.8
Scale = 1:100

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

FILE No.: REI2020D009

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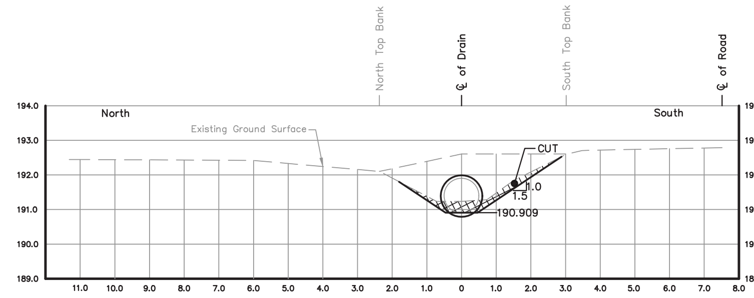
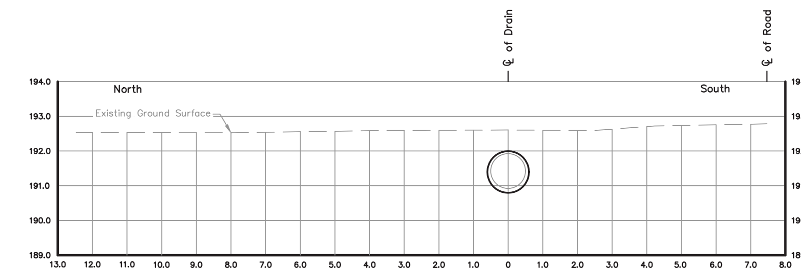


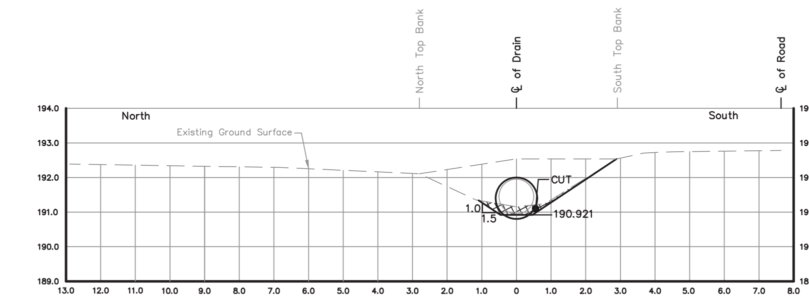
Elev.	192.446	192.420	192.102	191.253	191.234	191.283	191.836	192.593	192.705	192.726	192.786
Offset	11.314	6.032	2.369	0.736	0.000	0.728	1.501	3.020	3.474	4.322	7.516

STA 0+196.3
Scale = 1:100



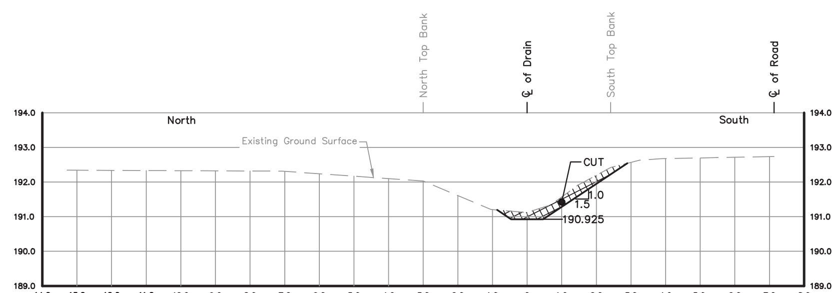
Elev.	192.529	192.527	192.593	192.604	192.590	192.721	192.782
Offset	12.466	7.898	3.396	0.000	2.480	4.227	7.468

STA 0+202.8
Scale = 1:100



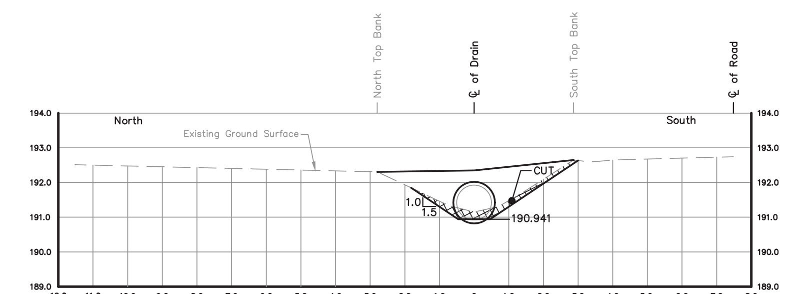
Elev.	192.388	192.290	192.109	191.352	191.153	191.244	192.542	192.708	192.742	192.782
Offset	12.892	6.788	2.801	1.168	0.000	0.818	2.913	3.675	4.448	7.636

STA 0+209.3
Scale = 1:100



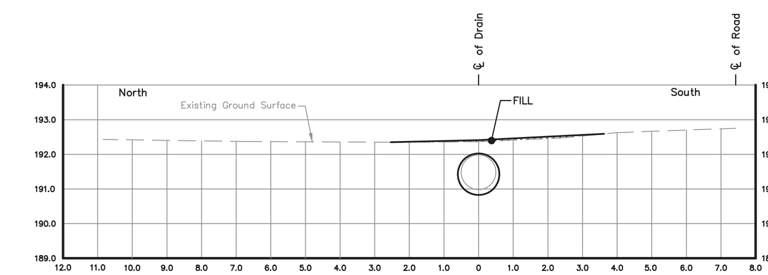
Elev.	192.341	192.314	192.029	191.210	191.121	191.344	191.909	192.418	192.631	192.672	192.737
Offset	13.287	7.080	3.000	1.048	0.000	0.693	1.469	2.414	3.253	3.861	7.133

STA 0+213.4
Scale = 1:100



Elev.	192.512	192.391	192.307	191.337	191.149	191.303	191.679	192.649	192.595	192.654	192.743
Offset	11.524	6.375	2.798	0.736	0.000	0.693	1.350	2.871	3.347	4.208	7.486

STA 0+228.6
Scale = 1:100



Elev.	192.430	192.372	192.349	192.364	192.478	192.627	192.754
Offset	10.838	6.746	2.534	0.000	2.455	4.000	7.425

STA 0+234.6
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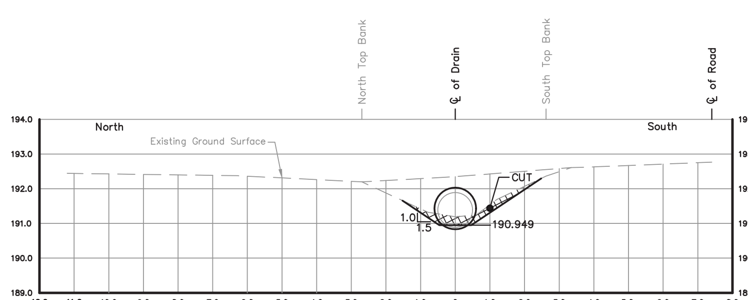
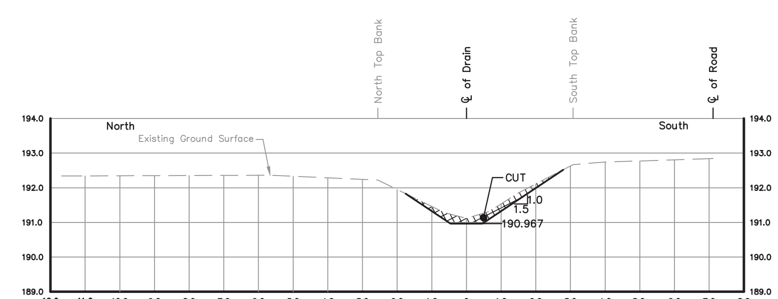


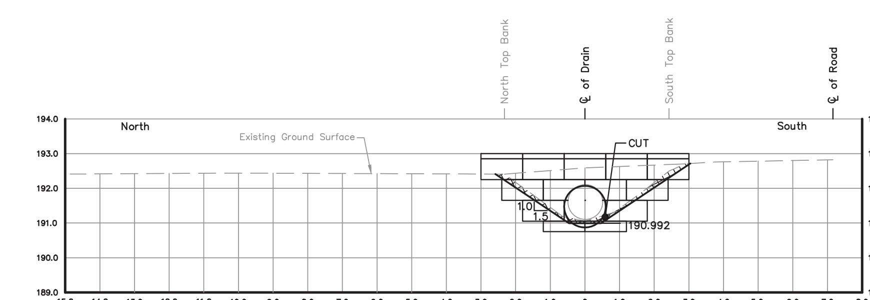
Elev.	192.443	192.375	192.197	191.322	191.193	191.245	191.685	192.362	192.608	192.633	192.766
Offset	11.199	6.271	2.696	0.791	0.000	0.612	1.195	2.620	3.349	4.102	7.406

STA 0+240.6
Scale = 1:100



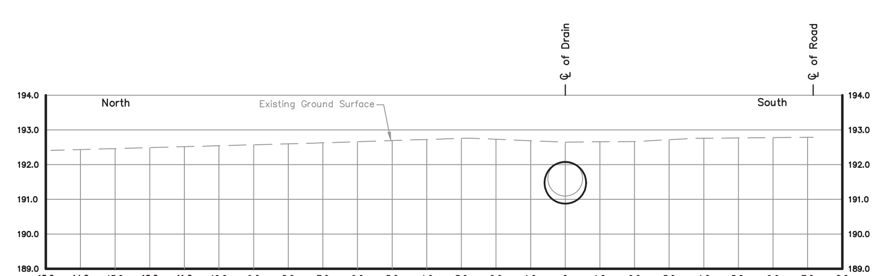
Elev.	192.340	192.363	192.223	191.294	191.116	191.318	191.854	192.668	192.722	192.742	192.844
Offset	11.679	5.665	2.554	0.664	0.000	0.652	1.504	3.075	3.709	4.015	7.112

STA 0+255.6
Scale = 1:100



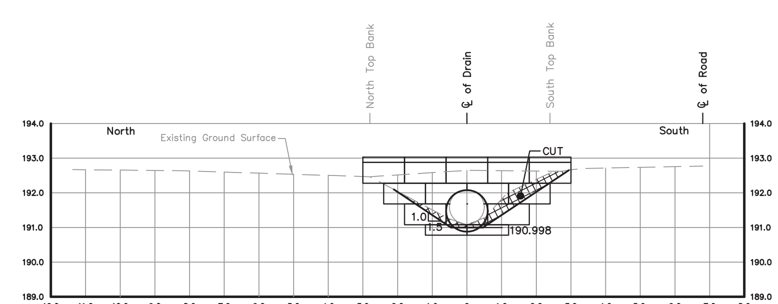
Elev.	192.411	192.439	192.409	191.185	191.052	191.313	191.871	192.498	192.705	192.758	192.823
Offset	14.856	10.011	2.325	0.636	0.000	0.848	1.624	2.427	2.896	3.737	7.160

STA 0+280.9
Scale = 1:100



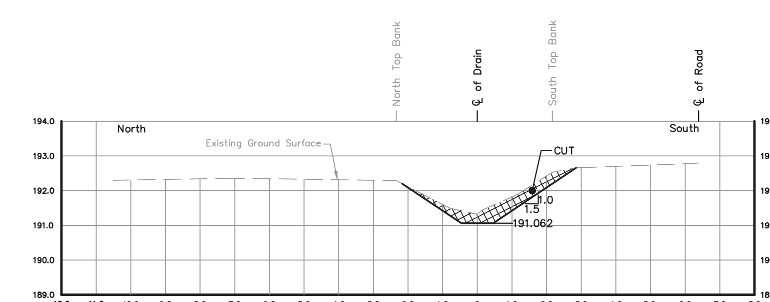
Elev.	192.411	192.620	192.765	192.648	192.668	192.757	192.790
Offset	14.856	7.274	2.801	0.000	2.065	3.717	7.160

STA 0+284.3
Scale = 1:100



Elev.	192.670	192.635	192.464	191.257	191.078	191.290	191.995	192.570	192.672	192.704	192.771
Offset	11.372	8.135	2.798	0.530	0.000	0.533	1.156	2.397	3.067	3.445	6.802

STA 0+287.8
Scale = 1:100



Elev.	192.296	192.359	192.289	191.489	191.319	191.429	191.898	192.529	192.673	192.660	192.792
Offset	10.501	7.096	2.340	0.780	0.000	0.126	1.167	2.165	2.939	2.998	6.386

STA 0+321.3
Scale = 1:100

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

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PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

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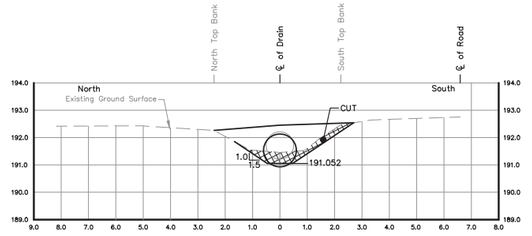
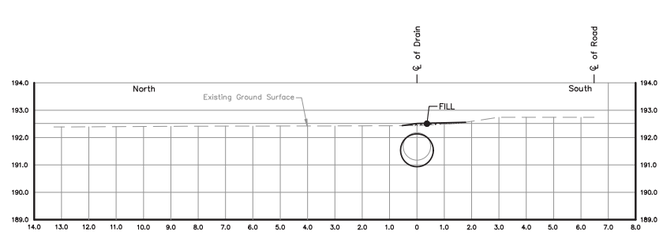


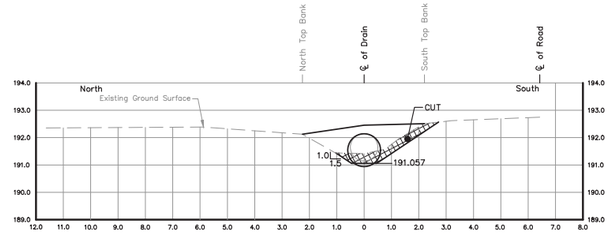
Elev.	192.416	192.430	192.262	191.555	191.454	191.527	191.934	192.467	192.641	192.755
Offset	8.176	5.103	2.406	1.115	0.000	0.899	1.413	2.228	3.311	6.591

STA 0+339.5
Scale = 1:100



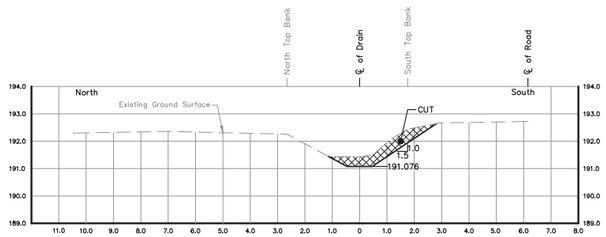
Elev.	192.368	192.416	192.428	192.428	192.524	192.622	192.742
Offset	13.278	8.237	2.824	0.000	1.538	3.289	6.478

STA 0+345.5
Scale = 1:100



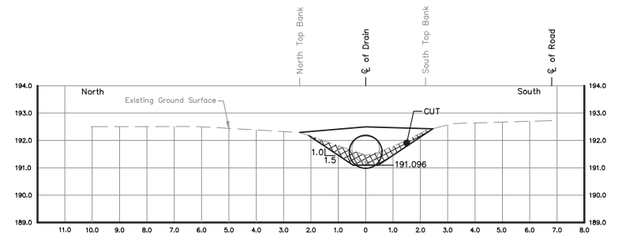
Elev.	192.354	192.385	192.122	191.444	191.412	191.569	191.985	192.509	192.618	192.747
Offset	11.628	5.873	2.254	1.059	0.000	0.760	1.310	2.205	3.197	6.422

STA 0+351.5
Scale = 1:100



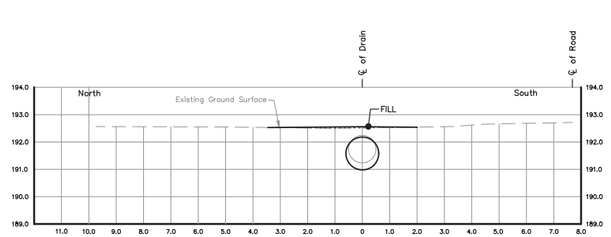
Elev.	192.296	192.359	192.259	191.440	191.430	191.516	192.072	192.438	192.670	192.724
Offset	10.479	7.074	2.656	1.133	0.000	0.488	1.142	1.756	2.948	6.155

STA 0+366.9
Scale = 1:100



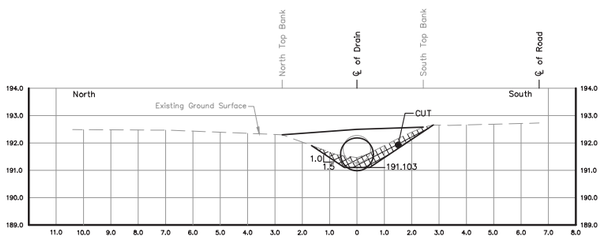
Elev.	192.506	192.507	192.291	191.458	191.501	191.918	192.355	192.615	192.723
Offset	10.045	6.169	2.412	0.000	0.452	1.314	2.189	3.167	6.804

STA 0+384.4
Scale = 1:100



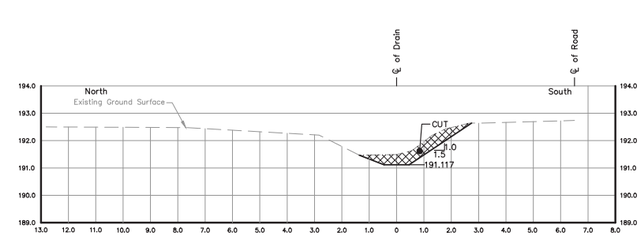
Elev.	192.565	192.560	192.499	192.527	192.567	192.653	192.715	
Offset	9.741	4.963	1.106	1.116	3.321	4.459	7.682	

STA 0+390.4
Scale = 1:100



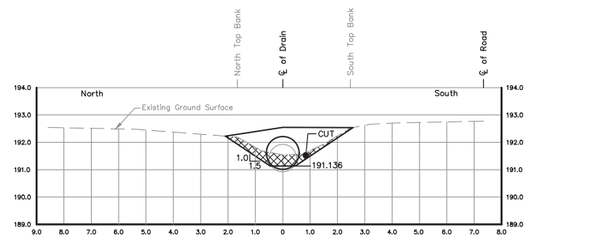
Elev.	192.458	192.466	192.300	191.574	191.463	191.596	192.278	192.579	192.653	192.644	192.729
Offset	10.395	6.806	2.726	0.760	0.000	0.397	1.729	2.423	2.767	3.352	6.602

STA 0+396.4
Scale = 1:100



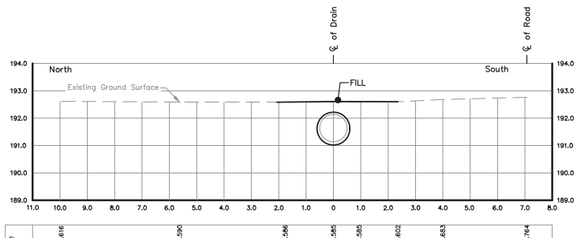
Elev.	192.501	192.476	192.202	191.470	191.490	191.631	192.194	192.441	192.636	192.737
Offset	12.817	7.712	2.833	1.364	0.000	0.557	1.302	1.782	2.670	3.108	6.508

STA 0+405.3



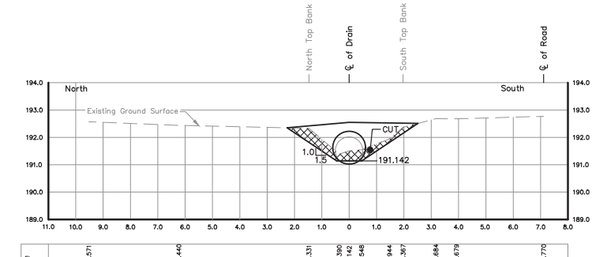
Elev.	192.544	192.481	192.194	191.690	191.542	191.587	191.963	192.521	192.658	192.710	192.773
Offset	8.582	5.384	1.661	0.776	0.000	0.728	1.552	2.472	3.173	4.166	7.340

STA 0+424.8



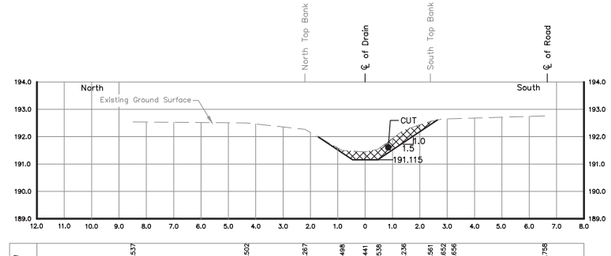
Elev.	192.616	192.590	192.586	192.585	192.585	192.602	192.683	192.764
Offset	9.957	5.629	1.792	0.000	0.937	2.356	3.997	7.071

STA 0+430.8



Elev.	192.571	192.440	192.331	191.390	191.142	191.548	191.944	192.367	192.684	192.879	192.770
Offset	9.523	6.231	1.473	0.366	0.000	0.451	1.475	1.970	3.171	3.924	7.111

STA 0+436.8



Elev.	192.537	192.502	192.267	191.468	191.441	191.538	192.236	192.561	192.602	192.656	192.758
Offset	8.468	4.335	2.204	0.839	0.000	0.500	1.411	2.384	2.858	3.242	6.585

STA 0+447.1

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PLOT CODE: 1:1
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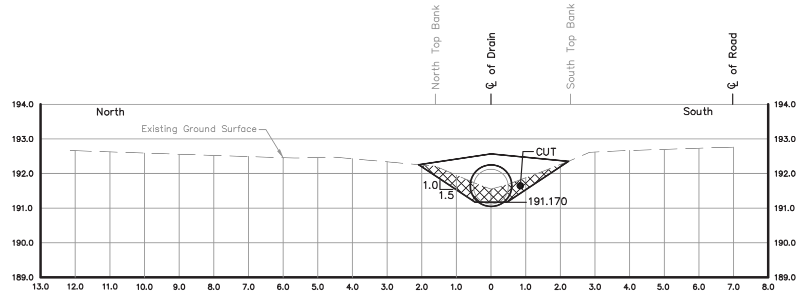
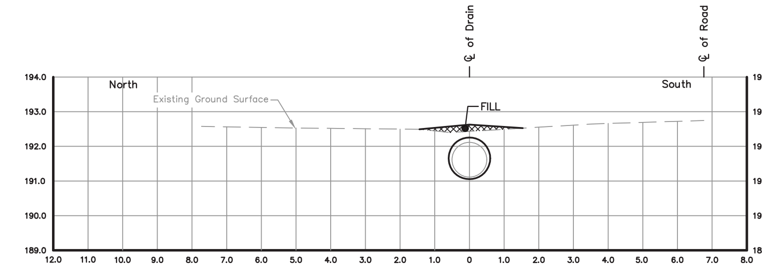


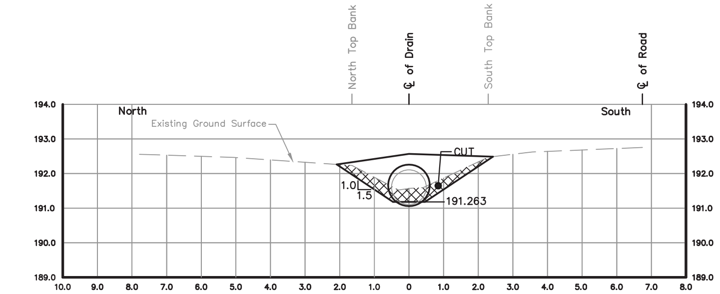
Elev.	192.663	192.447	192.476	192.213	191.681	191.550	191.651	192.004	192.375	192.615	192.657	192.764
Offset	12.142	5.680	4.551	1.605	0.364	0.000	0.380	1.343	2.293	2.847	3.740	6.973

STA 0+459.4



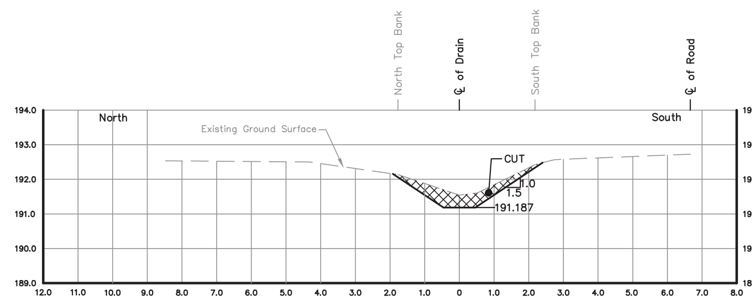
Elev.	192.576	192.530	192.492	192.400	192.649	192.746
Offset	7.728	5.031	1.442	0.559	3.633	6.760

STA 0+465.4



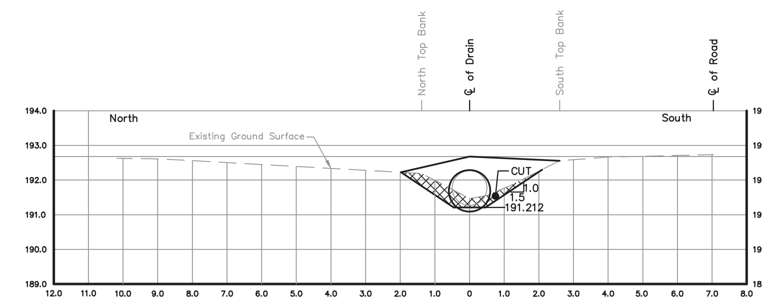
Elev.	192.557	192.465	192.235	191.525	191.570	191.596	192.474	192.622	192.754
Offset	7.786	5.063	1.646	0.306	0.000	0.413	2.289	3.558	6.743

STA 0+471.4



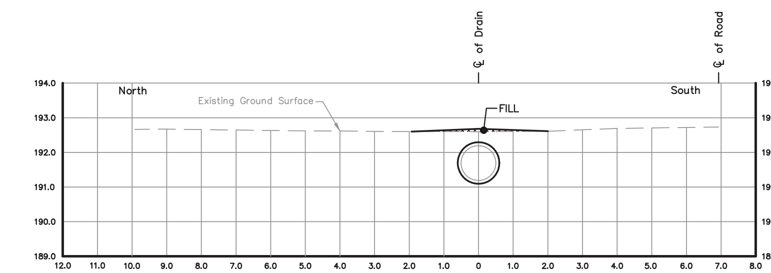
Elev.	192.537	192.502	192.139	191.546	191.604	192.426	192.567	192.593	192.727
Offset	8.474	4.321	1.773	0.000	0.500	2.184	2.729	3.322	6.659

STA 0+479.4



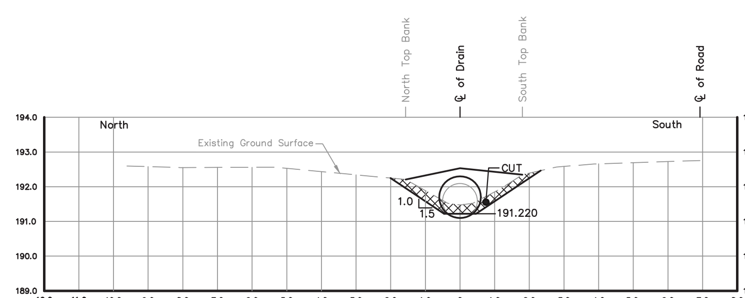
Elev.	192.626	192.612	192.192	191.468	191.552	191.864	192.557	192.664	192.735
Offset	10.177	8.942	1.384	0.000	0.492	1.226	2.600	4.018	7.038

STA 0+501.3



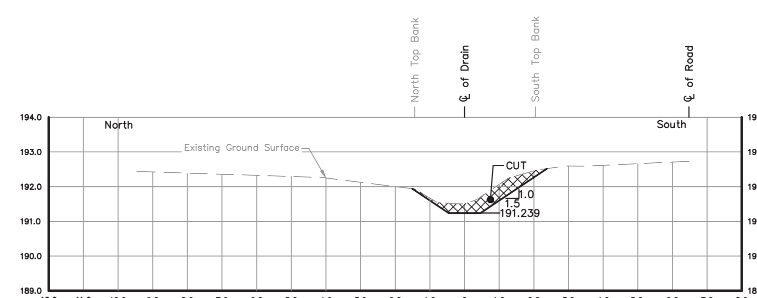
Elev.	192.663	192.627	192.600	192.598	192.614	192.691	192.733
Offset	9.921	5.583	1.935	0.060	2.085	3.968	6.929

STA 0+507.3



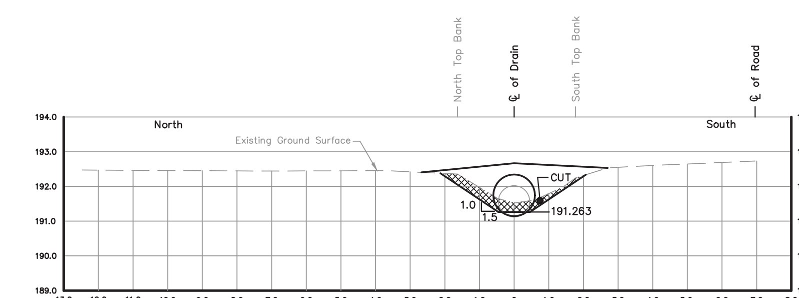
Elev.	192.598	192.552	192.563	192.909	191.520	191.475	191.521	191.944	192.345	192.567	192.654	192.755
Offset	9.613	8.068	5.363	1.571	0.350	0.000	0.369	1.175	1.799	2.781	3.867	6.924

STA 0+513.3
Scale = 1:100



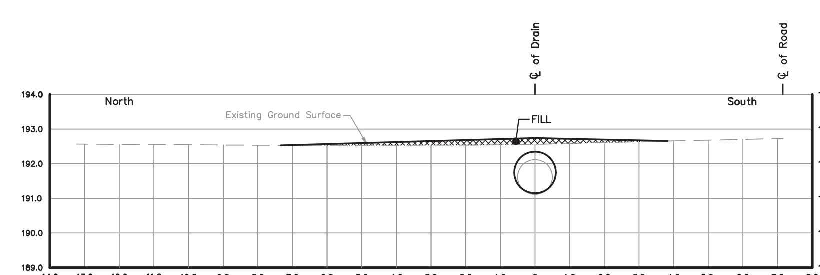
Elev.	192.438	192.265	191.932	191.541	191.499	191.634	192.256	192.468	192.596	192.591	192.732
Offset	9.458	4.112	1.440	0.784	0.000	0.358	1.286	2.042	2.907	3.504	6.478

STA 0+532.5
Scale = 1:100



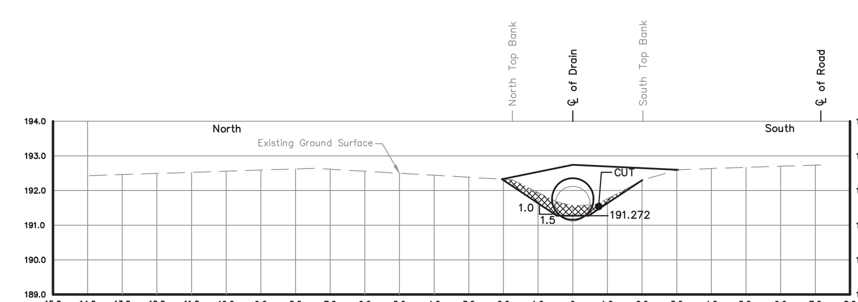
Elev.	192.472	192.442	192.455	192.356	191.654	191.523	191.604	191.974	192.247	192.535	192.590	192.732
Offset	12.469	7.295	3.712	1.636	0.480	0.000	0.583	1.435	1.775	2.702	3.686	6.955

STA 0+556.2
Scale = 1:100



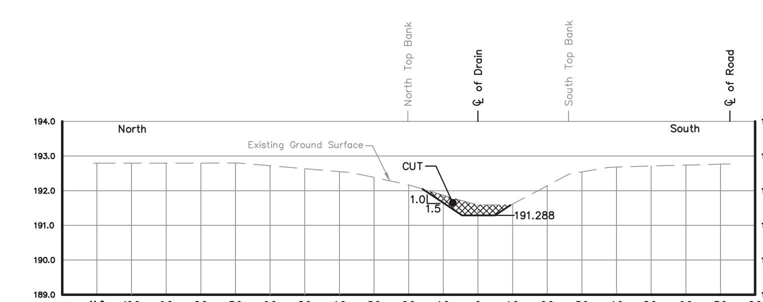
Elev.	192.567	192.530	192.539	192.562	192.565	192.656	192.726
Offset	13.237	7.343	1.506	0.000	0.213	3.825	7.155

STA 0+562.7
Scale = 1:100



Elev.	192.429	192.641	192.311	191.671	191.560	191.595	192.308	192.596	192.638	192.737
Offset	13.952	7.462	1.743	0.453	0.000	0.687	2.025	3.035	4.002	7.158

STA 0+569.2
Scale = 1:100



Elev.	192.795	192.797	192.519	192.174	191.688	191.595	191.585	192.004	192.474	192.677	192.690	192.773
Offset	11.088	6.909	3.642	2.024	0.387	0.000	0.937	1.744	2.617	3.731	4.186	7.271

STA 0+582.0
Scale = 1:100

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PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

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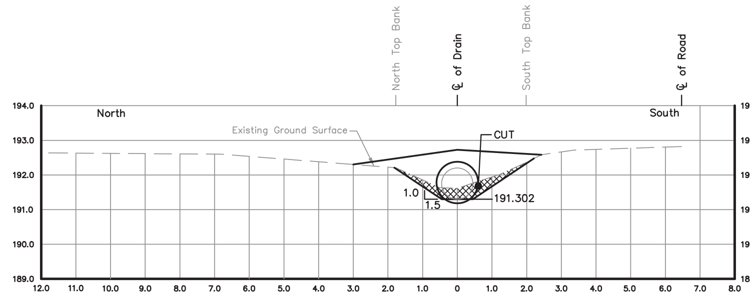
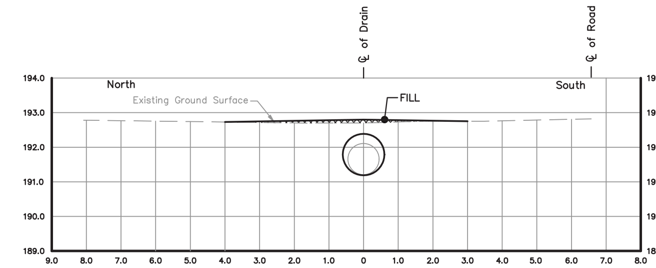


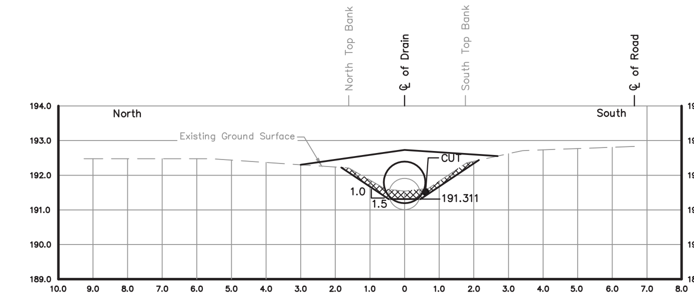
Elev.	192.637	192.600	192.208	191.637	191.612	191.795	192.016	192.361	192.584	192.718	192.819
Offset	11.788	6.816	1.775	0.515	0.000	0.537	1.231	1.986	2.424	3.374	6.468

STA 0+596.3
Scale = 1:100



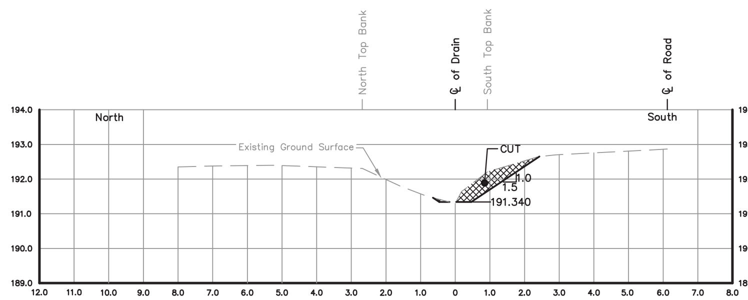
Elev.	192.782	192.742	192.698	192.703	192.754	192.753	192.821
Offset	0.000	0.000	0.000	0.000	0.000	0.000	0.000

STA 0+602.8
Scale = 1:100



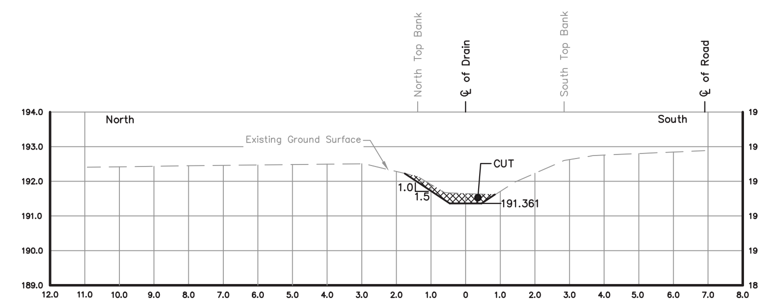
Elev.	192.477	192.476	192.210	191.604	191.542	191.619	192.360	192.711	192.830
Offset	9.259	5.605	1.611	0.557	0.000	0.684	1.796	3.407	6.638

STA 0+609.3
Scale = 1:100



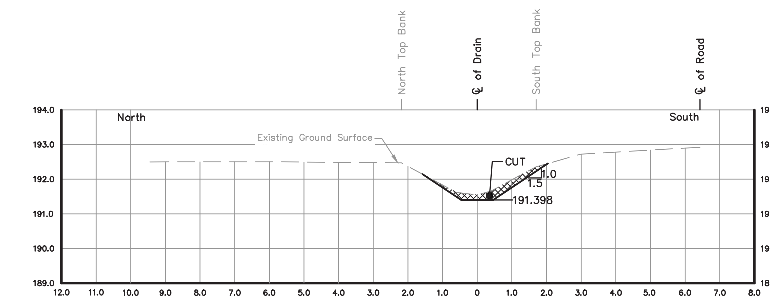
Elev.	192.351	192.382	192.399	192.308	191.812	191.516	191.297	191.641	192.208	192.643	192.699	192.867
Offset	8.001	6.811	5.295	2.682	1.620	0.850	0.000	0.183	0.928	2.394	2.891	6.120

STA 0+635.1
Scale = 1:100



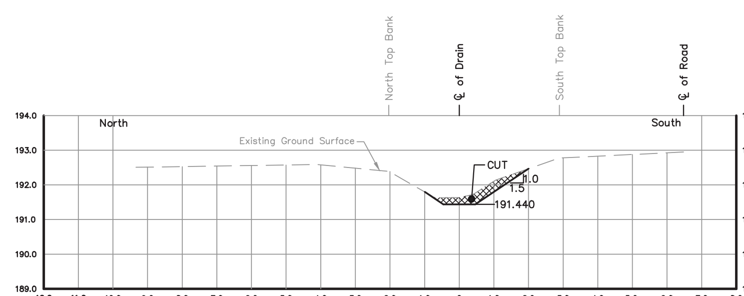
Elev.	192.405	192.447	192.507	192.133	191.673	191.644	191.618	191.976	192.600	192.722	192.734	192.884
Offset	10.926	8.047	2.947	1.385	0.607	0.000	0.863	1.415	2.841	3.571	3.667	6.907

STA 0+656.7
Scale = 1:100



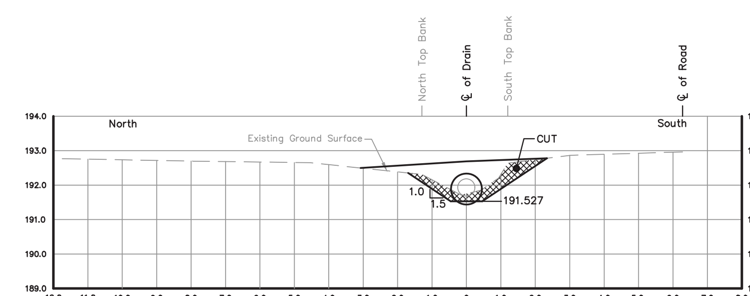
Elev.	192.495	192.502	192.498	192.469	191.616	191.547	191.656	192.109	192.305	192.722	192.921
Offset	9.448	8.174	5.587	2.184	0.595	0.000	0.401	1.234	1.701	3.000	6.431

STA 0+694.2
Scale = 1:100



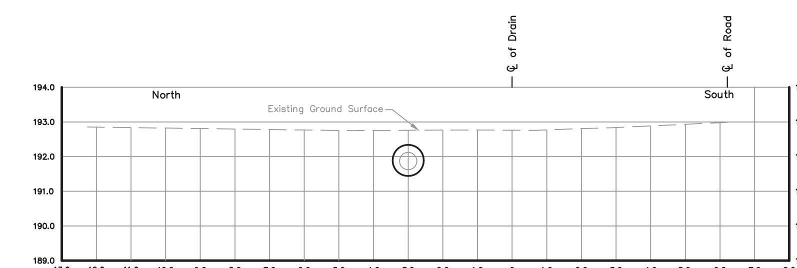
Elev.	192.507	192.587	192.391	191.629	191.632	191.723	192.137	192.774	192.948
Offset	9.336	4.116	2.033	0.703	0.000	0.397	1.050	2.893	6.477

STA 0+736.2
Scale = 1:100



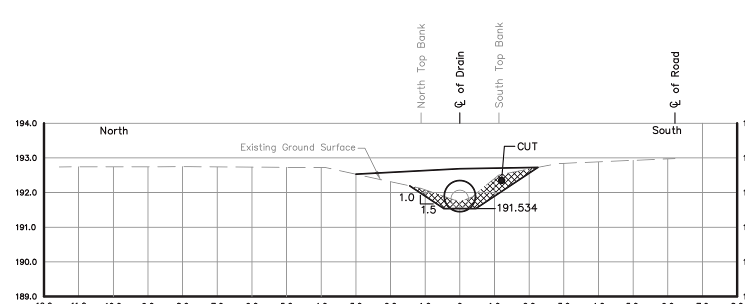
Elev.	192.767	192.695	192.650	192.309	191.716	191.743	191.859	192.206	192.635	192.865	192.963
Offset	11.767	7.941	4.540	1.294	0.167	0.000	0.435	0.937	1.202	3.020	6.277

STA 0+822.8
Scale = 1:100



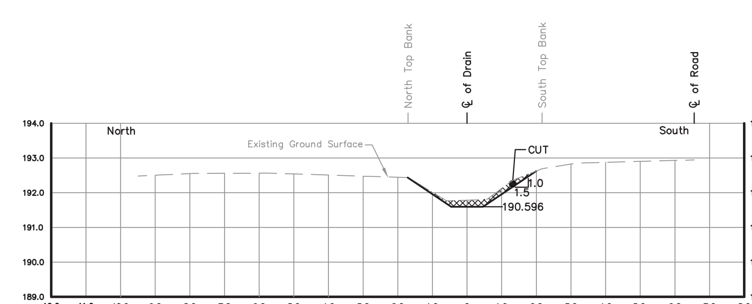
Elev.	192.855	192.798	192.816	192.759	192.807	192.835	192.989
Offset	12.257	4.674	1.401	0.669	1.953	2.904	6.211

STA 0+828.8
Scale = 1:100



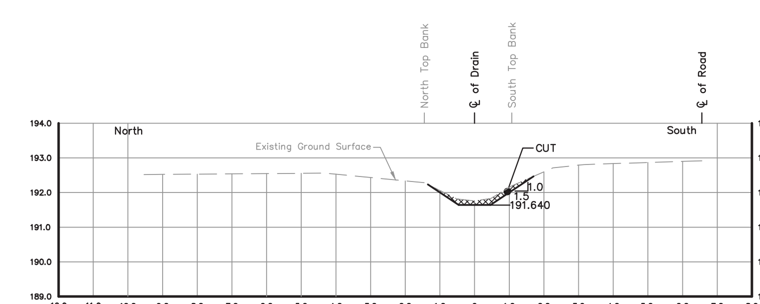
Elev.	192.739	192.745	192.719	192.120	191.731	191.873	192.167	192.510	192.834	192.980
Offset	11.556	7.779	3.875	1.121	0.000	0.359	0.706	1.129	2.808	6.208

STA 0+834.8
Scale = 1:100



Elev.	192.480	192.555	192.565	192.436	191.766	191.799	191.815	192.357	192.690	192.854	192.945
Offset	9.495	7.933	5.721	1.703	0.588	0.000	0.588	1.313	2.167	3.164	6.557

STA 0+894.9
Scale = 1:100



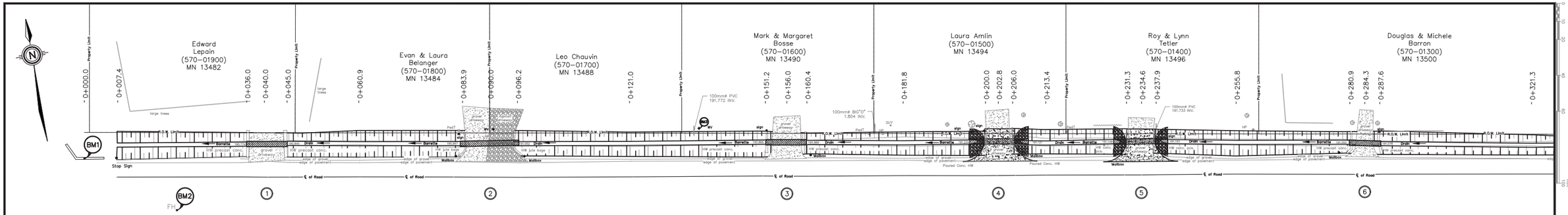
Elev.	192.520	192.560	192.283	191.817	191.759	191.830	192.194	192.711	192.808	192.918
Offset	9.534	4.294	1.449	0.514	0.000	0.468	1.075	2.258	3.156	6.558

STA 0+940.8
Scale = 1:100

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

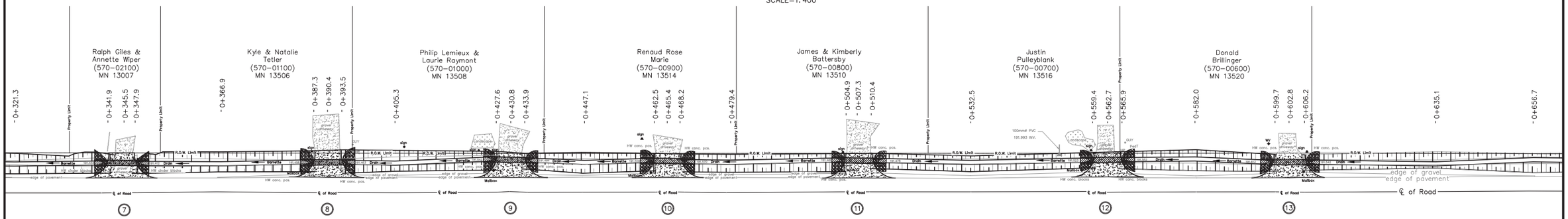
DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

FILE No.:	SHEET No.:
REI2020D009	7 OF 8



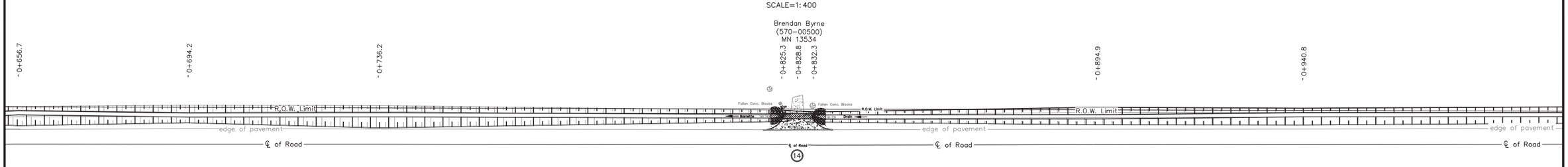
BARRETTE DRAIN PLAN - STA 0+000 TO 0+321.3

SCALE=1:400



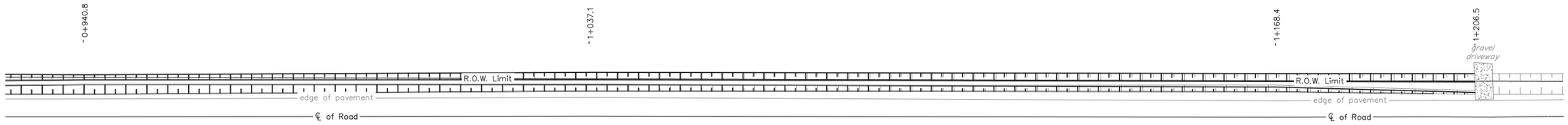
BARRETTE DRAIN PLAN - STA 0+321.3 TO 0+656.7

SCALE=1:400



BARRETTE DRAIN PLAN - STA 0+656.7 TO 0+940.8

SCALE=1:400



BARRETTE DRAIN PLAN - STA 0+940.8 TO 1+206.5

SCALE=1:400

BENCHMARKS:

1. NORTH EAST HEADWALL OF BRIDGE OVER HYLAND SIDEROAD DRAIN. APPROXIMATELY 36M WEST OF MN 13482 DOWNSTREAM PIPE. 3.05M SPAN, 7.92M WIDE. **ELEV: 193.156m**
2. TOP OF NUT OF FIRE HYDRANT. LOCATED ACROSS THE ROAD FROM MN 13482, APPROXIMATELY 26M EAST OF THE INTERSECTION BETWEEN HYLAND ROAD & 13 CONCESSION ROAD. **ELEV: 193.411m**
3. TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490. **ELEV: 192.286m**

PIPE LEGEND:

1. 900mmø CSP, 9.20m (30.2ft) length
2. 1100mmø CSP, 11.60m (38.1ft) length
3. 1050mmø CSP, 9.00m (29.5ft) length
4. 1050mmø CSP, 6.15m (20.2ft) length
5. 1050mmø CSP, 6.20m (20.3ft) length
6. 1000mmø CSP, 6.60m (21.7ft) length
7. 1100mmø CSP, 6.10m (20.0ft) length
8. 1000mmø CSP, 6.15m (20.2ft) length
9. 900mmø CSP, 6.20m (20.3ft) length
10. 900mmø CSP, 5.50m (18.0ft) length
11. 1000mmø CSP, 5.60m (18.4ft) length
12. 1050mmø CSP, 6.10m (20.0ft) length
13. 900mmø CSP, 6.20m (20.3ft) length
14. 500mmø PVC, 4.00m (13.1ft), buried, approx. length

THESE PLANS HAVE BEEN REDUCED AND THE SCALE THEREFORE VARIES. FULL SCALE PLANS MAY BE VIEWED AT THE MUNICIPAL OFFICE.

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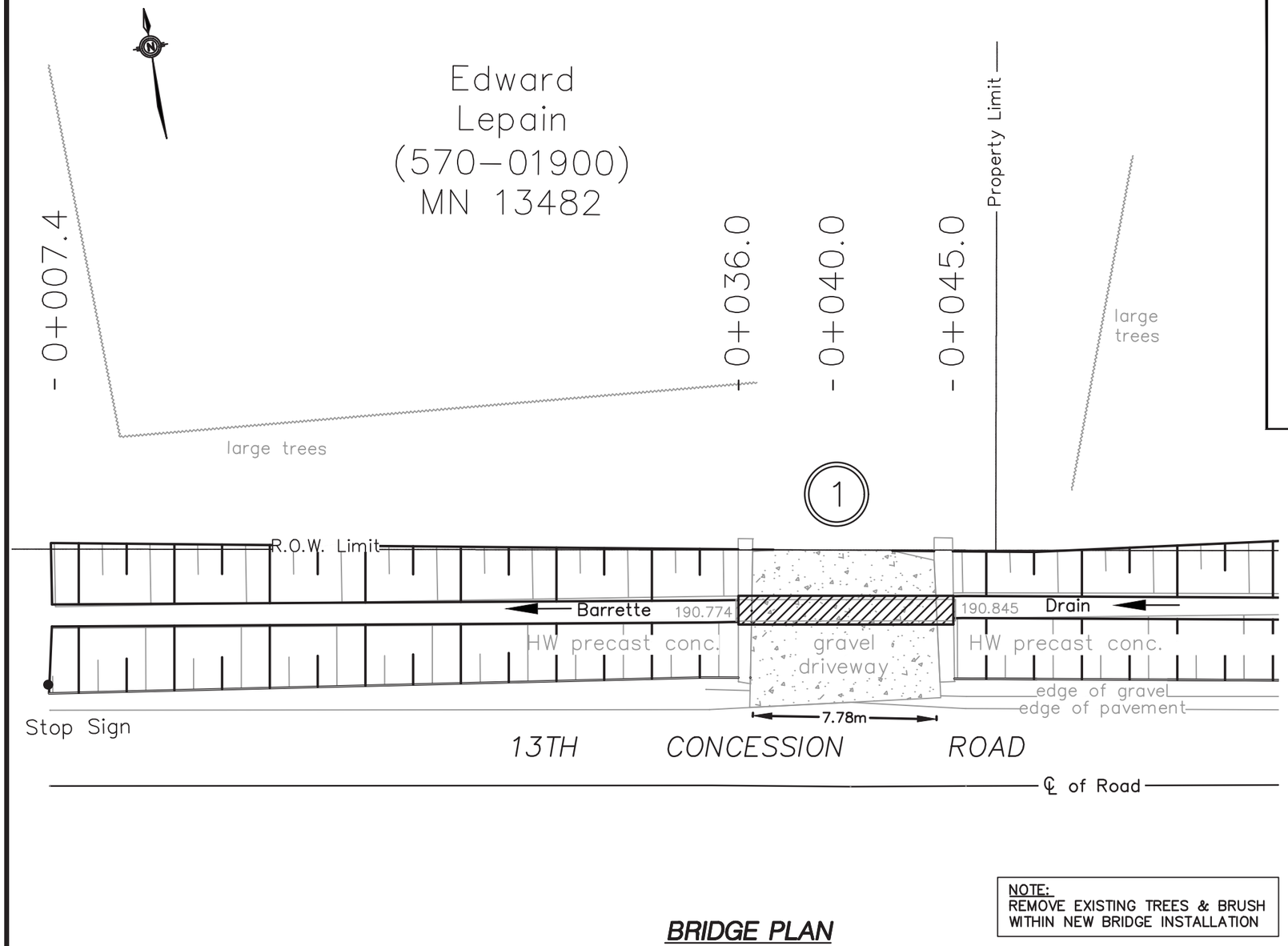
PLOT CODE: 1:1
COMPUTER FILE: REI2020D009.DWG

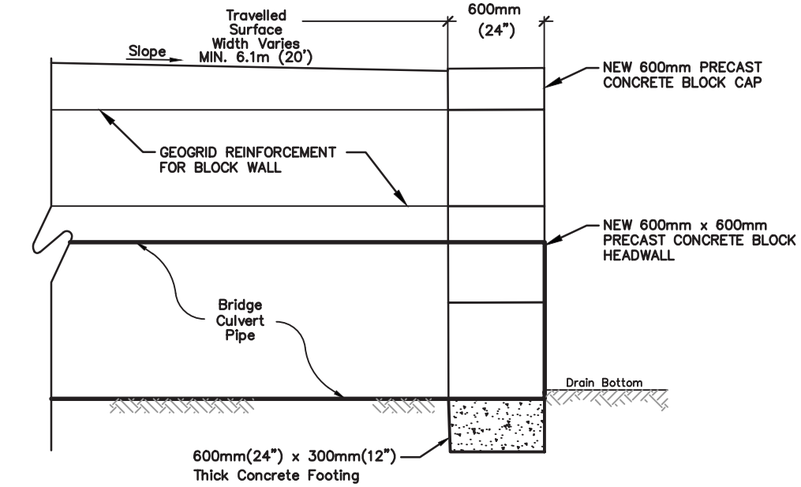
FILE No.: REI2020D009

SHEET No.: 8 OF 8

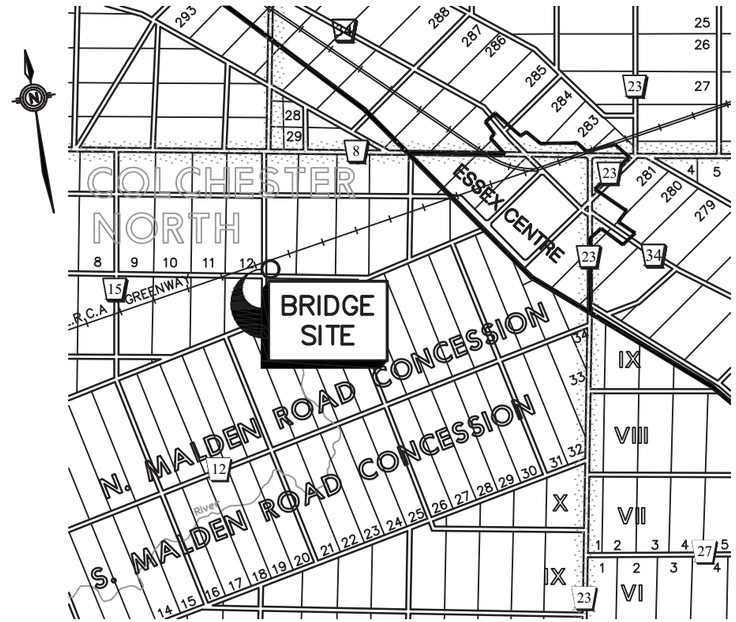


BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

FUTURE MAINTENANCE

BENCHMARK:
TOP OF NUT OF FIRE HYDRANT. LOCATED ACROSS THE ROAD FROM MN 13482, APPROXIMATELY 26M EAST OF THE INTERSECTION BETWEEN HYLAND ROAD & 13TH CONCESSION ROAD.

ELEV: 193.411m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	9.0m (29.53 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 190.640m DOWNSTREAM INV. (W) = 190.632m ℄ TOP OF DRIVEWAY = 192.586m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR EDWARD LEPAIN (570–01900)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

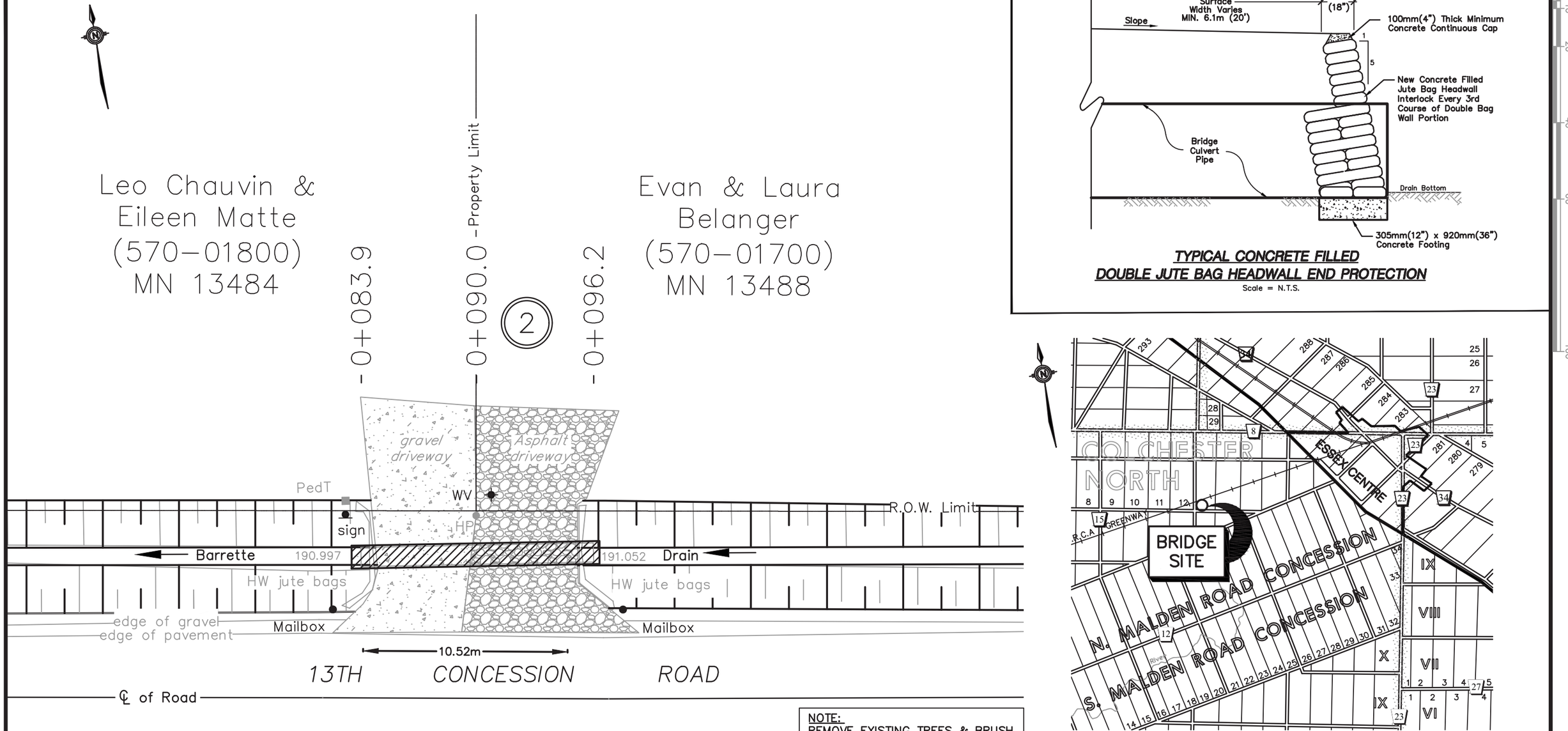
REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
1 OF 14



FUTURE MAINTENANCE

BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

TYPICAL CONCRETE FILLED DOUBLE JUTE BAG HEADWALL END PROTECTION
Scale = N.T.S.

KEY PLAN
Scale = 1:100,000

BENCHMARK:
TOP OF NUT OF FIRE HYDRANT. LOCATED ACROSS THE ROAD FROM MN 13482, APPROXIMATELY 26M EAST OF THE INTERSECTION BETWEEN HYLAND ROAD & 13TH CONCESSION ROAD.

ELEV: 193.411m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	13.0m (42.65 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.690m DOWNSTREAM INV. (W) = 190.678m ℄ TOP OF DRIVEWAY = 192.493m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR EVAN & LAURA BELANGER (570-01700) & LEO CHAUVIN & EILEEN MATTE (570-01800)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: 2021-01-25

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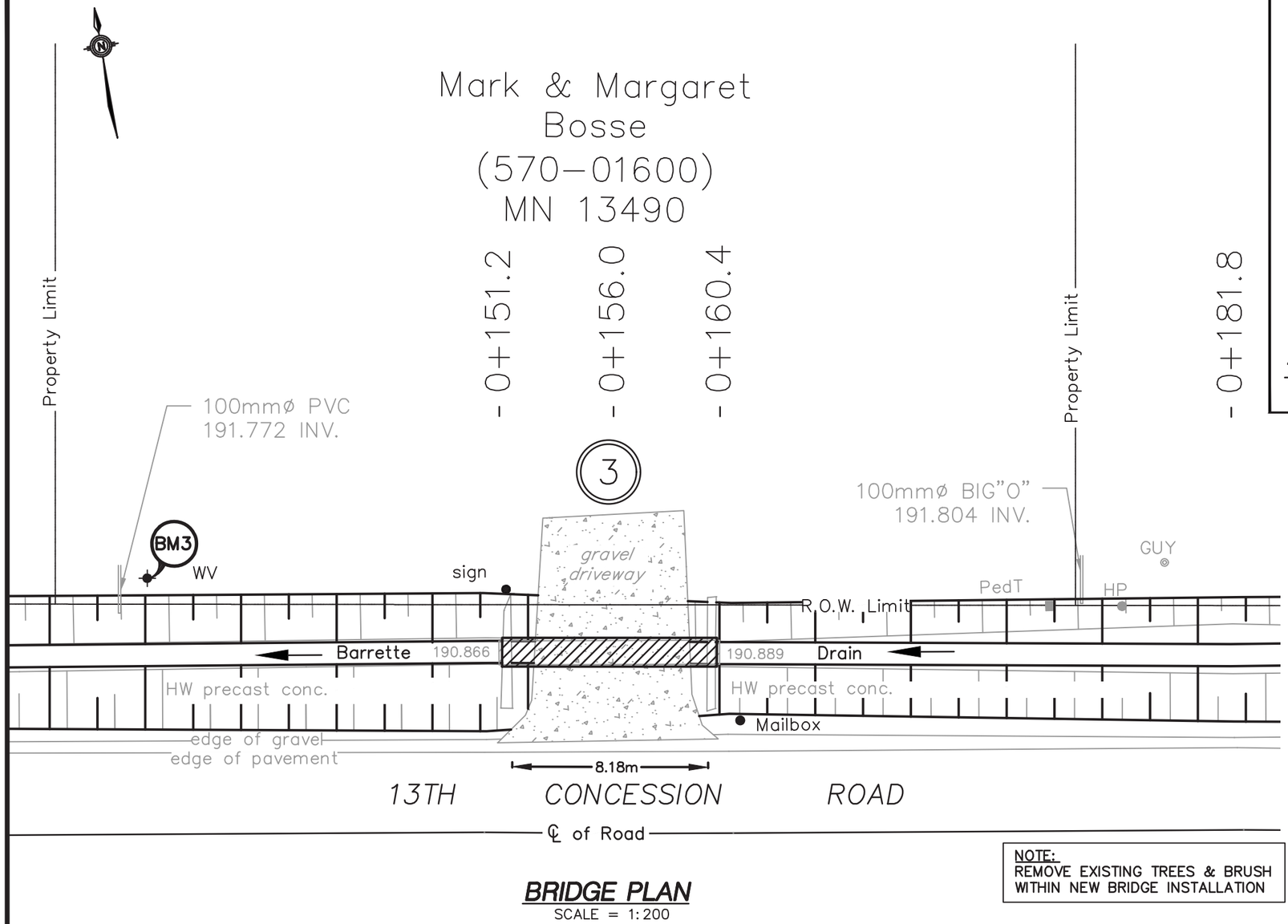
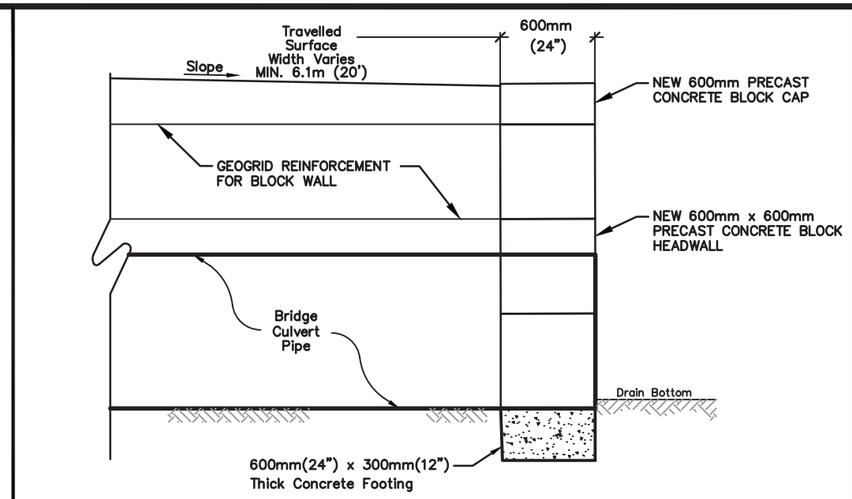
PLOT CODE: 1:1
FILE: REI2020D009.DWG

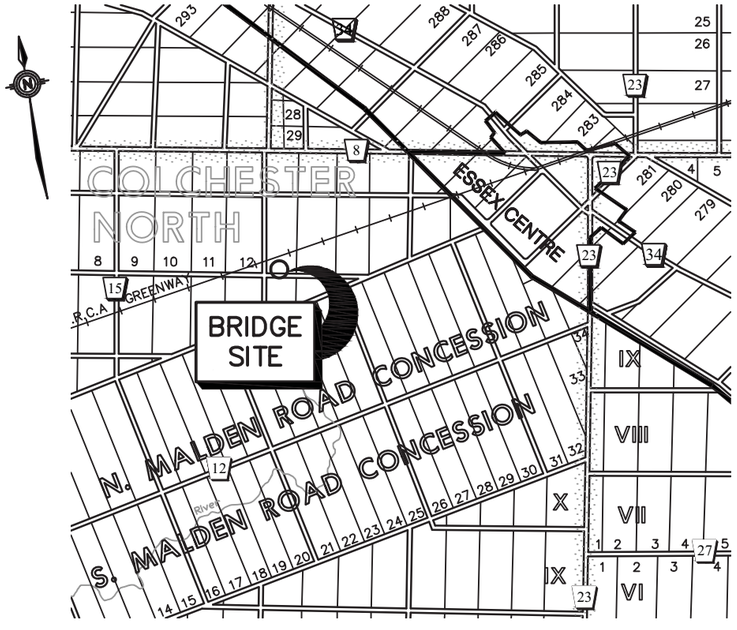


BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

FUTURE MAINTENANCE

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	9.0m (29.53 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.753m DOWNSTREAM INV. (W) = 190.745m ℄ TOP OF DRIVEWAY = 192.394m DRAIN GRADE = 0.09%

BARRETTE DRAIN

BRIDGE FOR MARK & MARGARET BOSSE (570-01600)

(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)

IN THE

TOWN OF ESSEX

IN THE

COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: 2021-01-25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

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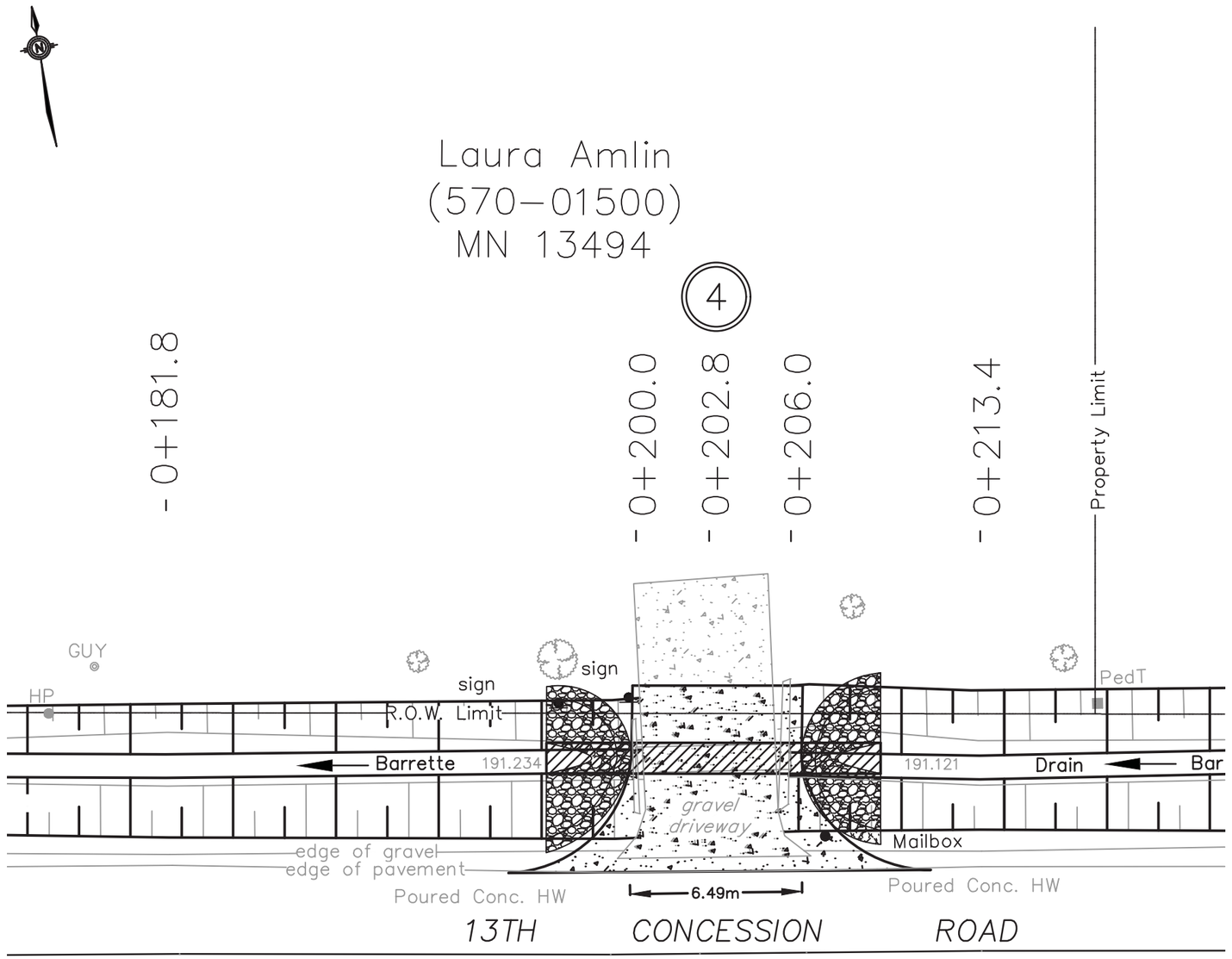
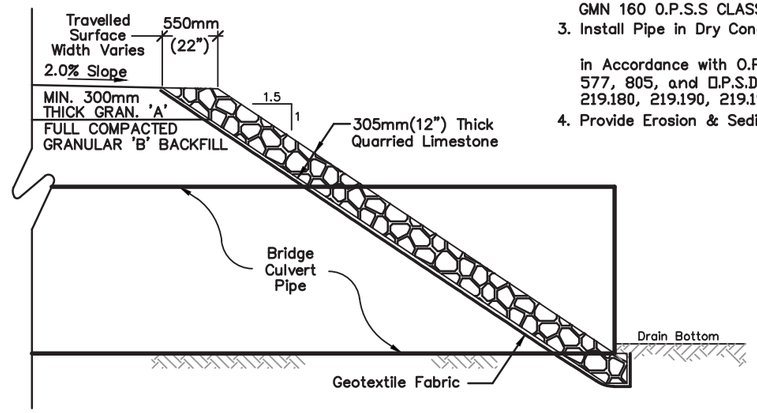


BRIDGE PLAN
SCALE = 1:200

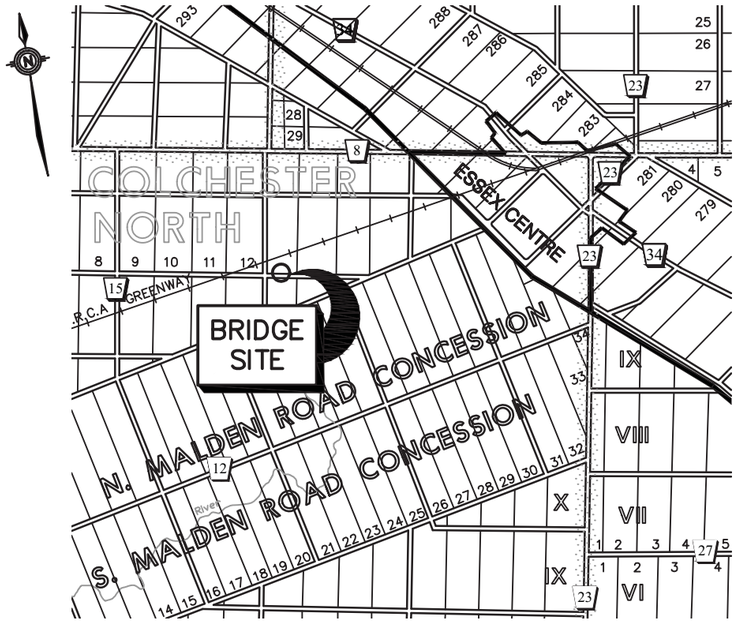
NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

FUTURE MAINTENANCE

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	13.0m (42.65 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.801m DOWNSTREAM INV. (W) = 190.789m ℄ TOP OF DRIVEWAY = 192.604m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR LAURA AMLIN (570-01500)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: 2021-01-25

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PLOT CODE: 1:1
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APPENDIX 'E'
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Roy & Lynn
Tetler
(570–01400)
MN 13496

5

-0+231.3
-0+234.6
-0+237.9
-0+255.8

Property Limit
Property Limit

100mmø PVC
191.733 INV.

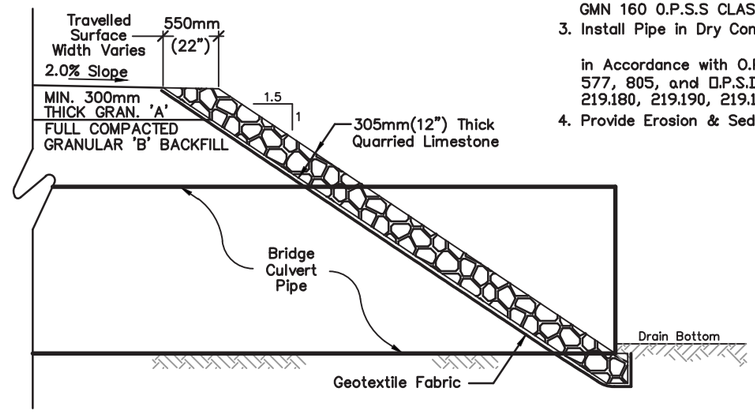
PedT
sign
HP
R.O.W. Limit
Barrette
191.149
191.193
Drain
HW conc. pcs.
gravel driveway
HW conc. pcs.
edge of gravel
edge of pavement
Mailbox
6.16m
13TH CONCESSION ROAD
℄ of Road

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

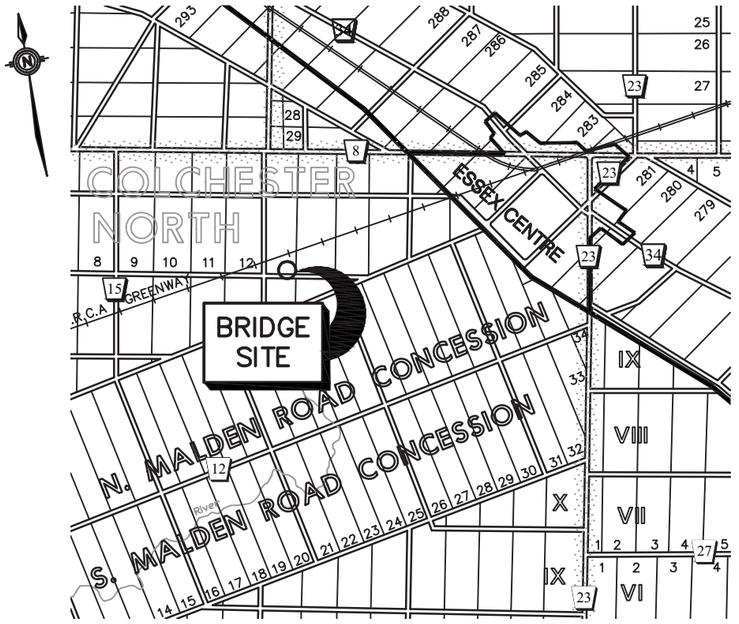
BRIDGE PLAN
SCALE = 1:200

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

FUTURE MAINTENANCE

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 190.831m DOWNSTREAM INV. (W) = 190.821m ℄ TOP OF DRIVEWAY = 192.410m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR ROY & LYNN TETLER (570–01400)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
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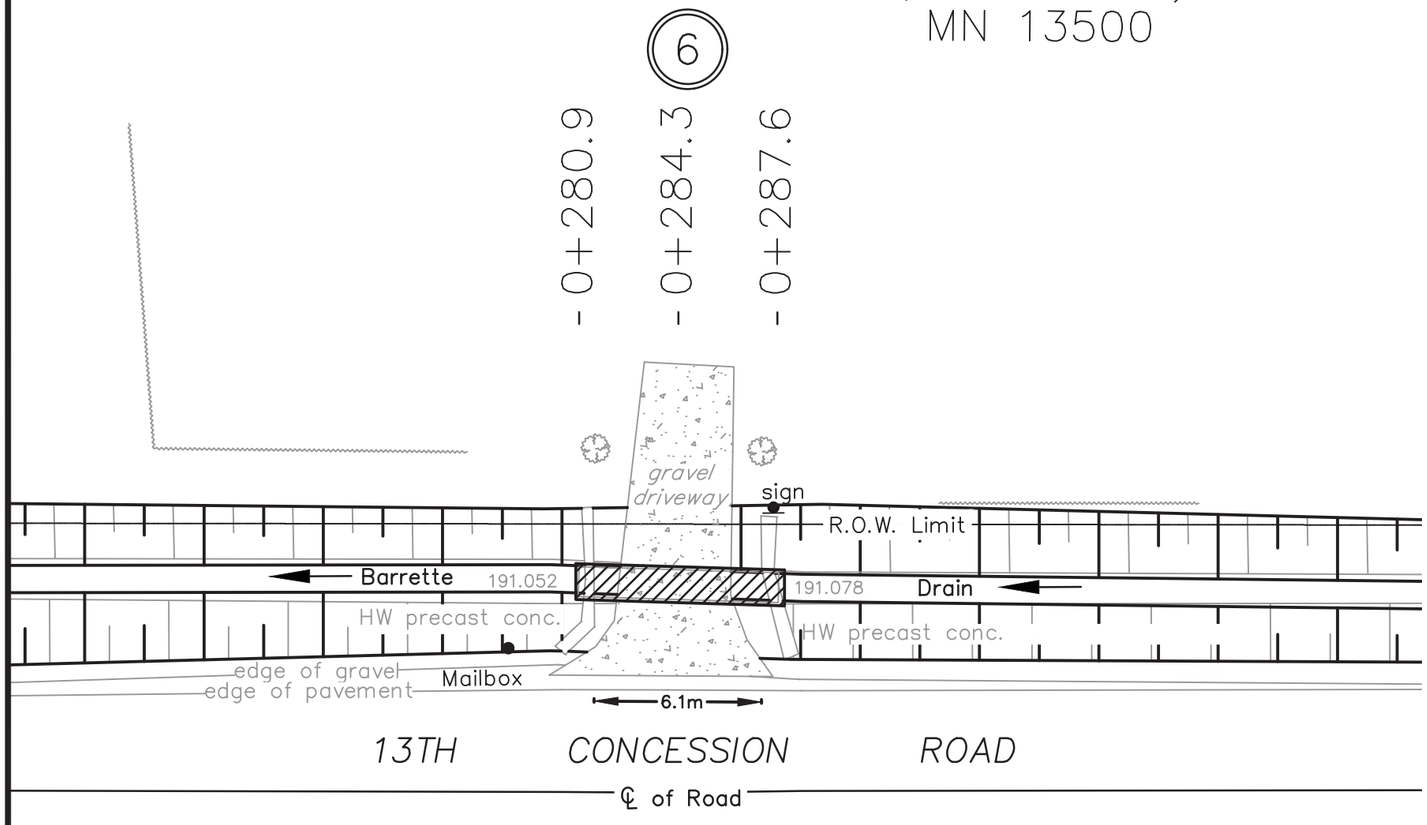
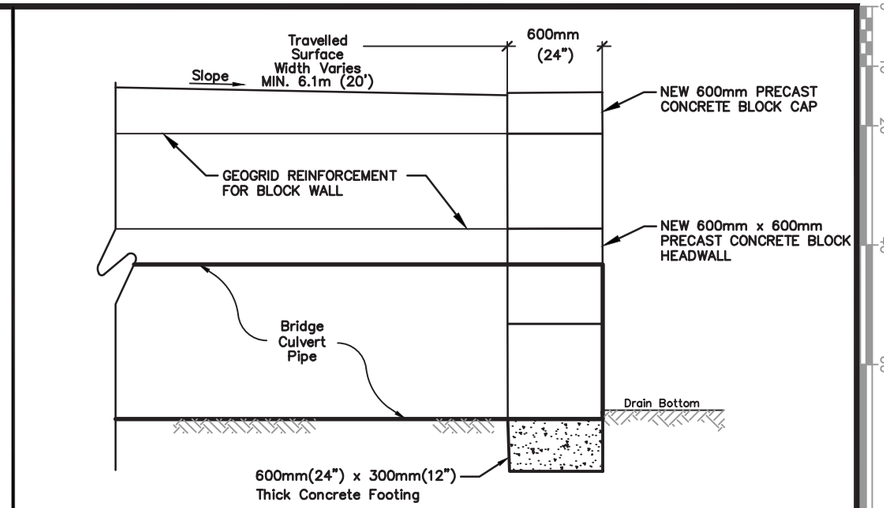
Douglas & Michele
Barron
(570–01300)
MN 13500



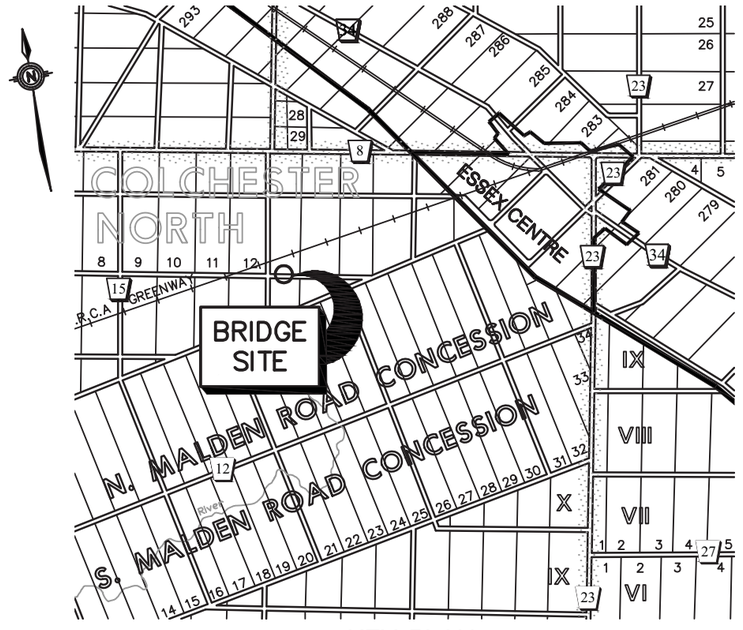
FUTURE MAINTENANCE

BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	7.0m (22.97 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 190.878m DOWNSTREAM INV. (W) = 190.872m ℄ TOP OF DRIVEWAY = 192.648m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR DOUGLAS & MICHELE BARRON (570–01300)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

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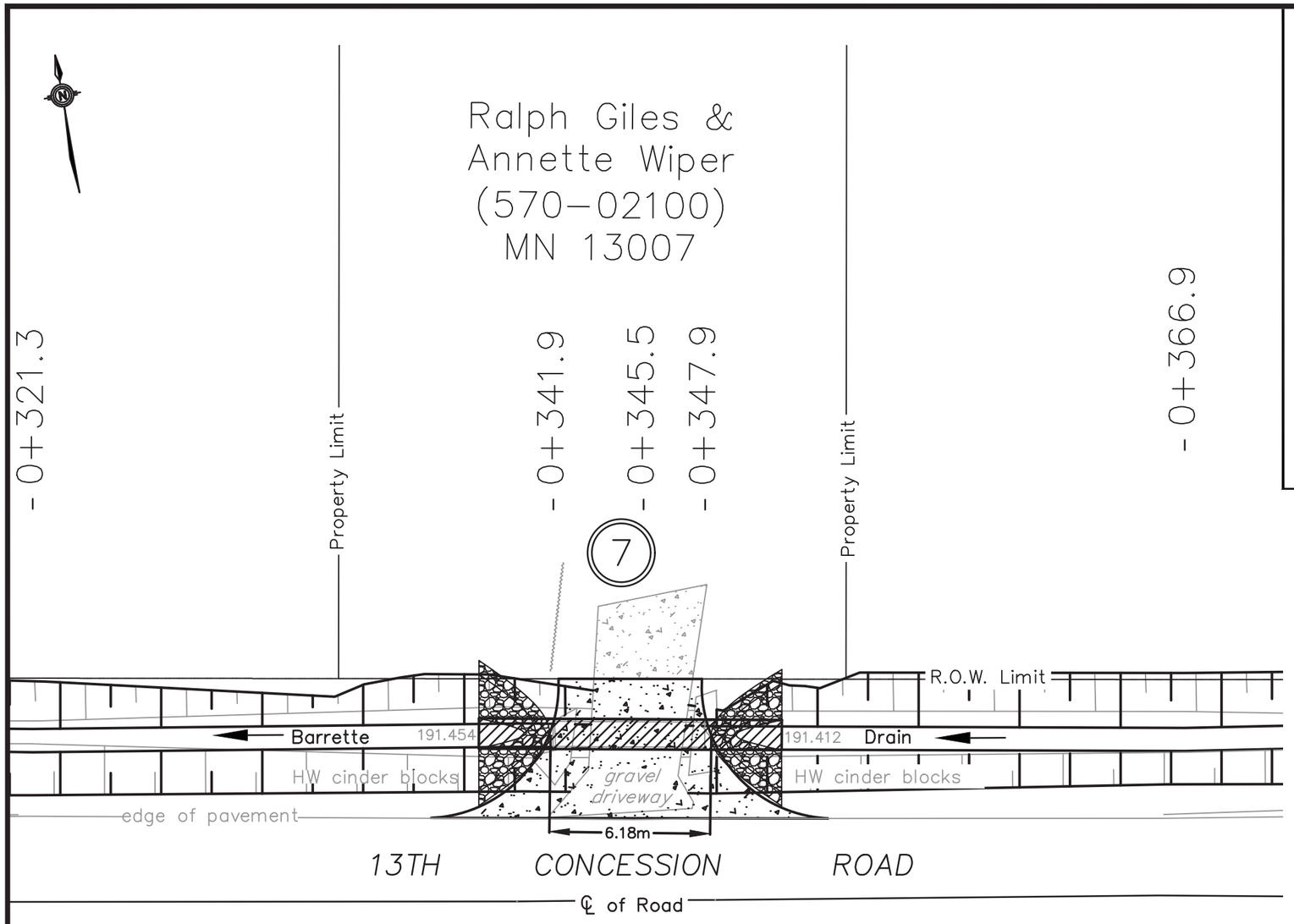
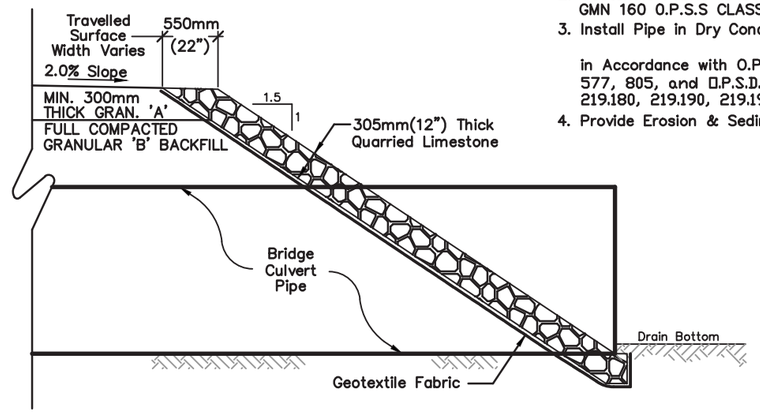
6 OF 14



NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

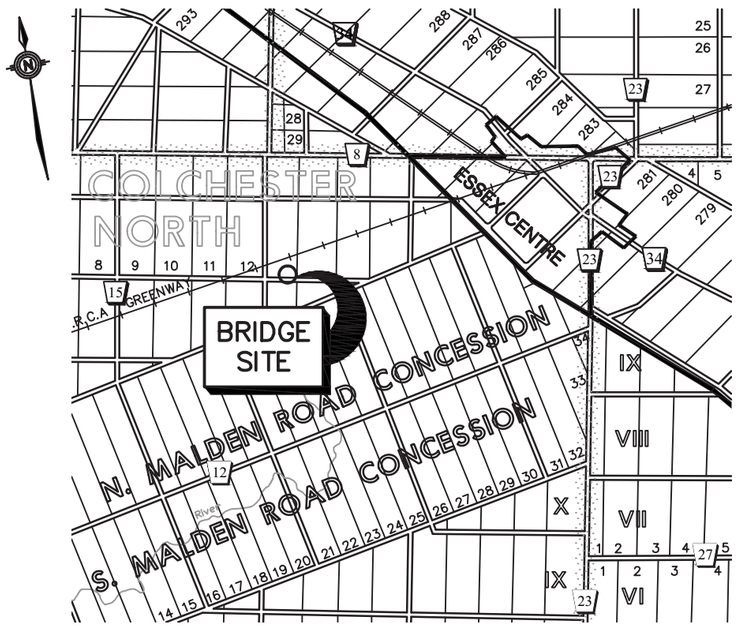
BRIDGE PLAN
SCALE = 1:200



NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control

TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.940m DOWNSTREAM INV. (W) = 190.930m ℄ TOP OF DRIVEWAY = 192.515m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR RALPH GILES & ANNETTE WIPER (570-02100)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: 2021-01-25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
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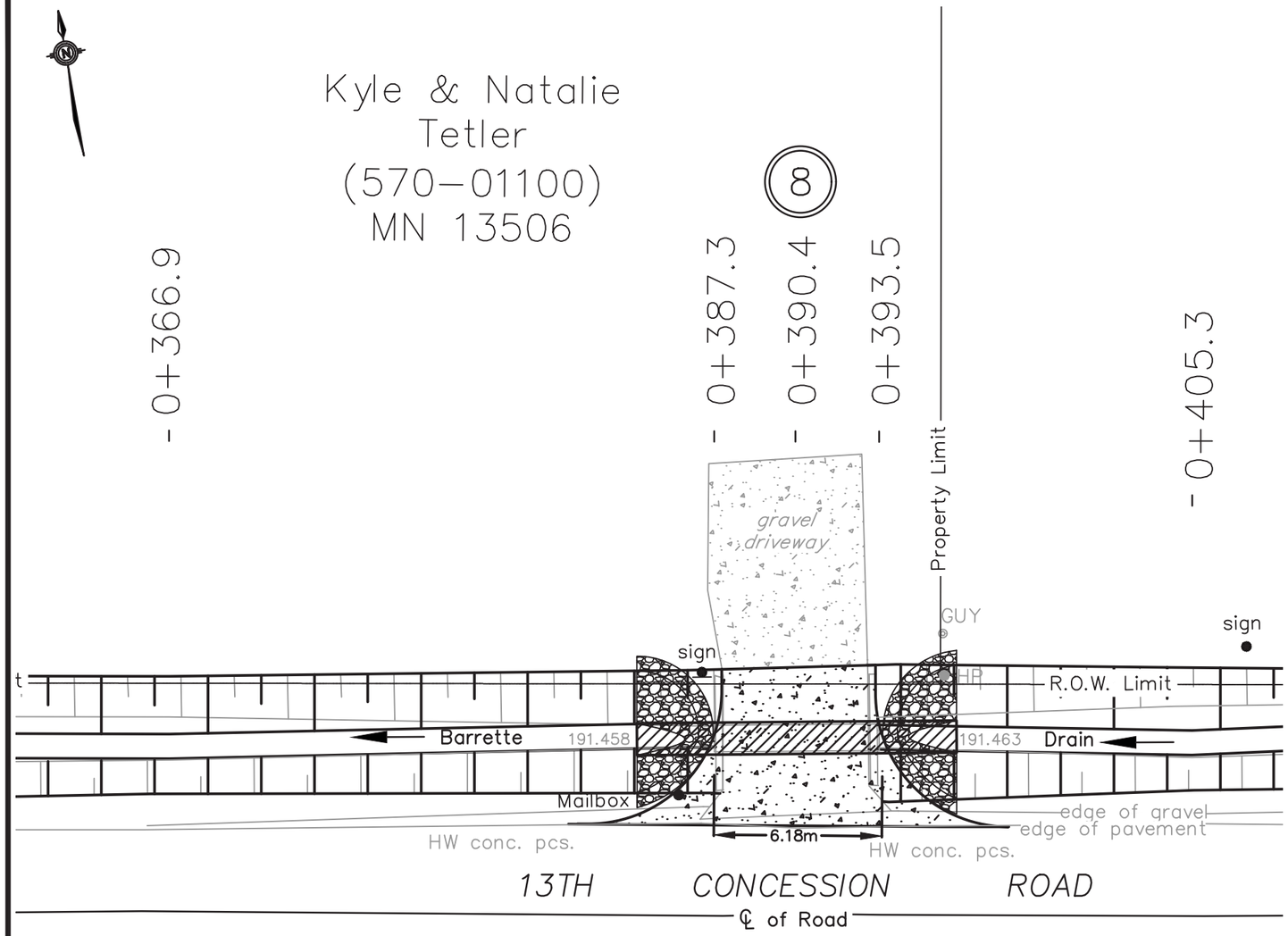


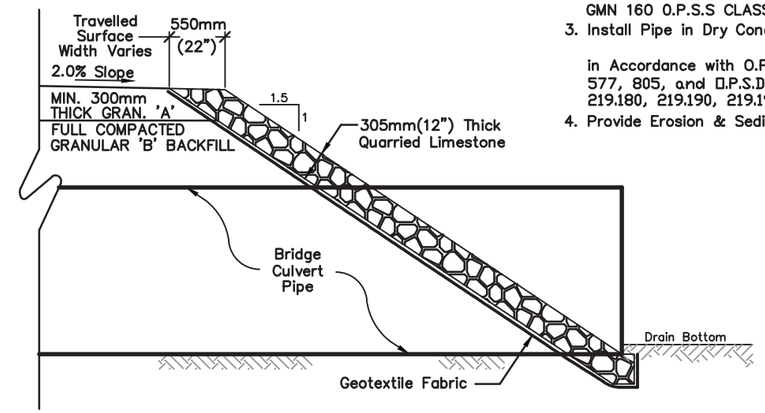
NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

FUTURE MAINTENANCE

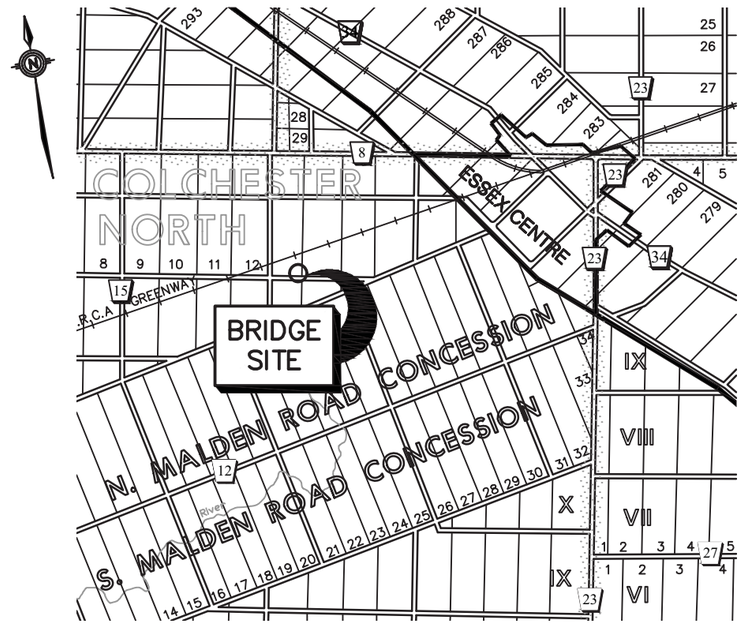
BRIDGE PLAN
SCALE = 1:200

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.985m DOWNSTREAM INV. (W) = 190.975m ℄ TOP OF DRIVEWAY = 192.560m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR KYLE & NATALIE TETLER (570–01000)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

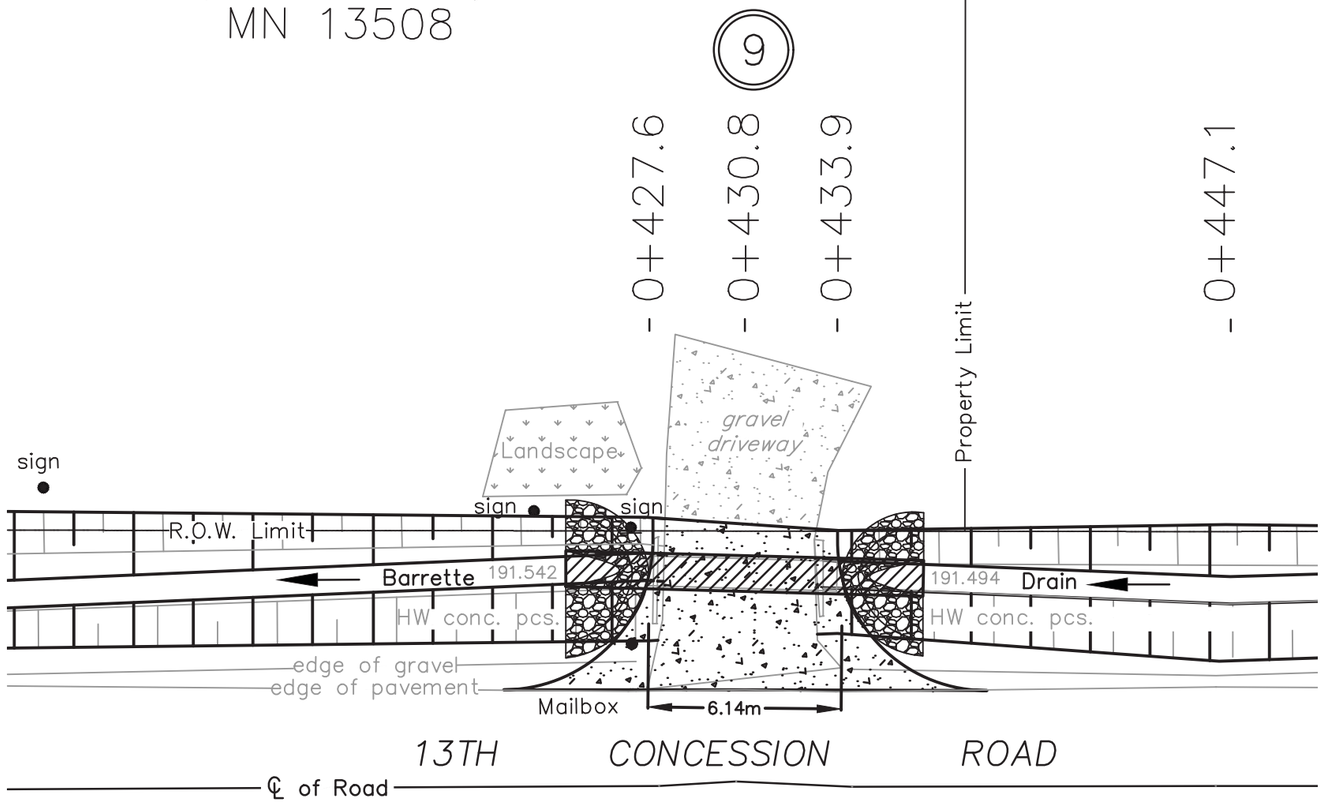
ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

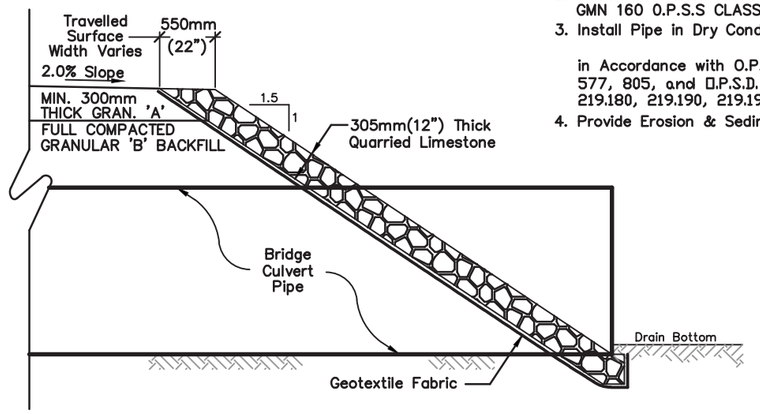
APPENDIX 'E'
8 OF 14

Philip Lemieux &
Laurie Raymont
(570–01000)
MN 13508



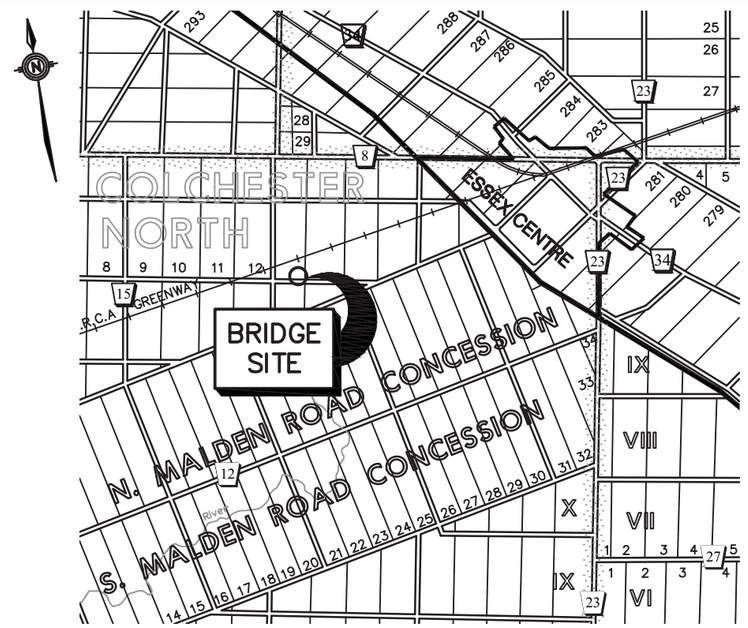
BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions
   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 191.024m DOWNSTREAM INV. (W) = 191.014m ℄ TOP OF DRIVEWAY = 192.610m DRAIN GRADE = 0.09%

BARRETTE DRAIN

BRIDGE FOR PHILIP LEMIEUX & LAURIE RAYMONT (570–01000)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
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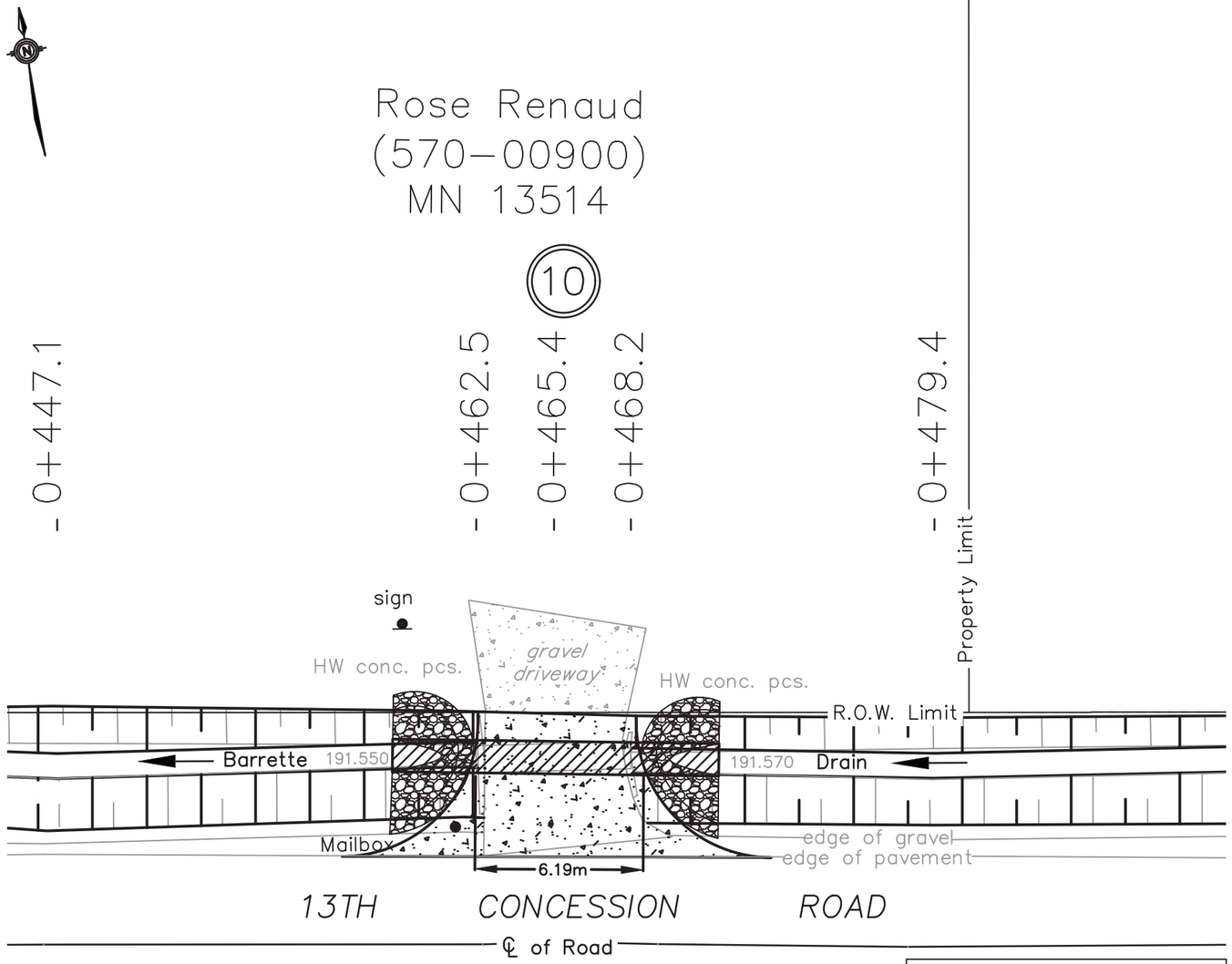
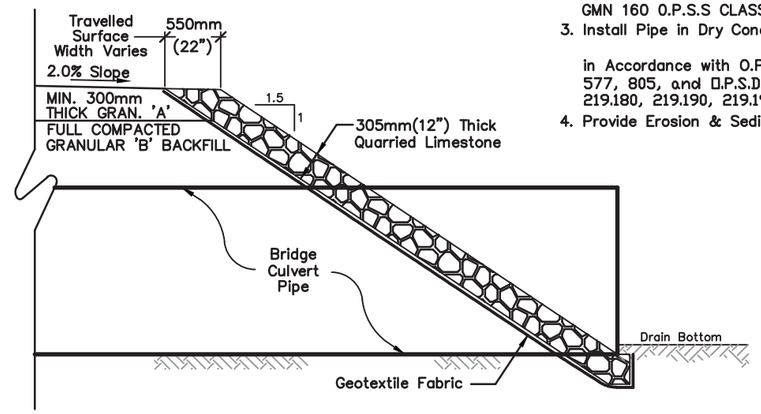


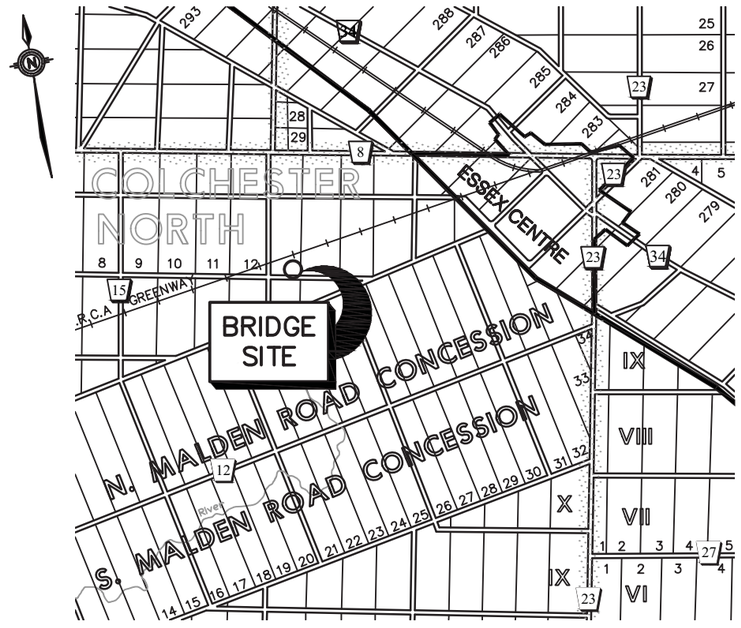
NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

BRIDGE PLAN
SCALE = 1:200



NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions
   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control

TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 191.059m DOWNSTREAM INV. (W) = 191.049m ℄ TOP OF DRIVEWAY = 192.630m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR ROSE RENAUD (570-00900)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

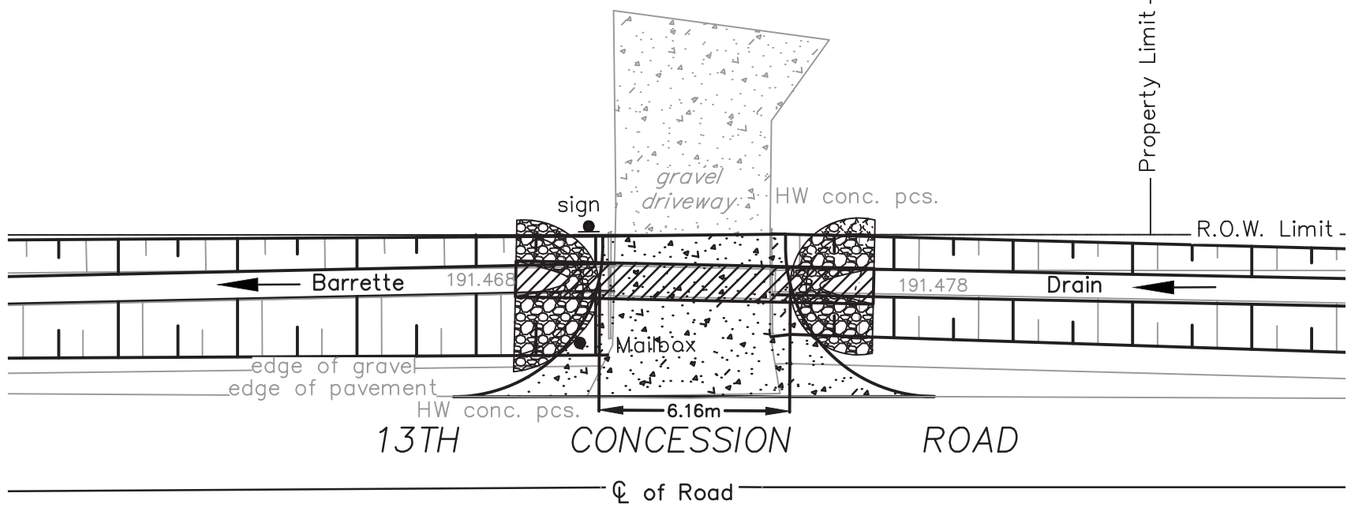
DATE: 2021-01-25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

James & Kimberly
Battersby
(570–00800)
MN 13510

11

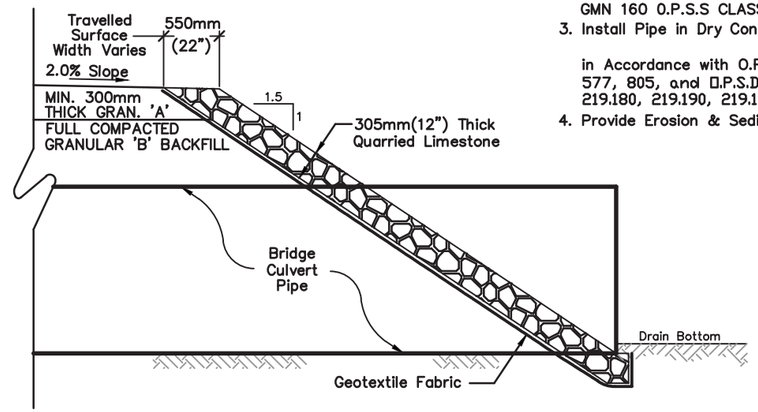
0+504.9
0+507.3
0+510.4



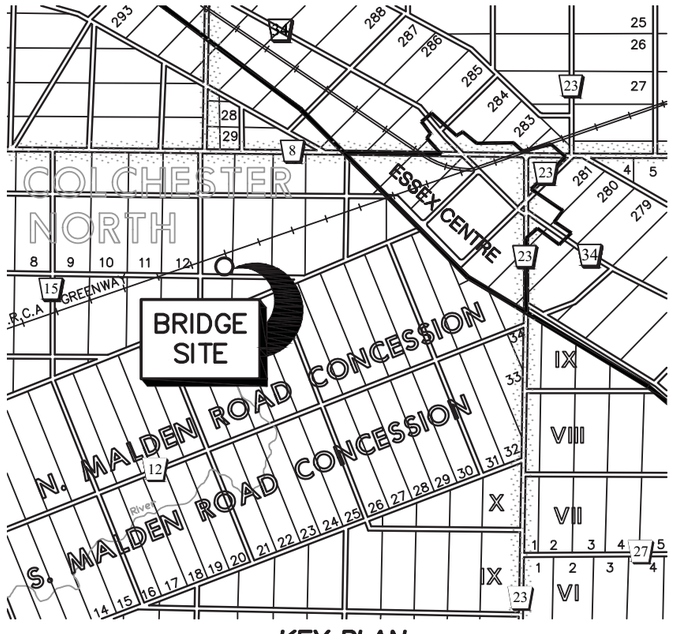
BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions
   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	12.0m (39.37 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 191.100m DOWNSTREAM INV. (W) = 191.090m ℄ TOP OF DRIVEWAY = 192.680m DRAIN GRADE = 0.09%

BARRETTE DRAIN

BRIDGE FOR JAMES & KIMBERLY BATTERSBY (570–00800)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
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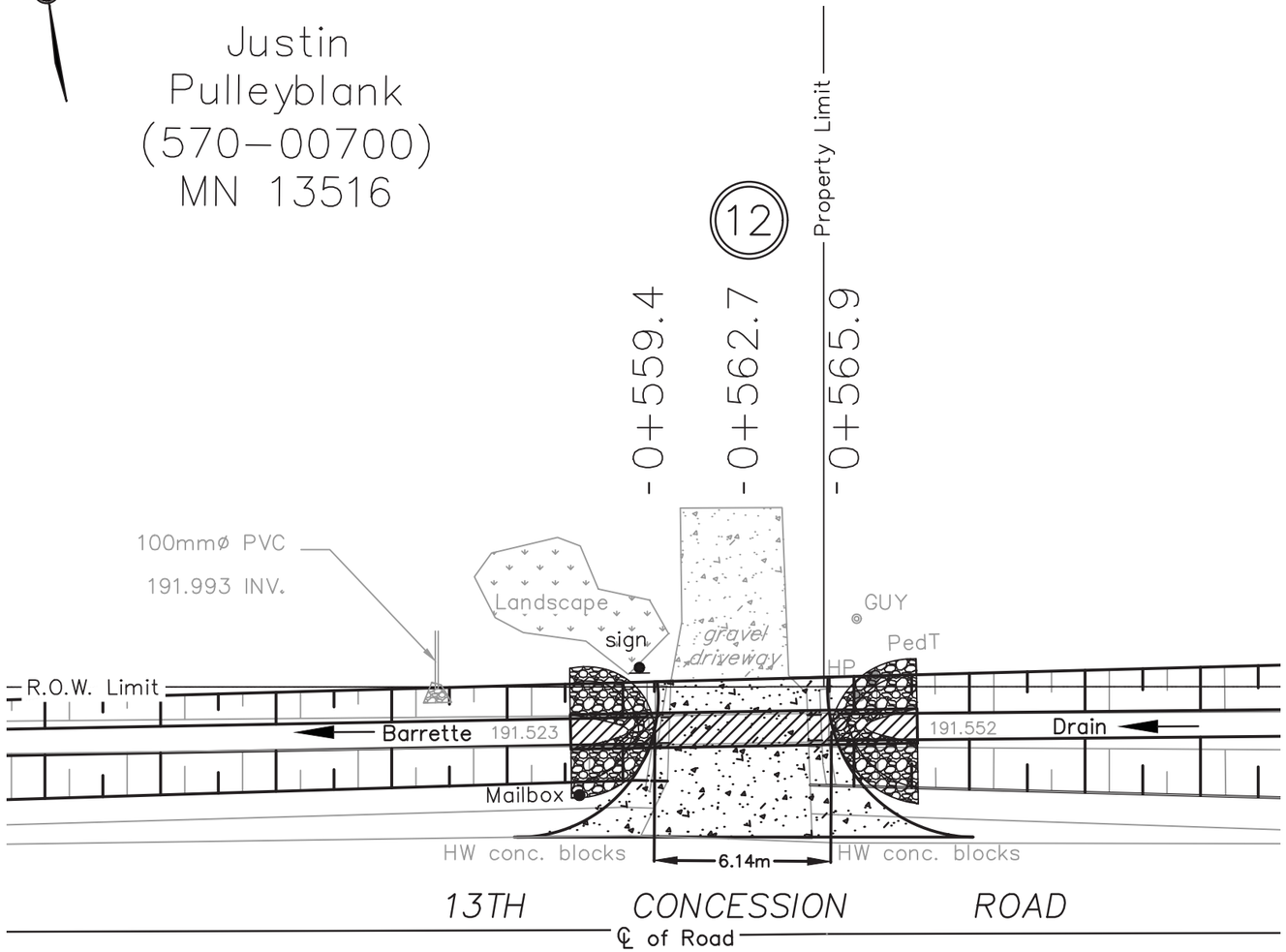
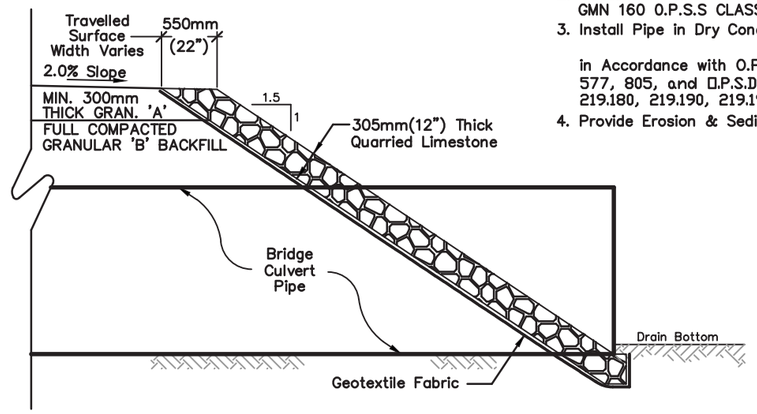
Justin
Pulleyblank
(570–00700)
MN 13516



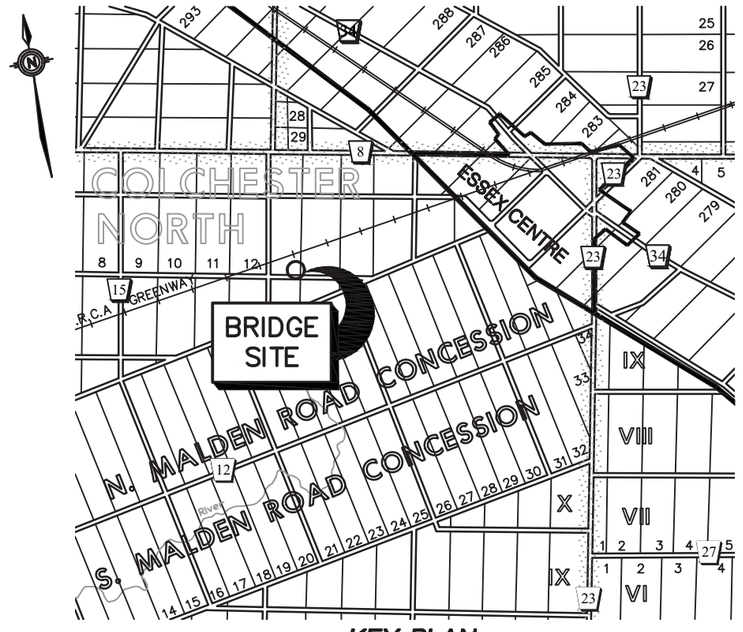
BRIDGE PLAN
SCALE = 1:200

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions
   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	13.0m (42.65 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 191.155m DOWNSTREAM INV. (W) = 191.143m ℄ TOP OF DRIVEWAY = 192.740m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR JUSTIN PULLEYBLANK (570–00700)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

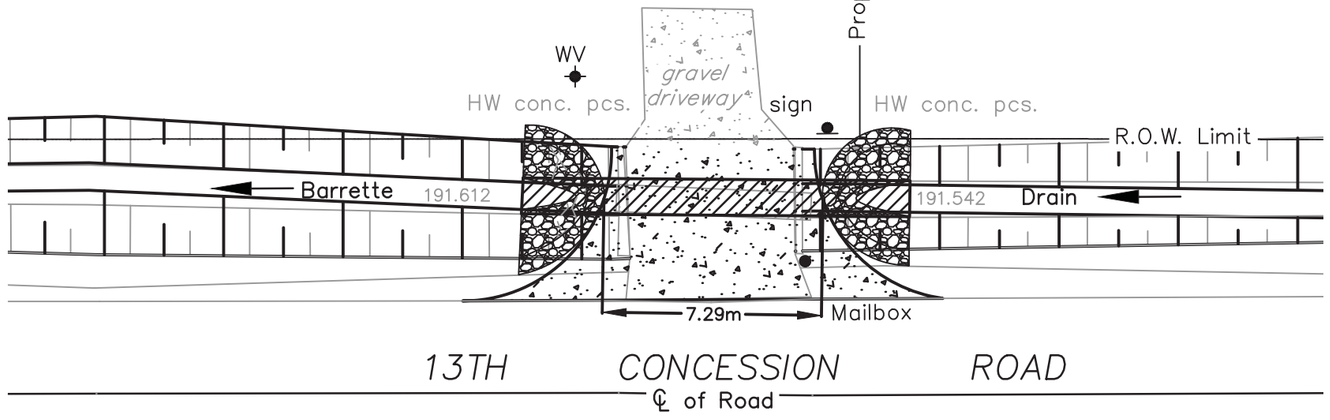
APPENDIX 'E'
12 OF 14

Donald
Brillinger
(570–00600)
MN 13520

13

- 0+582.0
- 0+599.7
- 0+602.8
- 0+606.2

Property Limit

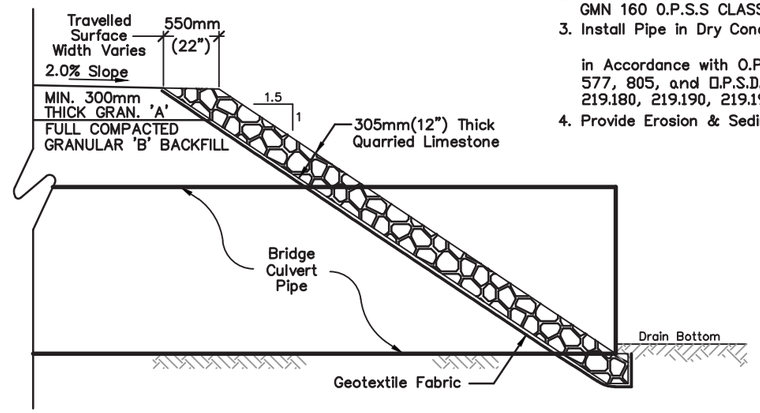


NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

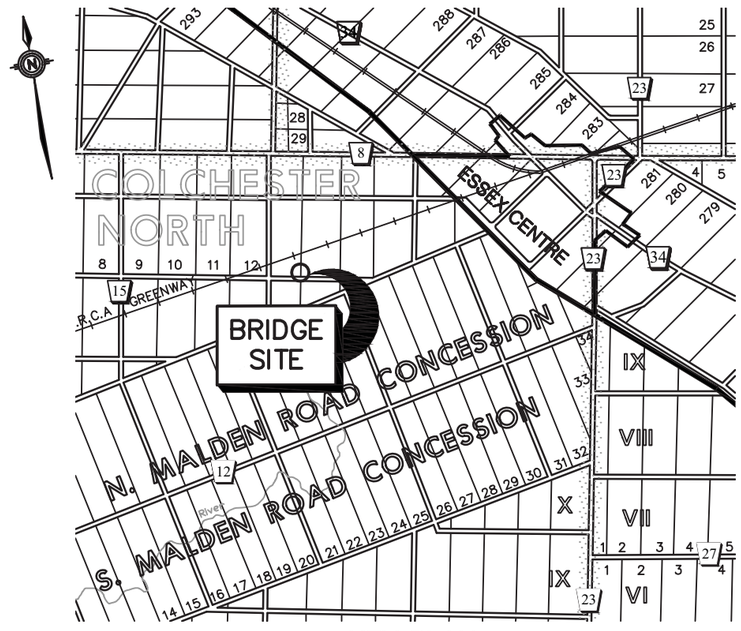
BRIDGE PLAN
SCALE = 1:200

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

FUTURE MAINTENANCE

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mmø	13.0m (42.65 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 191.194m DOWNSTREAM INV. (W) = 191.182m ℄ TOP OF DRIVEWAY = 192.800m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR DONALD BRILLINGER (570–0600)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

FILE No.: 2020D009
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2020D009.DWG

APPENDIX 'E'
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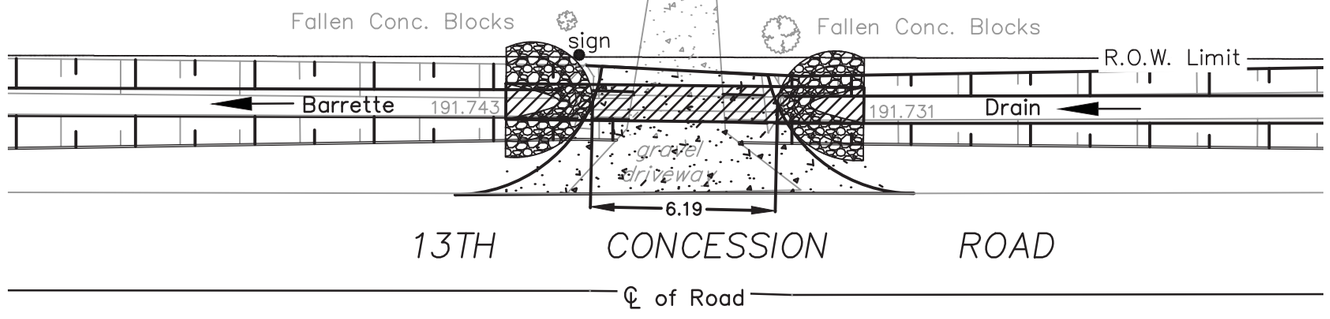
Brendan Byrne
(570–00500)
MN 13534

0+825.3
0+828.8
0+832.3

14

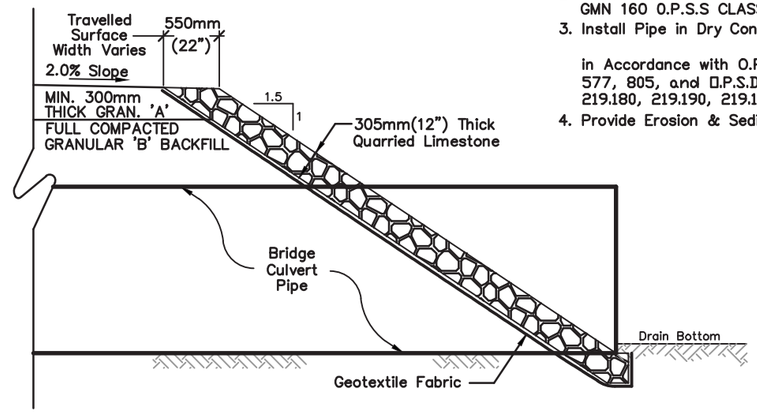


NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

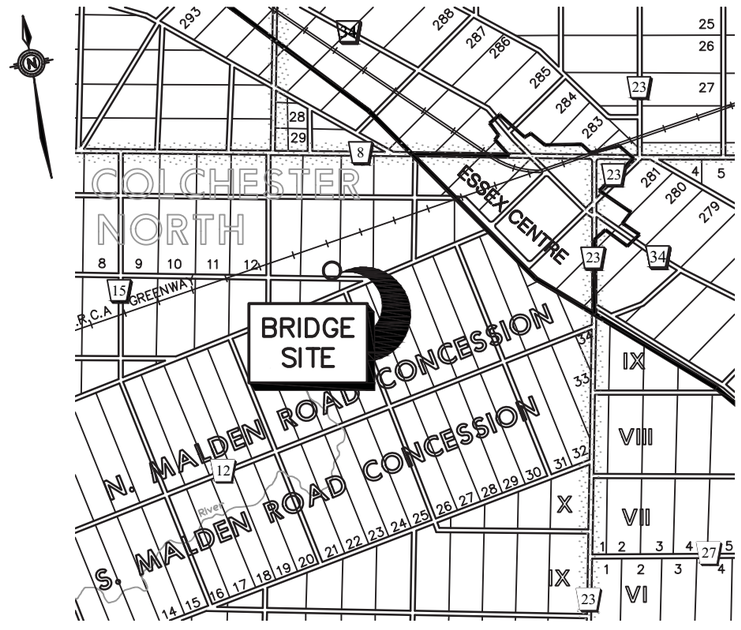
BRIDGE PLAN
SCALE = 1:200

NOTE:
1. Size of Quarried Limestone to be 100mm(4") – 250mm(10")
2. Geotextile Fabric to be GMN 160 O.P.S.S CLASS 1
3. Install Pipe in Dry Conditions

   in Accordance with O.P.S.S. 518, 577, 805, and O.P.S.D. 805, 219.180, 219.190, 219.191
4. Provide Erosion & Sediment Control



TYPICAL QUARRIED LIMESTONE END PROTECTION
Scale = N.T.S.



KEY PLAN
Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF WATER VALVE LOCATED APPROXIMATELY 12M WEST OF THE WEST HEADWALL OF MN 13490.

ELEV: 192.286m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
900mmø	12.0m (39.37 FT.)	2.0 mm	68 X 13	ALUMINIZED CORRUGATED HEL–COR C.S.P.	UPSTREAM INV. (E) = 191.446m DOWNSTREAM INV. (W) = 191.436m ℄ TOP OF DRIVEWAY = 192.759m DRAIN GRADE = 0.09%

BARRETTE DRAIN
BRIDGE FOR BRENDAN BYRNE (570–0500)
(GEOGRAPHIC TOWNSHIP OF COLCHESTER NORTH)
IN THE
TOWN OF ESSEX
IN THE
COUNTY OF ESSEX • ONTARIO

REGISTERED PROFESSIONAL ENGINEER
G.ROOD
2021-02-02
PROVINCE OF ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519–322–1621

DATE: 2021–01–25

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APPENDIX 'E'
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