COLCHESTER TOWNLINE DRAIN

E09CO(10)

Repairs and Improvements

Geographic Township of Sandwich South

TOWN OF TECUMSEH

Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario N8N 1W9
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Project REI2018D035
May 20th, 2022

May 20th, 2022

Mayor and Municipal Council
Corporation of the Town of Tecumseh
917 Lesperance Road
Tecumseh, Ontario
N8N 1W9

Mayor McNamara and Members of Council:

COLCHESTER TOWNLINE DRAIN
E09CO(10) - Geographic Twp. of Sandwich South
Project REI2018D035
Town of Tecumseh, County of Essex

I. INTRODUCTION

In accordance with the instructions provided at your September 10th, 2019 meeting and received from the Town by letter dated July 6th, 2021, from Laura Moy your Director Staff Services/Clerk, 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 Colchester Townline Drain comprises of an open drain generally located along the north side of County Road 8 extending from an outlet in the Merrick Creek upstream in an easterly direction to the westerly limit of the 12th Concession Road, in the geographic township of Sandwich South, Town of Tecumseh. A plan showing the Colchester Townline 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 Colchester Townline Drain, proposed under this report, is in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2021". 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 reports that we utilized as reference for carrying out this project:

1)	August 24th, 1963	Colchester Townline Drain	C.G.R. Armstrong, P.Eng.
2)	September 15th, 1978	Colchester Townline Drain	Maurice Armstrong, P.Eng.
3)	March 11th, 2014	Colchester Townline Drain – Report & Plan & Profile	Halliday Pearson, P.Eng.

4)	July 25th, 2019	Colchester Townline Drain – Section 65 Report	Gerard Rood, P.Eng.
5)	May 18th, 2022	South Talbot Road Drain East and 12th Line Drain	Josh Warner, P.Eng.

The 2014 report by Halliday Pearson, P.Eng. provided for general repairs and improvements to the upper length of the drain and has the latest profile for the grading of that drain portion. The 1978 report provides a profile for grading of the lower reach of the drain.

We arranged with the Towns 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 and Town staff to help in establishing the current watershed limit for the Colchester Townline Drain.

III. PRELIMINARY EXAMINATION AND ON-SITE MEETING

After reviewing all of the drainage information provided by the Town, we arranged with the former Town Drainage Superintendent Sam Paglia, P.Eng., to schedule a virtual on-site meeting for September 28th, 2021. The following people were in attendance at said virtual meeting: Maddalena Chiarappa (landowner), Kevin and Mary Parent (landowners), Mrs. White (landowner), Shane McVitty, (Amherstburg Drainage Superintendent), Lindsay Dean (Essex Drainage Superintendent), Mark Fishleigh (County), Sam Paglia (Town Drainage Superintendent), and Gerard Rood (Rood Engineering). Details of the drain were discussed, and the primary concern was some serious sediment accumulation in the drain with some bank erosion as well as a culvert failing at the Lafferty property. It was discussed that the other bridges along the drain would be inspected, and owners of the bridges would be contacted if there were concerns with any of the structures. Once the work scope is confirmed, a final report is then prepared and submitted to Council and goes through the Drainage Act process of a Consideration meeting and Court of Revision meeting.

Mr. Rood asked the Town and owners to provide information on any drainage changes that they might be aware of. 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.

Cost sharing of work to the bridges was discussed. The Town expects to hold a Public Information Centre meeting with the owners to review the Draft report and get their input and address their questions on the project. It was discussed that owners may debenture the cost of $5,000.00 or greater for the drainage work over a 5 year period to reduce the immediate cost burden of their assessment for the work. There were some general discussions about private ditches and options that are available to the owners. Ms. Chiarappa asked for clarifications on bills that are received. Mr. Paglia outlined the procedures for doing drainage works and billing costs to all affected owners. Mr. & Mrs. Parent wanted an explanation of what is being done. Mr. Paglia explained Section 78 of the Drainage Act, report preparation and the length of the drain. Mr. Parent asked

if we were expanding the drain or making changes to the drain and Mr. Paglia responded that the scope of work is not known. Mr. Rood explained the survey work and investigations that will be done. Mr. Paglia noted that the 1978 report is the latest one and culverts may or may not need work. Assessments were discussed outlining Benefit, Outlet Liability and Special Benefit. Standard bridges were described with typical endwalls being rock on filter cloth. If an owner desires special concrete headwalls it can cause a Special Benefit assessment for the increase in cost. Benefit basis was described with higher values to lands abutting the drain. Outlet Liability is based on volume of water flowing from the property and all owners are responsible to take their water to a sufficient outlet. There is no cost to a parcel if work is located upstream of the parcel. Agricultural lands designated as Farm Property Tax Class are expected to eligible for a 1/3 grant on their total assessment. The Town only bills out the net assessment to each parcel.

Mrs. White asked if a full clean out is planned and Mr. Paglia responded yes so that the grades and side slopes are restored to the 1978 design. She asked where the material will go, and Mr. Rood explained brushing and excavation procedures. Timelines for the project were discussed with field work schedule impacting the report preparation. Mr. Paglia expects that it will take 6-8 months to adopt the by-law. Bills are usually sent out the following year. There are many variables so the timeline can be longer. Mrs. White asked about debris on the field and does not expect to see brush or concrete. Mr. Paglia confirmed the works with material being spread out and no deleterious material allowed. There will be a final walk through, and debris is to be removed for final approval. Mrs. White has erosion of the farm side and has done some repairs and questioned if it will be replaced. Mr. Rood advised that they would evaluate the erosion and provide to repair all work as needed. She asked about crops and Mr. Rood confirmed that there will be allowance for damage to lands and crops, if any.

Ms. Dean asked about the extent of the report and why the work was not being done as maintenance. Mr. Paglia explained that the survey work will be focused mostly downstream of Walker Road and the final scope will be checked. The Town has some drainage changes, so they need assessment schedule adjustment along the entire length of the drain. She asked if there would be work upstream of Walker Road and Mr. Paglia responded that this segment of the drain has been good, and they can use the existing report if maintenance is required. They are doing some Section 65 reports and they need to make the schedule fair at this point for cost assessment. He went on to note that the work involves Tecumseh, Essex and a subsequent connection from Amherstburg that was completed a couple of years ago. The Drainage Act does not have boundaries and a project can include all affected lands in all municipalities. People were told that they can call in or make contact at any time.

IV. FIELD SURVEY AND INVESTIGATIONS

Subsequent to the on-site meeting we arranged for a topographic survey of the drain and bridges to be completed. We further arranged to get updated assessment roll information from the Towns and obtained information on the tax class of each of the properties affected by the Municipal Drain.

The Town made initial submissions to the Essex Region Conservation Authority (E.R.C.A.) regarding their requirements or any D.F.O. (Department of Fisheries and Oceans) requirements for work that would be proposed to be carried out on the Colchester Townline Drain. A response from the Conservation Authority was received by email on August 15th, 2019, and indicated that the Town must apply for a permit and follow standard mitigation requirements. We also

reviewed the Town maps for fish and mussel species at risk and find that there are no species indicated in the vicinity of this project. A copy of the concerns and requirements to satisfy E.R.C.A. and D.F.O. is included in **Appendix "REI-A"** of this report.

We also arranged to review the Ministry of Natural Resources & Forestry (M.N.R.F.) Species at Risk (S.A.R.) Mitigation Plan for Drainage Works (March 2018-17-4938) that the Town has prepared to address the Endangered Species Act, 2007 that is administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.). Section 6.0 of the Mitigation Plan indicates that snake species are a concern for this work area and although turtles are not indicated, they are mobile and could be encountered. The Mitigation Plan includes measures to be followed as outlined in "Section 7.0 Mitigation Measures" of the document and a copy of same as it relates to turtles and snakes is included 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 the works will not contravene 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 and the Mitigation Measures in their S.A.R. Mitigation Plan. 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.

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 400-00100 owned by Karen & Jerome Racicot. It was found to be in poor condition and will be replaced as discussed with the owner. The bridge is a farm access bridge.

2. This bridge serves parcel 400-00200 owned by John Lafferty. The bridge is in poor condition. In discussions with the owner, it was established that the failing bridge will need to be replaced.

3. This bridge serves parcel 400-00201 owned by Kevin & Mary Parent. The bridge is in poor condition with signs of wear and erosion on the jute bag headwalls and rusted at the spring line of the pipe. The bridge will need to be replaced.

4. This bridge serves parcel 400-00300 that is owned by Peter Friesen. The bridge is in poor condition with rusting occurring along the pipe and broken inverts at both the upstream and downstream. The jute bag headwalls show signs of wear and cracking with the top layer being displaced downstream of the structure. The bridge will need to be replaced.

5. This arch corrugated steel pipe conveys the drain flows under the 11th Concession Road. During inspection, the pipe was found to be rusting at the spring lines and the western jute bag headwall was found to be in poor condition and in need of replacement. The western headwall will be replaced with precast concrete block headwall and the eastern headwall will be left as is.

6. The arch corrugated steel pipe conveys the drain flows under Malden Road. The bridge structure is in good condition and does not require any work at this time. 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. The arch corrugated steel pipe conveys the drain flows under the 10th Concession Road. The bridge structure is in good condition and does not require any work at this time. 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 410-00200 owned by Eleanor Mergl. The bridge is in poor condition and requires replacement. The pipe is rusted above the spring line at both upstream and downstream ends of the bridge. The jute bag headwalls have fallen into the drain and need replacement with precast concrete block headwalls.

9. The arch corrugated steel pipe conveys the drain flows under the 9th Concession Road. The bridge structure is in good condition and does not require any work at this time. 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.

10. This bridge serves parcels 410-00106 and 420-00107 owned by Joan Pettypiece. The bridge is in good condition with minimal rust on the pipe spring line. 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. The arch corrugated steel pipe conveys the drain flows under the 8th Concession Road. The bridge structure is in good condition and does not require any work at this time. 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 steel beam clear span serves parcel 420-00200 and 420-00201 owned by Vincenzo & Kristen Chiarappa. The structure is supported by corrugated steel post columns. The structure is in poor condition with rusting occurring along the steel beams and support columns. The concrete driveway surface also has cracking along the upstream edge and the bridge will need to be replaced with the correct pipe size and set to the new proposed profile grade line of the drain.

13. The clear span wood deck with wood columns and wood and steel railings is owned by the Essex Region Conservation Authority and serves the Chrysler Greenway. No additional work is needed for the structure.

14. The concrete box culvert conveys flows beneath County Road 11 (Walker Road). The structure is in good condition and does not require any work at this time. Since the bridge is serving the road authority and therefore would not be needed if the road was taken out of service, we recommend that 98% of all future maintenance costs for works to the bridge be borne by the road authority pursuant to Section 26 of the Drainage Act. 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.

15. This bolted arch corrugated steel pipe serves parcel 440-00100 owned by Meredith and Gertrude White. The pipe is in fair condition with some rust at the spring line of the pipe and the bolts. The jute bag headwalls are falling into the drain with signs of erosion and failure. The structure will need to be replaced with the correct pipe size and set to the new proposed profile grade line of the drain.

16. This bolted arch corrugated steel pipe serves parcel 440-00150 owned by Edward White. The pipe is in fair condition with rusting at the spring line. The headwalls are also in fair condition and are made up of makeshift gabion baskets. The driveway is made up of broken asphalt pieces over top of an asphalt driveway. The current state of the structure could provide possible future issues and concerns. In coordination with the other replacement bridges along the drain, the existing bridge should be removed and replaced so that the new pipe is set to the new proposed profile grade line of the drain.

17. This bridge is composed of a steel beam clear span on concrete footing supports and it servers the parcel 440-00200 owned by the Islamic Cultural Association of Windsor. The bridge is in fair condition with some pieces from the concrete footing falling off. The headwalls are composed of metal beams and have rusting occurring along the joints. The structure's current state could cause possible future issues and concern and should be removed and replaced with a new pipe that is set to the new proposed profile grade line of the drain.

18. The concrete box culvert conveys flows beneath the Holden Road. The bridge looks newer than the other structures and no issues have been observed during the inspection of the bridge. 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.

19. This bolted arch corrugated steel pipe serves the parcel 450-00100 owned by Tommaso and Angela Rossi. The bridge is in fair condition with noticeable rust at the spring lines upstream and downstream of the pipe. The headwall is in fair condition with sign of wear and jute bags falling into the drain. The structure's current state could cause possible future issues and concern and should be removed and replaced with a new pipe that is set to the new proposed profile grade line of the drain.

20. This bolted arch corrugated steel pipe serves the parcels 450-00200 and 450-00201 owned by the Gordon and Linda Keirl. The bridge is in a poor condition with the pipe flaking at the downstream end and rust all along the spring line. The structure's current state could cause possible future issues and concern and should be removed and replaced with a new pipe that is set to the new proposed profile grade line of the drain.

VI. PUBLIC INFORMATION CENTRE AND THE DRAINAGE ACT

Arrangements will be made to meet with the Drainage Superintendent, Drainage Engineer and interested owners to discuss the Draft drainage report dated May 20th, 2022 for this project.

Benefit and Outlet liability assessments will be discussed as defined below. Establishment of pipe lengths is based on the minimum standard top width of 6.1m (20'), the depth of the drain and the type of end treatment provided. The cost of additional top width requested by an owner is fully borne by that owner. The owners are reminded that the drainage report provides estimates

of costs, and the owners will only pay the actual cost shared on the basis of the assessment schedule. Lands eligible for the farm property tax class will be eligible for a grant in the amount of 1/3 of their total cost assessment. If there is a request for a new access bridge, all of the cost for the new access bridge will be fully assessed to the lands served by the bridge. Following construction of the bridge, any future maintenance that is required will be shared by the parcel served by the bridge and upstream lands and roads as set out in the bridge cost sharing table of this drainage report.

The Town hopes to have the project approved by August. If the work is started before March 15th, it will likely be completed in the spring. If any delay occurs, the fish protection timing window from March 15 to June 30th will come into effect and the work will have to be done after June 30th. Bridge cost sharing will be reviewed with the owners.

It should be noted that the Public Information Centre (P.I.C.) is not a requirement under the Drainage Act but the Town holds these meetings to address questions and concerns and to solicit comments from the affected owners.

Owners are reminded that they have the opportunity to present their concerns to Council regarding the report details at the Consideration meeting and assessment questions at the Court of Revision meeting, along with appeal rights to the Ontario Ministry of Agriculture, Food and Rural Affairs (O.M.A.F.R.A.) Appeals Tribunal and to the Drainage Referee as provided for in the Drainage Act.

The Drainage Act definitions and applicable clarifications are as follows:

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

"Outlet liability" means the part of the cost of the construction, improvement or maintenance of a drainage works that is required to provide such outlet or improved outlet. Lands and roads that use a drainage works as an outlet, or for which, when the drainage works is constructed or improved, an improved outlet is provided either directly or indirectly through the medium of any other drainage works or of a swale, ravine, creek, or watercourse, may be assessed for outlet liability. The assessment for outlet liability shall be based upon the volume and rate of flow of the water artificially caused to flow upon the injured land or road or into the drainage works from the lands and roads liable for such assessments. Every drainage works constructed under this Act shall be continued to a sufficient outlet.

Owners are advised that they have a legal responsibility to convey their drainage to a sufficient outlet. For this reason, they have a share in the cost for upkeep of the drain downstream of their lands and this obligation is reflected in the assessment for Outlet Liability. Owners are reminded that the responsibility for carrying out maintenance on a Municipal drain rests with the Town as set out in the Drainage Act. Any owner can notify the Town that the drain requires maintenance, and the Town has to take action pursuant to the Act. This system is generally reactive and requires the property owners to raise their concerns and issues to the Town. Owners are reminded that keeping brush clear along their portion of the drain and having buffer strips provides them with a direct benefit of improved crop yield and preservation of topsoil on their

lands. Owners have an Outlet Liability for the downstream portion of the drain. The owners are reminded that Municipal drainage is a communal project and basically a user pay system. As an example, when work is carried out on a Drain downstream of the current Drain outlet, the owners in the current drain watershed that are outletting to the downstream Drain will be responsible for a portion of the cost, along with the other owners in the downstream Drain watershed upstream of the work that is conducted. Owners are advised of the 1/3 grant available to agricultural lands that qualify for the Farm Property Tax Class and should be aware that the Town administers the grant process and reflects any available grant on the final billing to each qualified owner.

Owners may appeal their assessment as set out in the drainage report. They are advised that they should submit their appeal to the Court of Revision 10 days before the scheduled date of the meeting; however, the Court of Revision can agree to hear appeals presented at the meeting. If owners are still dissatisfied with the report after that meeting, they may submit an appeal to the O.M.A.F.R.A. Appeals Tribunal through the Town Clerk within 21 days of the closing of the Court of Revision pursuant to Section 54 of the Drainage Act.

The cost sharing for bridges is based on the location of same along the overall length of the drainage system. Each owner has the right for one access across each Municipal drain. The owner generally pays 100% of the cost for the first bridge installation and it becomes part of the drain when included in an engineer's report and is then to be maintained by the drain with costs shared as set out in the drainage report.

Owners should be aware that existing grass buffers and accesses will be protected and maintained as set out in the report specifications. Allowances as set out in the report are to offset damages to lands from the construction work and excavated material disposal. Owners are advised that the Contractor is responsible to remove any sticks and rocks (cobbles) etcetera from the spread materials and the Contractor is responsible to guarantee the work performed on the drain with a maintenance period of one year from the date of substantial completion.

VII. FINDINGS AND RECOMMENDATIONS

We find that the profile included in the 1978 report plans by engineer Maurice Armstrong provides a good fit to the existing profile of the west portion of the drain. Said report provided for improvements to the open drain that still appear to suit the current conditions of the watershed. The easterly portion of the drain profile will be adjusted to accommodate tile and pipe outlets into the drain with a standard 300mm freeboard from the invert of the outlets to the drain bottom.

Based on our detailed survey, investigations, examinations, and discussions with the affected Owners and governing Authorities, we would recommend that drain improvement works be carried out as follows:

a) We recommend that all drain improvements, be carried out in accordance with the requirements established by E.R.C.A. and D.F.O. as set out in the documents within **Appendix "REI-A"** attached to this report.

b) As this is an existing Municipal drain, and conditions have not changed and there is no information to indicate any new species concerns, the repair and improvement can be

carried out based on the provisions included within the former Agreement that the Municipality had with M.N.R.F. and the mitigation measures included within same. A copy of said mitigation measures is included in **Appendix "REI-B"** within this report. We recommend that any work being completed shall be carried out in accordance with the **Schedule "C" Mitigation Plan** of the former agreement as included in **Appendix "REI-B"** for reference by the land owners, the Town of Tecumseh, and the Contractor who will be conducting the works.

c) We find that portions of the open drain have significant accumulation of silt and debris and we recommend that these be cleaned out as set out further in this report.

d) As provided for by Section 18 of the Drainage Act, we recommend that the bridges along the drain be repaired and improved as outlined further in this report including the specifications and the plans that form part of the report.

e) The existing drain has some buffer strips and grass areas along the Municipal drain that reduce the amount of erosion and the sediment entering the drain and enhance water quality. We recommend that the existing grass areas and buffer strips be protected as part of this project and suggest that new buffer strips be constructed by the owners in all areas where no current grass buffer exists, with the owners responsible to maintain the new buffers.

We recommend that the Colchester Townline 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 pursuant to Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17 as amended 2021".

VIII. ALLOWANCES

We have provided that all of the work 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 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 for brushing and cleaning work 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 owners 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)	Karen & Jerome Racicot, (400-00100),	Owners,	Part of Lot 1, Concession 11,	$	1,280.00
2)	John Lafferty, (400-00200),	Owner,	Part of Lot 1, Concession 11,	$	301.00

3)	Kevin & Mary Parent, (400-00201),	Owners,	Part of Lot 1, Concession 11,	$	lawn
4)	Gurvinder & Mandeep Virk, Peter Friesen & Jeff Siefker Farms Ltd. (400-00300),	Owners,	Part of Lot 1, Concession 11,	$	1,009.00
5)	Gerald Santo, (410-05500),	Owner,	Part of Lot 1, Concession 10,	$	1,290.00
6)	Gerald & Michelle Santo, (410-05595),	Owners,	Part of Lot 1, Concession 10,	$	lawn
7)	Chad & Maegan Santo, (410-00100),	Owners,	Part of Lot 1, Concession 10,	$	lawn
8)	Charles Farrough, (410-04100),	Owner,	Part of Lot 1, Concession 10,	$	1,256.00
9)	Zachary Pan & Xiaotong Tang, (410-04000),	Owners,	Part of Lot 1, Concession 10,	$	204.00
10)	Mergl Seeds Ltd., (410-02540),	Owner,	Part of Lot 1, Concession 9,	$	810.00
11)	Eleanor Mergl, (410-00200),	Owner,	Part of Lot 1, Concession 9,	$	112.00
12)	Royal Estate Golf Club Ltd. (410-00600),	Owner,	Part of Lot 1, Concession 9,	$	483.00
13)	Mike Balipap Jr., (410-00300),	Owner,	Part of Lot 1, Concession 9,	$	1,630.00
14)	Dennis & Marilyn O'Neil, (420-06800),	Owners,	Part of Lot 1, Concession 8,	$	lawn
15)	Augustinus & Gaynia Revenberg, (420-06600),	Owners,	Part of Lot 1, Concession 8,	$	1,448.00
16)	Augustine Revenberg, (420-00100),	Owner,	Part of Lot 1, Concession 8,	$	492.00
17)	Joan Pettypiece, (420-00106),	Owner,	Part of Lot 1, Concession 8,	$	lawn
18)	Karen Harrison, (420-00107),	Owner,	Part of Lot 1, Concession 8,	$	lawn

19)	Augustine & Gaynia Revenberg, (420-00150),	Owners,	Part of Lot 1, Concession 8,	$	813.00
20)	Gaynia Revenberg, (420-03100),	Owner,	Part of Lot 1, Concession 7,	$	1,649.00
21)	Vincenzo Chiarappa, (420-00201),	Owner,	Part of Lot 1, Concession 7,	$	lawn
22)	Vincenzo & Kristen Chiarappa, (420-00200),	Owners,	Part of Lot 1, Concession 7,	$	112.00
23)	Manjinderjit Singh & Surjit Toor, (420-00400),	Owners,	Part of Lot 1, Concession 7,	$	1,407.00
24)	Asim Ala, (420-00300),	Owner,	Part of Lot 1, Concession 6,	$	lawn
25)	Edward White, (440-00150),	Owner,	Part of Lot 1, Concession 6,	$	1,133.00
26)	Meredith & Gertrude White, (440-00100),	Owners,	Part of Lot 1, Concession 6,	$	lawn
27)	Alawi Islamic Cultural Association of Windsor, (440-00200),	Owner,	Part of Lot 1, Concession 6,	$	lawn
28)	George Agocs & Robert Wickett, (440-00300),	Owners,	Part of Lot 1, Concession 6,	$	1,436.00
29)	George Agocs, (450-04400),	Owner,	Part of Lot 1, Concession 5,	$	1,516.00
30)	Tommaso & Angela Rossi, (450-00100),	Owners,	Part of Lot 1, Concession 5,	$	lawn
31)	Gordon & Linda Keirl, (450-00200),	Owners,	Part of Lot 1, Concession 5,	$	155.00
32)	Gordon & Linda Keirl, (450-00201),	Owners,	Part of Lot 1, Concession 5,	$	lawn
33)	John & Shelagh McKinley, (450-00300),	Owners,	Part of Lot 1, Concession 5,	$	830.00
TOTAL FOR ALLOWANCES AND DAMAGES				**$**	**19,366.00**

These values for allowances and damages are based on a strip of land minimum 8 metres wide parallel to and immediately adjacent to the drain or grassed buffer and driveway, for the parcels abutting the north side of the Municipal drain and are based on a value of $1,227.00 per acre ($3,032.00 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 $177.00 for the third year. The impact after 3 years is considered negligible. Parcels that are used for residential are designated as "lawn" and no compensation is required since work will be completed from the roadside and the material trucked away and disposed of without impacting the lawn areas.

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".

IX. ESTIMATE OF COST

Our estimate of the Total Cost of this work, including all incidental expenses, is the sum of **EIGHT HUNDRED FIFTY THOUSAND SEVEN HUNDRED FIFTY DOLLARS ($850,750.00)**, made up as follows:

CONSTRUCTION

Item 1)	**Station 0+000 to Station 4+200**; Carry out excavation of the drain to remove accumulated sediment and restore the drain to the profile grade shown on the plans, including all disposal, hauling and leveling of material, approximately 1127 metres (approximately 133.3 cubic metres). Lump Sum	$	4,920.00
Item 2)	**Signs and traffic control;** Provide all signs and labour to protect the public. Lump Sum	$	1,200.00
Item 3)	**Station 0+000 to Station 9+480;** Supply and install 300mm thick quarried limestone on non woven filter cloth for drain bank stabilization and erosion protection including all excavation, disposal, placement and restoration, complete:		
	a) Approximately 120 tonnes of rip rap at $75.00 per tonne	$	9,000.00
	b) Approximately 240 sq.m. of filter cloth at $7.00 per sq. m.	$	1,680.00
Item 4)	**Bridge No. 1**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; supply and install 14 metres of 750mm diameter, aluminized C.S.P. 2.0mm gauge 68 x 13 corrugations, 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. (Karen & Jerome Racicot)	Lump Sum	$	23,000.00
Item 5)	**Bridge No. 2**; 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 900mm diameter, C.S.P. 2.0mm gauge 68 x 13, 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. Extend 100mm Big "O" through the quarried limestone. (John Lafferty)	Lump Sum	$	25,300.00
Item 6)	**Bridge No. 3**; 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 900mm diameter, C.S.P. 2.0mm gauge 68 x 13, 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. (Kevin & Mary Parent)	Lump Sum	$	27,400.00
Item 7)	**Bridge No. 4**; 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, C.S.P. 2.0mm gauge 125 x 25, 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 (Peter Friesen)	Lump Sum	$	23,300.00
Item 8)	**Bridge No. 5**; Excavate drain, remove and dispose of the western headwall and sediment, including any other deleterious material encountered, supply and install precast concrete block end wall, 1.0 metre wide rock on filter cloth protection along the endwall, excavation, compaction hauling, restoration and clean up, complete. (11th Concession Road)	Lump Sum	$	8,400.00

Item 9)	**Bridge No. 6**; Provide all labour, equipment and material to flush and clean pipe, including restoration and clean up, complete. (Malden Road)	Lump Sum	$	550.00
Item 10)	**Bridge No. 7**; Provide all labour, equipment and material to flush and clean pipe, including restoration and clean up, complete. (10th Concession Road)	Lump Sum	$	550.00
Item 11)	**Bridge No. 8**; Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 10 metres of 2400mm diameter C.S.P. 2.0mm gauge 125 x 25, including Granular 'B' backfill, Granular 'A' travel surface; providing precast concrete block end walls, granular bedding and backfill, granular approaches, excavation, compaction, 1.0 metre wide rock on filter cloth protection along the endwalls, hauling, cleanup and restoration, complete. (Eleanor Mergl)	Lump Sum	$	64,800.00
Item 12)	**Bridge No. 9**; Provide all labour, equipment and material to flush and clean pipe, including restoration and clean up, complete. (9th Concession Road)	Lump Sum	$	550.00
Item 13)	**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 19.0 metres of 2400mm diameter, C.S.P. 2.0mm gauge 125 x 25, 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. (Joan Pettypiece)	Lump Sum	$	78,800.00
Item 14)	**Bridge No. 11;** Provide all labour, equipment and material to flush and clean the concrete box culvert, including restoration and clean up, complete. (8th Concession Road)	Lump Sum	$	550.00
Item 15)	**Bridge No. 12;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 10 metres of 3000mm x 2000mm			

	Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Vincenzo & Kristen Chiarappa)	Lump Sum	$	60,200.00
Item 16)	**Bridge No. 14;** Provide all labour, equipment and material to flush and clean the concrete box culvert, including restoration and clean up, complete. (County Road 11)	Lump Sum	$	550.00
Item 17)	**Bridge No. 15;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 18 metres of 3000mm x 2000mm Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Meredith & Gertrude White)	Lump Sum	$	86,300.00
Item 18)	**Bridge No. 16;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 16 metres of 3000mm x 2000mm Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Edward White)	Lump Sum	$	75,900.00
Item 19)	**Bridge No. 17;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 16 metres of 3000mm x 2000mm Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Alawi Islamic Cultural Assoc. of Windsor)	Lump sum	$	77,500.00

Item 20)	**Bridge No. 18;** Provide all labour, equipment and material to flush and clean the concrete box culvert, including restoration and clean up, complete. (Holden Road)	Lump Sum	$	550.00
Item 21)	**Bridge No. 19;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 16 metres of 3000mm x 2000mm Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Tommaso & Angela Rossi)	Lump sum	$	76,900.00
Item 22)	**Bridge No. 20;** Excavate drain, completely remove and dispose of the existing pipe, sediment and all endwall materials, including any other deleterious material encountered; install 18 metres of 3000mm x 2000mm Arch C.S.P. 2.0mm gauge 125 x 25, 9 corrugation wide aluminized bolted coupler, 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. (Gordon & Linda Keirl)	Lump Sum	$	84,800.00
	Estimated Net Harmonized Sales Tax (1.76% H.S.T.)		$	12,896.00
	TOTAL FOR CONSTRUCTION		**$**	**745,596.00**

INCIDENTALS

1)	Report, Estimate, & Specifications	$	20,000.00
2)	Survey, Assistants, Expenses, and Drawings	$	40,000.00
3)	Estimated cost of preparing tender documents	$	1,000.00
4)	Estimated Cost of Construction Supervision and Inspection (based on 25 days)	$	20,000.00
5)	Estimated Net H.S.T. on Incidental Items Above (1.76%)	$	1,425.00
6)	Estimated Cost of Interim Financing	$	800.00

7)	E.R.C.A. Permit	$	800.00
7)	Contingency Allowance	$	1,763.00
	TOTAL FOR INCIDENTALS	**$**	**85,788.00**
	TOTAL FOR ALLOWANCES (brought forward)	**$**	**19,366.00**
	TOTAL FOR CONSTRUCTION (brought forward)	**$**	**745,596.00**
	TOTAL ESTIMATE	**$**	**850,750.00**

X. 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 and bridge repairs and improvements, which also include Standard Specifications labelled therein as **Appendix "REI-C".**

XI. 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.

XII. 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, the assessment to the affected Owners shall be based on the actual future maintenance cost shared on a pro-rata basis with the 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 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.

BRIDGE COST SHARING

Bridge	Owners	Benefit to Owner	Outlet Upstream
1	Karen & Jerome Racicot, (400-00100),	83.6%	16.4%
2	John Lafferty, (400-00200),	80.5%	19.5%
3	Kevin & Mary Parent, (400-00201),	80.7%	19.3%
4	Peter Friesen, (400-00300),	79.0%	21.0%
5	Concession Road 11, Tecumseh	98.0%	2.0%
6	Malden Road,	98.0%	2.0%
7	Concession Road 10, Tecumseh	98.0%	2.0%
8	Eleanor Mergl, (410-00200),	64.4%	35.6%
9	Concession Road 9, Tecumseh	98.0%	2.0%
10	Joan Pettypiece, (420-00107) & (420-00106),	30.2% 30.2%	39.6%

11	Concession Road 8, Tecumseh	98.0%	2.0%
12	Vincenzo & Kristen Chiarappa, (420-00200) & (420-00201),	 23.1% 23.1%	 53.8%
13	Essex Region Conservation Authority Greenway, (420-00010),	98.0%	2.0%
14	County Road 11 (Walker Road), County of Essex	98.0%	2.0%
15	Meredith & Gertrude White, (440-00100),	48.3%	51.7%
16	Edward White, (440-00150),	45.8%	54.2%
17	Alawi Islamic Cultural Association of Windsor, (440-00200),	41.8%	58.2%
18	Holden Road, Tecumseh	98.0%	2.0%
19	Tommaso & Angela Rossi, (450-00100),	40.6%	59.4%
20	Gordon & Linda Keirl, (450-00200) & (450-00201),	 22.8% 22.8%	 54.4%

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.

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, P.Eng.

tm

att.

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

SCHEDULE OF ASSESSMENT
COLCHESTER TOWNLINE DRAIN
Town of Amherstburg

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
470-02402	7	14	7.09	7.09	2.868	Joel & Tara Bezaire	$ 232.00	$ 412.00	$ 479.00	$ 1,123.00
		Total on Privately Owned - Non-Agricultural Lands					**$ 232.00**	**$ 412.00**	**$ 479.00**	**$ 1,123.00**
AMHERSTBURG TOTAL ASSESSMENT				7.09	2.87		**$ 232.00**	**$ 412.00**	**$ 479.00**	**$ 1,123.00**

1 Hectare = 2.471 Acres
Project No.REI2018D035
May 20th, 2022

SCHEDULE OF ASSESSMENT
COLCHESTER TOWNLINE DRAIN
Town of Essex

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
580-01290	14	11	1.01	1.01	0.409	Eleanor Mergl	$ 83.00	$ 142.00	$ 716.00	$ 941.00
580-01505	14	12	0.57	0.57	0.231	Douglas & Theresa Lypps	$ 47.00	$ 94.00	$ 838.00	$ 979.00
580-01575	14	12	0.95	0.95	0.384	Brandon Antonucci	$ 78.00	$ 138.00	$ 1,230.00	$ 1,446.00
580-01700	14	12	0.94	0.94	0.380	Rakesh Kumar	$ 77.00	$ 136.00	$ 1,563.00	$ 1,776.00
580-01800	14	12	0.98	0.98	0.397	Jacqueline Flood	$ 80.00	$ 142.00	$ 1,630.00	$ 1,852.00
590-01300	14	9	0.43	0.43	0.174	Kathleen Lepain	$ 35.00	$ 77.00	$ 320.00	$ 432.00
590-01400	14	9	0.43	0.43	0.174	Leonard O'Neil	$ 35.00	$ 77.00	$ 320.00	$ 432.00
590-01500	14	9	0.93	0.93	0.376	Margaret Liedtke	$ 76.00	$ 135.00	$ 563.00	$ 774.00
590-01700	14	9	1.73	1.73	0.700	Kristan Bondy & Minnis Joseph	$ 142.00	$ 209.00	$ 870.00	$ 1,221.00
590-01800	14	9	0.47	0.47	0.190	Virginia Oriet	$ 38.00	$ 82.00	$ 341.00	$ 461.00
590-01801	14	9	0.51	0.51	0.206	Mark & Deborah Marshall	$ 42.00	$ 84.00	$ 348.00	$ 474.00
590-01900	14	9 - 10	1.69	0.49	0.198	Anglican Synod of Huron	$ 40.00	$ 59.00	$ 245.00	$ 344.00
590-02000	14	10	0.44	0.44	0.178	Steven & Jennifer St. Louis	$ 36.00	$ 79.00	$ 328.00	$ 443.00
590-02100	14	10	0.31	0.31	0.125	William & April Brazeau	$ 25.00	$ 60.00	$ 249.00	$ 334.00
590-02290	14	10	1.28	1.28	0.518	Ryan & Barbara O'Neil	$ 105.00	$ 167.00	$ 694.00	$ 966.00
600-00010	14	8	0.64	0.64	0.259	E.R.C.A.	$ 52.00	$ 102.00	$ 308.00	$ 462.00
600-04200	14	8	71.52	10.13	4.100	Frank Lafferty (Trust) & Paul, Philip & Rose Jobin	$ 332.00	$ 490.00	$ 1,479.00	$ 2,301.00
600-04250	14	8	1.65	0.44	0.178	James & Pauline Paquette	$ 36.00	$ 53.00	$ 161.00	$ 250.00
600-04300	14	8	0.53	0.53	0.214	Michael & Shawn King	$ 43.00	$ 87.00	$ 263.00	$ 393.00
600-04310	14	8	0.53	0.53	0.214	James Paquette & Stacey Cowper	$ 43.00	$ 87.00	$ 263.00	$ 393.00
600-04320	14	8	0.51	0.51	0.206	David Massarella & Acacia Ouellette	$ 42.00	$ 84.00	$ 253.00	$ 379.00
600-04400	14	8	0.67	0.67	0.271	Richard & Judy Gagnon	$ 55.00	$ 107.00	$ 323.00	$ 485.00
600-04410	14	8	0.49	0.49	0.198	Alina Persyn & Scott Staszuk	$ 40.00	$ 83.00	$ 250.00	$ 373.00
600-04420	14	8	0.49	0.49	0.198	Harvey & Catherine Martel	$ 40.00	$ 83.00	$ 250.00	$ 373.00
600-04490	14	8	0.59	0.59	0.239	Derrin Wall	$ 48.00	$ 97.00	$ 293.00	$ 438.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
600-04500	14	8	0.35	0.35	0.142	David St. Louis & Dawn Reaume	$ 29.00	$ 66.00	$ 199.00	$ 294.00
600-04600	14	8	2.00	0.61	0.247	Jason & Heather Toth	$ 50.00	$ 68.00	$ 205.00	$ 323.00
600-04700	14	8	13.62	0.37	0.150	Clayton & Kelly Kelly	$ 30.00	$ 18.00	$ 53.00	$ 101.00
600-04750	14	8	0.66	0.66	0.267	Cheuk-Ki Wu	$ 54.00	$ 105.00	$ 318.00	$ 477.00
600-04790	14	8	0.48	0.48	0.194	David & Sandra Driscoll	$ 39.00	$ 84.00	$ 253.00	$ 376.00
600-04800	14	8	0.56	0.56	0.227	Jeffery Windover & Alicia Handsor	$ 46.00	$ 92.00	$ 279.00	$ 417.00
600-04850	14	8	0.85	0.85	0.344	William & Marjory Robertson	$ 70.00	$ 128.00	$ 384.00	$ 582.00
600-05100	14	8	0.85	0.85	0.344	Justine Meloche	$ 70.00	$ 128.00	$ 442.00	$ 640.00
600-05300	14	9	0.64	0.64	0.259	Joseph & Diane Meloche	$ 52.00	$ 102.00	$ 355.00	$ 509.00
600-05400	14	9	0.32	0.32	0.130	Michael Reaume	$ 26.00	$ 62.00	$ 215.00	$ 303.00
Total on Privately Owned - Non-Agricultural Lands							**$ 2,136.00**	**$ 3,807.00**	**$ 16,801.00**	**$ 22,744.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
580-01400	14	12	51.08	0.64	0.259	Harvey & Kathleen Lafferty	$ 21.00	$ 31.00	$ 158.00	$ 210.00
580-01500	14	12	51.08	1.46	0.591	Harvey & Kathleen Lafferty	$ 48.00	$ 71.00	$ 357.00	$ 476.00
590-02250	14	10	46.50	2.26	0.915	Parrline Supply Limited	$ 74.00	$ 109.00	$ 455.00	$ 638.00
590-02305	14	10-11	51.05	0.64	0.259	David Fantinato	$ 21.00	$ 31.00	$ 157.00	$ 209.00
600-05000	14	8	49.32	0.92	0.372	Rosemary Meloche	$ 30.00	$ 45.00	$ 150.00	$ 225.00
600-05600	14	9	50.92	2.67	1.081	Louis & Dobrilla Stankovich	$ 87.00	$ 129.00	$ 448.00	$ 664.00
Total on Privately Owned - Agricultural Lands (grantable)							**$ 281.00**	**$ 416.00**	**$ 1,725.00**	**$ 2,422.00**
ESSEX TOTAL ASSESSMENT				40.77	16.50		**$ 2,417.00**	**$ 4,223.00**	**$ 18,526.00**	**$ 25,166.00**

1 Hectare = 2.471 Acres
Project No.REI2018D035
May 20th, 2022

SCHEDULE OF ASSESSMENT
COLCHESTER TOWNLINE DRAIN
Town of Tecumseh

3. MUNICIPAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
		County Road 8		46.78	18.932	County of Essex	$ 7,659.00	$ 12,448.00	$ 46,352.00	$ 66,459.00
		County Road 9 (Howard avenue)		0.35	0.142	County of Essex	$ 57.00	$ 93.00	$ -	$ 150.00
		County Road 11 (Walker Road)		0.35	0.142	County of Essex	$ 57.00	$ 93.00	$ 820.00	$ 970.00
		Holden Road		0.97	0.393	Town of Tecumseh	$ 159.00	$ 258.00	$ 998.00	$ 1,415.00
		Malden Road		2.48	1.004	Town of Tecumseh	$ 406.00	$ 660.00	$ 3,878.00	$ 4,944.00
		8th Concession Road		4.19	1.696	Town of Tecumseh	$ 686.00	$ 1,115.00	$ 4,412.00	$ 6,213.00
		9th Concession Road		3.75	1.518	Town of Tecumseh	$ 614.00	$ 998.00	$ 4,688.00	$ 6,300.00
		10th Concession Road		1.97	0.797	Town of Tecumseh	$ 323.00	$ 524.00	$ 3,190.00	$ 4,037.00
		11th Concession Road		4.45	1.801	Town of Tecumseh	$ 729.00	$ 1,184.00	$ 14,243.00	$ 16,156.00
		12th Concession Road		1.43	0.579	Town of Tecumseh	$ 234.00	$ 381.00	$ 4,360.00	$ 4,975.00
		Total on Municipal Lands					**$ 10,924.00**	**$ 17,754.00**	**$ 82,941.00**	**$ 111,619.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
400-00201	12	1	2.10	2.10	0.850	Kevin & Mary Parent	$ 172.00	$ 224.00	$ 23,774.00	$ 24,170.00
400-00390	12	1	1.70	1.70	0.688	Jeffery Gerard & Natalina Vesco	$ 139.00	$ 206.00	$ 1,043.00	$ 1,388.00
400-00600	12	1	0.95	0.95	0.384	Kurt & Barbara Farough	$ 78.00	$ 138.00	$ 700.00	$ 916.00
410-00100	11	1	0.99	0.99	0.401	Chad & Maegan Santo	$ 81.00	$ 144.00	$ 727.00	$ 952.00
410-00200	10	1	5.68	5.68	2.299	Eleanor Mergl	$ 465.00	$ 412.00	$ 43,704.00	$ 44,581.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
410-00400	10	1	10.01	10.01	4.051	George Dobrich Jr.	$ 819.00	$ 484.00	$ 2,013.00	$ 3,316.00
410-00600	10	1	90.77	47.77	19.332	Royal Estate Golf Club Ltd.	$ 1,564.00	$ 2,312.00	$ 9,605.00	$ 13,481.00
410-03810	11	1	0.72	0.72	0.291	Beverly Kaufmann	$ 59.00	$ 111.00	$ 564.00	$ 734.00
410-03901	11	1	1.21	1.21	0.490	William Burrows	$ 99.00	$ 158.00	$ 799.00	$ 1,056.00
410-03910	11	1	0.75	0.75	0.304	Kurt & Beverly Kaufmann	$ 61.00	$ 116.00	$ 587.00	$ 764.00
410-04150	11	1	1.24	1.24	0.502	Donald & Amy Deehan	$ 102.00	$ 162.00	$ 817.00	$ 1,081.00
410-04200	11	1	1.55	1.55	0.627	Raymond Long	$ 127.00	$ 195.00	$ 985.00	$ 1,307.00
410-04300	11	1	1.00	1.00	0.405	Matthew Jessop	$ 82.00	$ 145.00	$ 732.00	$ 959.00
410-04401	11	1	1.00	0.22	0.089	Jeremy Beaulieu & Tina Mayer	$ 18.00	$ 32.00	$ 163.00	$ 213.00
410-05400	11	1	0.99	0.99	0.401	Richard & Sue Homenuik	$ 81.00	$ 144.00	$ 727.00	$ 952.00
410-05595	11	1	0.93	0.93	0.376	Gerald & Michelle Santo	$ 76.00	$ 135.00	$ 684.00	$ 895.00
420-00010	8	1	18.05	2.96	1.198	E.R.C.A.	$ 242.00	$ 143.00	$ 530.00	$ 915.00
420-00106	9	1	1.24	1.24	0.502	Joan Pettypiece	$ 102.00	$ 162.00	$ 24,396.00	$ 24,660.00
420-00107	9	1	1.24	1.24	0.502	Karen Harrison	$ 102.00	$ 162.00	$ 24,396.00	$ 24,660.00
420-00200	8	1	5.64	5.64	2.282	Vincenzo & Kristen Chiarappa	$ 369.00	$ 409.00	$ 15,160.00	$ 15,938.00
420-00201	8	1	0.49	0.49	0.198	Vincenzo Chiarappa	$ 40.00	$ 83.00	$ 14,160.00	$ 14,283.00
420-00300	9	1	0.42	0.42	0.170	Asim Ala	$ 34.00	$ 77.00	$ 233.00	$ 344.00
420-00410	9	1	1.00	1.00	0.405	Stephen & Nancy Brown	$ 82.00	$ 145.00	$ 437.00	$ 664.00
420-00600	9	1	0.48	0.48	0.194	William Dennison	$ 39.00	$ 84.00	$ 253.00	$ 376.00
420-03101	8	1	2.17	2.17	0.878	Augustine & Gaynia Revenberg	$ 178.00	$ 231.00	$ 802.00	$ 1,211.00
420-03400	8	1	0.56	0.56	0.227	Augustine Revenberg	$ 46.00	$ 92.00	$ 321.00	$ 459.00
420-06640	9	1	1.45	1.45	0.587	Ethel & Elmer Grove	$ 119.00	$ 182.00	$ 758.00	$ 1,059.00
420-06700	9	1	1.33	1.33	0.538	Kenneth & Michelle Roberts	$ 109.00	$ 174.00	$ 721.00	$ 1,004.00
420-06800	9	1	1.01	1.01	0.409	Dennis & Marilyn O'Neil	$ 83.00	$ 142.00	$ 589.00	$ 814.00
440-00100	7	1	1.86	1.86	0.753	Meredith & Gertrude White	$ 152.00	$ 207.00	$ 42,241.00	$ 42,600.00
440-00200	7	1	2.55	2.55	1.032	Alawi Islamic Cultural Association of Windsor Inc.	$ 209.00	$ 259.00	$ 32,856.00	$ 33,324.00
440-03900	7	1	0.50	0.50	0.202	Christine Arthurton	$ 41.00	$ 85.00	$ 255.00	$ 381.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
440-04000	7	1	0.53	0.53	0.214	Leonard & Helen Meloche	$ 43.00	$ 87.00	$ 263.00	$ 393.00
450-00100	6	1	5.00	5.00	2.023	Tommaso & Angela Rossi	$ 409.00	$ 387.00	$ 31,671.00	$ 32,467.00
450-00201	6	1	1.00	1.00	0.405	Gordon & Linda Keirl	$ 82.00	$ 145.00	$ 19,418.00	$ 19,645.00
450-04410	6	1	1.25	1.25	0.506	Heather & Scott White	$ 41.00	$ 163.00	$ 190.00	$ 394.00
						Total on Privately Owned - Non-Agricultural Lands.....	**$ 6,545.00**	**$ 8,537.00**	**$ 297,274.00**	**$ 312,356.00**

5. PRIVATELY OWNED - AGRICULTURAL LANDS (grantable):

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
400-00100	12	1	75.00	20.00	8.094	Karen & Jerome Racicot	$ 655.00	$ 968.00	$ 29,084.00	$ 30,707.00
400-00200	12	1	22.89	22.89	9.263	John Lafferty	$ 750.00	$ 1,108.00	$ 29,587.00	$ 31,445.00
400-00300	12	1	20.01	20.01	8.098	Gurvinder & Mandeep Virk, Peter Friesen & Jeff Siefker Farms Ltd.	$ 655.00	$ 968.00	$ 23,631.00	$ 25,254.00
400-00400	12	1	18.30	18.30	7.406	James & Carolyn Gerard	$ 599.00	$ 886.00	$ 4,490.00	$ 5,975.00
400-00500	12	1	20.41	2.03	0.822	Carmen & Roy Tayfel	$ 67.00	$ 98.00	$ 498.00	$ 663.00
400-00700	12	1	17.75	17.75	7.183	Ronald Lafferty	$ 581.00	$ 859.00	$ 4,355.00	$ 5,795.00
410-00300	10	1	81.86	81.86	33.128	Mike Balipap Jr.	$ 2,681.00	$ 3,961.00	$ 14,061.00	$ 20,703.00
410-02540	10	1	64.00	43.29	17.519	Mergl Seeds Ltd.	$ 1,418.00	$ 2,095.00	$ 9,644.00	$ 13,157.00
410-03900	11	1	52.46	2.45	0.992	Iskandar El-Khoury	$ 80.00	$ 119.00	$ 599.00	$ 798.00
410-04000	11	1	36.90	36.90	14.933	Zachary Pan & Xiaotong Tang	$ 1,208.00	$ 1,786.00	$ 9,022.00	$ 12,016.00
410-04100	11	1	48.76	48.76	19.733	Charles Farough	$ 1,597.00	$ 2,360.00	$ 11,923.00	$ 15,880.00
410-05200	11	1	79.14	24.96	10.101	Charles Farough	$ 817.00	$ 1,208.00	$ 6,103.00	$ 8,128.00
410-05500	11	1	99.61	99.61	40.312	Gerald Santo	$ 3,262.00	$ 4,820.00	$ 24,359.00	$ 32,441.00
420-00100	9	1	50.00	50.00	20.235	Augustine Revenberg	$ 1,637.00	$ 2,420.00	$ 8,570.00	$ 12,627.00
420-00150	9	1	50.00	50.00	20.235	Augustine & Gaynia Revenberg	$ 1,637.00	$ 2,420.00	$ 8,735.00	$ 12,792.00
420-00400	9	1	42.09	42.09	17.034	Manjiderjit Singh & Surjit Toor	$ 1,378.00	$ 2,037.00	$ 7,073.00	$ 10,488.00

Tax Roll No.	Con. or Plan No.	Lot or Part of Lot	Acres Owned	Acres Afft'd	Hectares Afft'd	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
420-00500	9	1	41.33	41.33	16.726	Nancy Brown	$ 1,353.00	$ 2,000.00	$ 6,947.00	$ 10,300.00
420-03100	8	1	162.00	151.99	61.510	Gaynia Revenberg	$ 4,977.00	$ 7,355.00	$ 25,547.00	$ 37,879.00
420-06600	9	1	119.19	119.19	48.236	Augustinus & Gaynia Revenberg	$ 3,903.00	$ 5,768.00	$ 23,967.00	$ 33,638.00
440-00150	7	1	70.26	70.26	28.434	Edward White	$ 2,301.00	$ 3,400.00	$ 44,247.00	$ 49,948.00
440-00300	7	1	48.16	20.00	8.094	George Agocs & Robert Wickett	$ 655.00	$ 968.00	$ 2,153.00	$ 3,776.00
450-00200	6	1	9.18	9.18	3.715	Gordon & Linda Keirl	$ 301.00	$ 444.00	$ 19,795.00	$ 20,540.00
450-00300	6	1	41.31	15.00	6.070	John & Shelagh McKinley	$ 491.00	$ 726.00	$ 331.00	$ 1,548.00
450-04400	6	1	44.45	25.00	10.117	George Agocs	$ 819.00	$ 1,210.00	$ 1,959.00	$ 3,988.00
Total on Privately Owned - Agricultural Lands (grantable)							**$ 33,822.00**	**$ 49,984.00**	**$ 316,680.00**	**$ 400,486.00**
TECUMSEH TOTAL ASSESSMENT				1210.06	489.70		**$ 51,291.00**	**$ 76,275.00**	**$ 696,895.00**	**$ 824,461.00**
Brought Forward:										
AMHERSTBURG TOTAL ASSESSMENT				7.09	2.87		$ 232.00	$ 412.00	$ 479.00	$ 1,123.00
ESSEX TOTAL ASSESSMENT				40.77	16.50		$ 2,417.00	$ 4,223.00	$ 18,526.00	$ 25,166.00
TOTAL PROJECT ASSESSMENT				1257.92	509.07		**$ 53,940.00**	**$ 80,910.00**	**$ 715,900.00**	**$ 850,750.00**

1 Hectare = 2.471 Acres
Project No.REI2018D035
May 20th, 2022

SPECIFICATIONS

COLCHESTER TOWNLINE DRAIN

Repairs and Improvements

Geographic Township of Sandwich South

TOWN OF TECUMSEH

I. GENERAL SCOPE OF WORK

The Colchester Townline Drain comprises of an open drain generally located on the north side of County Road 8 extending from an outlet in the Merrick Creek upstream in an easterly direction along the north side of County Road 8 to the westerly limit of Concession Road 12, in the geographic township of Sandwich South, Town of Tecumseh. The work under this project generally comprises of repairs and improvements to the entire length of the drain. The work on the Colchester Townline Drain includes brushing works, sediment removal to restore the drain to design specifications, culvert cleaning and ancillary works as noted. The work on the bridges being improved includes the removal of the existing structures; the installation of a new culverts; new culvert end treatments comprising of precast concrete block or sloped quarried limestone on filter cloth end protection; granular approaches and backfill; hard surface restorations, and granular transition areas.

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 drain repairs and improvements and the bridge improvements and new construction 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 Merrick Creek. 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 this project has gone through 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 Mitigation Plan for Drainage Works (March 2018-17-4938) that the Town has prepared to address the Endangered Species Act, 2007, that is now administered by the Ministry of Environment, Conservation and Parks (M.E.C.P.). Section 6.0 of the Mitigation Plan indicates that snake species are a concern for this work area and although turtles are not indicated, they are mobile and could be encountered. The Mitigation Plan includes measures to be followed as outlined in "Section 7.0 Mitigation Measures" of the document and a copy of same as it relates to turtles and snakes is included 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 the works will not contravene 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 and the Mitigation Measures in their S.A.R. Mitigation Plan. To address these requirements the Town has established comprehensive mitigation measures as well as species identification guides for reference. 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. – M.E.C.P. information, or any future requirements, and follow the special requirements therein included, during construction. The Drainage Superintendent has reviewed the endangered species maps and any concerns will be provided in **Appendix "REI-B"**. Certain species such as turtles and snakes are mobile and may be encountered during construction. Therefore, the Mitigation Measures in Section 7.0 of the Town Plan has been included in **Appendix "REI-B"** in its entirety along with timing window charts for further information and use by the Contractor.

The Contractor shall contact the Drainage Superintendent if an endangered species is encountered during construction. The Contractor shall be responsible for providing the necessary

equipment and materials outlined in the "**MITIGATION PLAN"** to address the handling of any endangered species encountered during the course of the construction work. The Contractor shall cooperate fully and assist the Drainage Superintendent or M.N.R.F. – M.E.C.P. staff in the proper handling of the endangered species as outlined in the "**MITIGATION PLAN"**, and as may be further directed by the Drainage Superintendent or the M.N.R.F. – M.E.C.P. staff and shall govern all its operations accordingly.

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 County Road 8 and open areas along the north side of the open drain. The Contractor shall have access for the full width of the roadway abutting the proposed drainage works and a minimum 8 metre wide access on the abutting open lands. 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 removal of the existing access bridge and to construct the new replacement access bridge, 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.

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 County Road 8 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 County of Essex and Tecumseh Works Departments.

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 and satisfy the Town by-law requirements as set out in **Appendix "REI-D"**. 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. 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 and comply with excess soil management regulations.

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 concrete and steel beam and columns Bridge 12 slated to be removed shall be replaced with new aluminized steel Type II Hel-Cor pipe. For all replacement aluminized steel pipes 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 replacements 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

Any 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 each 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 County 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 concrete 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. 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. GENERAL QUARRIED LIMESTONE EROSION PROTECTION

At all of the swale and furrow locations entering the drain from either side, it is required that general quarried limestone erosion protection and rock chutes be provided on the drain slopes, at the locations indicated or established due to erosion, and to the widths generally shown within the details and notes included in the accompanying drawings. The rock chutes shall be V-shaped and constructed to direct all flows through the centre portion of the rock chute. Where the drain banks are showing erosion or slumping and distress, the Contractor shall provide quarried limestone on filter cloth general erosion protection as outlined below. Protection locations shall be as established in consultation with the Town Drainage Superintendent and Consulting Engineer and shall include the areas noted on the profiles.

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 general 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 equipment 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 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.

XIII. 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.

XIV. 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 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 and installations.

XV. 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.

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 County of Essex, the Town of Tecumseh 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 County of Essex, the Town of Tecumseh 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 onto 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 County of Essex, the Town of Tecumseh 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

   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 bio-degradable 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.

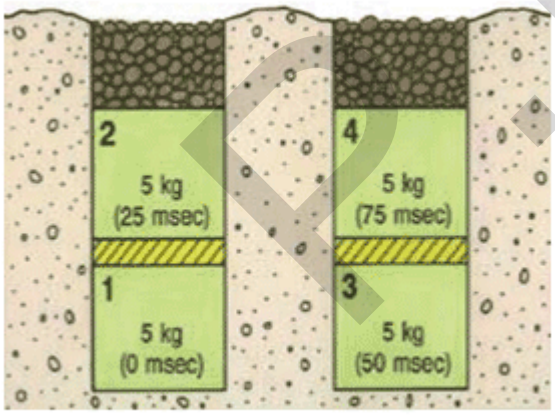
- Develop and implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has 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”

5.0 Location

Located along the southern shores of Lake St. Clair in Essex County and in the Essex Region Watershed, the Town of Tecumseh (Study Area) encompasses a geographic area of 9,538.60 hectares (ha) that is bordered by the City of Windsor and the Town of LaSalle on its western side and the Town of Lakeshore to the east and shown on **Figure 1** (Essex Region Conservation Authority (ERCA), 2013). There are four (4) subwatersheds (total area): Pike Creek subwatershed (8,993 ha), Canard River subwatershed (34,776 ha), Tecumseh Area Drainage subwatershed (1,150 ha), Turkey Creek subwatershed (6,112 ha), and Little River subwatershed (6,490 ha) that traverse the lands within the Town's boundaries (ERCA, 2011). Approximately 95.15% (9,079.38 ha) of the landscape consists of anthropogenic features (residential, commercial, agricultural, etc.) while the remaining 4.81% (459.22 ha) is made up of natural areas (terrestrial (4.49%) and other terrestrial (0.32%)) (ERCA, 2013).

There are one hundred and twenty (120) municipal drains measuring 221 kilometers (km) within the Town of Tecumseh (Town of Tecumseh, 2014). Through our background review we identified 3 dominant habitat types surrounding/within the drains that have potential to provide habitat for SAR. Habitats consist of:

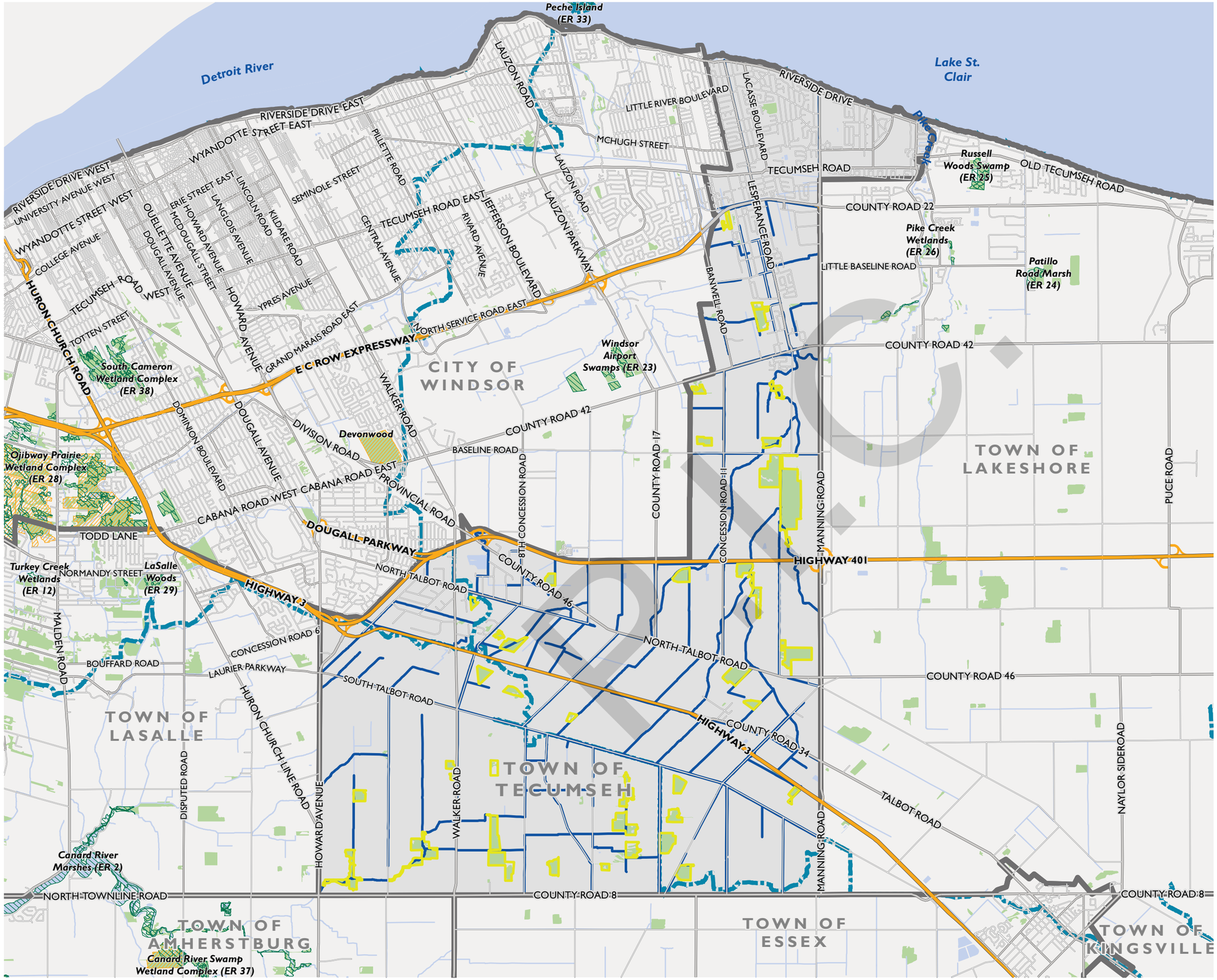
Existing Natural Features:

- Forest

Existing Anthropogenic Features:

- Urban (residential, commercial, recreational, right-of-ways)
- Agricultural (row crop, hayfield, old abandoned fields)

Within the Town, there are no forest patches greater than 100 ha in size with the largest being Fairplay Woods (an Environmentally Significant Area (ESA)) which spans a total area of 52.9 ha (ERCA, 2013). There are 2 forest patches that contain 200 m interior forest and 16 patches that contain 100 m interior forest (ERCA, 2013). In accordance with subparagraph i, of paragraph 2, of subsection 6 under Section 23.9 of O.Reg. 242/08, **Drainage Maps** have been prepared that show drain locations, surrounding land use types, proximity to sensitive natural features (e.g. Forest) and potential SAR habitat that exists within the Town's jurisdiction (see ***Appendix B***). A list of all the drains and adjacent habitat type(s) has been provided in ***Appendix B*** following the Drainage Maps. In addition, a **Tecumseh Drain Database** (provided electronically) contains the drain names, adjacent habitat types, and relevant information found during our background review from the MNRF and ERCA.



TOWN OF TECUMSEH

NATURAL FEATURES

FIGURE 1

- Mainland
- Provincially Significant Wetland
- ANSI, Life Science
- Natural Heritage System
- Municipal Drain
- Quaternary Watershed
- Water Body
- Woodland

1:75,000

0 0.5 1 2 km

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, TOWN OF TECUMSEH

MAP CREATED BY: GM
MAP CHECKED BY: KM/AB
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 174938

STATUS: FINAL

DATE: 2017-12-08

FILE LOCATION: I:\GIS\174938 - Tecumseh Drain\mxd\Figure 1 Natural Features.mxd

6.0 Species at Risk

A review of secondary source information, including the expired MNRF Agreement[1], Natural Heritage Information Centre (NHIC) GIS Database records (i.e. 1 km squares that overlap the Study Area) were reviewed to gather a list of the SAR that have the potential to occur within the Town's boundaries. A total of sixty-six (66) species listed as either endangered or threatened on the SARO list (O.Reg. 230/08) were identified to occur within the Study Area (see ***Appendix C***). One Restricted Species Record was also identified in 1988 (NHIC 1 km Square 17LG4478).

The habitat requirements for each of the sixty-six species was crossed referenced with habitats identified within the Study Area. A total of Nineteen (19) species listed as endangered or threatened were identified as having potential habitat within the Study Area drains, consisting of Turtles (2 species), Snakes (2 species), Fishes (2 species), Birds (3 species), and Plants (10 species). **Table 2** lists the SAR, preferred habitat type(s) (Forest, Agricultural, Urban or All), need for water presence (requirement for some species), and the dates during the year when the species is likely to be carrying out sensitive life processes, referred to herein as the Restricted Activity Period (RAP).

Four (4) species listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08 were identified as having the potential to occur within the Town of Tecumseh drains, these species include: Pugnose Minnow (*Opsopoeodus emiliae*) (1 fish species), False Hop Sedge (*Carex lupuliformis*), Heart-leaved Plantain (*Plantago cordata*) and Scarlet Ammannia (*Ammannia robusta*) (3 plant species). Since these species are listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08, this mitigation plan cannot be used for these species and as such, they have not been included in **Table 2** below. Permitting related to these species may be required when working in specific drains. More information on these species, their habitat preferences, known distribution within the area and steps that need to be taken to determine whether a permit is required are outlined in ***Appendix D***.

Table 2: Species at Risk with Potential to Occur within the Study Area

Scientific Name	Common Name	ESA[1]	Preferred Habitat Type[2]	Restricted Activity Period
Turtles (2 species)				
Emydoidea blandingii	Blanding's Turtle	THR	Forest, Water is present	November 1 to April 30 ***Important to Note: Activities that require water level reduction cannot occur in areas when and where turtles are hibernating (paragraph 6, subsection 13, under Section 23.9 of O.Reg. 242/08).***
Apalone spinifera	Spiny Softshell	THR	Forest, Water is present	

[1] Agreement under Section 23 of O.Reg. 242/08 made under the *ESA*, 2007 (File # AY-23D-010-10)

Scientific Name	Common Name	ESA[1]	Preferred Habitat Type[2]	Restricted Activity Period
Snakes (2 species)				
Pantherophis gloydi	Eastern Foxsnake (Carolinian population)	END	All[3]	September 20 to May 31
Thamnophis butleri	Butler's Gartersnake	END	All[3]	
Fishes (2 species)				
Notropis anogenus	Pugnose Shiner	END	Water is present	March 15 to June 30
Lepisosteus oculatus	Spotted Gar	THR		
Birds (3 species)				
Dolichonyx oryzivorus	Bobolink	THR	Agricultural	May 1 to July 15
Sturnella magna	Eastern Meadowlark	THR	Agricultural	
Hirundo rustica	Barn Swallow	THR	All[3]	
Vascular Plants (10 species)				
Gymnocladus dioicus	Kentucky Coffee-tree	THR	Forest	Not Applicable
Liparis liliifolia	Purple Twayblade	THR	Forest	
Cornus florida	Eastern Flowering Dogwood	END	Forest	
Castanea dentata	American Chestnut	END	Forest	
Juglans cinerea	Butternut	END	Forest	
Morus rubra	Red Mulberry	END	Forest	
Aletris farinosa	Colicroot	THR	Agricultural, Forest	
Smilax rotundifolia	Round-leaved Greenbrier (Great Lakes Plains population)	THR	Forest	
Liatris spicata	Dense Blazing Star	THR	Agricultural	
Symphyotrichum praealtum	Willowleaf Aster	THR	Forest	

[1]Endangered Species Act – status as defined by O.Reg. 242/08 as of April 27, 2017; [2]Preferred Habitat Types – The habitat types listed are areas where a SAR has the potential to occur. It should be noted that species have the potential to occur outside of these habitats; [3]All – Structures such as culverts and bridges may provide suitable habitat for nesting Barn Swallow. Culverts, rip rap and gabion baskets also have the potential to provide nesting and/or hibernaculum for snake species.

7.0 Mitigation Measures

Based on the types of drainage work activities outlined above (in Section 2.0) and the potential for SAR and SAR habitat within and adjacent to the drainage features, the following best practices and mitigation measures are recommended when conducting drainage works. Prior to starting drainage works, the following steps are recommended to help determine the appropriate mitigation/management measures:

Step 1
- Determine Drainage Work Activity and Timing of Works.

Step 2
- Review **Drainage Maps** ***(Appendix B)*** and/or **KMZ File** to confirm habitat(s) the activity may impact.

Step 3
- Cross-reference **Habitat Type(s)** (determined in **Step 2**) with **Table 2** (in **Section 6.0**) to confirm which species may be impacted by activity and their RAP to determine most appropriate time to conduct activity.

Step 4
- Conduct **Site Visit** to verify Habitat Type(s). Identify potential SAR Habitat/Sensitive Natural Features and distance from activities. Confirm the presence/absence of water flow.

Step 5
- Implement recommended Mitigation Measures. Review Tecumseh Checklist (***Appendix E***) and provide **Contractor Information Package** (***Appendix F***) with Species Specific Mitigation Measures (**Section 7.2**), ID cards and Activity and SAR Observation Forms (***Appendix F***).

Step 6
- Upon completion of each Drainage Work Activity collect Observation/Reporting Form from Contractors and record activity in log form (***Appendix E***) for annual reporting to MNRF.

7.1 General Mitigation Measures

The following mitigation measures are recommended to avoid or minimize impacts to the natural environment when conducting drainage works. Following this section species specific mitigation measures are provided.

When planning for drainage works, activities should be planned outside of sensitive timing windows for all wildlife species wherever possible. **Table 2** in Section 6.0 indicates the Restricted Activity Periods for the different SAR having the potential to occur within the Study Area. **Table 3** indicates sensitive timing windows for various types of wildlife (including SAR) based on habitat types.

This information can be used to determine what time(s) of year may be sensitive at a particular site, based on which types of habitat and wildlife are present.

Where possible, activities are recommended to be planned outside of these sensitive time(s); otherwise additional species specific mitigation measures are recommended and/or consultation with the MNRF.

Table 3: Sensitive Timing Windows for other Wildlife Species (including SAR)

Habitat Type	Wildlife	Sensitive Timing Windows
Agricultural (Hayfields and pastures)	Migratory Birds	March through July (breeding season for most species)
Waterbodies	Migratory Birds (including waterfowl)	March through Mid-August
	Turtles and Amphibians	March through Mid-August; and Mid-October through March (for overwintering wildlife, including turtles).
	Mammals	March through mid-August; and Mid-October through March (overwintering wildlife)
	Fish	In-water timing restriction for warmwater fishes March 15 to June 30.
Forest	Migratory Birds	March through mid-August
	Mammals	March through mid-August; and Mid-October through March (overwintering wildlife)
	Snakes	March through mid-August; and Mid-October through March (overwintering wildlife)
Urban	Snakes	March through mid-August; and October through March (overwintering wildlife)
	Mammals	

The following list provides general measures that are recommended when conducting any drainage work activities:

- **Bats**: The work associated with drainage maintenance covered under this management plan would typically not include the removal of trees. As such, the potential for drainage work activities to impact bat SAR is low. However, if a tree that exhibits a diameter at breast height of 25 cm or greater or a tree that exhibits loose shaggy bark requires removal for drainage works, removal should be completed between November 1 and March 1, outside of the active season for bats. If the tree removal needs to occur during the active season, removal should be completed after dusk.
- Review species specific seasonal timing windows to avoid sensitive periods for species
- Where possible, abide by regulatory timing windows and setback distances and avoid regulated habitat features
- Minimize duration of in-water work (where applicable)

- Any in-stream work should be conducted during periods of low flow
- Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation
- Conduct wildlife sweeps prior to the commencement of drainage work activities to determine if SAR (or other wildlife) are present at the site and engaged in critical life processes (e.g. nesting, etc.)
- Following the wildlife sweep, the area of activity is to be isolated with silt fencing to keep SAR and other wildlife from entering the work space area.
- Develop and implement an erosion and sediment control plan for the site that minimizes the risk of sedimentation to the drain during all phases of an activity. 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 drain of settling basin and runoff water is clear. Following the DFO's Measures to Avoid Harm (as outlined on DFO's website: http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html), an erosion and sediment control plan, where applicable, is to include the following:
    - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the drain
    - 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 the drain
    - Site isolation measures, where required, to contain suspended sediment
    - Measures for containing and stabilizing waste materials generated from activities are stored away from any water bodies and prevent materials from re-entering water bodies
    - Erosion and sediment control measures are inspected and maintained on a regular basis during drainage works
    - Any damages to erosion and control measures are to be repaired immediately
    - Removal of non-biodegradable erosion and sediment control materials once site has been stabilized

- ***Phragmites*** is a non-native perennial grass species that has been observed throughout much of the province and Tecumseh, developing tall dense stands that degrade wetlands and other features by outcompeting native vegetation and changing habitat. To further prevent the spread and introduction of this unwanted species in the province, the provincial government has regulated invasive *Phragmites* as restricted under the *Invasive Species Act*, 2015. Restricted species under the Act, prohibits i) the transport of species into any provincial park and conservation reserve and ii) the deposit or release of species in Ontario. For further information on the *Invasive Species Act*, 2015 please visit: www.ontario.ca/invasionON. It is recommended that care be taken when working in areas with *Phragmites* and efforts be taken to prevent further spread of species through equipment transfer. Methods to prevent the spread of *Phragmites* while conducting drainage works should include:
    - Inspection of vehicles, equipment and heavy machinery thoroughly inside and out for accumulation of dirt, plant material or snow/ice, including the underside of vehicles, radiators, spare tires, foot wells and bumpers before entering onto a site. Remove any guards, covers, plates or other easy to remove external equipment;

- Inspections should be completed when: moving vehicles out of local area of operation; moving machinery between properties or sites within the same property where invasive species may be present or known to occur; and using machinery along roadsides, in ditches and along watercourses.
- Vehicles, equipment and heavy machinery should be cleaned: before moving out of local area where invasive species has been identified or known to occur; and when accumulations of dirt, plant material or snow/ice has been observed.
- Clean vehicles, equipment and heavy machinery in an area where risk of contamination is low, ideally on a mud free hard surface, at least 30 m away from any watercourse, waterbody, wetland or other natural area, if possible. Where risk of runoff is high, cleaning stations should be contained by sediment fence as per standard erosion and sediment control specifications.
- Remove large accumulations of dirt, using a compressed air device, high pressure hose or other device as necessary. Clean the vehicle starting at the top and working down, with particular attention to the undersides, wheels, wheel arches, guards, chassis, engine bays, grills and other attachments.
- Clean inside vehicles by sweeping, vacuuming or using compressed air device including floor, foot wells, pedals, seats and under the seats.

Additional details on cleaning equipment and/or managing invasive species can be found in the Clean Equipment Protocol for Industry (J. Halloran, et al., 2013) and online at the Government of Ontario's website: https://www.ontario.ca/page/stop-spread-invasive-species.

7.2 Species Specific Mitigation Plans

In the event a SAR or SAR habitat has been identified within the proposed area for drainage work activity, the following information should be clearly conveyed to the on-site staff as part of the drainage works protocol, via notes or plans and on-site briefings with construction/personnel:

- Schedule for pre-construction activities such as wildlife inspections, silt fencing installation and contractor briefing.
- Description of wildlife mitigation measured to be used during drainage work activities, including:
  - Placement and specifications of required protection measures (e.g. fencing, signage)
  - Phasing and direction of site clearing activities
  - Any recommendations regarding access routes for equipment, vehicle parking, materials, stockpiling, etc.
- Guidance on what to do in the event of a wildlife encounter, including SAR and arrangements for dealing with injured or orphaned animals (as indicated in **Table 5** and ***Appendix F***). This guidance should be summarized in a handout suitable for quick reference by on-site staff.
- SAR awareness training should be provided to all on-site staff, including truck drivers.

In the Contractor Information Package (***Appendix F***) Dillon has provided SAR identification sheets for SAR with the potential to occur within the Study Area.

7.2.1 Species Specific Mitigation Measures for Snake Species

Snake species can be found in a variety of habitat types and most of the drainage work activities have the potential to encounter snakes. Particular attention should be given when conducting works on catch basins, culverts, rip rap and crossing structures, as snakes carry out sensitive life processes in structures such as these. **Table 4** shows the sensitive timing windows for snake species when carrying out life processes related to hibernation and staging.

Table 4: Sensitive Timing Windows for Snake Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes[1]	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Hibernation																																				
Staging																																				

[1]Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

Table 5 below outlines the recommended mitigation measures to avoid impacts to snake species during and outside of RAP. Photographs of habitat observed within and adjacent to drains that have the potential to support SAR snakes, have been included in ***Appendix G*** (Photographs #1 - 4).

Table 5: Mitigation Measures for Snake Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Snakes in Study Area

Eastern Foxsnake (Carolinian population)
 	
and
 	
Butler's Gartersnake
	• Preconstruction planning that includes review for potential habitat.
	• During site visit, verify if attributes of regulated habitat occur and delineate where possible.
	• Establish constraints for activities, where possible, that abide by timing windows and setback distances and avoid regulated habitat features
	• Narrow construction footprint if possible.
	• Flag or fence off environmentally sensitive areas prior to drainage work activity. Bury fencing a minimum of 10 – 20 cm and vertical height of at least 60 cm. Note, stakes should be installed on the activity side to prevent snake use of stakes to climb fence.
	• Complete wildlife sweep within the exclusion area following fence installation to ensure no trapped wildlife.
	• Staff/workers conducting drainage works should be trained in snake species identification and procedures if encountered (review and sign off form in Contractor Information Package)
	• One staff member/worker or qualified biologist should be trained in proper snake handling procedures and protocols outlined in Section 2 of the Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (Included in the Contractor Information Package). This person should be onsite at all times (when required) for the potential capture, temporary holding, transfer and release of any snakes encountered during construction. A minimum of two holding tubs and cotton sacks should be onsite at all times.
	• Prior to commencement of daily drainage work activity, the area should be cleared of snakes through machinery inspections (e.g. wheels, engine compartment) each morning and after machinery is left idle for more than one (1) hour if left on site during the snake active season.
	• If a nest is uncovered during drainage work activity:
	  ○ Collect any displaced or damaged eggs and transfer them to a holding tub
	  ○ Capture and transfer all injured dispersing juveniles of that species into a light-coloured drawstring cotton sack
	  ○ Place all cotton sacks with the captured injured individuals into a holding tub out of direct sunlight
	  ○ Immediately contact the MNRF to seek direction and to arrange for transfer of the injured individuals
	  ○ Immediately stop any disturbance to the next site and loosely cover exposed portions with soil or organic material to protect the integrity of the remaining individuals
	  ○ Do not drive over the nest site or conduct any activities within 5 m of the nest site
	  ○ Do not place any dredged materials removed from drainage works on top of the nest site
	  ○ 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
	  ○ Where there are no collected eggs or captured individuals, contact the MNRF within 24 hours to provide information on the location of the nest
	• Any injured captured snakes should be stored outside of direct sunlight and the MNRF should immediately be contacted to seek direction and to arrange for transfer. MNRF may require transfer to the nearest MNRF authorized Wildlife Rehabilitator. Contact Information for Authorized Wildlife Rehabilitator can be found in SAR Information Sheets (***Appendix F***).
	• If conducting drainage works during a species sensitive timing window and one or more individuals belonging to a snake species is encountered or active hibernacula is discovered:
	  ○ Trained staff/worker or qualified biologist shall capture and transfer all injured and uninjured individual snakes of that species into individual light-coloured, drawstring cotton sacks
	  ○ Place cotton sacks into a holding tub
	  ○ Ensure that the holding tub with captured individuals is stored at a cool temperature to protect snakes from freezing until the individuals can be retrieved or transferred
	  ○ If an active hibernacula is uncovered cease all work and immediately, contact MNRF to seek advice and arrange for transfer and/or removal
	• If conducting drainage works outside of a species sensitive timing window and one or more individuals belonging to a snake species is encountered:
	  ○ Briefly stop the activity for a reasonable period of time to allow any uninjured individual snakes of that species to leave the work area
	  ○ If the individuals do not leave the work area after the activity is briefly stopped, trained staff/worker or qualified biologist shall capture all uninjured individuals and release them in accordance with the methods outlined below
	  ○ 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 into a holding tub which shall be stored out of direct sunlight for a maximum of 24 hours before releasing them in accordance with the methods outlined below
	  ○ Capture and transfer any individuals injured as a result of conducting drainage works into a holding tub separate from any holding tub containing uninjured individuals
	  ○ Store all captured injured individuals out of direct sunlight and immediately contact the MNRF to seek direction and to arrange their transfer
	• Uninjured individuals captured during drainage works, are to be released within 24 hours of capture, in an area immediately adjacent to the drainage works with natural vegetation cover within 50 m and out of harm's way (as per subsections 2.3 and 2.4 of Handling Manual included in the Contractor Information Package; ***Appendix F***).

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Snakes in Study Area

	• Uninjured individuals captured during drainage works, are to be released within 24 hours of capture, in an area immediately adjacent to the drainage works with natural vegetation cover within 50 m and out of harm's way (as per subsections 2.3 and 2.4 of Handling Manual included in the Contractor Information Package; ***Appendix F***).
	• Where one or more individuals belonging to a snake species is killed as a result of drainage work activity, or a person finds a deceased individual of a snake species, the following measures should be followed:
	  ○ Collect and transfer any dead individuals into a holding tub outside of direct sunlight; and,
	  ○ Contact the MNRF within 72 hours to seek direction and to arrange for the transfer of the carcasses of the dead individuals.
	• If the methods of handling snakes outlined in subsection 2.3 and 2.4 of the Handling Manuals are not applicable due to a snake's injuries, use a shovel or flat object to pick up the snake, ensuring that injured areas are supported and place in a large plastic bin or bucket with a lid with air holes. Immediately transport the turtle to an MNRF authorized veterinarian or wildlife rehabilitator and contact the MNRF. Contact Information for Authorized Wildlife Rehabilitator can be found in **Appendix F** and on SAR Information Sheets (***Appendix F***).
	• Complete a SAR Encounter Reporting Form included in Contractor Information Package (***Appendix F***)**.**

7.2.2 Species Specific Mitigation Measures for Turtle Species

Turtles can generally be found associated with large slow moving water features that have logs or stumps for basking. For nesting, turtles prefer moist well drained, loose soils for digging and on a gradual typically south facing slope. Species such as Blanding's Turtle and Spiny Softshell hibernate underwater in permanent waterbodies. Sensitive timing windows for turtle species includes the nesting period and has been provided in **Table 6.**

When conducting drainage works where there is potential for turtle species to be hibernating, water level **cannot be reduced** as per Paragraph 6 of subsection 13 of Section 23.9 of O.Reg. 242/08.

Table 6: Restricted Activity Period for Turtle Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes[1]	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Hibernation																																				

[1]Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

In **Table 7** below, the recommended mitigation measures to avoid impacts to turtle species during and outside sensitive timing windows and what to do when turtles or turtle nests are encountered is provided. Photographs of habitat observed within and adjacent to drains that have the potential to support SAR Turtles, have been included in ***Appendix G*** (Photographs #5 - 6).

Table 7: Mitigation Measures for Turtle Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Turtles within the Study Area
Blanding's Turtle	• Preconstruction planning that includes review for potential habitat. • During site visit, verify if attributes of regulated habitat occur and delineate where possible. • Establish constraints for activities, where possible, that abide by timing windows, setback distances and avoid regulated habitat features. • Narrow construction footprint if possible. • Flag or fence off environmentally sensitive areas prior to drainage work activity. Bury fencing a minimum of 10 – 20cm and vertical height of at least 60 cm. • Complete wildlife sweep within the exclusion/construction area following fence installation to ensure no trapped wildlife. • Staff/workers conducting drainage works should be trained in turtle species identification and procedures if encountered (Review and sign off form in the Contractor Information Package; ***Appendix F***). • One staff member/worker or qualified biologist should be trained in proper turtle handling procedures and protocols outlined in Section 1 of the Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (provided in the Contractor Information Package; ***Appendix F***). This person should be onsite at all times (when required) for the potential capture, temporary holding, transfer and release of any turtles encountered during construction. A minimum of two holding tubs and cotton sacks should be onsite at all times. • If construction is planned to commence during the turtle nesting period, prior to site preparation a turtle nesting search should be completed to identify turtle nests. If nests are encountered, the MNRF must be consulted immediately. Nests should be relocated to an appropriate facility for incubation with MNRF approval. Contact information for MNRF Authorized Wildlife Rehabilitator can be found in SAR Information Sheets (***Appendix F***). • Drainage work activity related to excavation of sediment or disturbance to banks should be avoided during the sensitive timing windows for turtles. • During turtle hibernation periods, water in drains or ditches cannot be reduced. • Prior to commencement of daily activity, the area should be cleared of turtles and turtle nests by a specially trained staff member or qualified biologist.

Spiny Softshell	• Do not disturb a turtle encountered laying eggs and do not conduct activities within 20 m of the turtle while it is laying eggs.
	• If conducting drainage works during a species sensitive timing window and one or more individuals belonging to a turtle species is encountered:
	  ○ Trained staff/worker or qualified biologist shall capture and transfer all injured and uninjured individuals of that species to a holding tub
	  ○ Capture and transfer all individuals injured as a result of the drainage work activity into a holding tub separate from any holding tub containing uninjured individuals
	  ○ Ensure that the holding tub with captured individuals is stored at a cool temperature until the individuals can be retrieved or transferred
	  ○ Contact the MNRF immediately to seek advice and arrange for transfer and/or removal
	• If a nest is uncovered during construction, immediately stop all activity near the nest. Cover the nest with soil or organic material. Do not drive within 5 m of the nest and contact the MNRF within 24 hours if no eggs or individuals were captured/collected.
	• Isolate material stockpile areas with fencing.
	• Any injured captured turtles should be stored outside of direct sunlight and the MNRF should immediately be contacted to seek direction and to arrange for transfer.
	• Machinery should be inspected each morning (e.g. under vehicles) for presence of turtles.
	• Uninjured individuals captured during drainage works, are to be released within 1 hour of capture, out of harm's way no more than 125 m of where it was found, unless absolutely necessary. If it is not possible to relocate the turtle within 125 m of the capture location, contact the MNRF for further direction. MNRF may require transport of turtle(s) to MNRF Authorized Wildlife Rehabilitator or Veterinarian. Contact information can be found in ***Appendix F***.
	• If the methods of handling turtles outlined in subsection 1.3 of the Handing Protocol are not possible due to a turtle's injuries, use a shovel or flat object to pick up the turtle, ensuring that injured areas are supported and place in a large plastic bin or bucket with a lid with air holes. Immediately transport the turtle to an MNRF Authorized Wildlife Rehabilitator or Veterinarian and contact the MNRF. Contact Information for Authorized Wildlife Rehabilitator can be found in ***Appendix F*** and on SAR Information Sheets (***Appendix F***). See subsection 1.7 of the Handling Manual (included in the Contractor Information Package; ***Appendix F***) for more details.
	• **Complete a SAR Encounter Reporting Form included in the Contractor Information Package** (***Appendix F***).

7.2.3 Species Specific Mitigation Measures for Aquatic Species

Review of background information including, DFO's Aquatic SAR Mapping (Map 29 of 33), NHIC and MNRF Agreement[2] identified 10 fish and 10 mollusc species listed as endangered or threatened under the *ESA*, 2007 with occurrence records within and/or adjacent to the Study Area. Of the 20 aquatic SAR identified only two fish species have been included in the Plan based on the presence of suitable habitat within the Study Area drains.

Although suitable habitat for SAR mussel species was not identified during our background review and site visits, if at any time a mussel species (of any type) are encountered, stop work and contact DFO for direction on how to proceed. A SAR Information Sheet for mussels species found during the background review has been provided in ***Appendix F***.

Watercourses and drains identified during the background review and subsequent field investigations found all features to be of warm water thermal regime and to support warm water fish species. **Table 8** below indicates the in-water timing window restriction for warm water fish species. **Table 9** provides a list of recommended measures to follow to avoid impacts to fish species. As previously mentioned, activities that affect a species listed in Table 1, subsection 2, Section 23.9 of O. Reg. 242/08 still require a permit to conduct drainage works (see ***Appendix D*** for details). DFO's *Guidance for Maintaining and Repairing Municipal Drains in Ontario version 1.0* (2017) document should be consulted when conducting all drainage works.

Table 8: In-water Timing Window Restriction for Warm Water Fish Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes[1]	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
In-water Restriction																																				

[1]Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under ESA, 2007 (File #: AY-23D-010-10).

[2] Agreement under Section 23 of O.Reg. 242/08 made under the *ESA*, 2007 (File # AY-23D-010-10).

Table 9: Mitigation Measures for Aquatic Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Aquatic Species within the Study Area
Pugnose Shiner Spotted Gar	• Consult with MNRF if in-water timing window restrictions cannot be adhered to. • Allow for fish salvage within the isolated work area prior to dewatering. • Limit duration of in-water work as much as possible. • Conduct in-stream work during periods of low flow to reduce the risk to fish and their habitat and 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. Suspend in-stream work immediately if sedimentation is detected. • Implement water quality monitoring if required. • Ensure equipment is clean and free of leaks. 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. • Alter activities to reduce disturbance to species and habitat and follow current DFO Measures to Avoid Harm • If federally listed SAR fish are encountered or have the potential to be present, contact the DFO to review next steps. • If SAR encountered, complete a SAR Encounter Reporting Form that will be included in the annual reporting.

7.2.4 Species Specific Mitigation Measures for Bird Species

Environment and Climate Change Canada (ECCC) identifies general nesting periods for migratory birds in Canada. Essex County is located within nesting zone C1, **Table 10** provides the RAPs for two habitat types: open field habitat and forest habitat. The RAPs provided are based on 61-100% of the migratory bird species predicted to be nesting during the identified time period (as indicated on the ECCC C1 nesting zone table).

Table 10: Restricted Activity Period for Bird Species

Month	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
Date Codes[1]	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L	E	M	L
Open																																				
Forest																																				

[1]Monthly intervals: E = Early (days 1-10); M = Middle (days 11-20); L = Late (days 21-31). Adapted from the Seasonal Timing Windows Chart in the MNRF Agreement under Section 23 of O.Reg. 242/08 made under *ESA*, 2007 (File #: AY-23D-010-10).

Based on our review of potential SAR birds to occur within the Study Area, the following mitigation measures are recommended while conducting drainage work activities:

Table 11: Mitigation Measures for Bird Species

Common Name	Recommended Mitigation Measures to Avoid Impacts to SAR Birds within the Study Area
Bobolink Eastern Meadowlark	• Planning activities should include review of area for potential habitat (including box culverts and bridges for Barn Swallow nests). • Limit construction footprint where possible. • Conduct work outside of the RAP for birds where possible. • Pre-construction activities should include bird nest sweeps if activities occur during migratory bird sensitive timing window identified in **Table 10**, above. • Protect active nests by flagging or fencing off an appropriate setback distance. • Suspend activity if active habitat is discovered that cannot be adequately setback from.
Barn Swallow	• Maintain habitat connections where possible during activities. • Implement measures to restore lost habitat/ habitat connections. • If sensitive habitat is on site, a qualified biologist should be on site daily. • If SAR encountered, complete a SAR Encounter Reporting Form that will be included in the annual submission to the MNRF.

7.2.5 Species Specific Mitigation Measures for Vegetation Communities

Potential impacts to plant SAR may include trampling by personnel or equipment, alteration of growing conditions (e.g. soil compaction, sunlight availability, and moisture regime), disturbance to localized seed bank and introduction of invasive species. Mitigation measures that will be incorporated during drainage work activities to minimize the impacts to adjacent forest communities and SAR vegetation include:

- Planning activities should include review of area for identification of potential SAR vegetation.
- Limit construction footprint where possible to minimize the disturbance to plant species.
- Installing temporary erosion and sediment control measures prior to activity, and maintaining them throughout activity, including routinely inspecting and repairing them, as required. Enhanced sediment and erosion control measures will be implemented for sensitive areas where SAR habitat has been identified within and abutting the work site.
- Vegetation that does not require removal for the purposes of construction will be protected through the installation and maintenance of temporary vegetation protection fencing (e.g. snow fencing or erosion sediment control fencing). This includes protection of any SAR trees identified.
- Equipment, materials and other construction activities will not be permitted in zones delineated for protection.
- If drainage work activity cannot be undertaken without disturbing a SAR plant(s), the Town should contact the MNRF for additional site-specific measures.
- Operational procedures and Best Management Practices for handling material and excess material, and spill prevention will be implements. Vehicular and equipment maintenance and refuelling will be carried out in a controlled manner, and where applicable, at designated maintenance areas. Refuelling will not be permitted within 30 m of any forest, or watercourse.
- Stabilize and re-vegetate exposed soil surfaces as soon as possible following activities, using native groundcover seed mixes and plantings.

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.

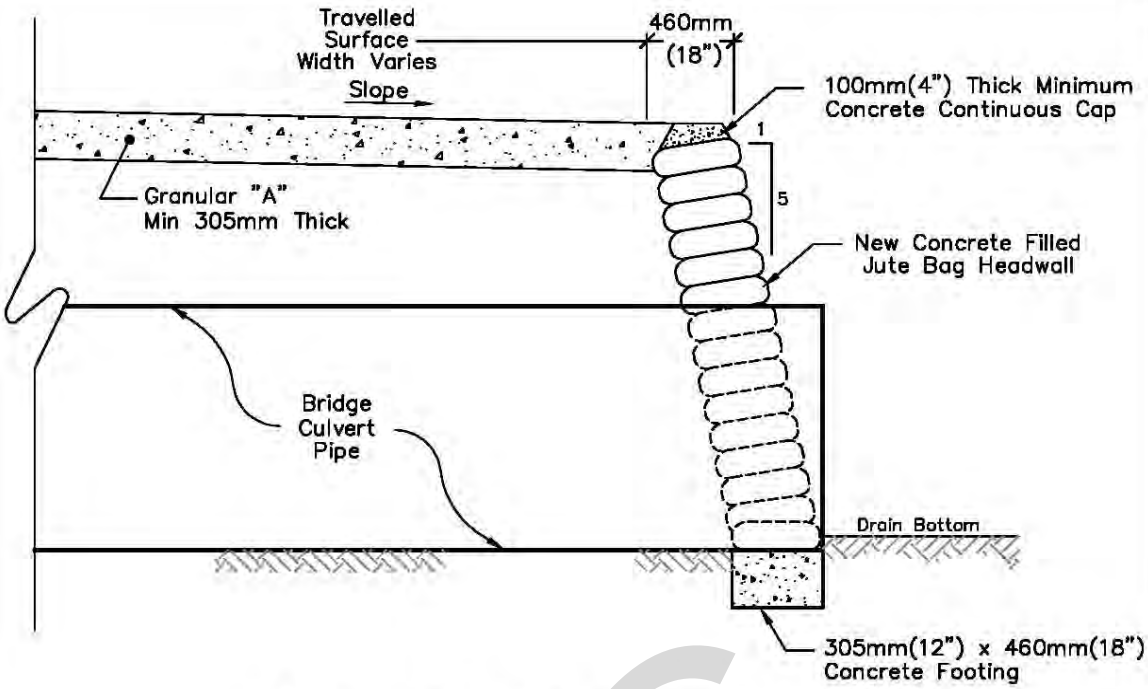
Where applicable, the Contractor and/or landowner constructing the new bridge shall be responsible for any damage caused by them to any portion of the Town road right-of-way. They shall take whatever precautions are necessary to cause a minimum of damage to same and must restore the roadway to its original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

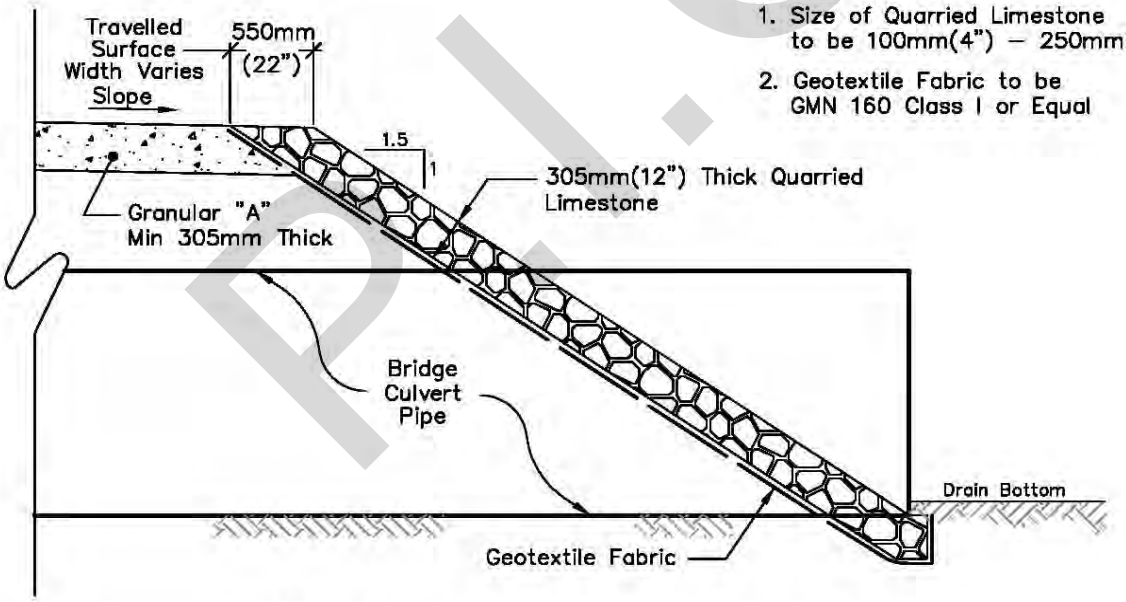
All of the excavation, installation procedures, and parameters as above mentioned are to be carried out and performed to the full satisfaction of the Drainage Superintendent and Engineer.



Typical Jute Bag Headwall

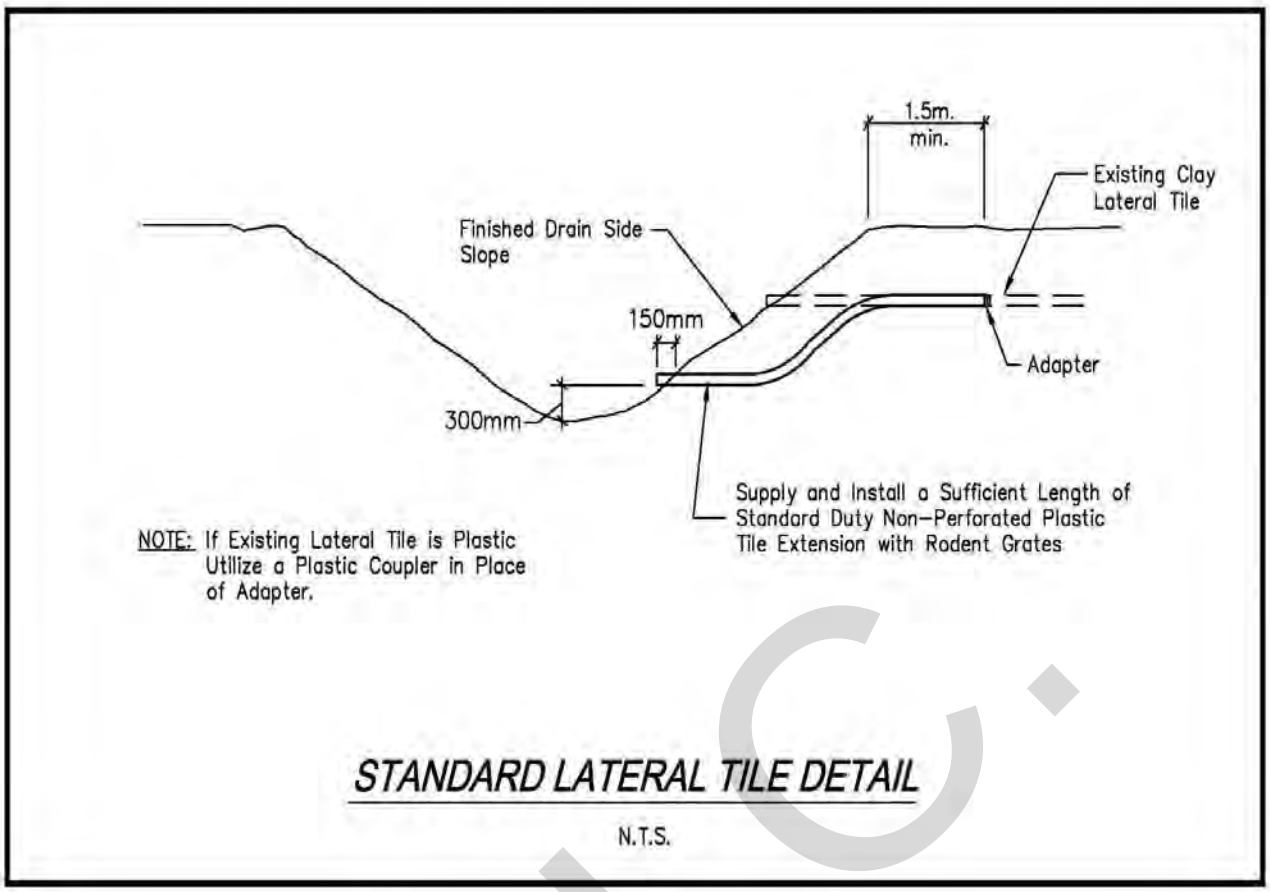
NOTE:

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



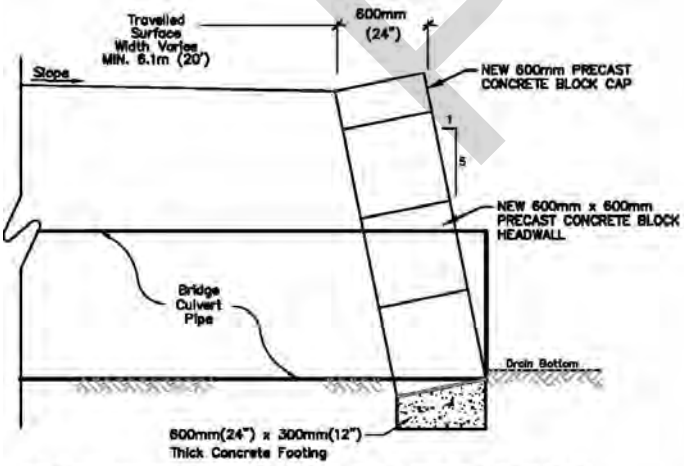
Typical Quarried Limestone End Protection

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



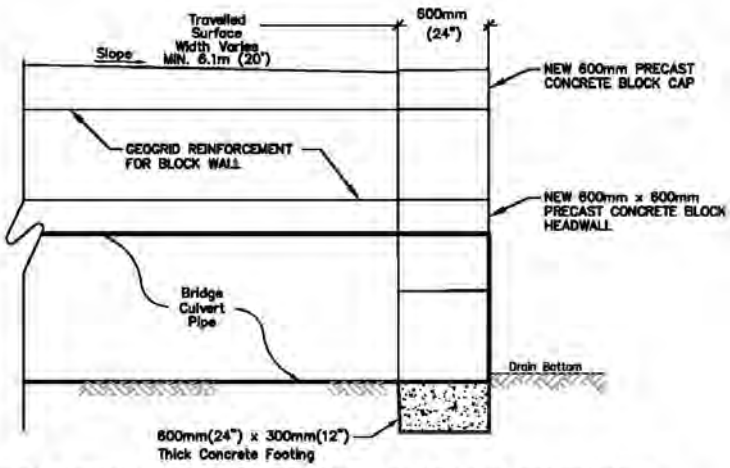
STANDARD LATERAL TILE DETAIL

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"

THE CORPORATION OF THE TOWN OF TECUMSEH

BY-LAW NO. 2007-51

Being a by-law to amend By-law No. 2007-41 to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh.

WHEREAS Council considers excessive smoke, smell, airborne sparks or embers to be or could become or cause public nuisances by creating negative health effects on neighbouring residents, increasing fire exposure hazards, infringing the enjoyment of the use of neighbouring properties and generating false or nuisance alarms;

AND WHEREAS Council is empowered under Section 128 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, to pass by-laws to prohibit and regulate public nuisances, including matters that, in the opinion of Council are, or could become or cause public nuisances;

AND WHEREAS in accordance with Section 425 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, a municipality may pass by-laws providing that a person who contravenes a by-law of the municipality passed under this Act is guilty of an offence;

AND WHEREAS Section 444 of the *Municipal Act* 2001, c. 25 states if a municipality is satisfied that a contravention of a by-law of the municipality passed under this Act has occurred, the municipality may make an order requiring the person who contravened the by-law or who caused or permitted the contravention or the owner or occupier of the land on which the contravention occurred to discontinue the contravening activity;

AND WHEREAS the Council of The Corporation of the Town of Tecumseh enacted By-law No. 2007-41 on the 26th day of June, 2007 to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh;

AND WHEREAS the Council of The Corporation of the Town of Tecumseh is desirous of amending By-law No. 2007-41;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF TECUMSEH ENACTS AS FOLLOWS:

1. **That** paragraph 4.9 be deleted and replaced with the following paragraph:

   4.9 Permitted fires, except those described in Section 4.4, shall,

   a) be kept to manageable size that shall not be greater than one (1) square metre with flames no higher than one (1) metre in height; and,
   b) in residentially zoned areas, be completely extinguished by 2:00 a.m.

2. **That** paragraph 5.2 be deleted and replaced with the following paragraph:

   5.2 An application for a Permit must be completed on the form/forms provided by the Tecumseh Fire/Rescue Services.

3. **That** paragraph 5.3 be deleted and replaced with the following paragraph:

   5.3 An application must be filed with the Chief Fire Official of the Tecumseh Fire/Rescue Services. Approved permits must be retained and presented to an attending fire official in the event that there is a need for a fire official to attend at the burn location due to complaint.

4. **That** this by-law shall take full force and effect on the third and final reading.

READ a first, second, third time and finally passed this 11th day of September, 2007.

Gary McNamara, Mayor

Laura Moy, Clerk

THE CORPORATION OF THE TOWN OF TECUMSEH

BY-LAW NUMBER 2007-41

A by-law to regulate the setting of open air fires and identify the precautions and conditions to be observed for such fires within The Corporation of the Town of Tecumseh.

WHEREAS Council considers excessive smoke, smell, airborne sparks or embers to be or could become or cause public nuisances by creating negative health effects on neighbouring residents, increasing fire exposure hazards, infringing on the enjoyment of the use of neighbouring properties and generating false or nuisance alarms;

AND WHEREAS Council is empowered under Section 128 of the *Municipal Act* 2001, S.O. 2001, c. 25 as amended, to pass bylaws to prohibit and regulate public nuisances, including matters that, in the opinion of Council are, or could become or cause public nuisances;

AND WHEREAS in accordance with Section 425 of the *Municipal Act 2001*, S.O. 2001, c. 25 as amended, a municipality may pass by-laws providing that a person who contravenes a by-law of the municipality passed under this Act is guilty of an offence;

AND WHEREAS Section 444 of the *Municipal Act* 2001 c. 25 states if a municipality is satisfied that a contravention of a by-law of the municipality passed under this Act has occurred, the municipality may make an order requiring the person who contravened the by-law or who caused or permitted the contravention or the owner or occupier of the land on which the contravention occurred to discontinue the contravening activity;

AND WHEREAS Section 446(1) of the *Municipal Act* 2001 c.25 states that if a municipality has the authority under this or any other Act or under a by-law under this or any other Act to direct or require a person to do a matter or thing, the municipality may:

- provide that, in default of it being done by the person directed or required to do it, the matter or thing shall be done at the person's expense;
- enter upon land at any reasonable time;
- recover the costs of doing a matter or thing from the person directed or required to do it by action or by adding the costs to the tax roll and collecting them in the same manner as property taxes; and
- that costs include interest calculated at a rate of 15 per cent or such lesser rate as may be determined by the municipality, calculated for the period commencing on the day the municipality incurs the costs;
- the costs, including interest, constitutes a lien on the land upon the registration in the proper land registry office of a notice of lien;

AND WHEREAS Section 390 of the *Municipal Act* 2001 c.25 provides that a "person" includes a municipality and a local board and the Crown;

AND WHEREAS Section 426 of the *Municipal Act* 2001 c. 25 provides that no person shall hinder or obstruct, or attempt to hinder or obstruct any person exercising a power or performing a duty under this Act or a by-law under this Act and that any person who contravenes subsection (1) is guilty of an offence;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF TECUMSEH ENACTS AS FOLLOWS:

1. DEFINITIONS

In this By-law:

1.1 "Burning Appliance" means any device designed or engineered to have a fire set within a contained area and totally enclosed by various means of screening and/or other methods.

1.2 "By-law Enforcement Officer" means the municipal person appointed by the Town of Tecumseh who shall be responsible for the enforcement of the provisions of this by-law.

1.3 "Chief Fire Official" means the Fire Chief of the Tecumseh Fire/ Rescue Services or designate.

1.4 "Competent Adult" means any person (18 years of age or older) who, in the opinion of those charged with enforcement of this By-Law, is capable of exercising the required judgement and capable of performing the necessary actions to control and prevent its unwanted spread.

1.5 "Farmer" means the owner or operator of an agricultural operation within an area zoned for agricultural pursuant to the *Farming & Food Protection Act*, 1998.

1.6 "Farmlands" means land designated "agricultural".

1.7 "Firefighter" means any person or any rank of person employed in, or appointed to the Tecumseh Fire/Rescue Services and assigned to undertake fire protection or fire prevention services.

1.8 "Full Cost Recovery Basis" has the meaning as described in Schedule "A" attached hereto.

1.9 "Open Air" means any open place, yard, field, lot, part lot or construction area which is not enclosed by a building or structure.

1.10 "Open Air Burning" means any fire set in the Open Air.

1.11 "Owner" means the registered owner or any person, firm or corporation having control over, or possession, of any portion of the building or property under consideration and includes the persons in the building or on the property.

1.12 "Permit" means a permit issued by the Chief Fire Official to set a fire in the Open Air for a specified date and period of time.

1.13 "Person" means an individual, business, a partnership or a corporation.

1.14 "Pit" means an area dug into the ground and/or surrounded by materials designed to contain the fire and prevent its spread to areas beyond the Pit.

1.15 "Police Officer" means any member of the Ontario Provincial Police.

1.16 "Tenant" means the occupant having possession or Person having control of a property or premises.

1.17 "Town" means The Corporation of the Town of Tecumseh.

2. ADMINISTRATION AND ENFORCEMENT

2.1 The Chief Fire Official shall be responsible for the administration of this by-law.

2.2 Enforcement of this by-law is the responsibility of the Chief Fire Official, any Fire-fighter, any Police Officer or any By-law Enforcement Officer.

2.3 The Chief Fire Official may refuse to issue a Permit or revoke any or all issued Permits.

2.4 The Fire Chief, Firefighters or Police Officers may, at all times enter and inspect any property or premises in order to ascertain whether the provisions of this by-law are complied with and to enforce or carry into effect the by-law.

2.5 Any person who fails to comply with the provisions of this by-law or fails to extinguish a fire once notification to do so has been given to him by the Chief Fire Official, a Police Officer or a Firefighter shall, in addition to any penalty provided herein, be liable to the municipality for all expenses incurred for the purposes of controlling and extinguishing of any fire so set or left to burn and such expenses may be recovered by court action or in a like manner as municipal taxes.

3. ENVIRONMENT

3.1 All Open Air Burning shall comply with the provisions of the *Environmental Protection Act*, R.S.O. 1990. c. E19.

3.2 No Open Air Burning shall be permitted when a smog alert has been issued for the region of Essex County, which includes the Town.

3.3 No Open Fire shall be started or maintained when wind condition is in such direction or intensity so as to cause any or all of the following:

(a) decrease in visibility on any highway or roadway;

(b) threaten a rapid spread of fire through a grass or brush area;

(c) smoke which causes annoyance or irritation to adjacent persons, properties or premises.

4. GENERAL PROVISIONS

4.1 No Person being the Owner or Tenant in possession of lands within the Town shall allow a fire to be set or burn on such lands unless a Permit has been obtained.

4.2 No Person shall allow a fire to be set or burned exceeding the requirements of Sections 4.8 and 4.9.

4.3 Notwithstanding any provisions herein, no Person shall set or maintain a fire,

(a) in contravention of the *Ontario Fire Code*, the *Environmental Protection Act* or any other statutory requirements of the Province of Ontario or the Government of Canada;

(b) where the consumption of material or size and area of the fire will exceed the limits set by the Chief Fire Official and/or listed within this by-law in Sections 4.8 and 4.9.

4.4 (a) No Permit shall be required for domestic barbeques or permanent outdoor fireplaces used solely for the cooking of food on a grill and extinguished immediately upon completion of the cooking process or any Burning Appliance, or a Pit or open area where the requirements of Sections 4.8 and 4.9 are not exceeded;

(b) installation and location of Burning Appliances must meet the manufacturer's specifications.

4.5 (a) A farmer who intends to set or maintain a fire in the Open Air on a specified day for disposal of vegetable matter or vegetation on Farmlands which is normal and incidental for farming purposes shall obtain a Permit to cover the period of the proposed Open Air fire, and will be required to notify the Tecumseh Fire/Rescue Services for each day that the proposed Open Air fire will take place;

(b) an Open Air fire shall be supervised by a Competent Adult equipped with sufficient equipment to control and contain the Open Air fire to prevent the spread of the Open Air fire that would endanger or put at risk other properties or premises;

(c) an Open Air fire shall be restricted to daylight hours only;

(d) an Open Air fire shall be surrounded by a tilled area wide enough to prevent an Open Air fire from jumping across the tilled area and to maintain the area of the burn to be no greater then one (1) hectare in size;

(e) the leading edge of the flame of an Open Air fire shall not exceed thirty (30) metres in length.

4.6 No Person shall set any fire in the Open Air to burn asphalt products, tires, treated wood, construction materials or rubble, kitchen garbage or any garbage or trash, rubber plastics and like items.

4.7 No Person shall set any fire in the Open Air except where permitted and only in the presence of a Competent Adult. The Competent Adult shall not leave the burning operation until such time as the fire has been completely extinguished and there is no threat of re-ignition or spreading of the fire.

4.8 Every Person that starts a fire in the Open Air shall ensure that there are adequate tools and/or water on hand to contain or extinguish the fire.

4.9 Permitted fires, except those described in Section 4.4, shall be kept to manageable size that shall not be greater then one (1) square metre with flames no higher than one (1) metre in height.

4.10 Every Person who sets an Open Air fire in the Town of Tecumseh shall be:

(a) responsible and liable for any damage to property or injury to person occasioned by said fire;

(b) liable for all costs incurred by the Town of Tecumseh, including but not limited to, the Fire/Rescue Services, including personnel and other agencies called to control and extinguish said fire on a Full Cost Recovery Basis. All fees and charges to be paid under this subsection shall be payable in the manner and subject any interest and penalties set forth in paragraph 5 and 6 of the Administrative Fees and Charges By-law 2007-12, as may be amended or repealed from time to time;

(c) the fees and charges under this section shall not be payable by that class of persons which have obtained a permit for an Open Air fire and complied with the terms of such permit.

4.11 Notwithstanding the aforementioned sections listed herein, the Fire Chief may issue a Permit upon application and approve the setting of any fire subject to the fire being adequately supervised and controlled through special conditions addressed by the Chief Fire Official.

4.12 No fire shall be set to dispose of commercial, industrial or construction waste or other like materials in areas zoned for commercial or industrial occupancies and such aforementioned materials shall not be transported to residential or agricultural areas for burning purposes.

4.13 No fires shall be set at construction and/or demolition sites for the purpose of disposing of waste, building material or rubble.

5. FIRES REQUIRING PERMITS

5.1 Except as provided in section 4.3 of this by-law, no Person shall set, maintain or cause to be set or maintained, a fire in the Open Air unless a Permit has been issued by the Chief Fire Official.

5.2 An application for a Permit must be completed on the form/forms provided by the Tecumseh Fire/Rescue Services. Such forms are available to fill out by telephone call to Tecumseh Fire Station No. 1, Monday to Friday from 08:30 hr to 16:30 hr.

5.3 Each completed application for a Permit must be filed with the Chief Fire Official of the Tecumseh Fire/Rescue Services, at the administration offices located at 985 Lesperance Road, Tecumseh, Ontario.

5.4 In issuing a Permit under this part for Open Air Burning, the Chief Fire Official may impose any additional requirements or conditions as may be deemed necessary.

6. OFFENCES

6.1 (a) Any person who contravenes any of the provisions of this by-law is guilty of an Offence;

(b) any person who hinders or obstructs a person lawfully carrying out the enforcement of this by-law is guilty of an Offence.

7. FINES

7.1 Every Person who is convicted of an Offence is liable to a Fine of not more than Five Thousand ($5,000.00) Dollars as provided for in the *Provincial Offences Act*, R. S.O. 1990, Chap. P.33.

8. SEVERABILITY

8.1 If any section or sections of this by-law or parts thereof are found in any court to be illegal or beyond the power of Council to enact, such section or sections or parts thereof shall be deemed severable and all other sections or parts of this by-law shall be deemed separate and independent there from and enacted as such.

9. **SHORT TITLE**

9.1 The short title of this by-law shall be TECUMSEH OPEN AIR BURNING BY-LAW.

10. **EFFECTIVE DATE**

10.1 This by-law shall come into full force and take effect on the 1st day of July, 2007.

11 **REPEAL**

11.1 By-law No. 2005-57 is hereby repealed.

READ a first, second, third time and finally passed this 26th day of June, 2007.

Gary McNamara, Mayor

Laura Moy, Clerk

SCHEDULE "A"
By-law Number 2007-41

THE CORPORATION OF THE TOWN OF TECUMSEH
TECUMSEH FIRE/RESCUE SERVICES EQUIPMENT SERVICES RATES

"Full Cost Recovery Basis" includes any and all charges and costs howsoever incurred by the Town directly or indirectly in controlling and extinguishing the Open Air fire and shall include without limitations:

Emergency Services Rendered:

(a) $350.00 first hour or part thereof per piece of equipment;

(b) $175.00 each additional half-hour or part thereof per piece of equipment;

(c) $42.00 first hour or part thereof per firefighter who responds to the call;

(d) $27.50 for each additional hour or part thereof per firefighter until all equipment is cleaned, checked and returned to service;

(e) the cost of all extinguishing agents required to extinguish the fire.

No Emergency Services Rendered:

(a) $350.00 flat rate per piece of equipment where services are not required nor provided;

(b) $42.00 flat rate per firefighter who responds to the call for service.

APPENDIX “REI-E”

WATERSHED PLAN, PROFILES, PLANS, AND SECTIONS

COLCHESTER TOWNLINE DRAIN

(Geographic Township of Sandwich South)

IN THE

TOWN OF TECUMSEH

IN THE

COUNTY OF ESSEX • ONTARIO

GERARD ROOD, P.ENG.

REGISTERED PROFESSIONAL ENGINEER G.ROOD 2022-06-02 PROVINCE OF ONTARIO

ROOD ENGINEERING INC.

CONSULTING ENGINEERS
Leamington, Ontario
519-322-1621

DATE: APRIL 26th, 2022

TOWN OF TECUMSEH

MAYOR: GARY McNAMARA
CLERK: LAURA MOY
DRAINAGE SUPERINTENDENT: SAM PAGLIA, P.ENG.

BENCHMARKS:

TOP SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.
ELEV. = 192.990m

TOP OF NAIL IN HYDRO POLE APPROXIMATELY 18 METRES SOUTH OF 10TH CONCESSION ROAD.
ELEV. = 193.563m

TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH WEST OF MN 6264.
ELEV. = 193.301m

TOP OF NAIL IN HYDRO POLE APPROXIMATELY 1 METRE EAST OF WESTERN HEADWALL OF 9TH CONCESSION ROAD.
ELEV. = 191.610m

TOP OF NAIL IN HYDRO POLE APPROXIMATELY 10 METRES SOUTH OF MN 4890.
ELEV. = 189.852m

TOP OF NAIL ON HYDRO POLE APPROXIMATELY 40 METERS SOUTH WEST OF 8TH CONCESSION ROAD.
ELEV. = 188.298m

TOP OF NAIL IN HYDRO POLE NORTH OF MN 15415. APPROXIMATELY 50 METRES SOUTH EAST OF MN 2770.
ELEV. = 187.602m

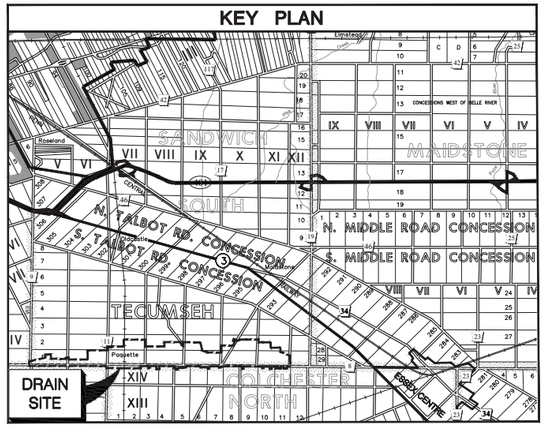
TOP OF NUT ON FIRE HYDRANT APPROXIMATELY 10 METRES SOUTH EAST OF WALKER ROAD.
ELEV. = 187.524m

TOP OF NAIL IN HYDROPOLE APPROXIMATELY 15 METRES SOUTH OF MN 1800.
ELEV. = 186.805m

TOP OF NAIL IN HYDRO POLE 35 METRES SOUTH EAST OF MN 1604.
ELEV. = 185.652m

TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.
ELEV. = 184.504m

TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.
ELEV. = 184.018m



KEY PLAN
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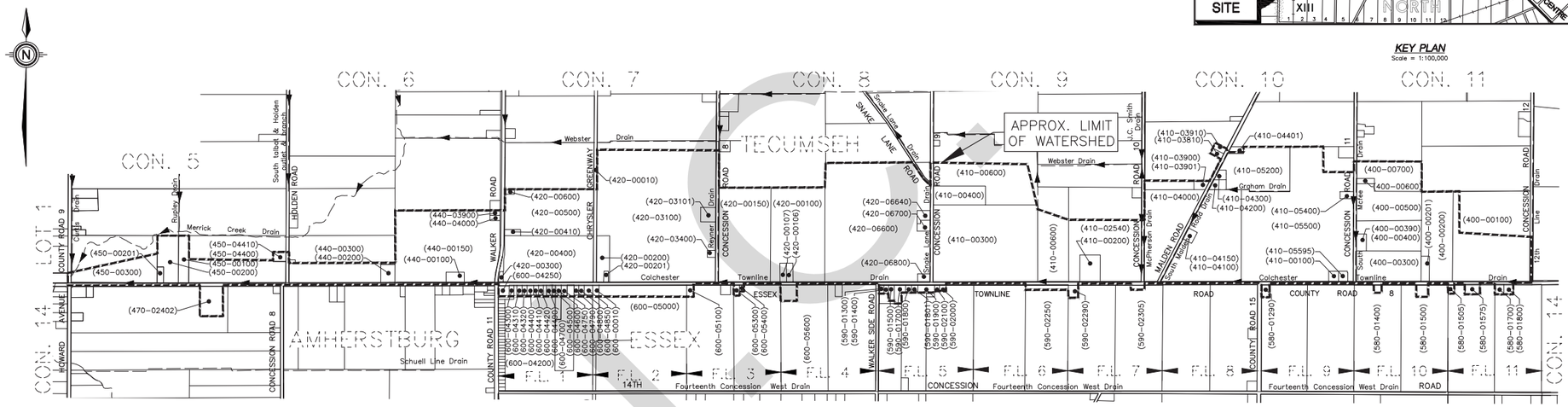

WATERSHED PLAN

SCALE = 1:15000

No.	Roll No.	Owner/s	No.	Roll No.	Owner/s	No.	Roll No.	Owner/s	No.	Roll No.	Owner/s
1	400-00100	KAREN & JEROME RACICOT	28	410-05500	GERALD SANTO	55	450-00100	TOMMASO & ANGELA ROSSI	82	600-04200	FRANK LAFFERTY & PAUL & ROSE JOBIN
2	400-00200	JOHN LAFFERTY	29	410-05595	GERALD & MICHELLE SANTO	56	450-00200	GORDON & LINDA KEIRL	83	600-04250	JAMES & PAULINE PAQUETTE
3	400-00201	KEVIN & MARY PARENT	30	420-00010	CONSERVATION AUTHORITY ESSEX	57	450-00201	GORDON & LINDA KEIRL	84	600-04300	MICHAEL & SHAWN KING
4	400-00300	GURVINDER & MANDEEP VIRK	31	420-00100	AUGUSTINE REVENBERG	58	450-00300	JOHN & SHELAGH MCKINLEY	85	600-04310	JAMES PAQUETTE & STACEY COWPER
5	400-00390	JEFFERY GERARD & NATALINA VESCO	32	420-00106	JOAN PETTYPIECE	59	450-04400	GEORGE AGOCS	86	600-04320	DAVID MASSARELLA & ACACIA OUELLETTE
6	400-00400	JAMES GERARD & CAROLYN GERARD	33	420-00107	KAREN HARRISON	60	450-04410	HEATHER BAROLAK-WHITE	87	600-04400	RICHARD & JUDY GAGNON
7	400-00500	CARMEN TAYFEL & ROY TAYFEL	34	420-00150	AUGUSTINE & GAYNIA REVENBERG	61	470-02402	BEZAIRE, PHILIP JOEL & MARIE TARA	88	600-04410	ALINA PERSYN & SCOTT STASZUK
8	400-00600	KURT FAROUGH & BARBARA FAROUGH	35	420-00200	VINCENZO & KRISTEN CHIARAPPA	62	580-01290	ELEANOR MERGL	89	600-04420	HARVEY & CATHERINE MARTEL
9	400-00700	RONALD LAFFERTY	36	420-00201	VINCENZO CHIARAPPA	63	580-01400	HARVEY & KATHLEEN LAFFERTY	90	600-04490	DERRIN WALL
10	410-00100	CHAD & MAEGAN SANTO	37	420-00300	ASIM ALA	64	580-01500	HARVEY & KATHLEEN LAFFERTY	91	600-04500	DAVID ST LOUIS & DAWN REAUME
11	410-00200	ELEANOR MERGL	38	420-00400	MANJINDERJIT SINGH & SURJIT TOOR	65	580-01505	DOUGLAS & THERESA LYPPS	92	600-04600	JASON & HEATHER TOTH
12	410-00300	MIKE BALIPAP	39	420-00410	STEPHEN & NANCY BROWN	66	580-01575	BRANDON ANTONUCCI	93	600-04700	CLAYTON & KELLY KELLY
13	410-00400	GEORGE DOBRICH	40	420-00500	NANCY BROWN	67	580-01700	RAKESH KUMAR	94	600-04750	CHEUK-KI WU
14	410-00600	ROYAL ESTATE GOLF CLUB LTD	41	420-00600	WILLIAM DENNISON	68	580-01800	JACQUELINE FLOOD	95	600-04790	DAVID & SANDRA DRISCOLL
15	410-02540	MERGL SEEDS LTD	42	420-03100	GAYNIA REVENBERG	69	590-01300	KATHLEEN LEPAIN	96	600-04800	JEFFERY WINDOVER & ALICIA HANDSOR
16	410-03810	BEVERLY KAUFMANN	43	420-03101	AUGUSTINE & GAYNIA REVENBERG	70	590-01400	LEONARD O'NEIL	97	600-04850	WILLIAM & MARJORY ROBERTSON
17	410-03900	ISKANDAR EL-KHOURY	44	420-03400	AUGUSTINE REVENBERG	71	590-01500	MARGARET LIEDTKE	98	600-05000	ROSEMARY MELOCHE
18	410-03901	WILLIAM BURROWS	45	420-06600	AUGUSTINUS & GAYNIA REVENBERG	72	590-01700	KRISTAN BONDY & MINNIS JOSEPH	99	600-05100	JUSTINE MELOCHE
19	410-03910	KURT KAUFMANN	46	420-06640	ETHEL & ELMER GROVE	73	590-01800	VIRGINIA ORIET	100	600-05300	JOSEPH & DIANE MELOCHE
20	410-04000	ZACHARY PAN	47	420-06700	KENNETH & MICHELLE ROBERTS	74	590-01801	MARK & DEBORAH MARSHALL	101	600-05400	MICHAEL REAUME
21	410-04100	CHARLES FAROUGH	48	420-06800	DENNIS & MARILYN O'NEIL	75	590-01900	ANGLICAN SYNOD OF HURON	102	600-05600	LOUIS & DOBRILLA STANKOVICH
22	410-04150	DONALD DEEHAN	49	440-00100	MEREDITH & GERTRUDE WHITE	76	590-02000	STEVEN ST. LOUIS			
23	410-04200	DONALD DEEHAN	50	440-00150	EDWARD WHITE	77	590-02100	WILLIAM & APRIL BRAZEAU			
24	410-04300	RAYMOND LONG	51	440-00200	ALAWI ISLAMIC CULTURAL ASSOCIATION OF WINDSOR	78	590-02250	PARRLINE SUPPLY LIMITED			
25	410-04401	JEREMY BEAULIEU	52	440-00300	GEORGE AGOCS & ROBERT WICKETT	79	590-02290	RYAN & BARBARA O'NEIL			
26	410-05200	CHARLES FAROUGH	53	440-03900	CHRISTINE ARTHURTON	80	590-02305	DAVID FANTINATO			
27	410-05400	RICHARD & SUE HOMENUIK	54	440-04000	LEONARD & HELEN MELOCHE	81	600-00010	CONSERVATION AUTHORITY EXREG			

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

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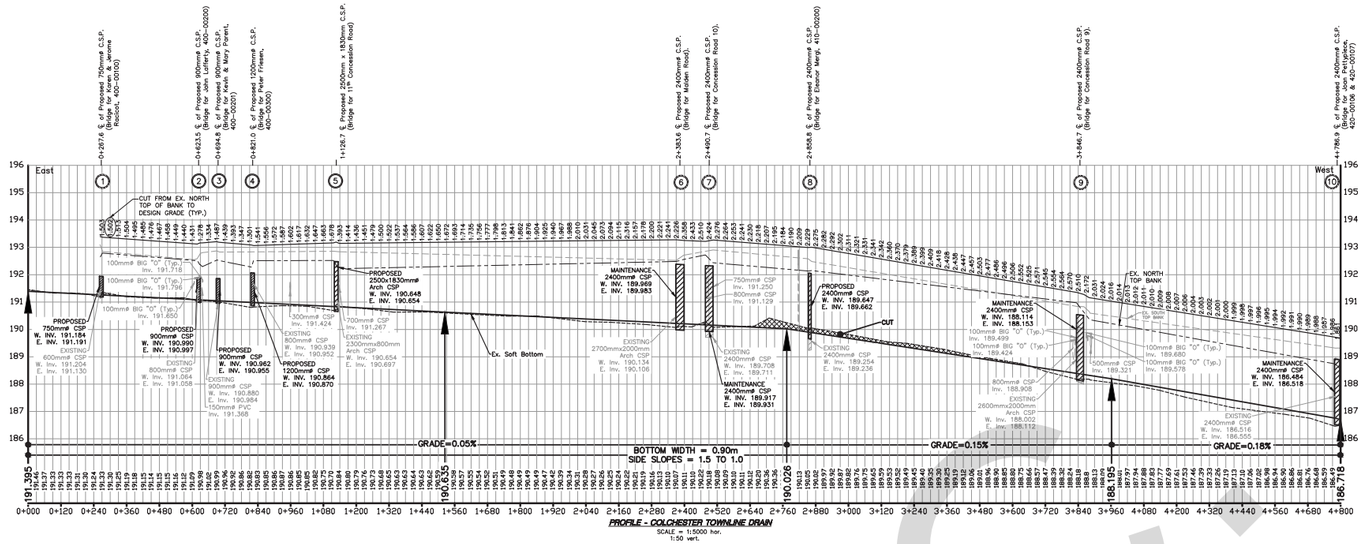

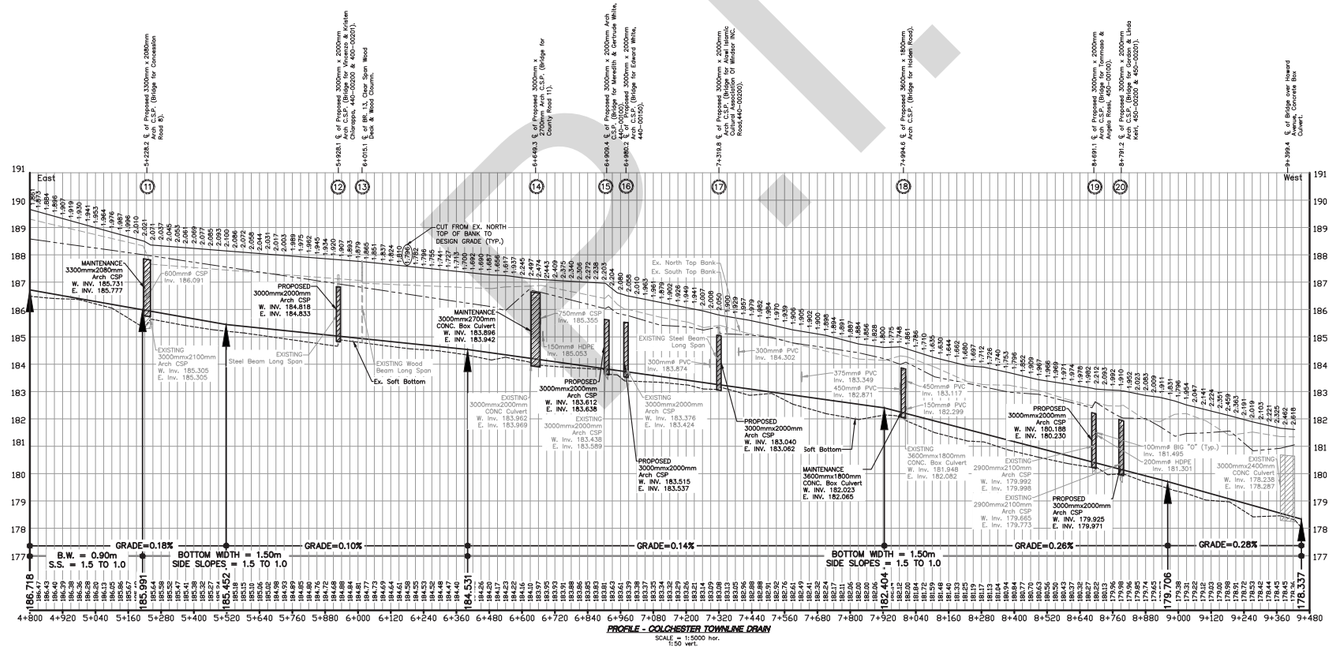

PIPE LEGEND:

1. 750mmø CSP, 14.00m (45.9ft) length
2. 900mmø CSP, 13.00m (42.7ft) length
3. 900mmø CSP, 14.00m (45.9ft) length
4. 1200mmø CSP, 13.00m (42.7ft) length
5. 2500mm x 1830mm Arch CSP, 13.0m (42.7ft) length
6. 2400mmø CSP, 28.00m (91.9ft) length
7. 2400mmø CSP, 28.00m (91.9ft) length
8. 2400mmø CSP, 10.00m (32.8ft) length
9. 2400mm Arch CSP, 26.00m (85.3ft) length
10. 2400mmø CSP, 19.00m (62.3ft) length
11. 3300mm x 2080mm Arch CSP, 26.00m (85.3ft) length
12. 3000mm x 2000mm Arch CSP, 15.00m (49.2ft) length
13. Clear Span Wood Deck & Column, 3.00m (9.8ft) length
14. 3000mm x 2700mm Concrete Box Culvert, 33.00m (108.3ft) length
15. 3000mm x 2000mm Arch CSP, 18.00m (59.1ft) length
16. 3000mm x 2000mm Arch CSP, 16.00m (52.5ft) length
17. 3000mm x 2000mm Arch CSP, 16.00m (52.5ft) length
18. 3600mm x 1800mm Concrete Box Culvert, 16.00m (52.5ft) length
19. 3000mm x 2000mm Arch CSP, 16.00m (52.5ft) length
20. 3000mm x 2000mm Arch CSP, 18.00m (59.1ft) length

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
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FILE No.:	SHEET No.:
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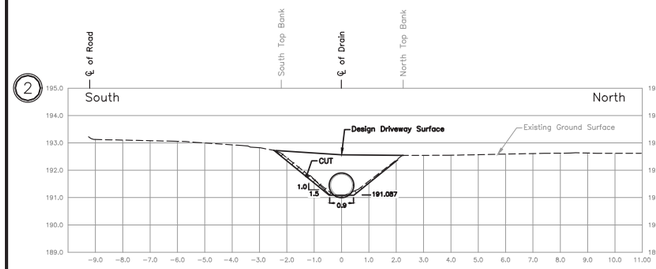

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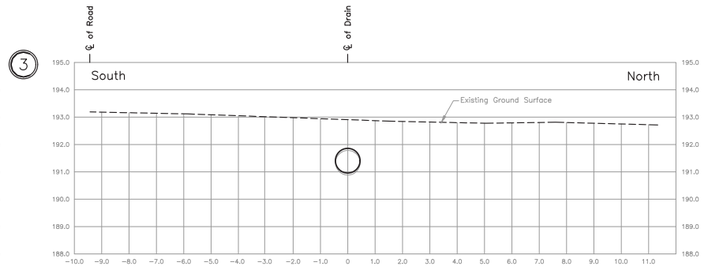

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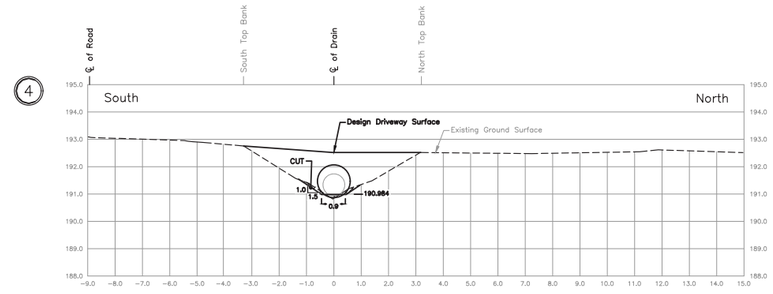

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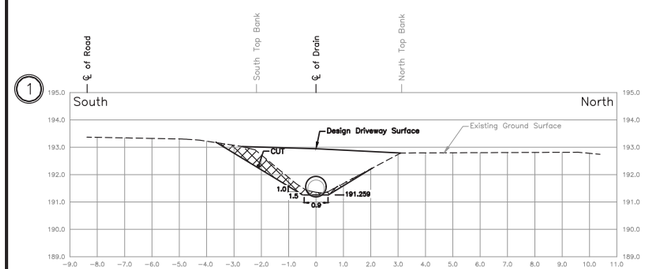
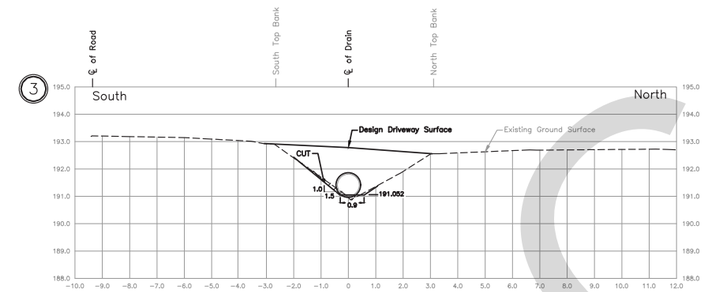
STA. 0+827.50
Scale = 1:100



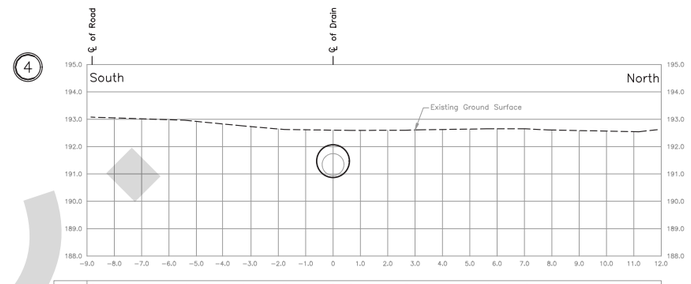
Elev.	193.37	193.32	193.30	193.26	193.03	192.95	191.66	191.43	191.36	191.26	191.46	192.79	192.82	192.74
Offset	8.38	6.04	4.89	4.26	2.69	2.39	0.71	0.35	0.24	0.18	0.60	3.10	9.58	10.38

STA. 0+274.60
Scale = 1:100



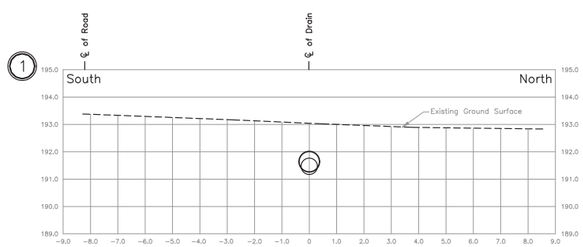
Elev.	193.19	193.19	193.15	193.10	193.02	192.93	192.80	191.96	191.85	191.86	192.56	192.56	192.70	192.73	192.71	192.70
Offset	9.37	8.02	5.94	5.11	3.52	3.08	2.07	0.07	0.44	1.98	3.36	3.36	6.97	6.92	11.28	12.00

STA. 0+687.80
Scale = 1:100



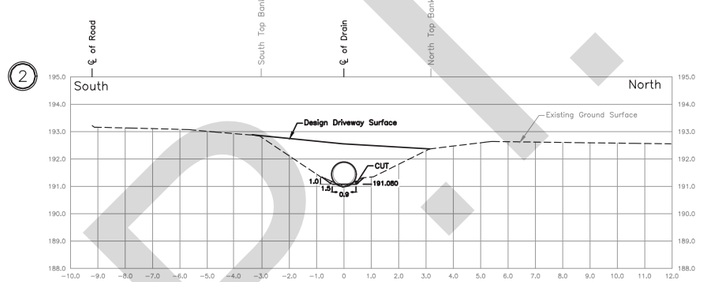
Elev.	193.28	192.96	192.76	192.83	192.60	192.59	192.60	192.61	192.65	192.65	192.61	192.54
Offset	8.81	5.39	3.26	1.75	0.03	0.67	2.48	3.21	5.65	7.07	7.91	11.00

STA. 0+821.0
Scale = 1:100



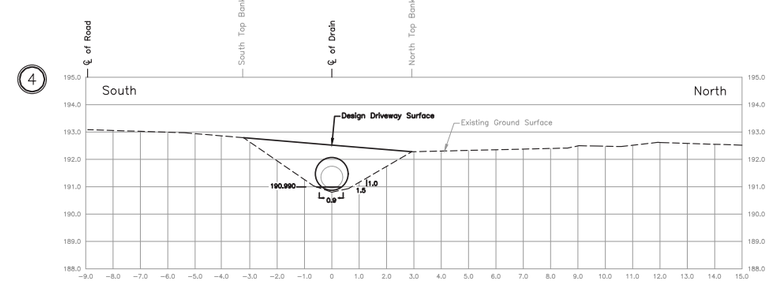
Elev.	193.38	193.17	193.05	192.89
Offset	8.39	2.75	0.00	3.77

STA. 0+267.60
Scale = 1:100



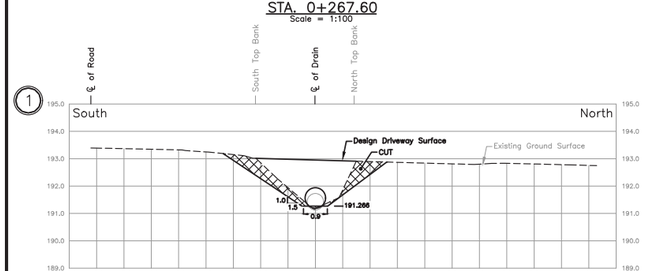
Elev.	193.22	193.13	193.08	192.88	192.83	191.34	191.25	190.89	191.31	191.35	192.37	192.62	192.64	192.60	192.57	192.56
Offset	9.17	7.76	5.64	4.61	3.40	3.04	0.81	0.54	0.10	0.71	1.12	3.18	5.24	5.56	8.65	10.65	12.00

STA. 0+630.60
Scale = 1:100



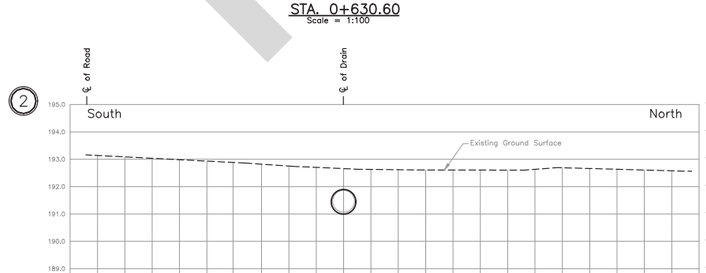
Elev.	193.09	192.87	192.79	191.03	190.80	190.83	192.28	192.41	192.50	192.49	192.47	192.62	192.62
Offset	8.92	5.39	3.23	0.87	0.00	0.00	2.92	8.62	9.03	9.73	10.59	11.92	15.00

STA. 0+814.5
Scale = 1:100



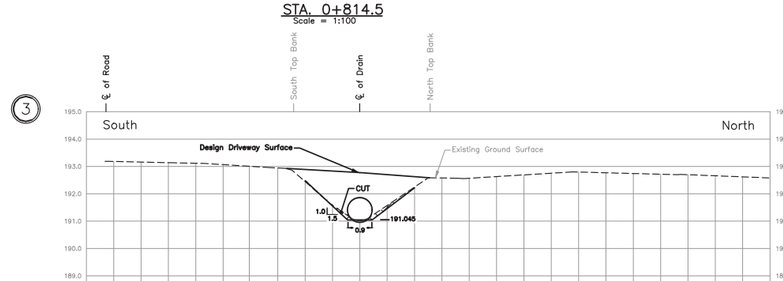
Elev.	193.39	193.39	193.32	193.24	193.11	193.02	192.28	191.44	191.26	191.60	191.58	191.88	192.79	192.83	192.84	192.76	192.75
Offset	8.21	8.00	4.88	3.92	2.60	2.39	1.40	0.40	0.19	0.18	0.87	1.47	5.81	6.45	6.93	9.30	10.28

STA. 0+260.60
Scale = 1:100



Elev.	193.165	192.864	192.740	192.661	192.463	192.609	192.603	192.895	192.559
Offset	9.383	3.598	1.775	0.00	0.607	2.858	6.635	7.864	12.774

STA. 0+624.10
Scale = 1:100



Elev.	193.19	193.13	193.11	192.97	192.93	192.86	191.03	190.19	190.03	191.11	192.59	192.57	192.80	192.70	192.58
Offset	9.28	6.78	5.65	3.36	2.68	2.44	1.03	0.39	0.00	0.35	2.55	3.64	7.83	11.67	15.00

STA. 0+701.8
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: REI2018D035.DWG

FILE No.: REI2018D035

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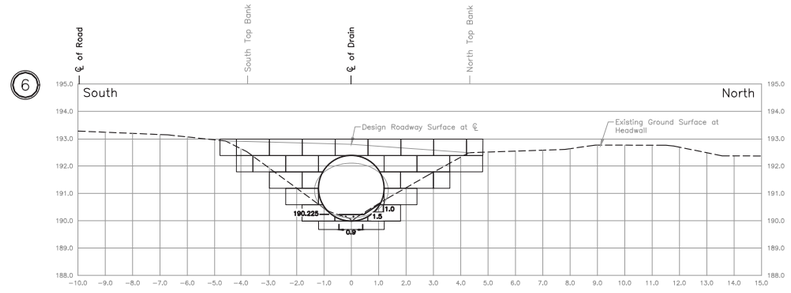
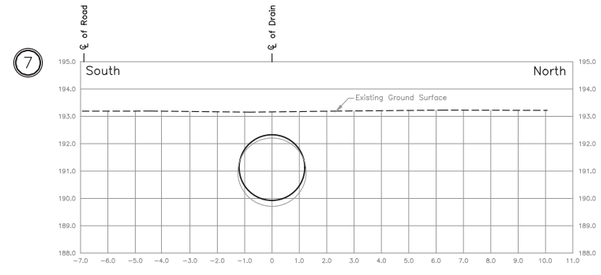


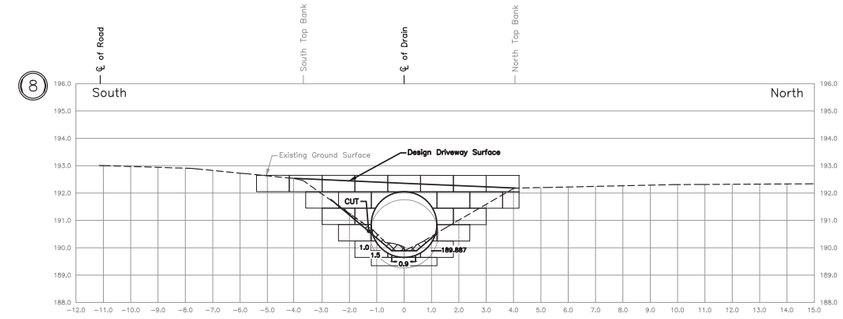
Elev.	193.28		193.14		192.91	192.53		190.42		190.07	190.16		190.81		191.68		192.48		192.61		192.77		192.76	192.75		192.37		192.37
Offset	9.95		6.68		4.56	3.78		0.92		0.00	0.28		1.35		2.87		4.33		7.86		8.97		11.44	11.83		13.60		15.00

STA. 2+365.50
Scale = 1:100



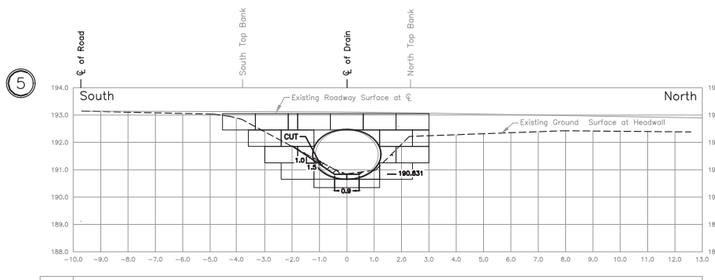
Elev.	193.17	193.19		193.15	193.16		193.19		193.23		193.22
Offset	10.89	4.41		0.74	0.00		2.35		6.34		10.10

STA. 2+490.81
Scale = 1:100



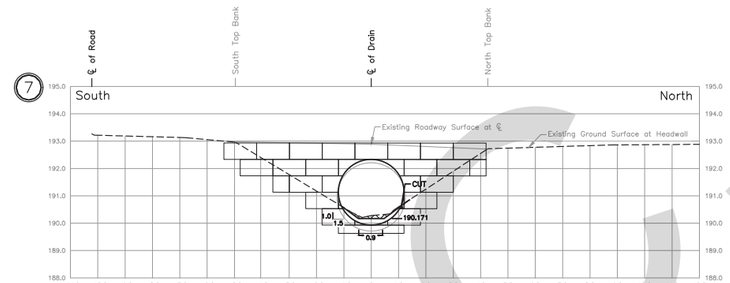
Elev.	192.75	191.79	193.01		192.90		192.71		192.55	192.46		190.63	190.19	190.16	190.05	190.23		190.76		192.18		192.21		192.31	192.31		192.34
Offset	11.62	11.37	11.10		7.72		5.81		4.16	3.66		1.08	0.64	0.36	0.00	0.74		1.61		4.07		5.31		9.88	10.91		15.00

STA. 2+863.80
Scale = 1:100



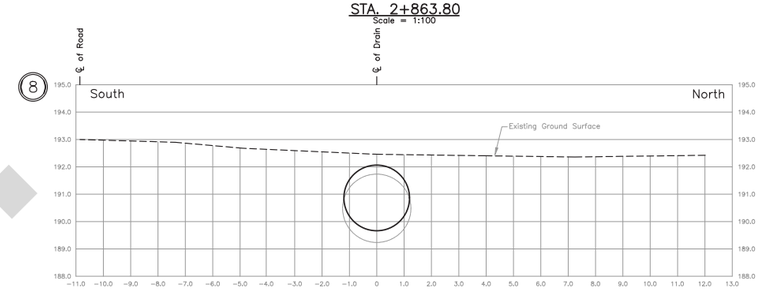
Elev.	193.14		193.05		192.95	192.84		191.01	190.85		190.98		192.22						192.43										192.38	
Offset	9.69		6.29		4.23	3.80		0.40	0.00		1.09		2.33						7.98										12.62	

STA. 1+137.10
Scale = 1:100



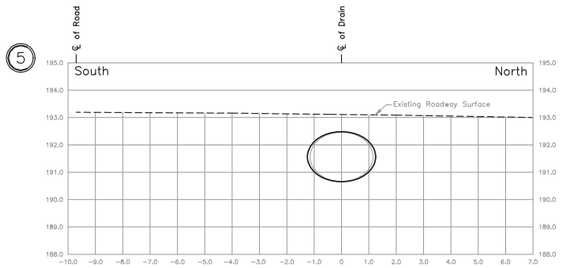
Elev.	193.27		193.13		192.96			190.40	190.23	190.28		190.34				192.77				192.86						192.89				
Offset	10.22		6.82		4.97			0.73	0.33	0.00		0.71				4.24				8.81						12.00				

STA. 2+476.43
Scale = 1:100



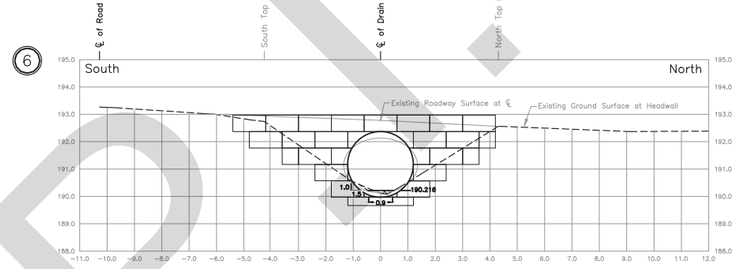
Elev.	193.00				192.90		192.68				192.46					192.40				192.36					192.42					
Offset	10.83				7.36		4.92				0.00					3.95				7.24					12.01					

STA. 2+858.80
Scale = 1:100



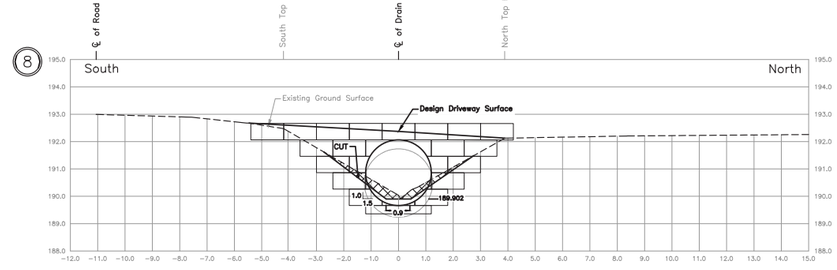
Elev.	193.19				193.16				193.12		193.12				193.09														193.00	
Offset	9.71				4.00				0.36		0.00				2.00														7.00	

STA. 1+126.60
Scale = 1:100



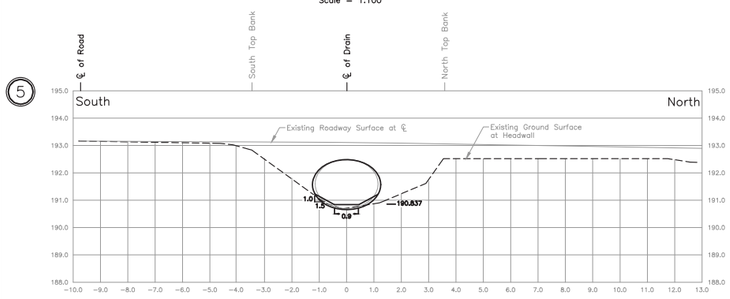
Elev.	193.27	193.25				193.02	193.01		192.80	192.74		191.85			190.55		190.11	190.18	190.32		190.86			192.56				192.37			192.37
Offset	10.28	9.90				6.42	6.07		4.79	4.25		2.96			1.04		0.00	0.34	0.47		1.35			4.30				9.13			12.00

STA. 2+402.50
Scale = 1:100



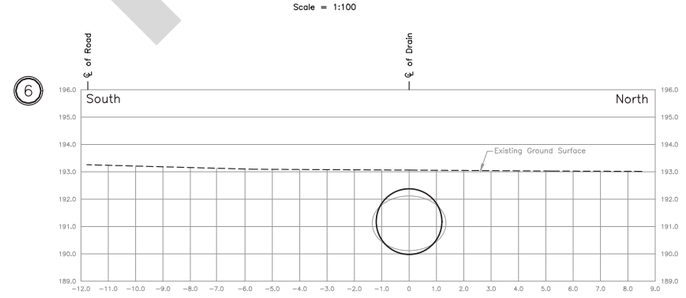
Elev.	192.76	191.80				192.90			192.69	192.68		192.48				190.04	190.24	190.33		192.12				192.20					192.26	
Offset	11.75	11.19				7.76			5.72	5.46		4.27				0.00	0.48	0.70		3.89				8.34					15.00	

STA. 2+853.80
Scale = 1:100



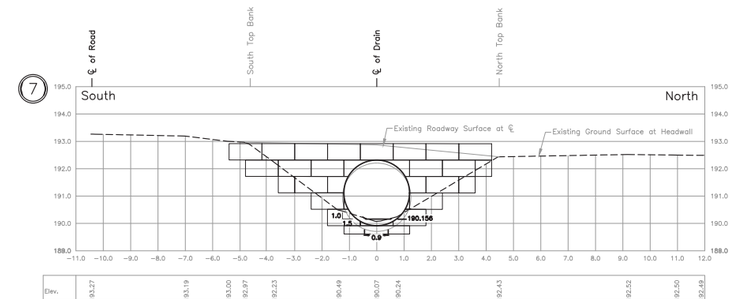
Elev.	193.16		193.11		193.08	193.03	192.86		190.90	190.70		190.97		191.61	192.52				192.52			192.52		192.52		192.39	192.39	
Offset	9.76		6.35		4.58	4.13	3.52		0.74	0.00		1.39		2.94	3.58				7.17			9.90		11.79		12.60	12.85	

STA. 1+116.10
Scale = 1:100



Elev.	193.26				193.09						193.06							193.03							190.11					
Offset	11.78				5.69						0.00							5.22							8.52					

STA. 2+384.0
Scale = 1:100



Elev.	193.27				193.19		193.00		192.97		192.23				190.49		190.07		190.24					192.43				192.52		192.50		192.49
Offset	10.42				6.97		5.42		4.81		3.70				1.38		0.00		0.78					4.48				9.21		10.98		12.00

STA. 2+505.18
Scale = 1:100

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COMPUTER FILE: REI2018D035.DWG

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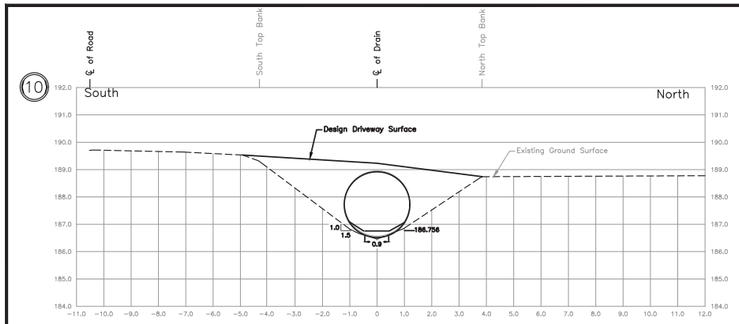
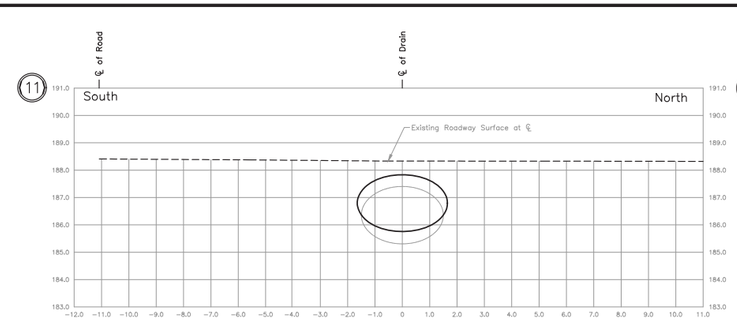


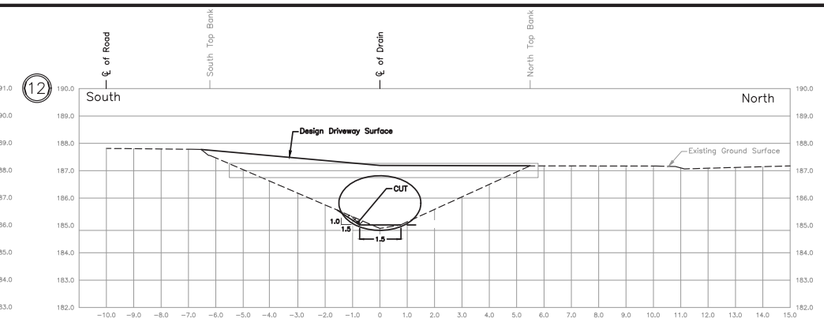
Elev.	189.70	189.64	189.53	189.32	186.82	186.67	186.46	186.84	188.70	188.79
Offset	10.52	7.07	4.92	4.33	0.99	0.69	0.00	0.98	3.76	12.00

STA. 4+777.90
Scale = 1:100



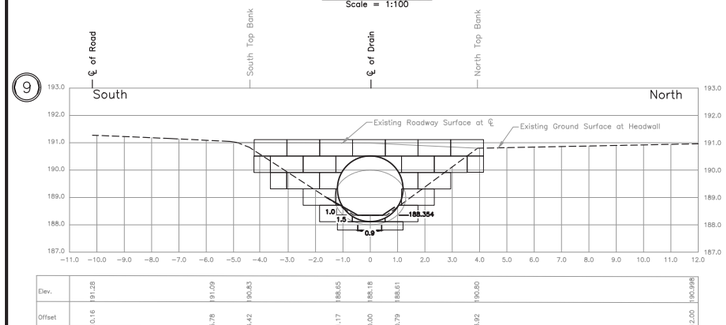
Elev.	188.41	188.38	188.33	188.33	188.32	188.32
Offset	11.08	5.54	0.52	0.00	5.23	9.42	11.00

STA. 5+228.21
Scale = 1:100



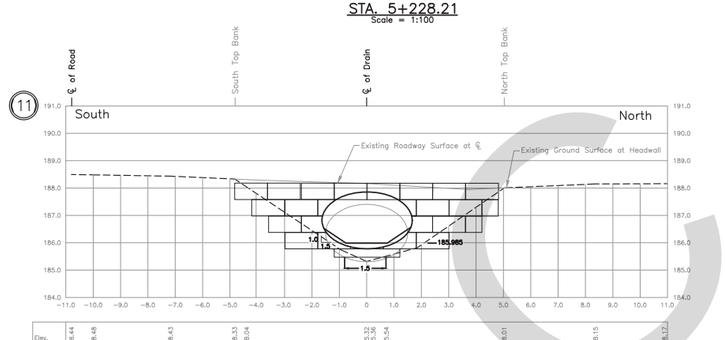
Elev.	187.81	187.78	187.77	187.56	187.30	187.12	187.27	194.72	187.18	187.17	187.15	187.07	187.18
Offset	10.00	6.91	6.54	6.27	3.96	2.85	2.44	0.00	5.49	10.10	10.80	11.14	15.00

STA. 5+934.53
Scale = 1:100



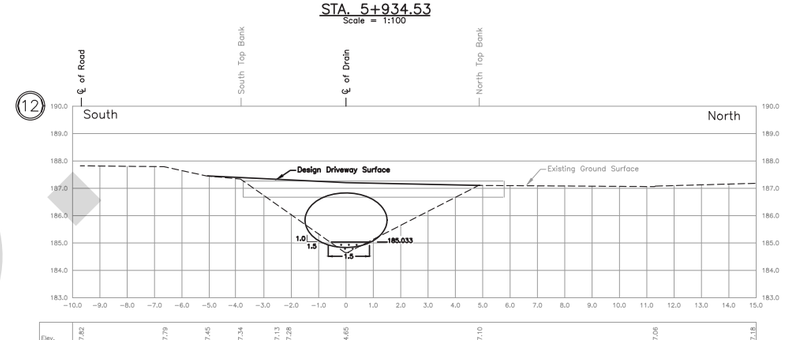
Elev.	191.28	191.09	190.83	188.65	188.18	188.61	190.80	190.998
Offset	10.16	5.78	4.42	1.17	0.00	0.79	3.92	12.00

STA. 3+860.08
Scale = 1:100



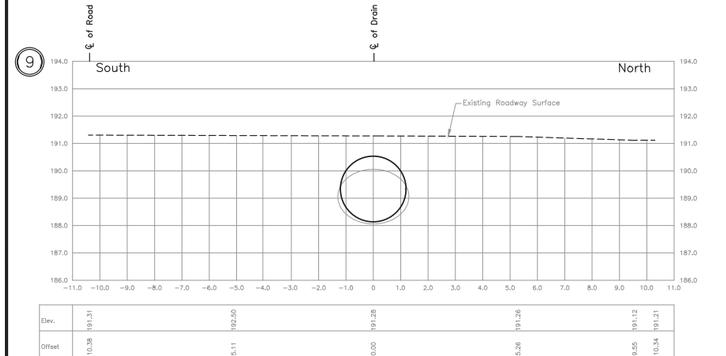
Elev.	188.44	188.48	188.43	188.33	188.04	185.32	185.26	185.54	188.01	188.15	188.172
Offset	10.79	9.97	7.17	4.83	4.38	0.00	0.04	0.72	5.03	8.37	11.00

STA. 5+215.21
Scale = 1:100



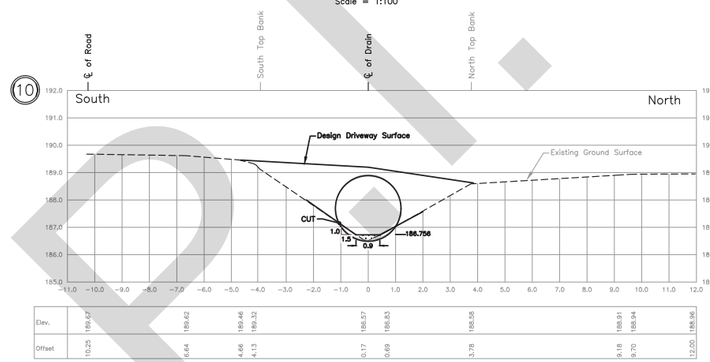
Elev.	187.82	187.79	187.45	187.34	187.13	187.28	184.65	187.10	187.06	187.18
Offset	9.67	6.61	5.06	3.82	2.52	2.09	0.00	4.89	11.31	15.00

STA. 5+925.21
Scale = 1:100



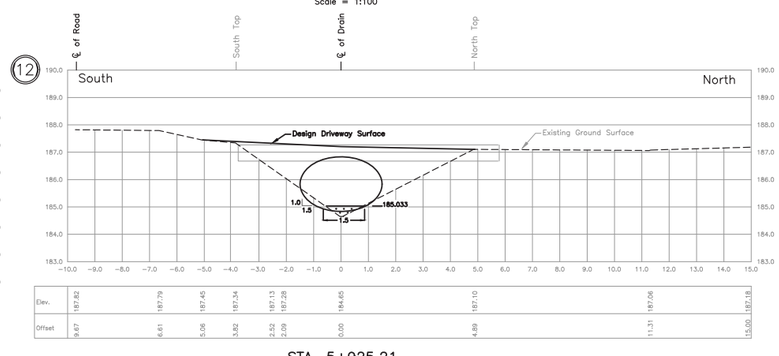
Elev.	191.31	192.50	191.28	191.26	191.12	191.21
Offset	10.38	5.11	0.00	5.26	9.55	10.34

STA. 3+846.66
Scale = 1:100



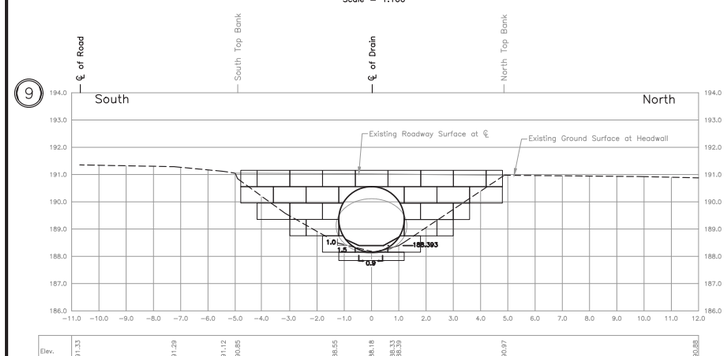
Elev.	189.67	189.62	189.46	189.32	186.57	186.83	188.68	188.91	188.94	188.96
Offset	10.25	6.64	4.66	4.13	0.17	0.69	3.78	9.18	9.70	12.00

STA. 4+795.90
Scale = 1:100



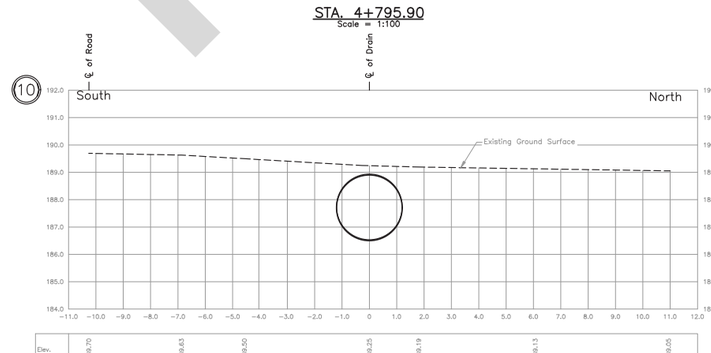
Elev.	187.82	187.79	187.45	187.34	187.13	187.28	184.65	187.10	187.06	187.18
Offset	9.67	6.61	5.06	3.82	2.52	2.09	0.00	4.89	11.31	15.00

STA. 5+925.21
Scale = 1:100



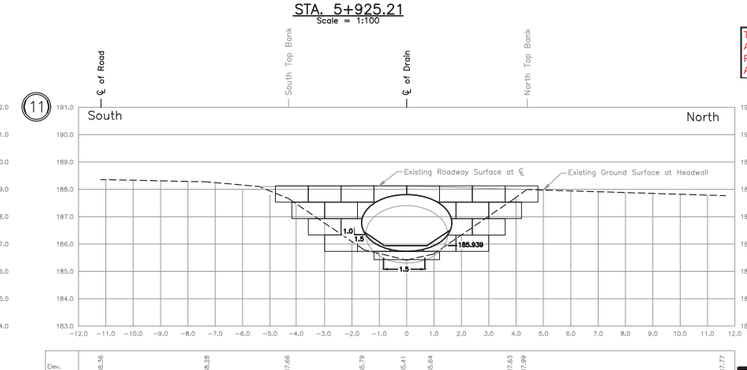
Elev.	191.33	191.29	191.12	190.85	188.55	188.18	188.33	188.39	190.97	190.88
Offset	10.70	7.25	5.43	4.91	1.35	0.00	0.76	1.00	4.86	12.00

STA. 3+833.32
Scale = 1:100



Elev.	189.70	189.63	189.50	189.25	189.19	189.13	189.05
Offset	10.26	6.87	4.57	0.00	1.80	6.07	11.00

STA. 4+786.90
Scale = 1:100



Elev.	188.36	188.28	187.66	185.79	185.41	185.64	187.63	187.99	187.77
Offset	11.19	7.31	4.31	2.44	0.00	0.98	3.89	4.39	11.65

STA. 5+241.20
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: REI2018D035.DWG

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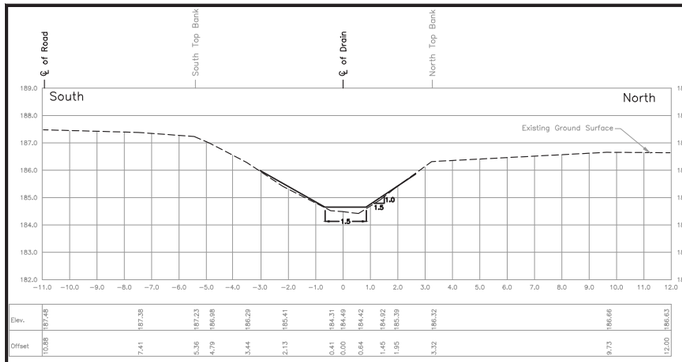
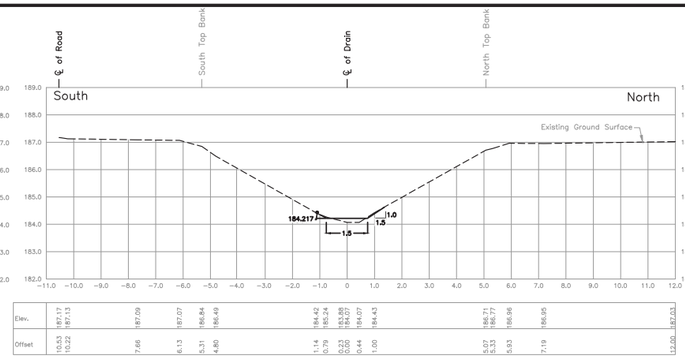


Elev.	187.48	187.38	187.23	186.98	186.29	185.41	184.31	184.49	184.42	184.92	185.39	186.32	186.66	186.83
Offset	10.38	7.41	5.36	4.79	3.44	2.13	0.41	0.00	0.64	1.45	1.95	3.32	9.73	12.00

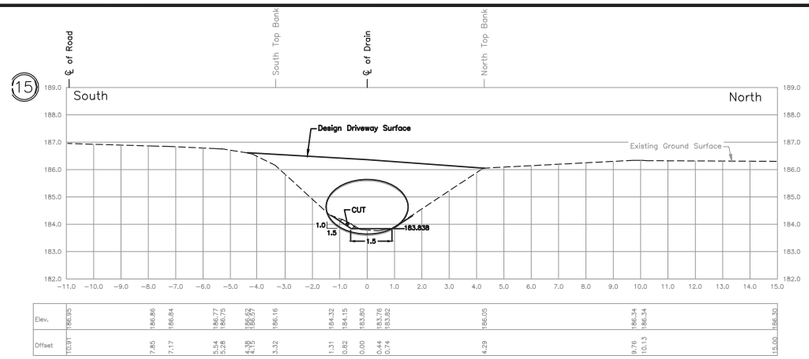
STA. 6+295.92
Scale = 1:100



Elev.	187.17	187.13	187.09	187.07	186.84	186.49	184.42	185.24	183.88	184.07	184.43	186.77	186.87	186.96	186.95	187.03
Offset	10.53	10.22	7.66	6.13	5.31	4.80	1.14	0.19	0.23	0.00	0.44	1.00	5.37	5.53	5.83	7.19	12.00

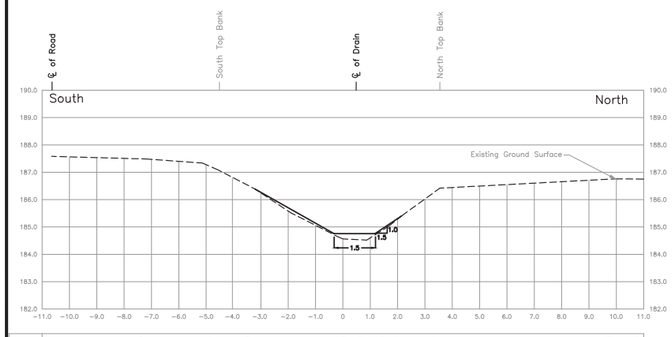
STA. 6+630.43
Scale = 1:100

15



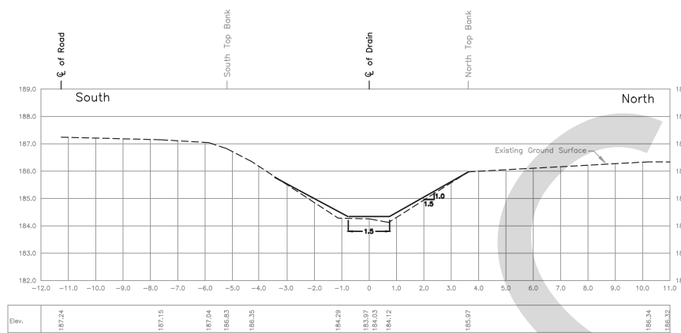
Elev.	186.95	186.86	186.84	186.77	186.75	186.49	186.39	186.16	184.32	184.15	183.80	183.76	183.82	186.05	186.34	186.34	186.30
Offset	10.91	7.85	7.17	5.54	5.28	4.78	4.42	3.32	1.31	0.82	0.00	0.44	0.74	4.29	9.76	10.13	15.00

STA. 6+900.40
Scale = 1:100



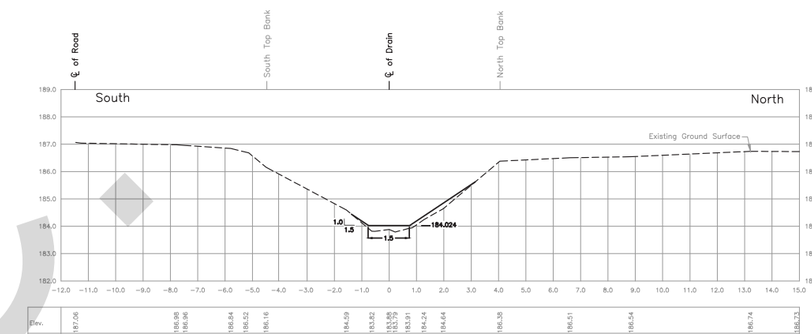
Elev.	187.58	187.48	187.34	187.07	186.39	185.51	184.56	184.52	185.02	185.43	186.42	186.76	187.75
Offset	10.38	7.41	5.36	4.79	3.44	2.13	0.00	0.64	1.45	1.95	3.32	9.73	11.00

STA. 6+190.23
Scale = 1:100



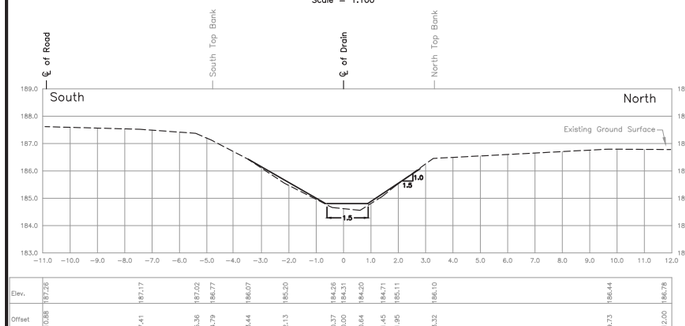
Elev.	187.24	187.15	187.04	186.83	186.35	184.29	185.07	184.03	184.12	185.87	186.34	186.32
Offset	11.26	7.62	5.87	5.22	4.29	1.14	0.00	0.23	0.71	3.62	10.22	11.00

STA. 6+539.70
Scale = 1:100



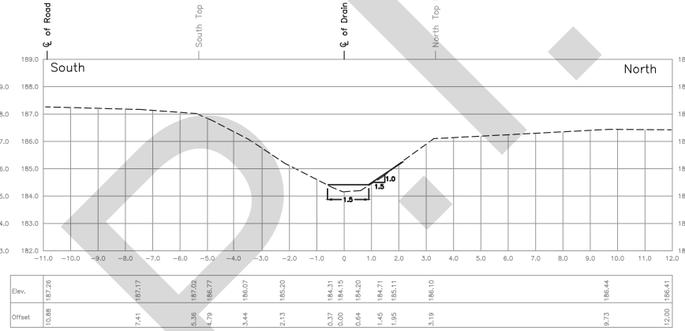
Elev.	187.06	186.98	186.86	186.84	186.52	186.16	184.59	183.82	183.88	183.91	184.24	184.64	186.38	186.51	186.54	186.74	186.73
Offset	11.46	7.78	7.45	5.79	5.24	4.50	1.56	0.63	0.00	0.23	0.68	1.27	1.98	4.05	6.61	8.85	13.21	15.00

STA. 6+767.45
Scale = 1:100



Elev.	187.26	187.17	187.02	186.77	186.07	185.20	184.31	184.26	184.20	184.71	185.11	186.10	186.44	186.78
Offset	10.38	7.41	5.36	4.79	3.44	2.13	0.37	0.00	0.64	1.45	1.95	3.32	9.73	12.00

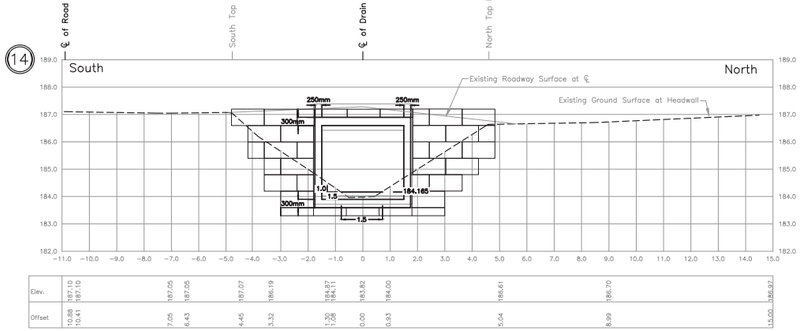
STA. 6+143.84
Scale = 1:100



Elev.	187.26	187.17	187.02	186.77	186.07	185.20	184.31	184.26	184.20	184.71	185.11	186.10	186.44	186.41
Offset	10.88	7.41	5.36	4.79	3.44	2.13	0.37	0.00	0.64	1.45	1.95	3.19	9.73	12.00

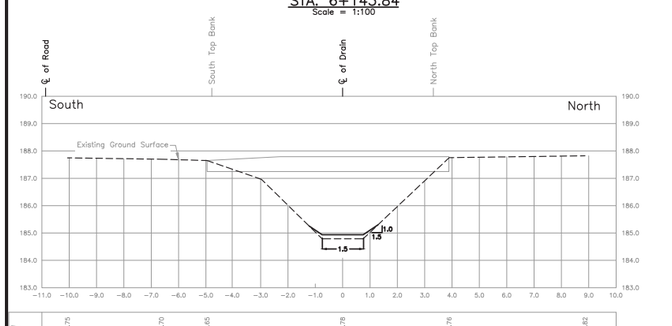
STA. 6+488.54
Scale = 1:100

14



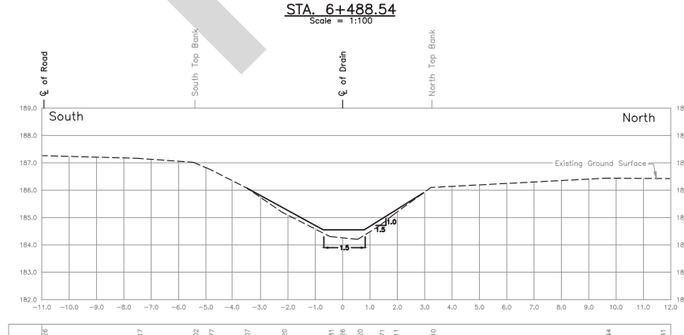
Elev.	187.10	187.10	187.05	187.05	187.07	186.19	184.87	184.51	183.82	184.00	186.61	186.70	186.97
Offset	10.88	10.41	7.05	6.43	4.45	3.32	1.20	1.28	0.00	0.83	5.04	8.99	15.00

STA. 6+666.51
Scale = 1:100



Elev.	187.75	187.70	187.65	184.78	187.76	187.82
Offset	10.06	6.63	4.96	0.00	3.90	8.86

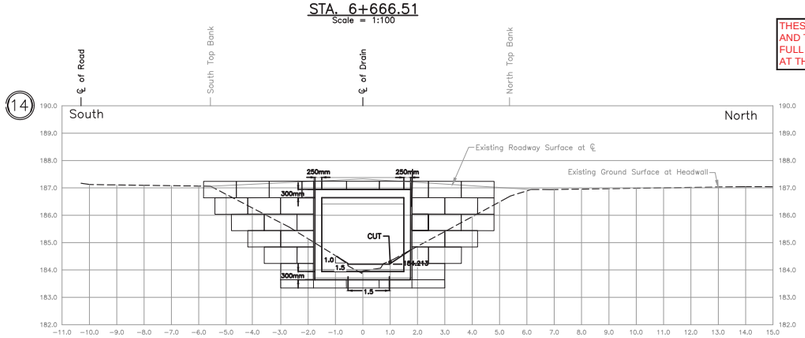
STA. 6+015.09
Scale = 1:100



Elev.	187.26	187.17	187.02	186.77	186.07	185.20	184.31	184.26	184.20	184.71	185.11	186.10	186.44	186.41
Offset	10.88	7.41	5.36	4.79	3.44	2.13	0.41	0.00	0.64	1.45	1.95	3.32	9.73	12.00

STA. 6+388.97
Scale = 1:100

14



Elev.	187.17	187.12	187.11	187.10	187.06	185.57	184.87	183.88	184.38	186.64	186.94	187.04
Offset	10.31	9.98	9.21	8.03	5.37	2.69	0.75	0.00	0.65	5.28	6.16	8.86	13.83	15.00

STA. 6+632.59
Scale = 1:100

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PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.: REI2018D035

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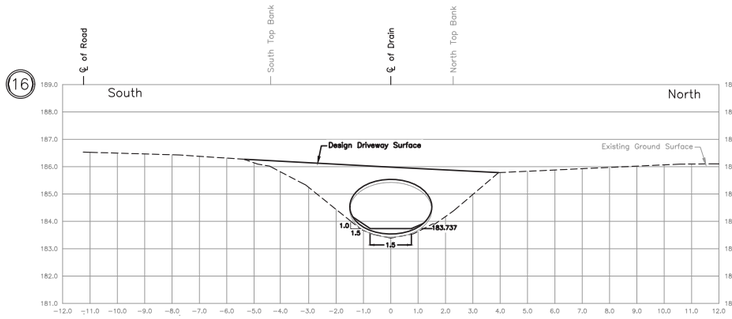
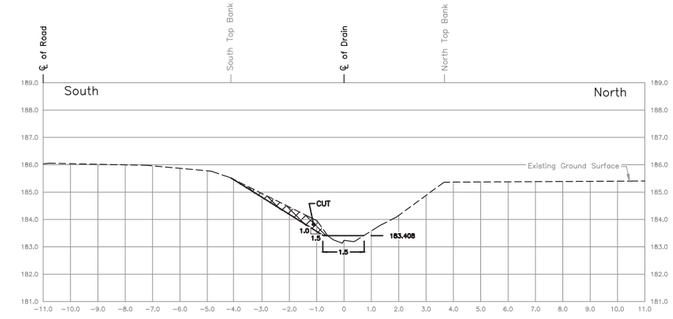


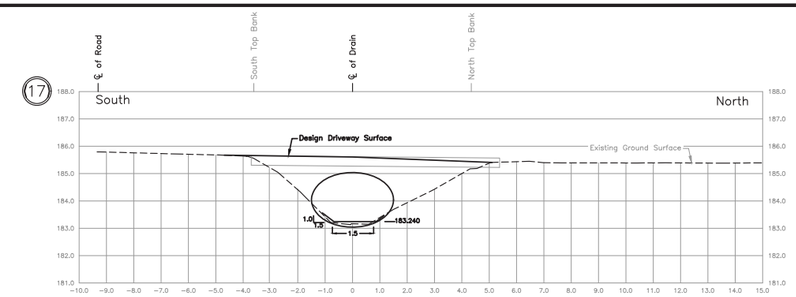
Elev.	186.75	186.52	186.43	186.28	186.09	186.02	185.33	183.97	183.69	183.52	183.39	183.55	183.90	184.39	184.44	185.78	186.09	186.10
Offset	1.44	10.08	7.72	5.47	4.88	4.43	3.11	1.42	1.07	0.63	0.00	0.84	1.53	2.30	2.71	3.94	10.57	11.82

STA. 6+972.20
Scale = 1:100



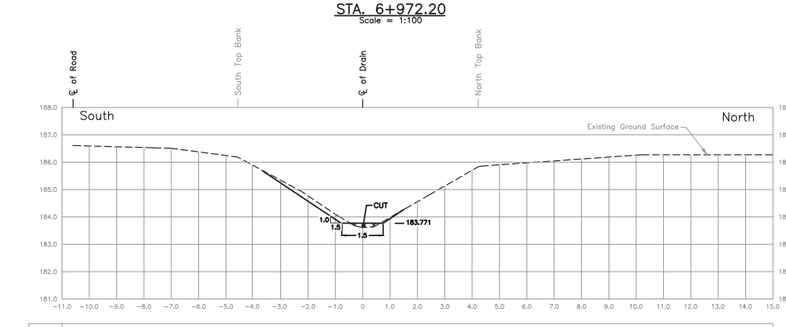
Elev.	186.06	185.98	185.76	185.54	184.09	183.95	183.40	183.74	183.74	184.09	185.36	185.40
Offset	10.77	7.21	4.86	4.18	1.26	0.99	0.58	0.36	1.26	1.92	3.66	10.57

STA. 7+207.29
Scale = 1:100



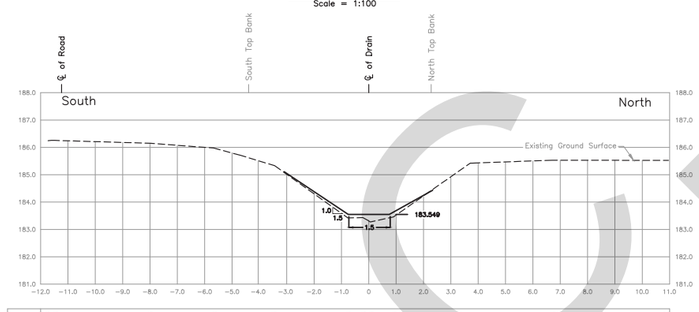
Elev.	185.79	185.72	185.68	185.64	185.56	185.04	184.32	183.83	183.21	183.17	183.15	183.69	184.42	185.17	185.39	185.41	185.45	185.40	185.39	185.39	185.38	185.39
Offset	9.30	6.37	4.69	3.95	3.58	2.68	1.86	1.08	0.75	0.00	0.63	1.55	3.02	4.24	4.68	5.11	6.51	7.02	7.65	10.44	11.50	13.56	15.00

STA. 7+327.80
Scale = 1:100



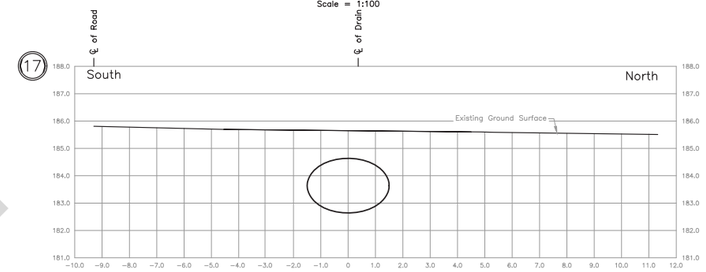
Elev.	186.82	186.53	186.51	186.19	184.94	184.05	183.89	183.81	183.64	184.28	184.82	185.84	186.27	186.27
Offset	10.78	7.64	7.00	4.58	2.26	0.93	0.32	0.00	0.41	1.53	2.46	4.23	10.19	15.00

STA. 6+948.39
Scale = 1:100



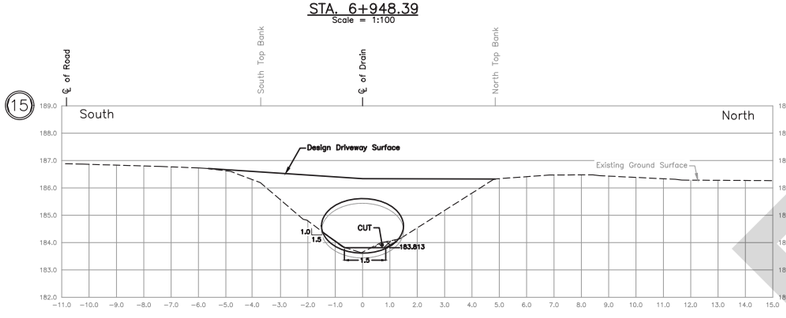
Elev.	186.38	186.26	186.15	185.98	185.71	185.33	183.43	183.43	183.28	183.46	185.41	185.63	186.52
Offset	11.74	11.44	7.97	5.64	4.67	3.41	0.73	0.18	0.10	0.94	3.73	6.75	11.00

STA. 7+107.00
Scale = 1:100



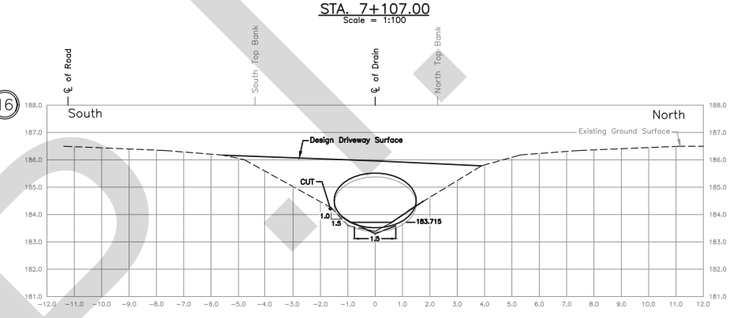
Elev.	185.809	185.656	185.700	185.603	185.590	185.506
Offset	9.30	2.97	0.00	4.86	5.32	11.32

STA. 7+319.80
Scale = 1:100



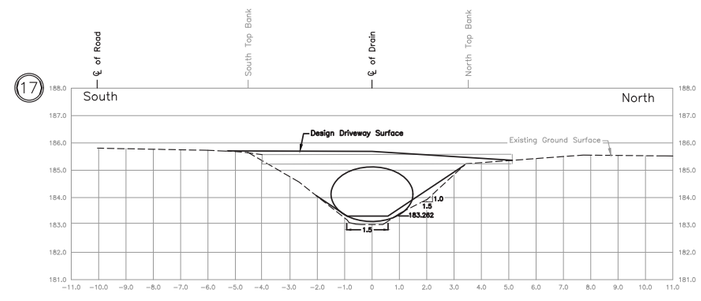
Elev.	186.88	186.87	186.78	186.73	186.71	186.60	186.19	184.85	183.85	183.69	183.69	184.14	186.32	186.47	186.46	186.45	186.31	186.29	186.27
Offset	10.83	10.18	7.35	5.95	5.64	4.78	3.70	2.13	0.70	0.11	0.70	1.41	4.85	6.88	8.47	8.71	11.48	11.72	15.00

STA. 6+918.40
Scale = 1:100



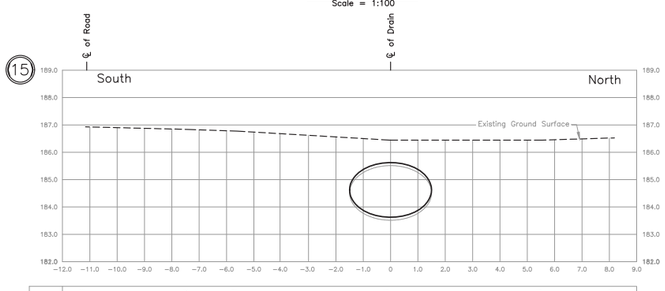
Elev.	186.90	186.54	186.18	186.09	186.02	185.33	183.97	183.98	183.52	183.39	183.55	183.90	184.39	184.44	186.09	186.10
Offset	11.39	7.72	5.47	4.88	4.43	3.11	1.42	1.07	0.63	0.00	0.84	1.53	2.30	2.71	10.57	11.82

STA. 6+988.20
Scale = 1:100



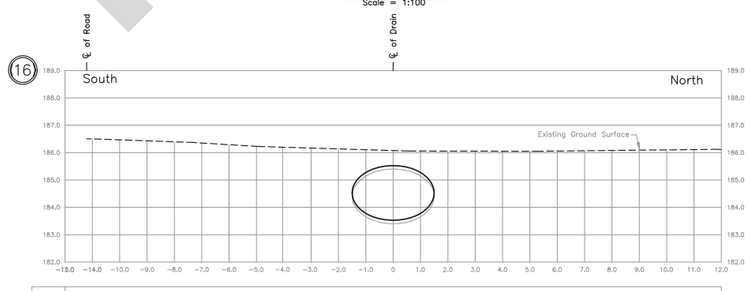
Elev.	185.81	185.73	185.70	185.64	184.57	183.18	183.03	183.02	183.43	183.94	185.24	185.56	185.50
Offset	9.51	5.55	4.80	3.99	2.14	0.77	0.75	0.93	1.56	2.55	3.43	8.28	11.00

STA. 7+311.80
Scale = 1:100



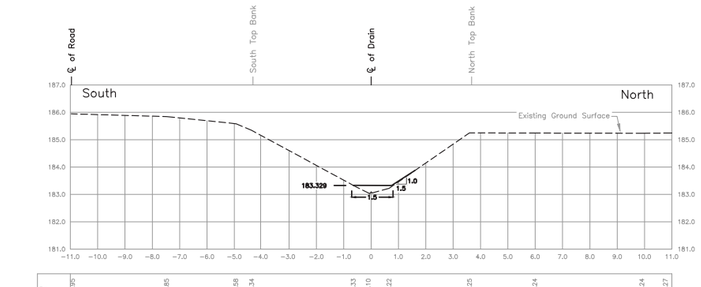
Elev.	186.93	186.84	186.78	186.45	186.45	186.53
Offset	11.12	7.33	5.58	0.00	5.60	8.23

STA. 6+909.40
Scale = 1:100



Elev.	186.51	186.38	186.23	186.08	186.06	186.05	186.12
Offset	11.20	7.39	4.98	0.00	0.60	5.31	12.00

STA. 6+980.20
Scale = 1:100



Elev.	185.95	185.85	185.58	185.34	183.33	183.10	183.32	185.25	185.24	185.24	185.27
Offset	11.07	7.48	4.95	4.37	0.65	0.00	0.65	3.60	5.98	8.90	11.00

STA. 7+263.62
Scale = 1:100

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PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.: REI2018D035

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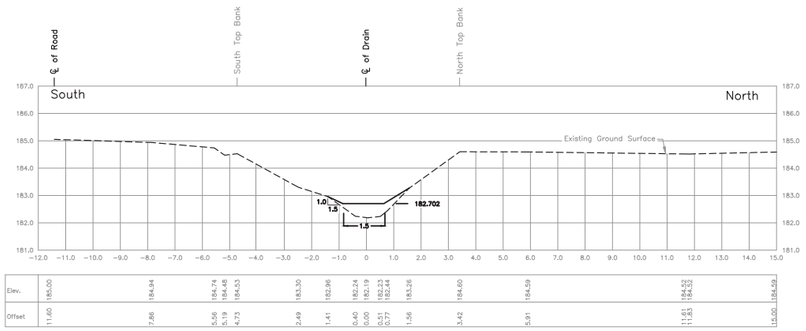
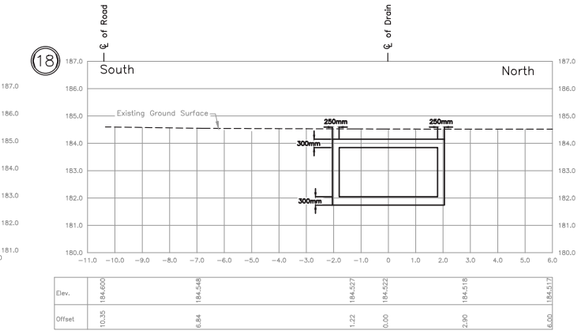


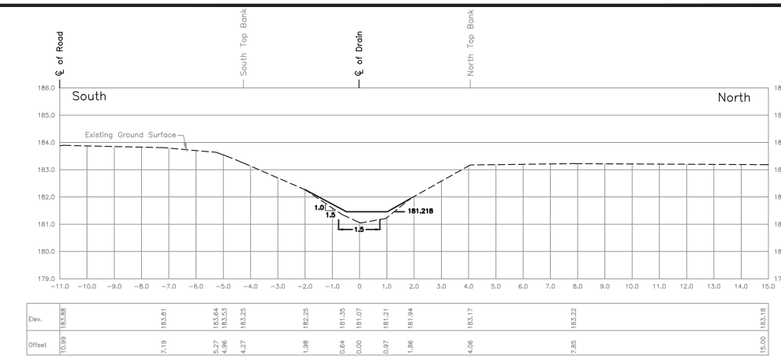
Elev.	185.00	184.94	184.74	184.48	184.53	183.30	182.86	182.24	182.19	182.23	182.44	183.26	184.60	184.59	184.52	184.52	184.59
Offset	11.40	7.86	5.56	5.19	4.73	2.49	1.41	0.40	0.00	0.51	0.77	1.56	3.42	5.91	11.61	11.83	15.00

STA. 7+712.07
Scale = 1:100



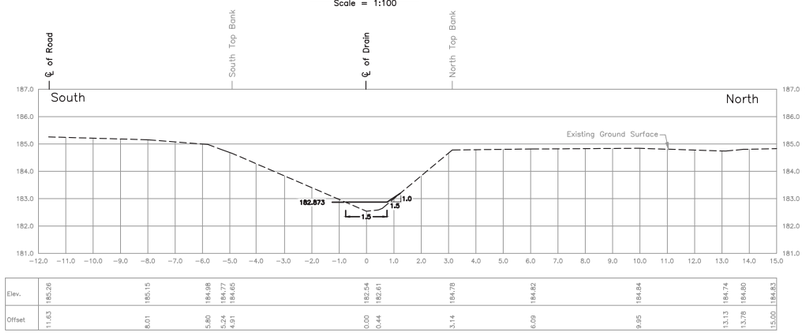
Elev.	184.600	184.548	184.527	184.522	184.518	184.517
Offset	10.35	6.84	1.22	0.00	2.90	6.00

STA. 7+994.2
Scale = 1:100



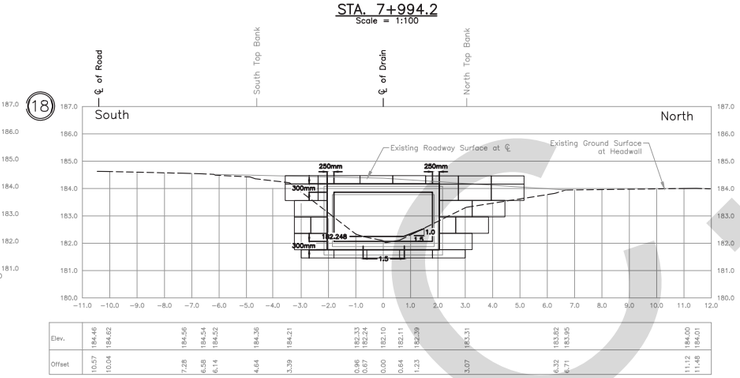
Elev.	183.88	183.81	183.64	183.53	183.25	182.25	181.35	181.07	181.21	181.94	183.17	183.22	183.18
Offset	10.99	7.19	5.27	4.86	4.27	1.98	0.64	0.00	0.97	1.86	4.06	7.85	15.00

STA. 8+288.35
Scale = 1:100



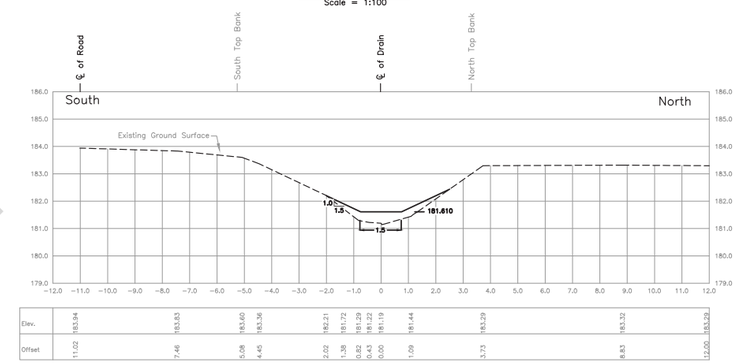
Elev.	185.26	185.15	184.98	184.77	184.65	182.54	182.61	184.78	184.82	184.84	184.74	184.80	186.83
Offset	11.83	8.01	5.80	5.24	4.91	0.00	0.44	3.14	6.09	9.95	13.13	13.78	15.00

STA. 7+589.90
Scale = 1:100



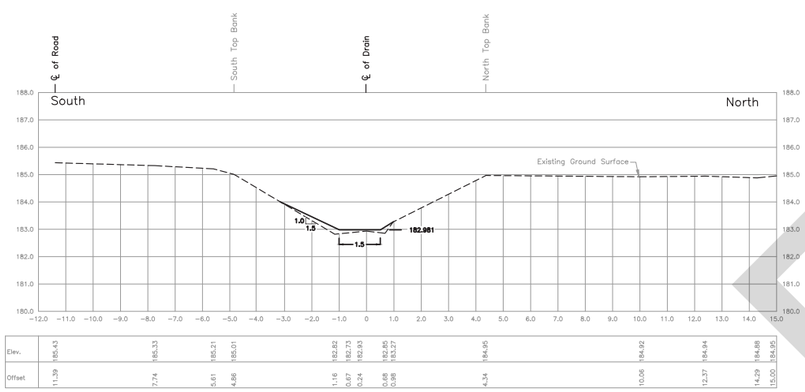
Elev.	184.46	184.522	184.56	184.54	184.522	184.36	184.21	182.33	182.24	182.10	182.11	182.39	183.31	183.92	183.95	184.00	184.01
Offset	10.57	10.04	7.28	6.58	6.14	4.64	3.39	0.96	0.67	0.00	0.64	1.23	3.07	6.32	6.71	11.12	11.48

STA. 7+986.2
Scale = 1:100



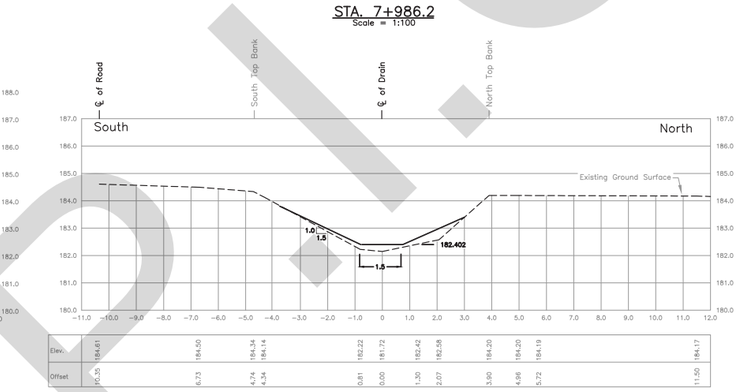
Elev.	183.94	183.83	183.60	183.36	182.21	181.72	181.29	181.22	181.19	181.44	183.29	183.32	183.29
Offset	11.02	7.46	5.08	4.45	2.02	1.38	0.82	0.45	0.00	1.09	3.73	8.83	12.00

STA. 8+229.66
Scale = 1:100



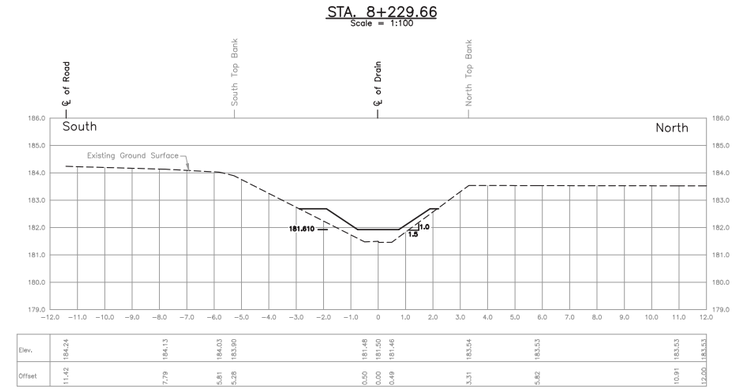
Elev.	185.43	185.33	185.21	185.01	182.82	182.73	182.93	182.95	182.82	184.95	184.92	184.94	184.88	184.95
Offset	11.39	7.74	5.61	4.86	1.16	0.67	0.24	0.08	0.00	4.34	10.06	12.37	14.29	15.00

STA. 7+512.68
Scale = 1:100



Elev.	184.61	184.50	184.34	184.14	182.22	181.72	182.42	182.58	184.20	184.20	184.19	184.17
Offset	10.35	6.73	4.74	4.34	0.81	0.00	1.30	2.07	3.90	4.96	5.72	11.50

STA. 7+926.13
Scale = 1:100



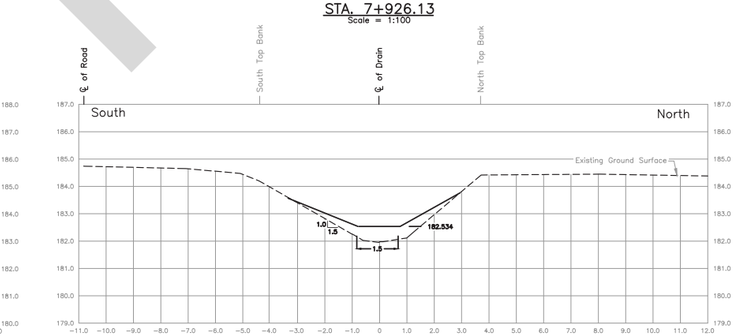
Elev.	184.24	184.13	184.03	183.90	181.48	181.50	181.46	183.54	183.53	183.53	183.53
Offset	11.42	7.79	5.81	5.28	0.50	0.00	0.49	3.31	5.82	10.81	12.00

STA. 8+108.77
Scale = 1:100

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

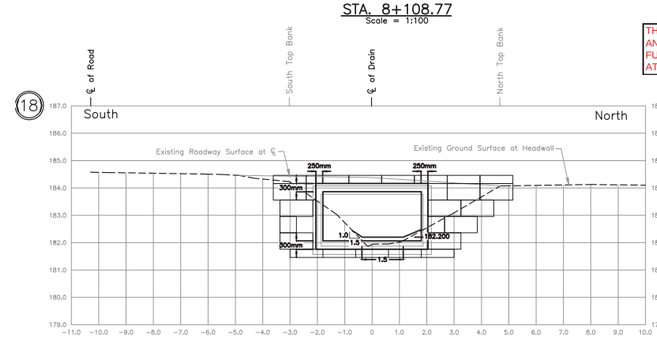
Elev.	185.59	185.49	185.32	185.11	182.45	182.71	182.86	182.85	185.07	185.11	185.02	185.04	185.05	185.03
Offset	11.47	7.89	5.67	5.04	0.92	0.46	0.00	0.79	3.67	8.40	12.23	13.84	14.55	15.00

STA. 7+432.33
Scale = 1:100



Elev.	184.74	184.65	184.48	184.19	182.27	182.02	181.95	182.11	182.30	184.42	184.45	184.38
Offset	10.82	7.11	5.09	4.39	1.03	0.60	0.03	0.99	1.21	3.71	8.04	12

STA. 7+831.70
Scale = 1:100



Elev.	184.43	184.56	184.51	184.49	184.46	184.36	184.24	183.03	181.88	181.95	182.04	183.08	184.08	184.13	184.10
Offset	10.36	9.59	6.10	5.43	4.88	4.30	3.09	1.30	0.18	0.61	1.08	2.97	4.69	8.03	10.00

STA. 8+002.2
Scale = 1:100

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PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

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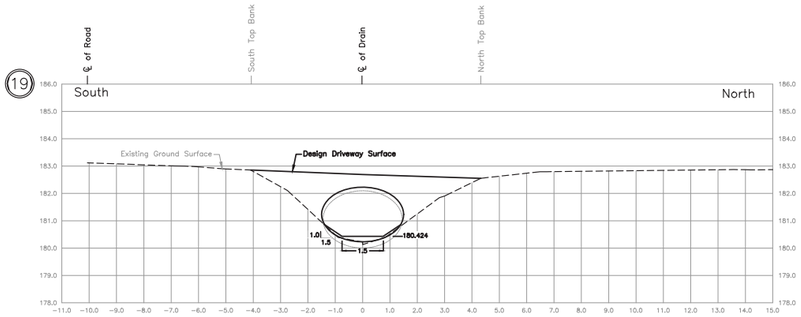
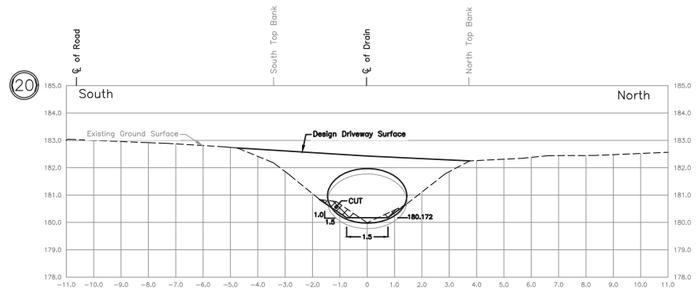
SHEET No.: 8 OF 17



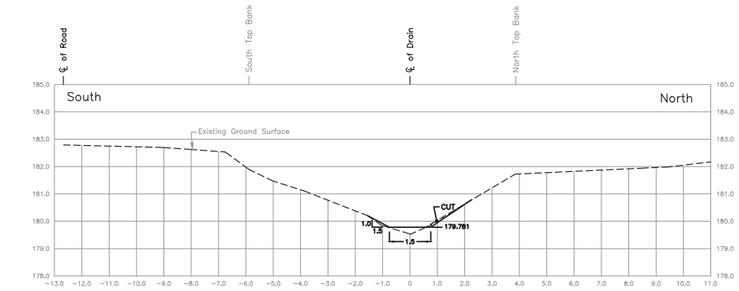
Elev.	183.12	183.01 183.00	182.98	182.89	182.86	182.11	180.39	180.22	180.41	181.84	182.55	182.79 182.79 182.72	182.87	182.87	182.87
Offset	10.00	6.88 6.51	6.12	5.00	4.09	2.75	0.90	0.00	0.85	2.81	4.33	6.49 6.74	13.57	13.98	15.00

STA. 8+683.13
Scale = 1:100



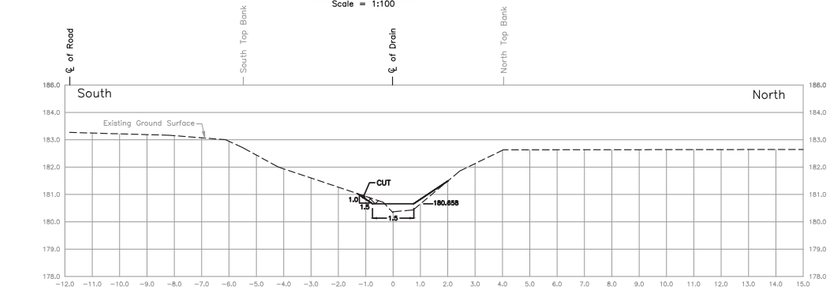
Elev.	183.00	182.92	182.89	182.76 182.74 182.72	182.18	181.75	180.83	180.77	179.99	180.64	181.79	182.25	182.34	182.44	182.45	182.56
Offset	17.00	8.02	7.34	5.23 4.97 4.70	3.43	2.86	1.73	1.14	0.00	1.40	2.86	3.75	5.65	6.62	8.31	11.00

STA. 8+782.24
Scale = 1:100



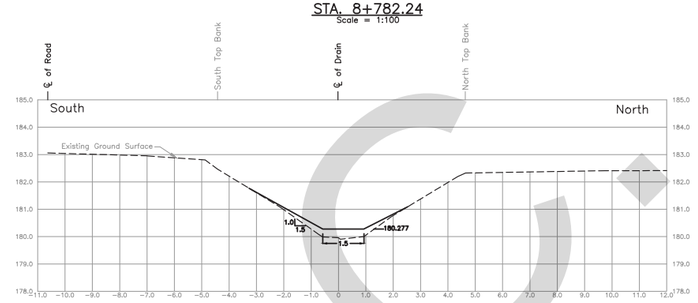
Elev.	182.79	182.70	182.62	182.53	181.90	181.47	181.10	180.20	179.86	179.56	179.74	181.71	181.94	181.88	182.17
Offset	12.67	9.06	7.95	6.78	5.89	5.01	3.85	1.55	1.06	0.00	0.51	3.82	8.48	9.44	11.00

STA. 8+932.28
Scale = 1:100



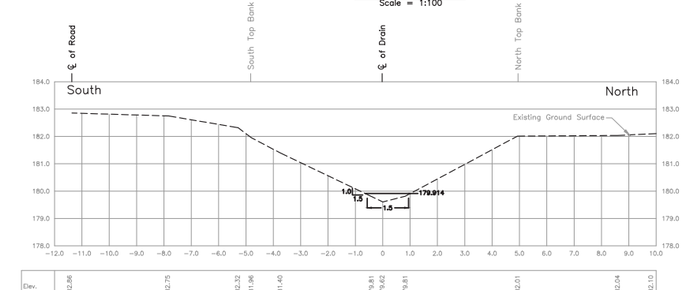
Elev.	183.27	183.16	183.00	182.71	182.01	180.71	180.33	180.43	181.86	182.63	182.64
Offset	11.83	8.20	6.13	5.49	4.21	0.36	0.00	0.74	2.44	4.03	15.00

STA. 8+595.56
Scale = 1:100



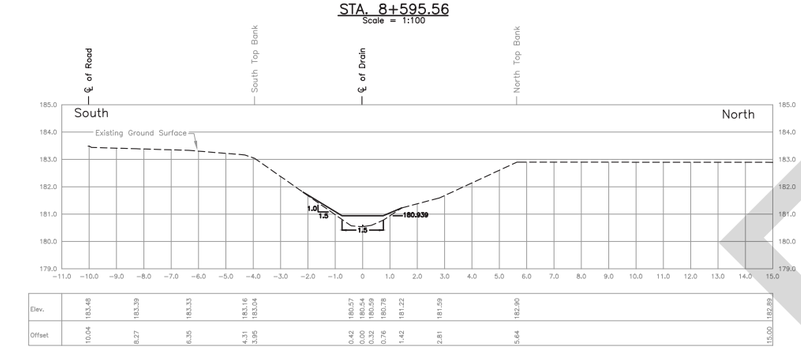
Elev.	183.06	182.95	182.80	182.47	181.07	180.08	179.86	180.00	180.73	182.20 182.32	182.41	182.41
Offset	10.70	7.01	4.88	4.43	2.11	0.73	0.00	0.93	1.92	4.38 4.63	9.75	12.00

STA. 8+741.82
Scale = 1:100



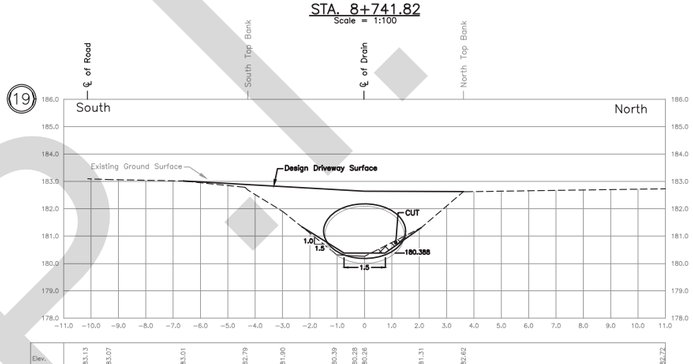
Elev.	182.86	182.75	182.32	181.96	181.40	179.81	179.62	179.81	182.01	182.24	182.10
Offset	11.46	7.87	5.31	4.82	3.76	0.41	0.00	0.82	4.93	8.58	10.00

STA. 8+881.24
Scale = 1:100



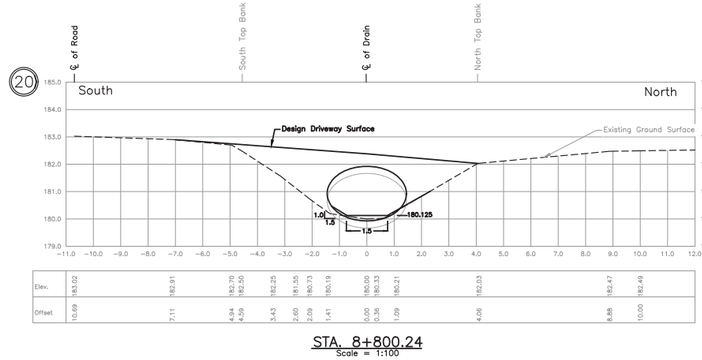
Elev.	183.48	183.39	183.33	183.16 183.04	180.57	180.54 180.59	180.78	181.22	181.59	182.90	182.89
Offset	10.04	8.27	6.35	4.31 3.95	0.42	0.00 0.32	0.76	1.42	2.81	5.64	15.00

STA. 8+487.55
Scale = 1:100



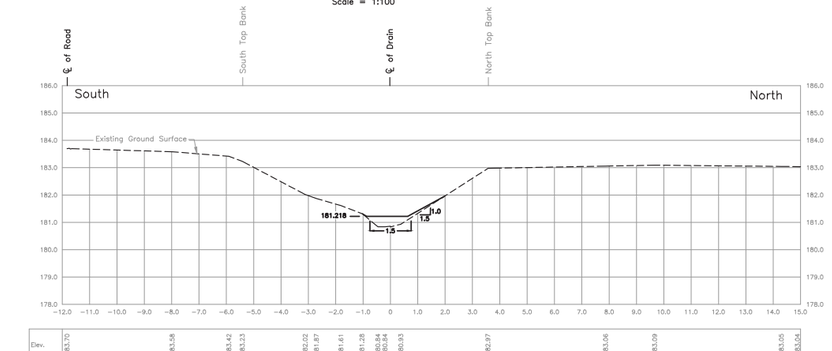
Elev.	183.13	183.07	183.01	182.79	181.90	180.39	180.28	180.28	181.31	182.62	182.72
Offset	10.21	9.35	6.63	4.37	2.99	1.11	0.36	0.00	2.07	3.61	11.00

STA. 8+699.13
Scale = 1:100



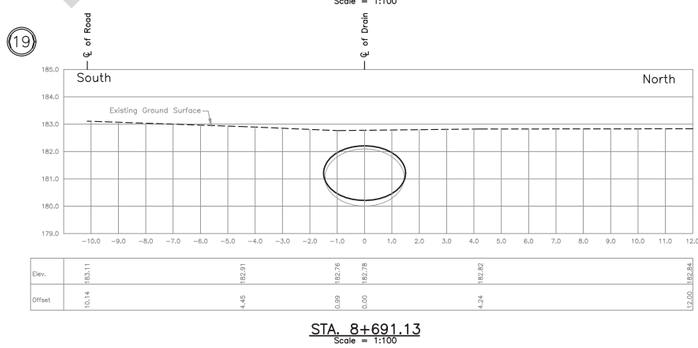
Elev.	183.02	182.91	182.70 182.50	182.25	181.55	180.13	180.19	180.00 180.03	180.21	182.03	182.47	182.49
Offset	10.69	7.11	4.94 4.59	3.43	2.80	2.09	1.41	0.00 0.36	1.09	4.06	8.88	10.00

STA. 8+800.24
Scale = 1:100



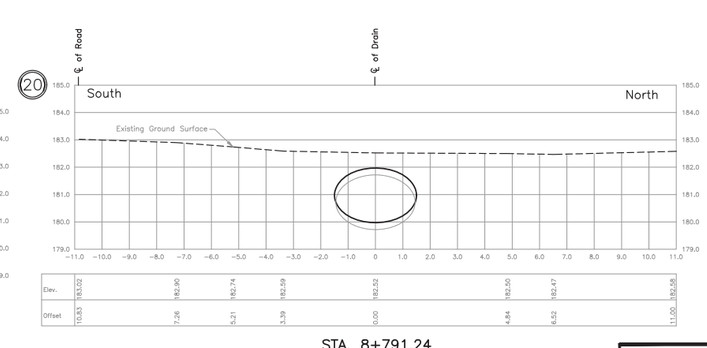
Elev.	183.70	183.58	183.42 183.23	182.02 181.87	181.61	181.28	180.84 180.64	180.03	182.97	183.06	183.09	183.05 183.04
Offset	11.83	7.98	5.91 5.42	3.12 2.71	1.81	1.04	0.46 0.00	0.38	3.56	7.87	9.66	14.30 15.00

STA. 8+380.21
Scale = 1:100



Elev.	183.11	182.91	182.76	182.78	182.82	182.84
Offset	10.14	4.45	0.99	0.00	4.24	12.00

STA. 8+691.13
Scale = 1:100



Elev.	183.02	182.90	182.74	182.59	182.52	182.50	182.47	182.58
Offset	10.83	7.26	5.21	3.39	0.00	4.84	6.52	11.00

STA. 8+791.24
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: REI2018D035.DWG

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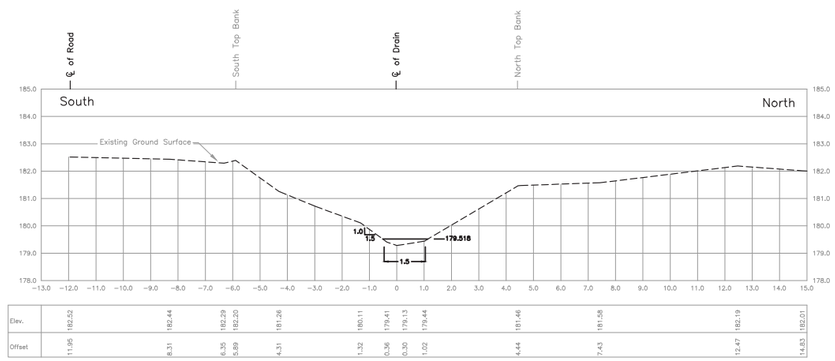
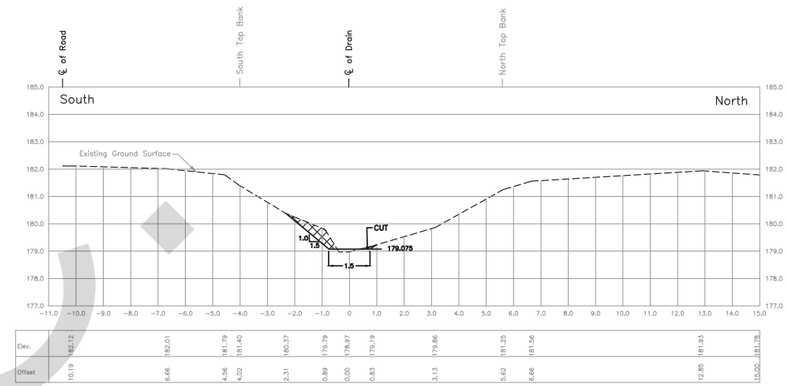
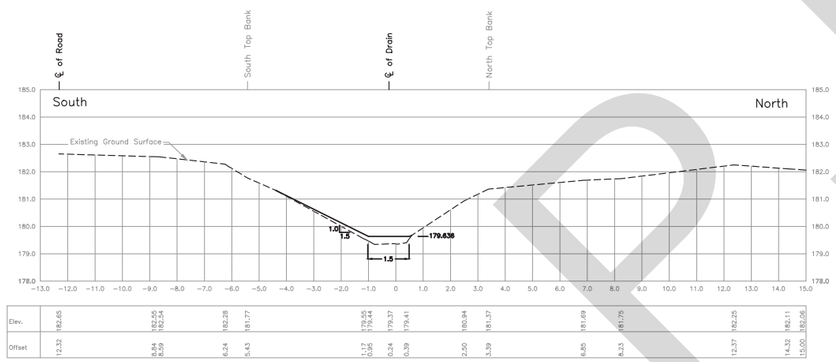


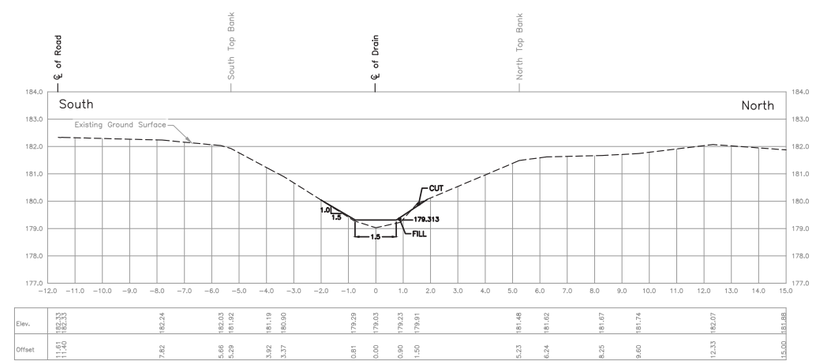
STA. 9+028.34
Scale = 1:100



STA. 9+186.73
Scale = 1:100



STA. 8+988.23
Scale = 1:100



STA. 9+101.66
Scale = 1:100

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DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.: REI2018D035

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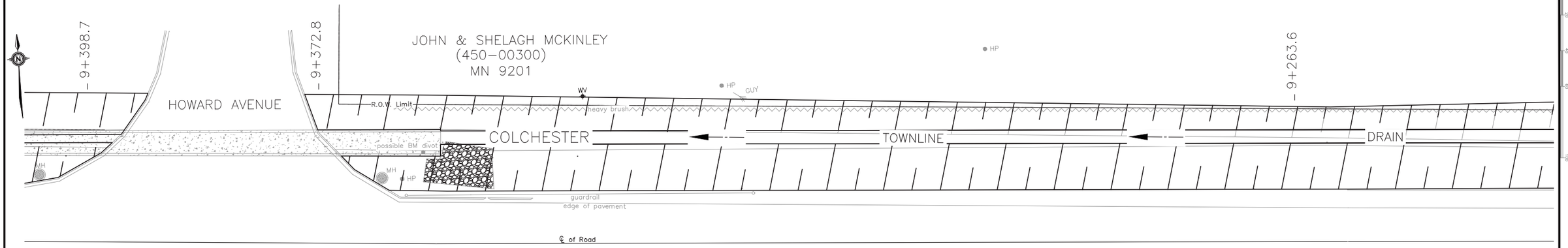
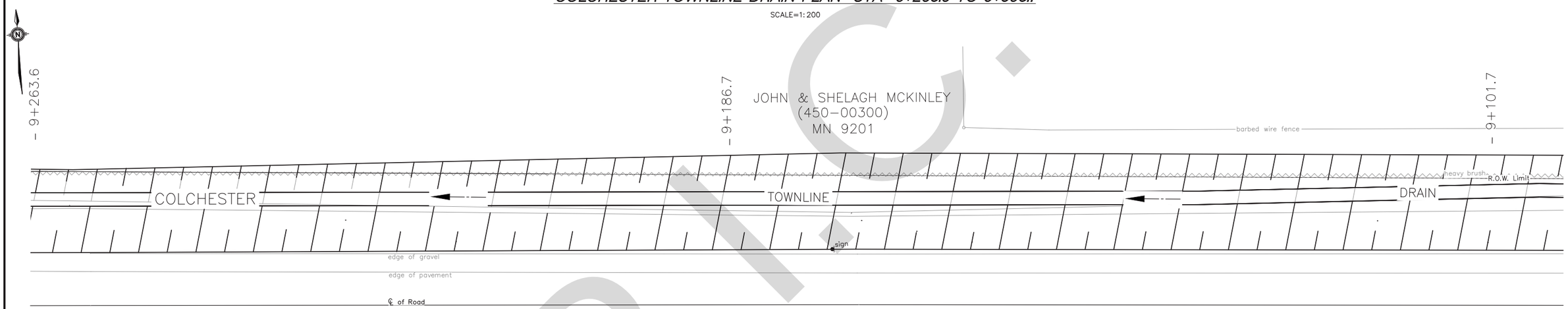


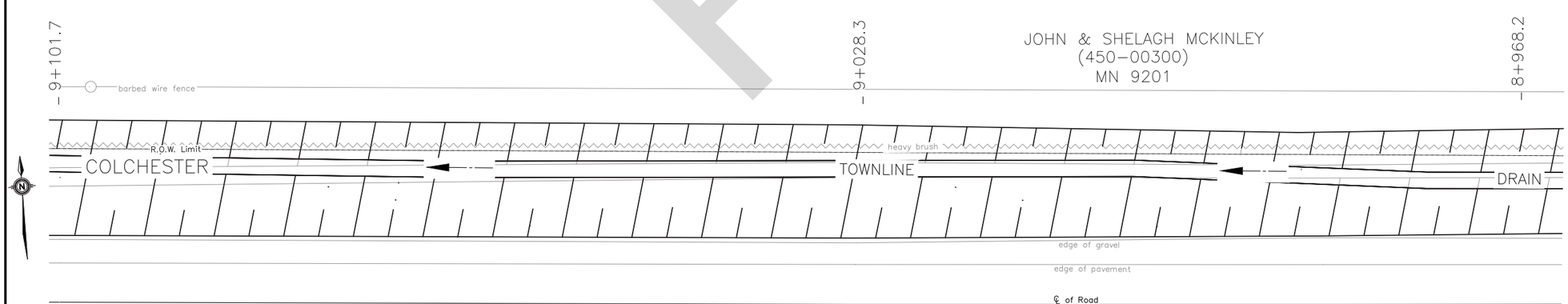
COLCHESTER TOWNLINE DRAIN PLAN- STA 9+263.6 TO 9+398.7

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 9+101.7 TO 9+263.6

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 8+968.2 TO 9+101.7

SCALE=1:200

PIPE LEGEND:

(19) 3000mmx2000mm Arch CSP, 16.0m (52.5ft) approx. length

(20) 3000mmx2000mm Arch CSP, 18.0m (59.1ft) approx. length

BENCHMARKS:

3. TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.

ELEV: 184.018m

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: REI2018D035.DWG

FILE No.: REI2018D035

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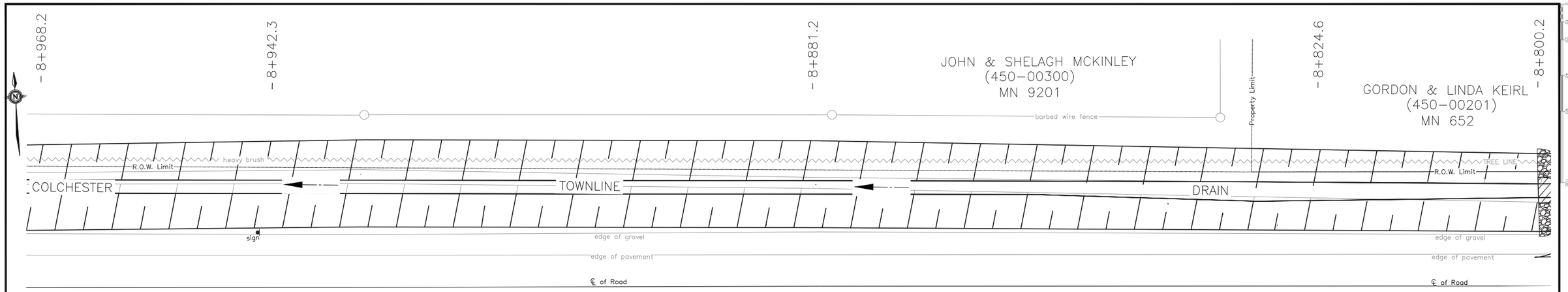
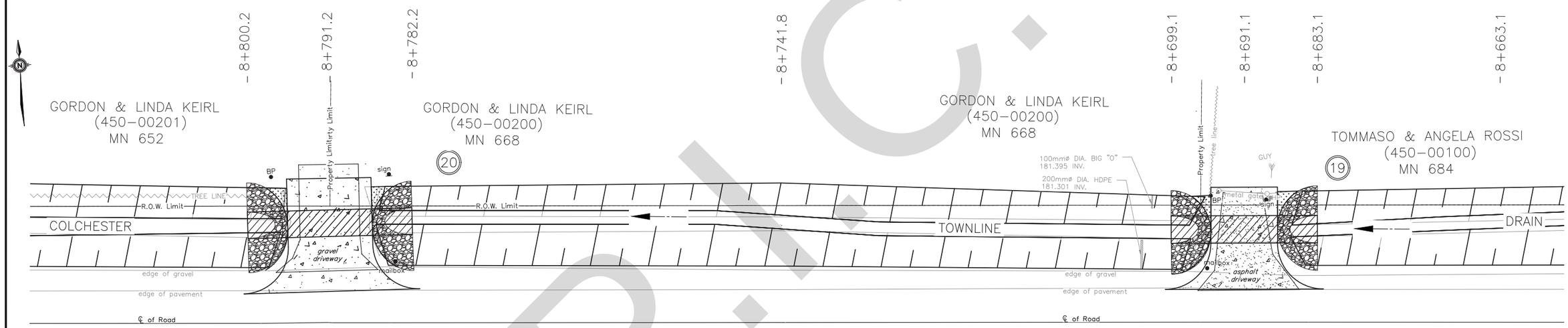


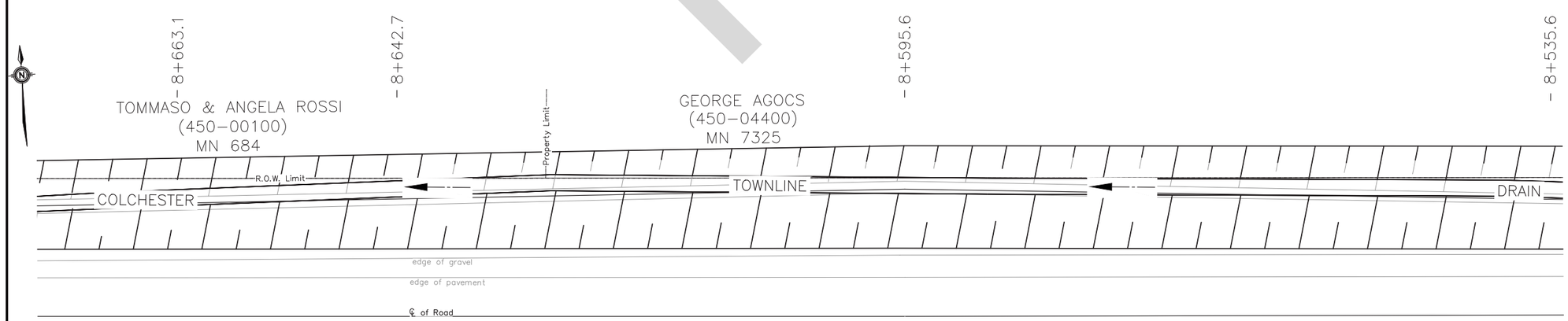
COLCHESTER TOWNLINE DRAIN PLAN- STA 8+800.2 TO 8+968.2

SCALE=1:400



COLCHESTER TOWNLINE DRAIN PLAN- STA 8+663.1 TO 8+800.2

SCALE=1:400



COLCHESTER TOWNLINE DRAIN PLAN- STA 8+535.6 TO 8+663.1

SCALE=1:200

PIPE LEGEND:

19 3000mmx2000mm Arch CSP, 16.0m (52.5ft) approx. length

20 3000mmx2000mm Arch CSP, 18.0m (59.1ft) approx. length

BENCHMARKS:

1. TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.
   ELEV: 184.018m
2. TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.
   ELEV: 184.504m

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: REI2018D035.DWG

FILE No.: REI2018D035

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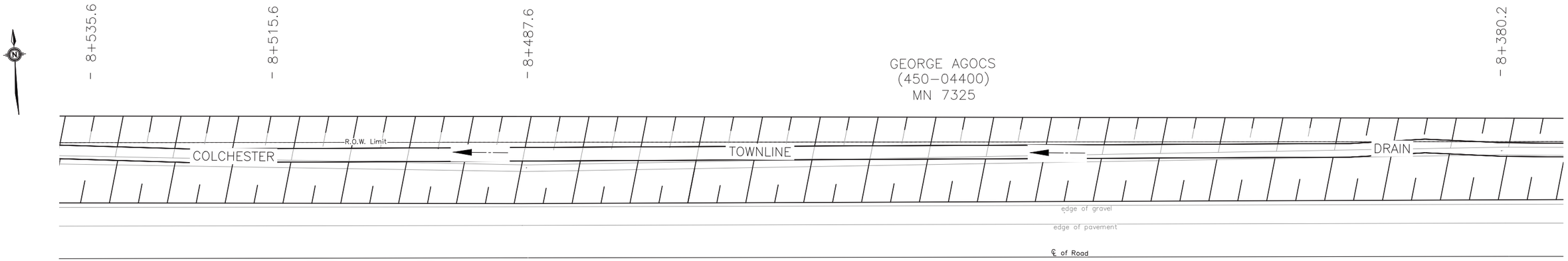
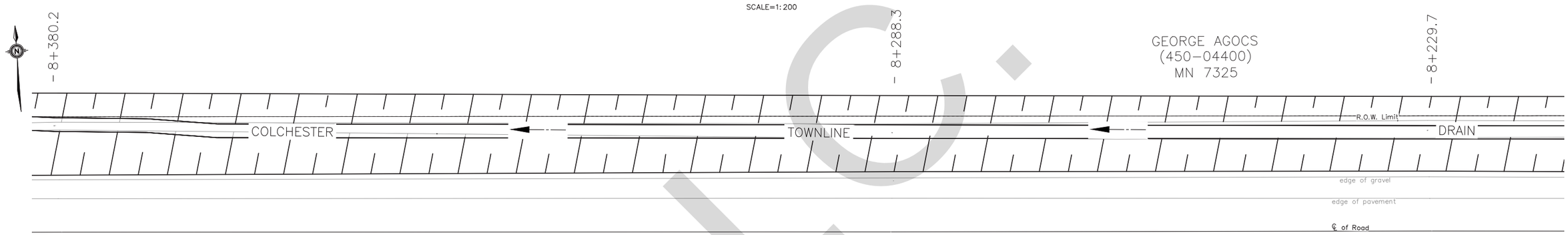


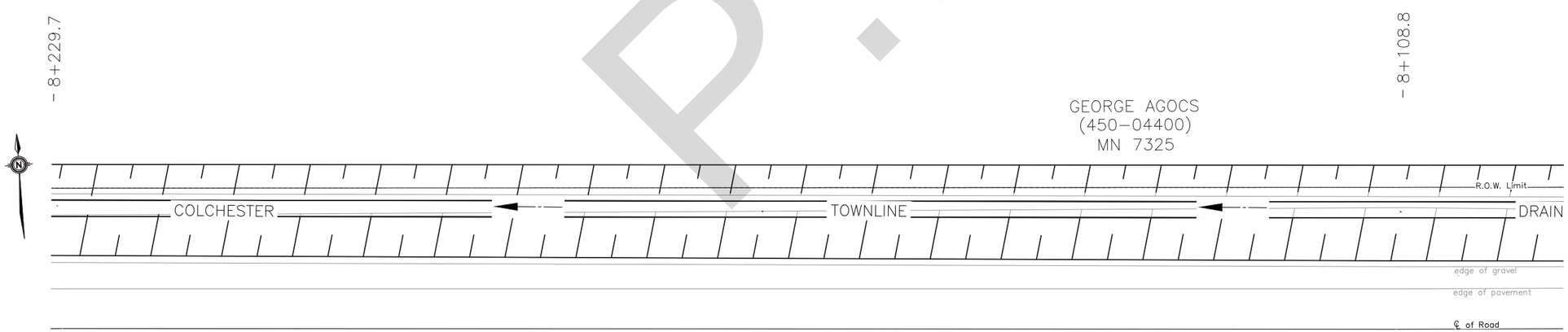
COLCHESTER TOWNLINE DRAIN PLAN- STA 8+380.2 TO 8+535.6

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 8+229.7 TO 8+380.2

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 8+108.8 TO 8+229.7

SCALE=1:200

BENCHMARKS:

2. TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.
   ELEV: 184.504m

3. TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.
   ELEV: 184.018m

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: REI2018D035.DWG

FILE No.: REI2018D035

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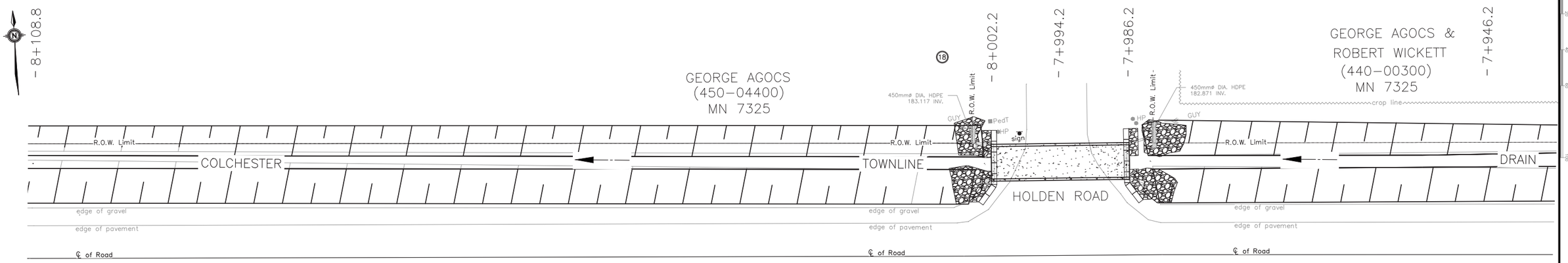
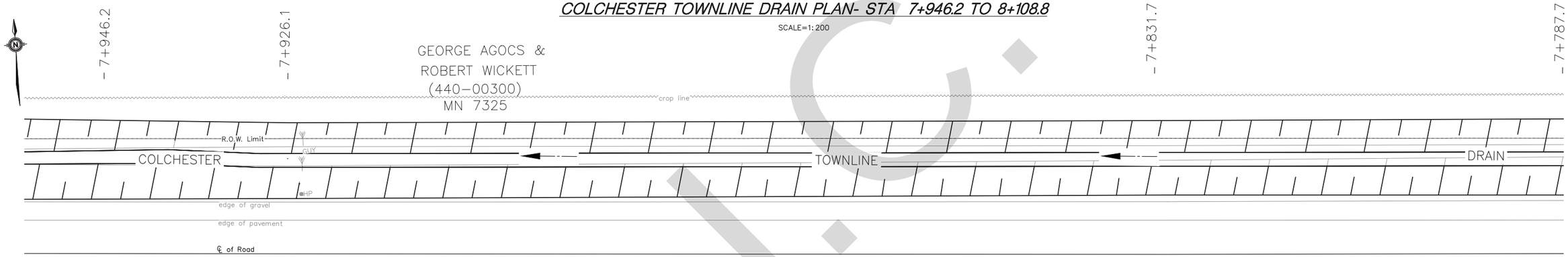


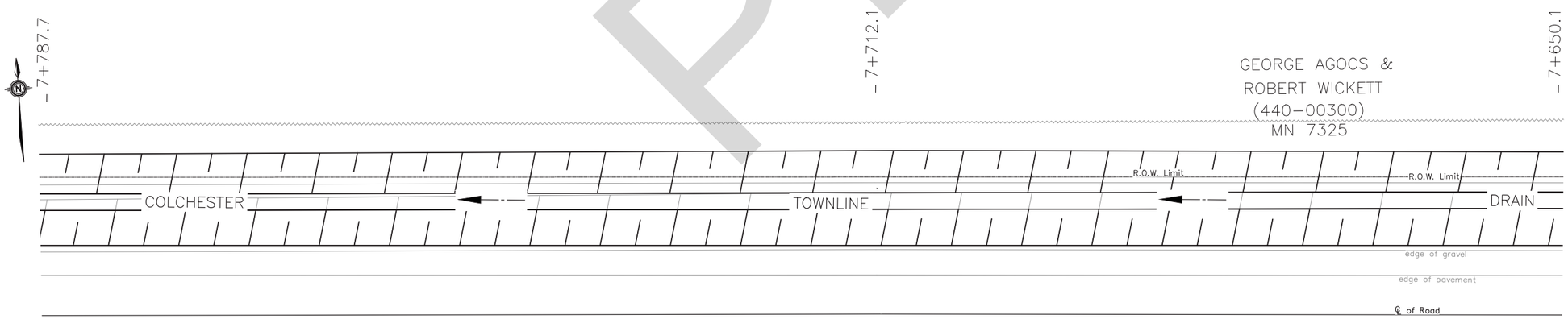
COLCHESTER TOWNLINE DRAIN PLAN- STA 7+946.2 TO 8+108.8

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 7+787.7 TO 7+946.2

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 7+650.1 TO 7+787.7

SCALE=1:200

PIPE LEGEND:

(18) 3600mmx1800mm Conc. Box Culvert, 16.0m (52.5ft) approx. length

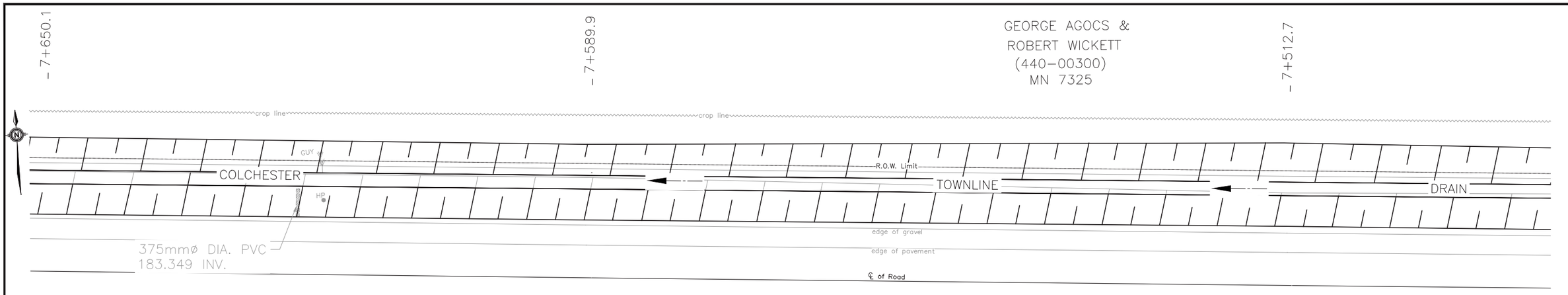
BENCHMARKS:

1. TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.
   ELEV: 184.018m
2. TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.
   ELEV: 184.504m

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

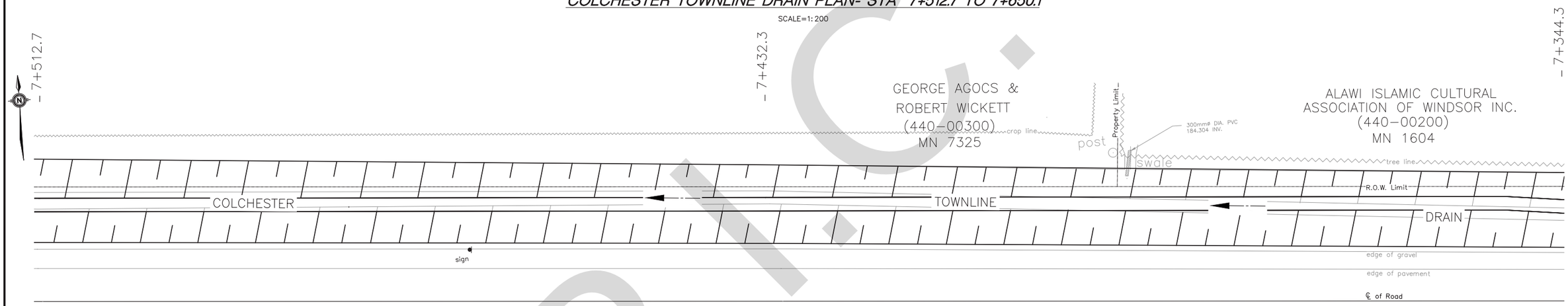
DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.:	SHEET No.:
REI2018D035	14 OF 17



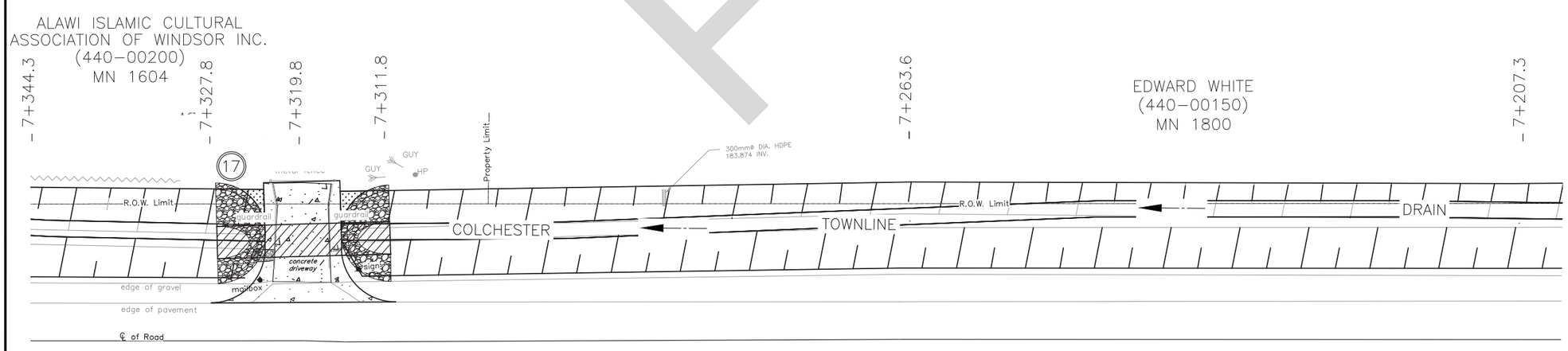
COLCHESTER TOWNLINE DRAIN PLAN- STA 7+512.7 TO 7+650.1

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 7+344.3 TO 7+512.7

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 7+207.3 TO 7+344.3

SCALE=1:200

PIPE LEGEND:

(17) 3000mmx2000mm Arch CSP, 16.0m (52.5ft) approx. length

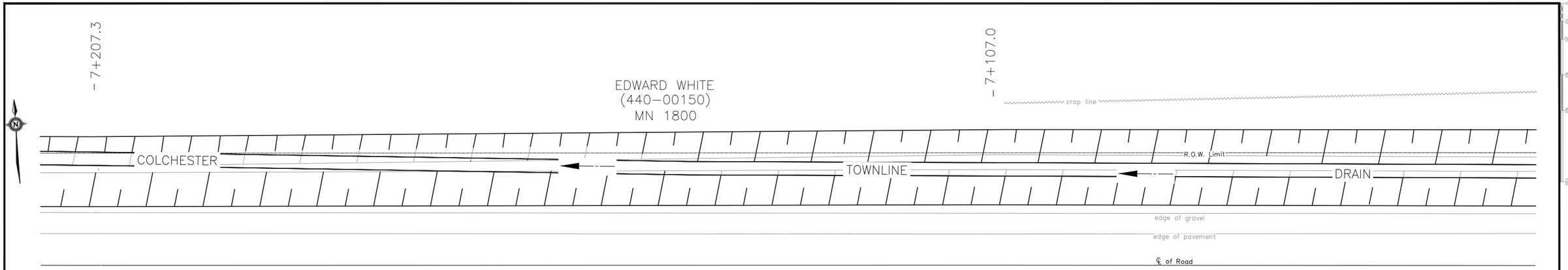
BENCHMARKS:

1. TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.
   ELEV: 184.504m
2. TOP OF NAIL IN HYDRO POLE 35 METRES SOUTH EAST OF MN 1604.
   ELEV: 185.652m

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

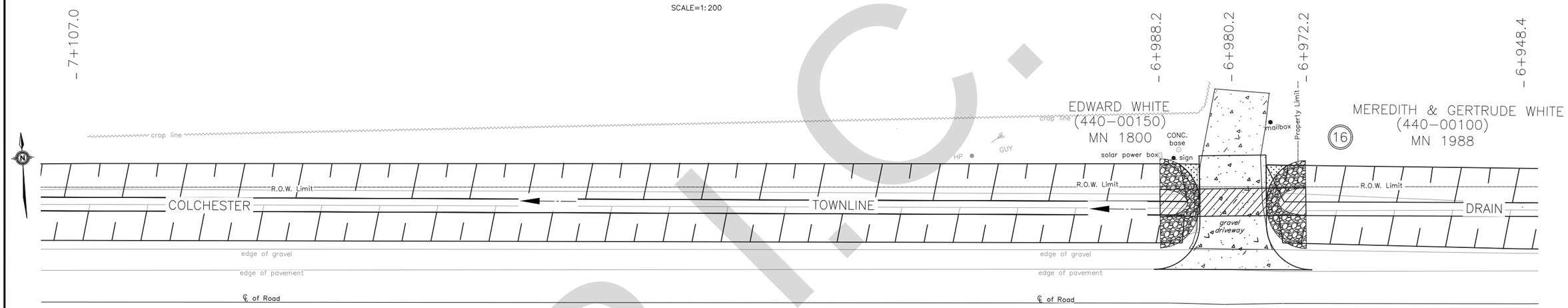
DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.:	SHEET No.:
REI2018D035	15 OF 17



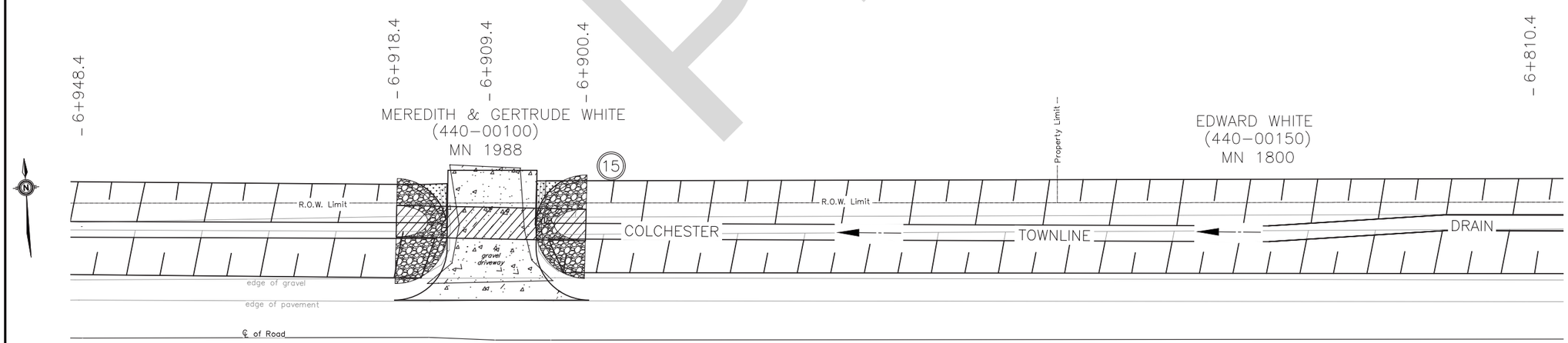
COLCHESTER TOWNLINE DRAIN PLAN- STA 7+107.0 TO 7+207.3

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 6+948.4 TO 7+107.0

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 6+810.4 TO 6+948.4

SCALE=1:200

PIPE LEGEND:

16 3000mmx2000mm Arch CSP, 16.0m (52.5ft) approx. length

15 3000mmx2000mm Arch CSP, 18.0m (59.1ft) approx. length

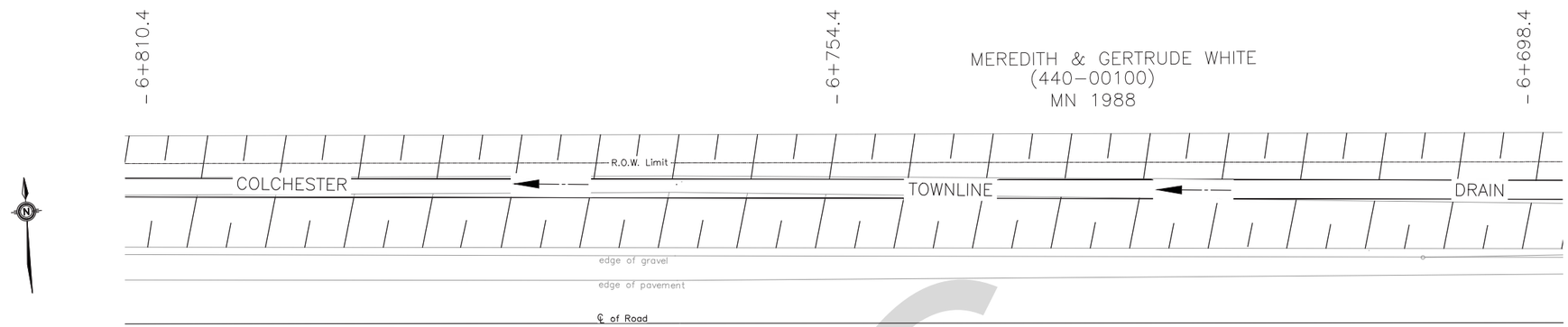
BENCHMARKS:

1. TOP OF NAIL IN HYDRO POLE 35 METRES SOUTH EAST OF MN 1604.
   ELEV: 185.652m
2. TOP OF NAIL IN HYDROPOLE APPROXIMATELY 15 METRES SOUTH OF MN 1800.
   ELEV: 186.805m
3. TOP OF NUT ON FIRE HYDRANT APPROXIMATELY 10 METRES SOUTH EAST OF WALKER ROAD.
   ELEV: 187.524m

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

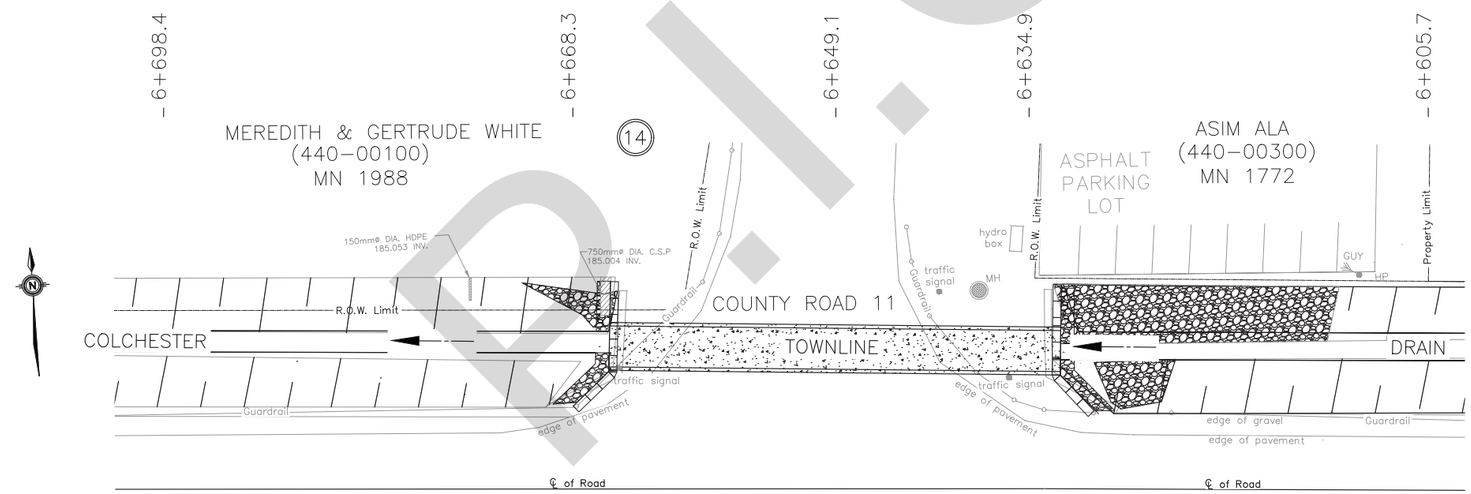
DRAWN BY: M.A.
PLOT CODE: 1:1
COMPUTER FILE: REI2018D035.DWG

FILE No.:	SHEET No.:
REI2018D035	16 OF 17



COLCHESTER TOWNLINE DRAIN PLAN- STA 6+698.4 TO 6+810.4

SCALE=1:200



COLCHESTER TOWNLINE DRAIN PLAN- STA 6+605.7 TO 6+698.4

SCALE=1:200

PIPE LEGEND:

(14) 3000mmx2700mm Conc. Box Culvert, 28.2m (92.4ft) approx. length

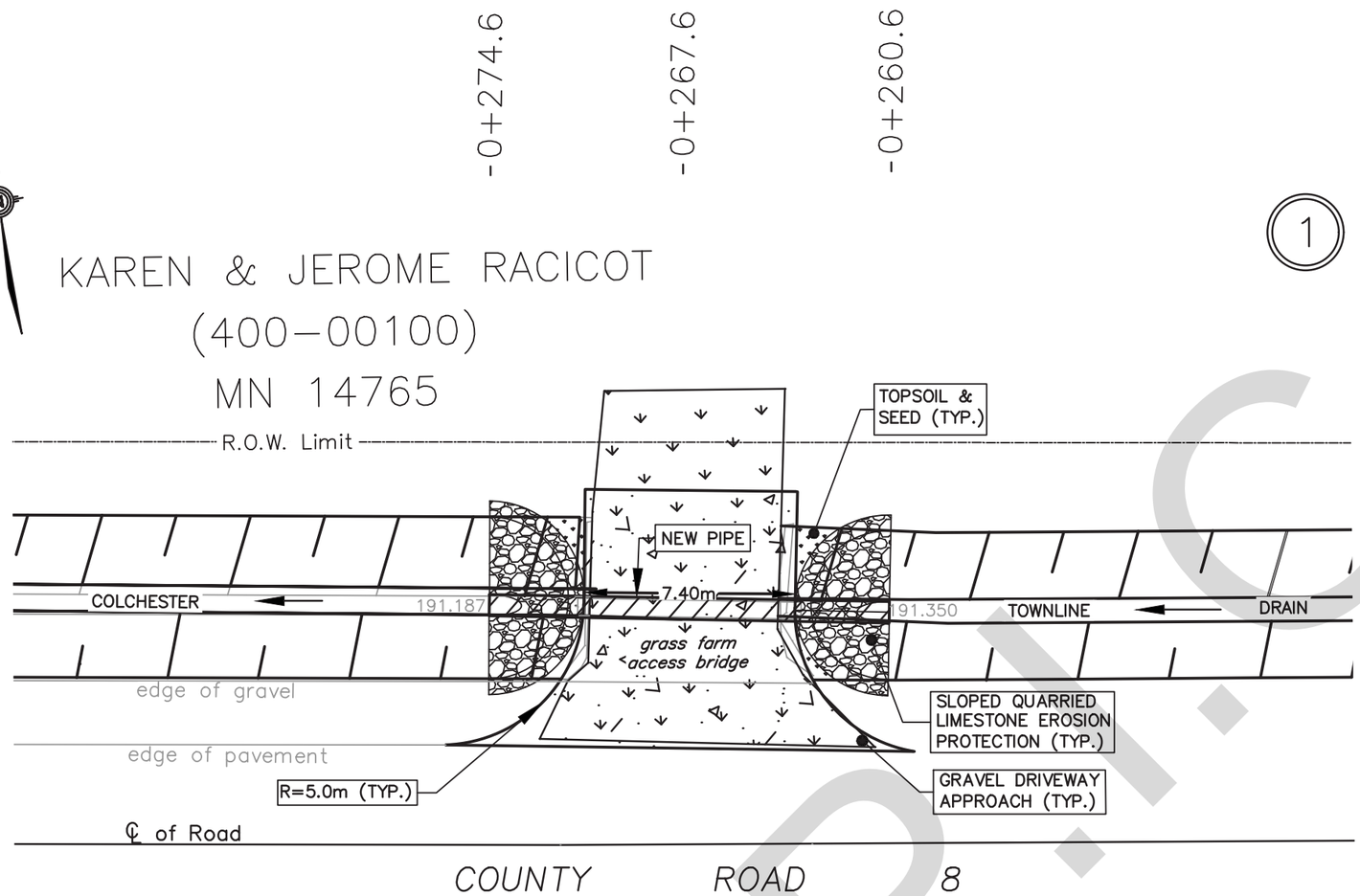
BENCHMARKS:

1. TOP OF NAIL IN HYDRO POLE 35 METRES SOUTH EAST OF MN 1604.
   ELEV: 185.652m
2. TOP OF NAIL IN HYDROPOLE APPROXIMATELY 15 METRES SOUTH OF MN 1800.
   ELEV: 186.805m
3. TOP OF NUT ON FIRE HYDRANT APPROXIMATELY 10 METRES SOUTH EAST OF WALKER ROAD.
   ELEV: 187.524m

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: REI2018D035.DWG

FILE No.:	SHEET No.:
REI2018D035	17 OF 17

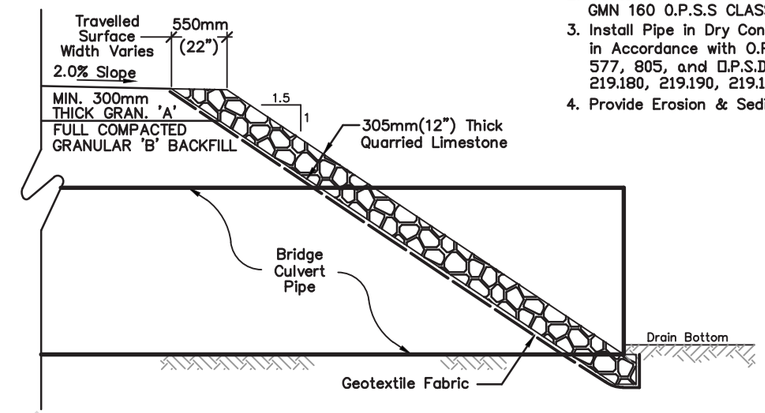


BRIDGE PLAN

SCALE = 1:200

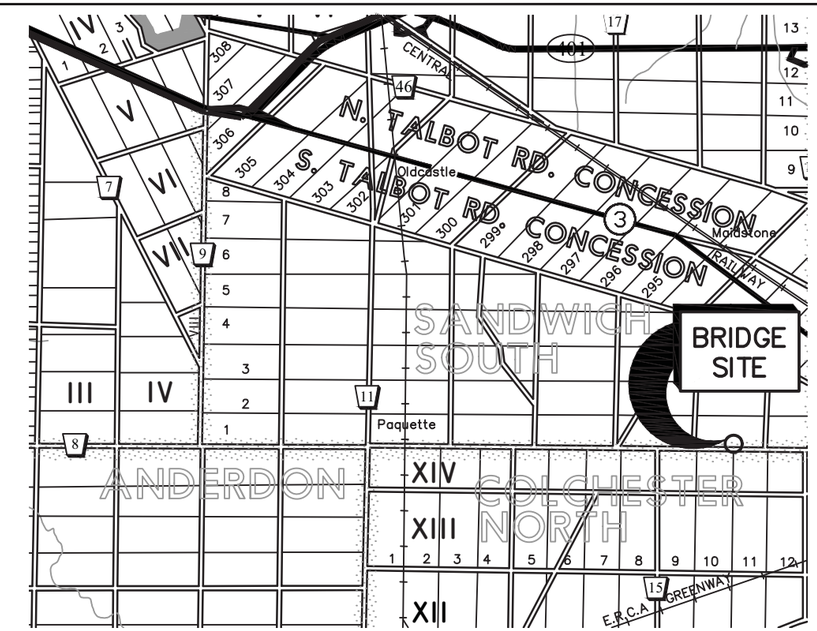
NOTE:

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 SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.

ELEV: 192.990m

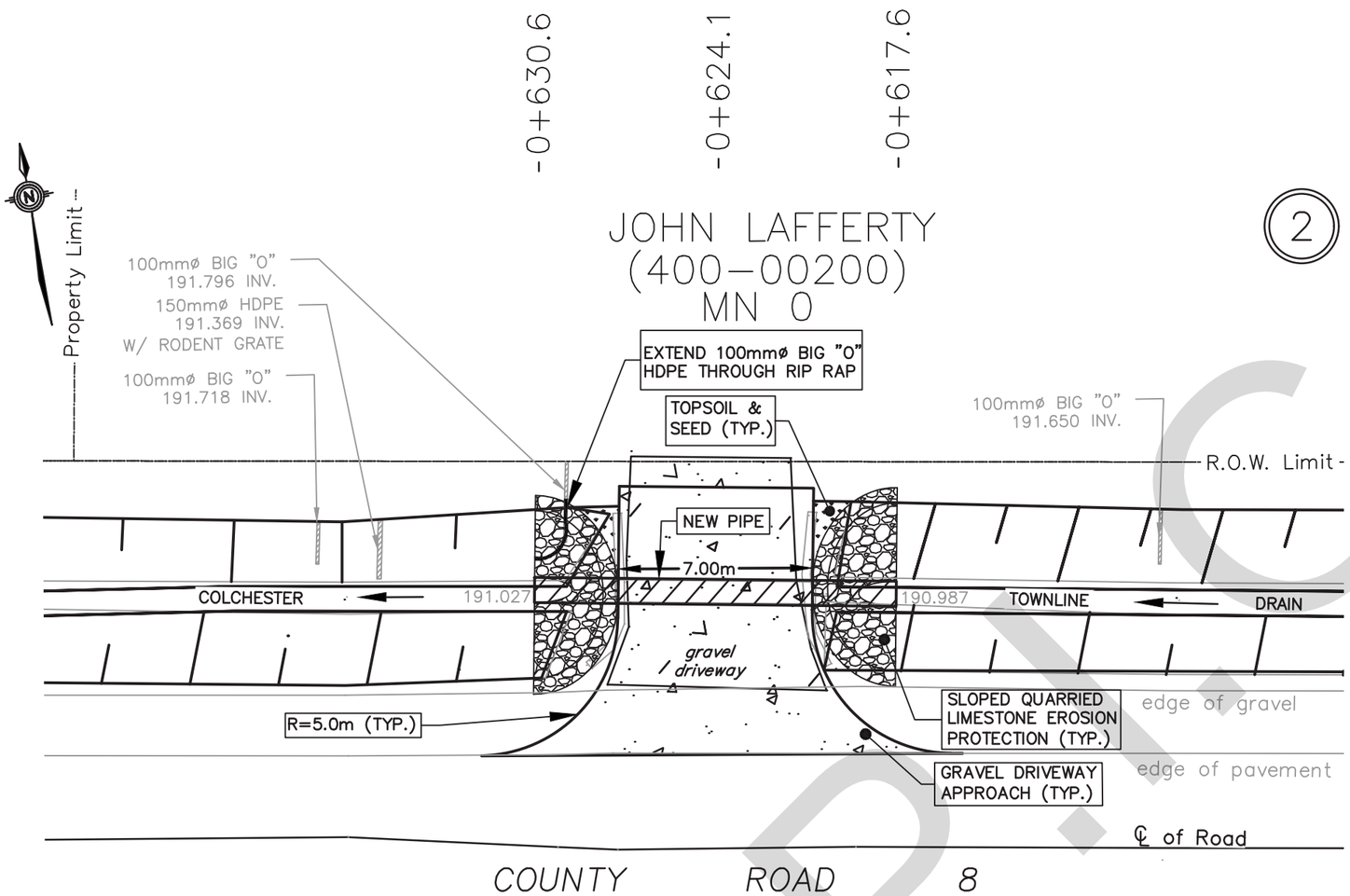
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
750mm	14.0m (45.93 FT.)	2.0 mm	68 X 13	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 191.191m DOWNSTREAM INV. (W) = 191.184m ℄ TOP OF DRIVEWAY = 193.025m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR KAREN & JEROME RACICOT (400-00100)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
2018D035		1 OF 20

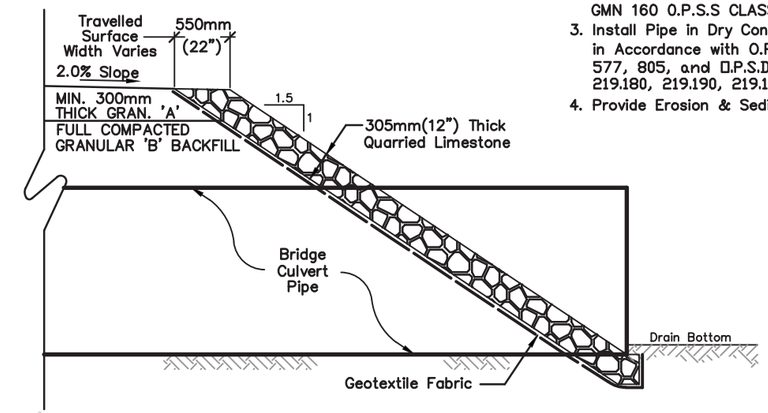


BRIDGE PLAN

SCALE = 1:200

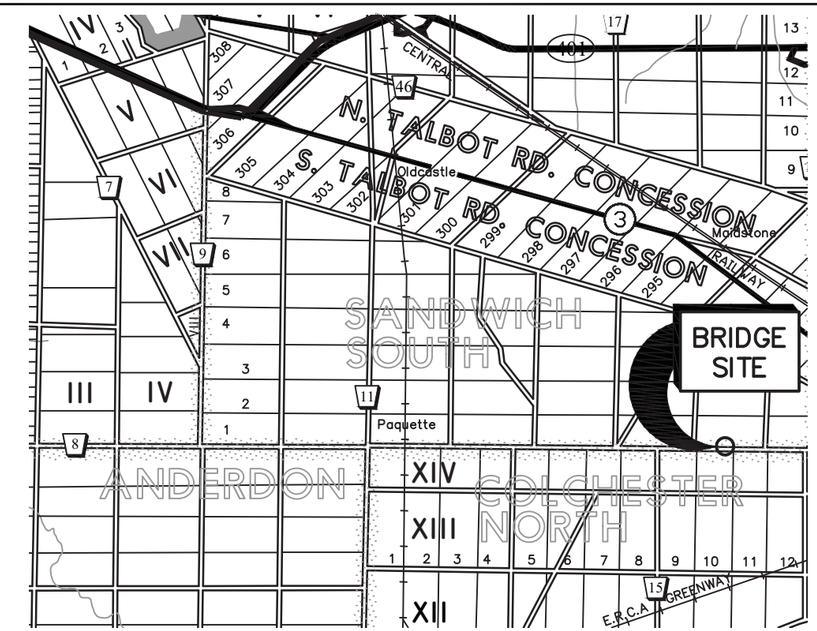
NOTE:

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 SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.

ELEV: 192.990m

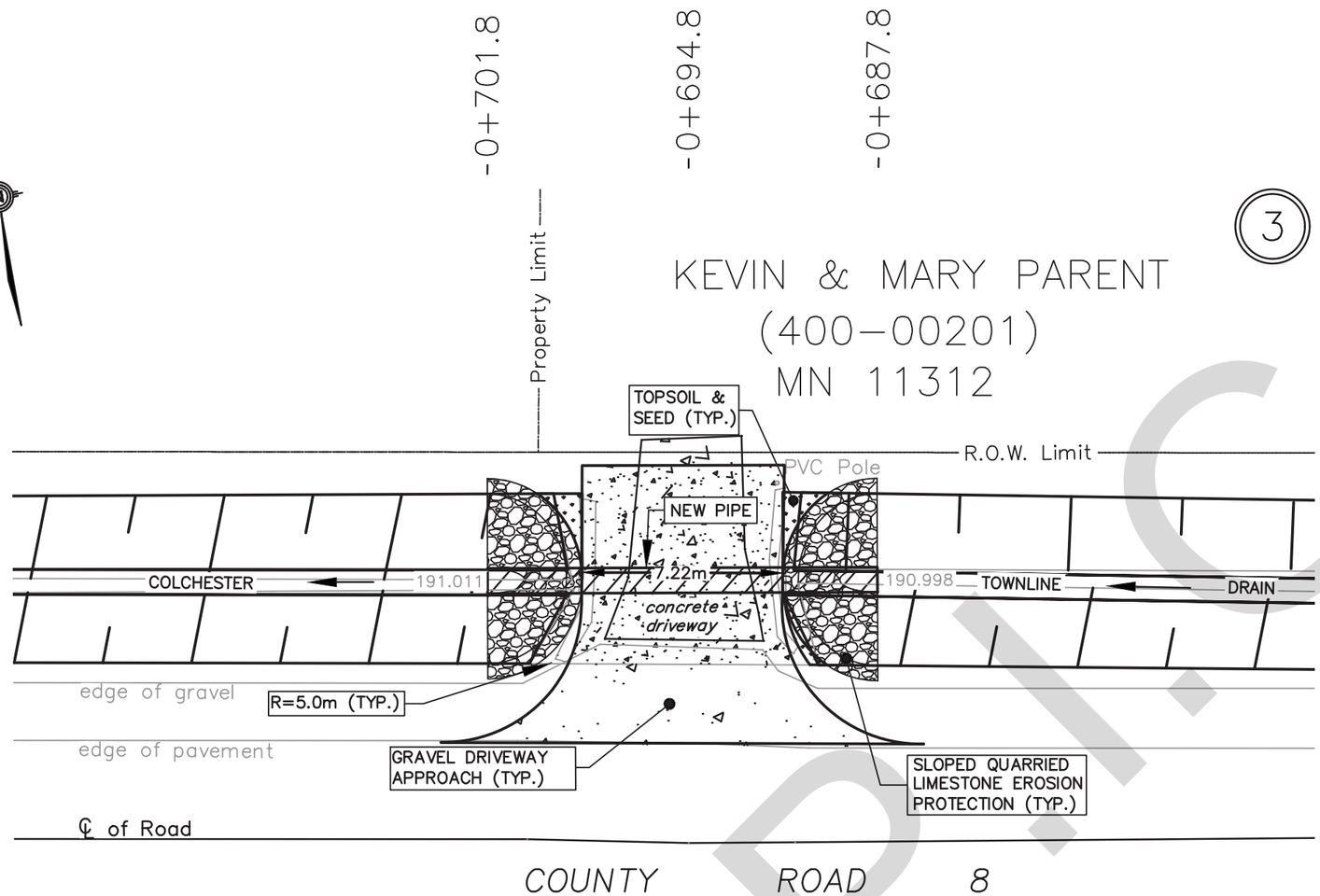
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
900mm	13.0m (42.65 FT.)	2.0 mm	68 X 13	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.997m DOWNSTREAM INV. (W) = 190.990m ℄ TOP OF DRIVEWAY = 192.634m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR JOHN LAFFERTY (400-00200)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
2018D035		2 OF 20

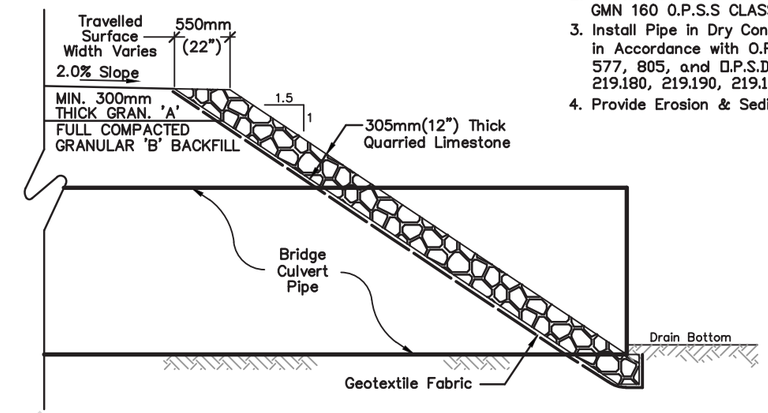


BRIDGE PLAN

SCALE = 1:200

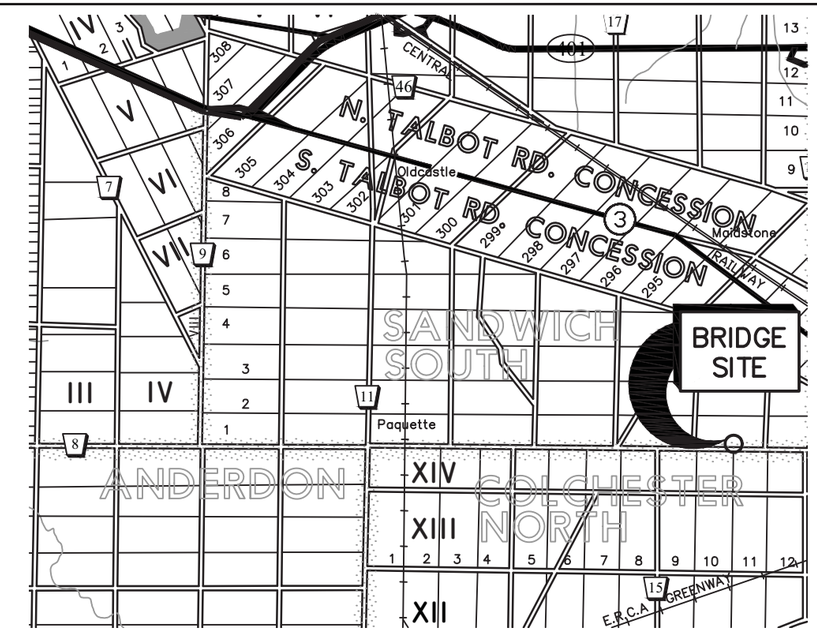
NOTE:

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 SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.

ELEV: 192.990m

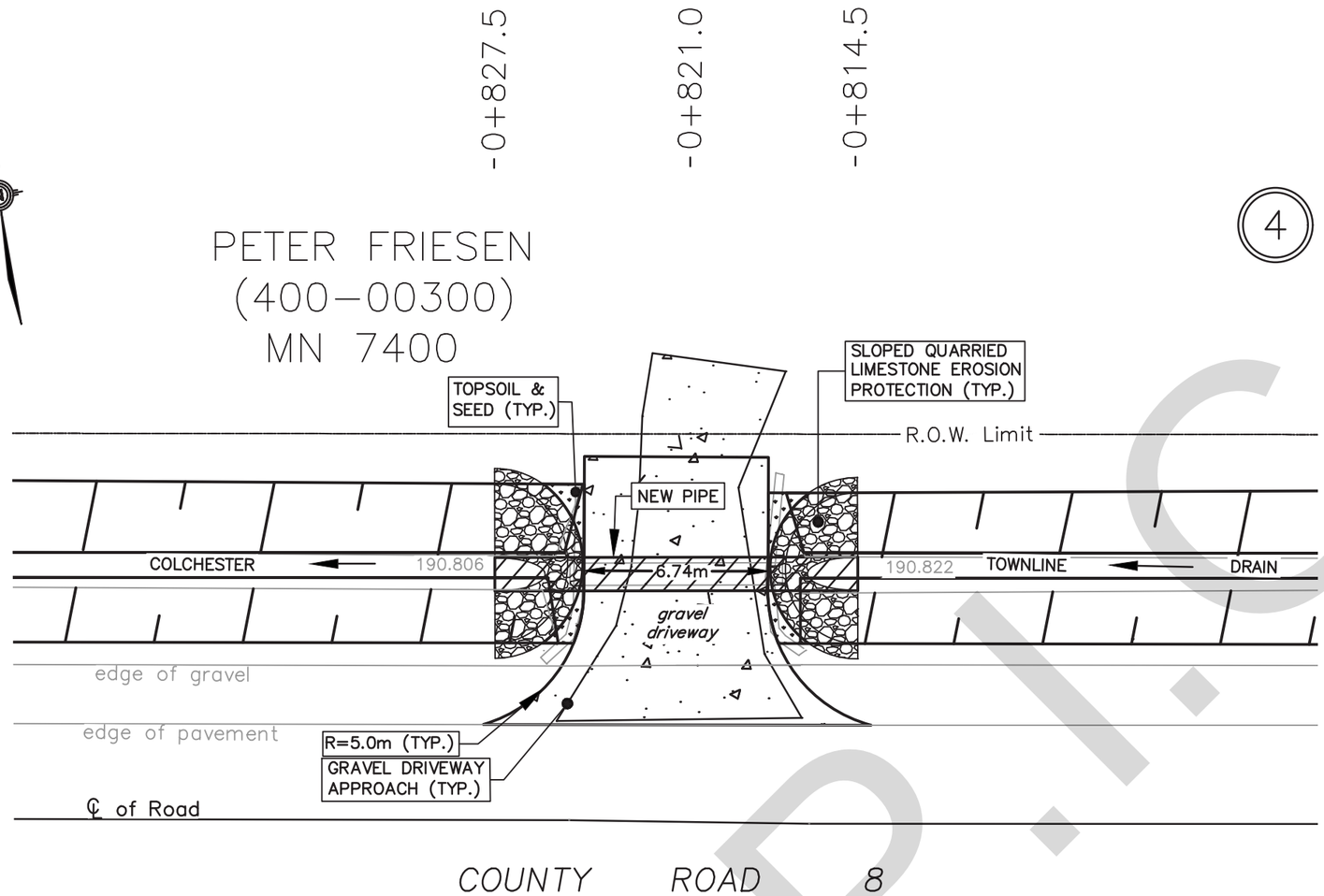
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
900mm	14.0m (45.93 FT.)	2.0 mm	68 X 13	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.962m DOWNSTREAM INV. (W) = 190.955m ℄ TOP OF DRIVEWAY = 192.854m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR KEVIN & MARY PARENT (400-00201)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
2018D035		3 OF 20

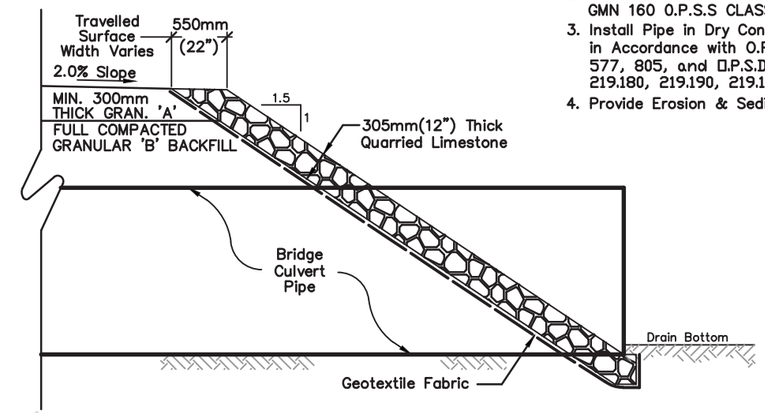


BRIDGE PLAN

SCALE = 1:200

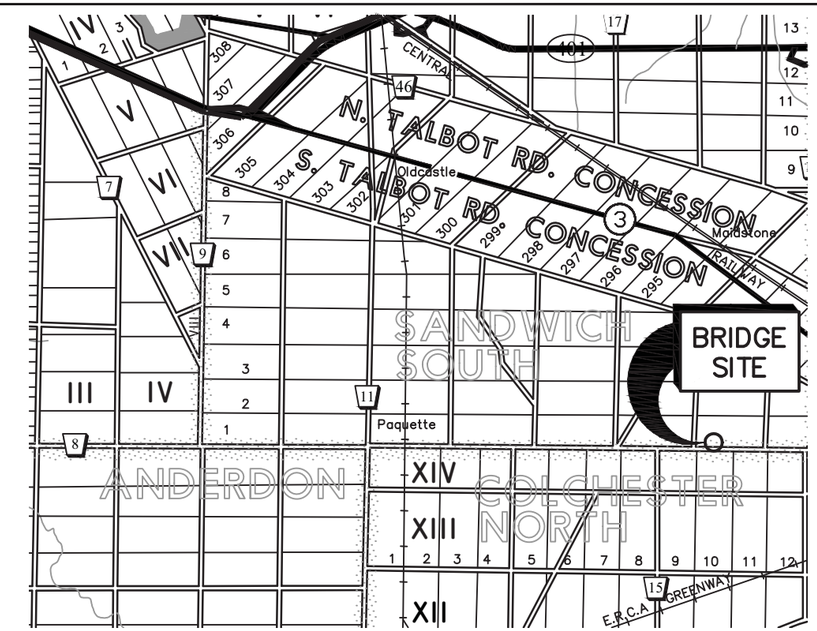
NOTE:

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 SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.

ELEV: 192.990m

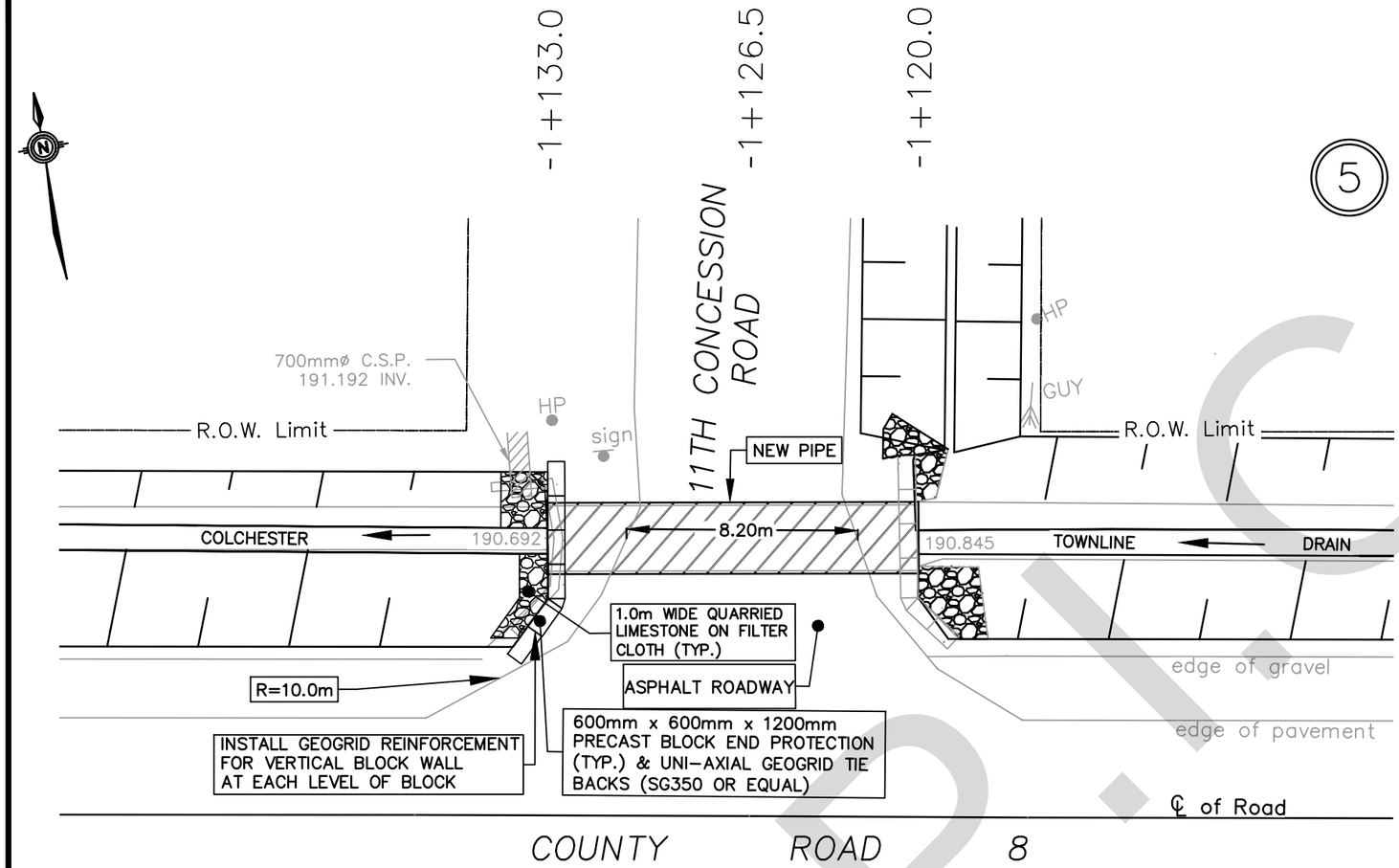
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
1200mm	13.0m (42.65 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 190.870m DOWNSTREAM INV. (W) = 190.864m ℄ TOP OF DRIVEWAY = 192.591m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR PETER FRIESEN (400-00300)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1821

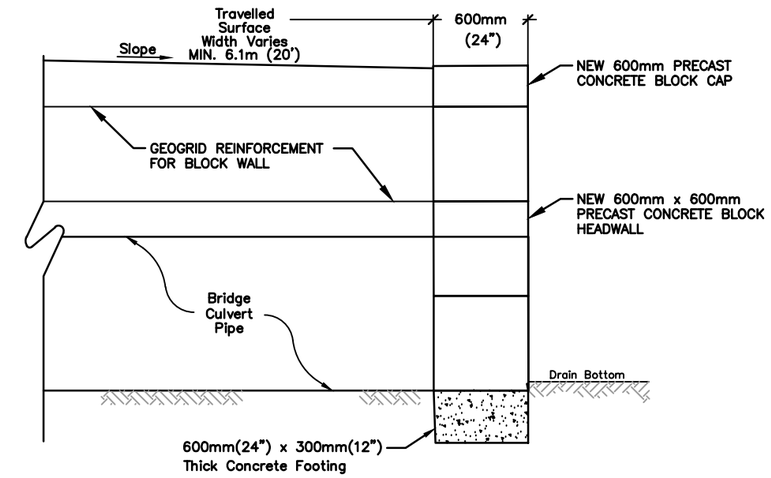
DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A.	APPENDIX 'E'
2018D035	PLOT CODE: 1:1 FILE: REI2018D035.DWG	4 OF 20



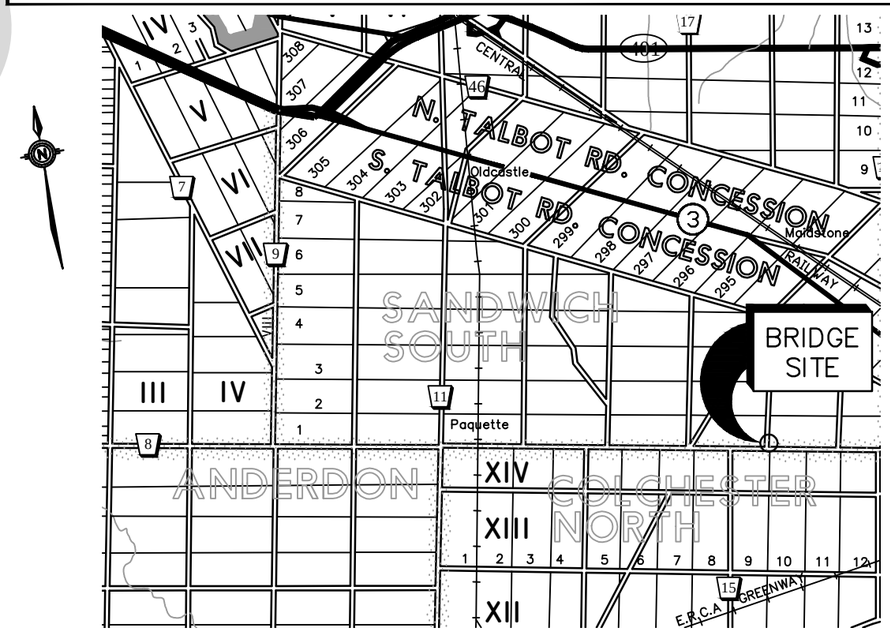
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

NOTE:
EASTERN HEADWALL IS GOOD AND SHOULD REMAIN WITH NEW BRIDGE INSTALLATION

CONSTRUCTION

BENCHMARK:
TOP SOUTH EAST END OF EASTERN PRECAST CONCRETE HEADWALL ON 11TH CONCESSION ROAD.

ELEV: 192.990m

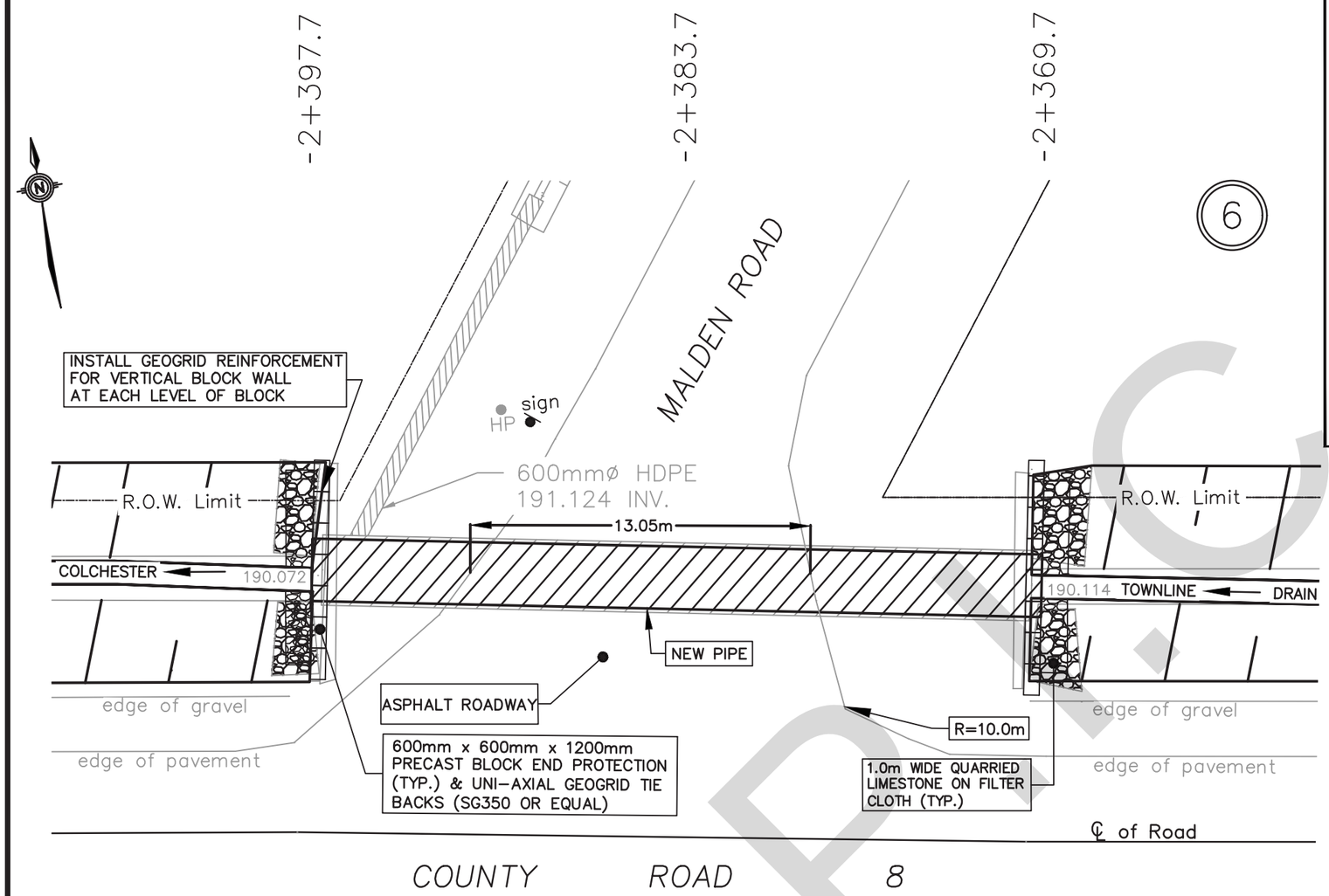
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2500mm X 1830mm	13.0m (42.65 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 190.654m DOWNSTREAM INV. (W) = 190.648m ℄ TOP OF DRIVEWAY = 193.115m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR CONCESSION ROAD 11
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

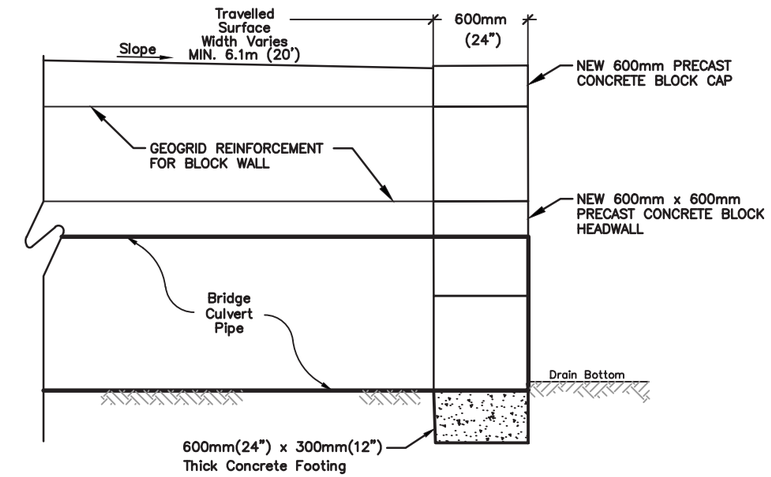
DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
2018D035		5 OF 20



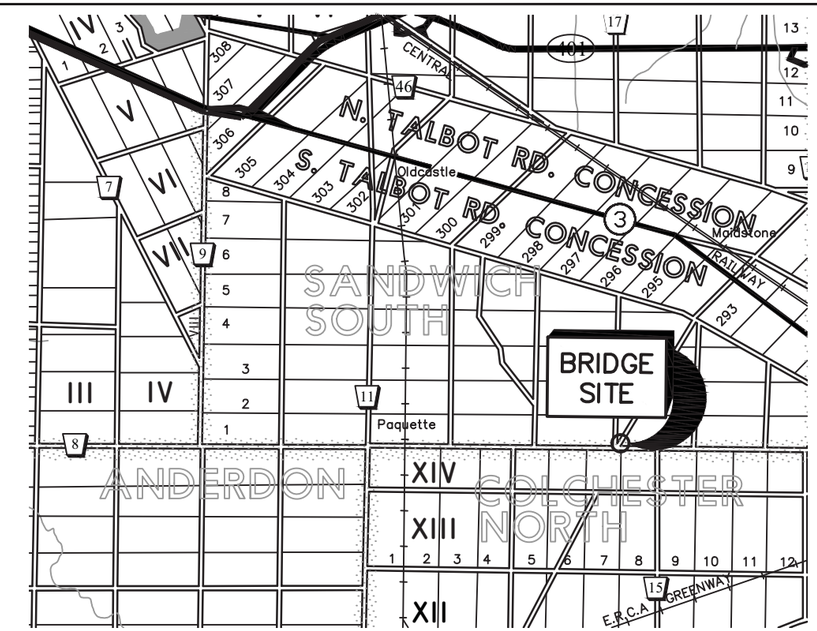
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 18 METRES SOUTH OF 10TH CONCESSION ROAD.

ELEV: 193.563m

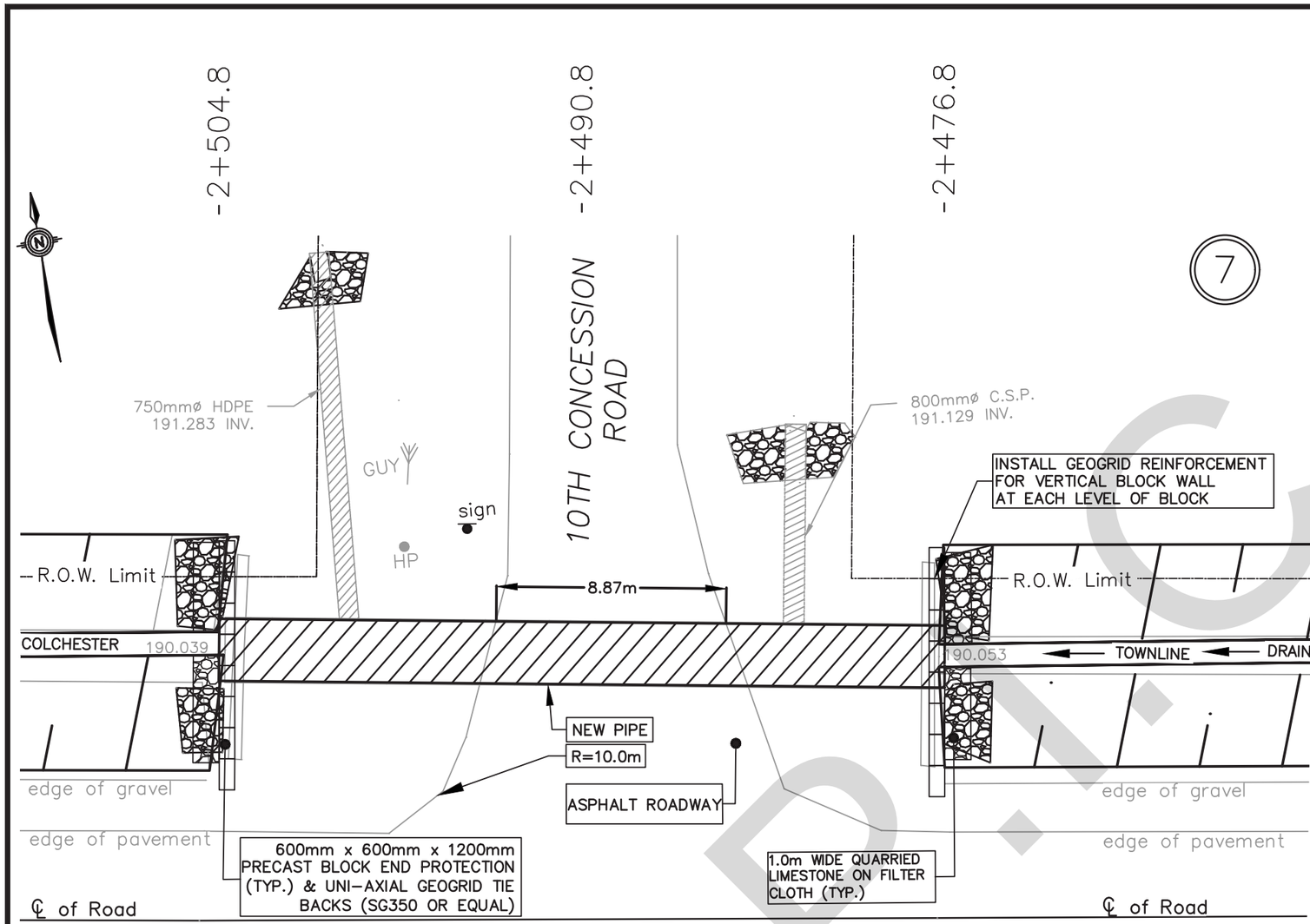
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2400mm	28.0m (91.86 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 189.983m DOWNSTREAM INV. (W) = 189.969m ℄ TOP OF DRIVEWAY = 193.063m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR MALDEN ROAD
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

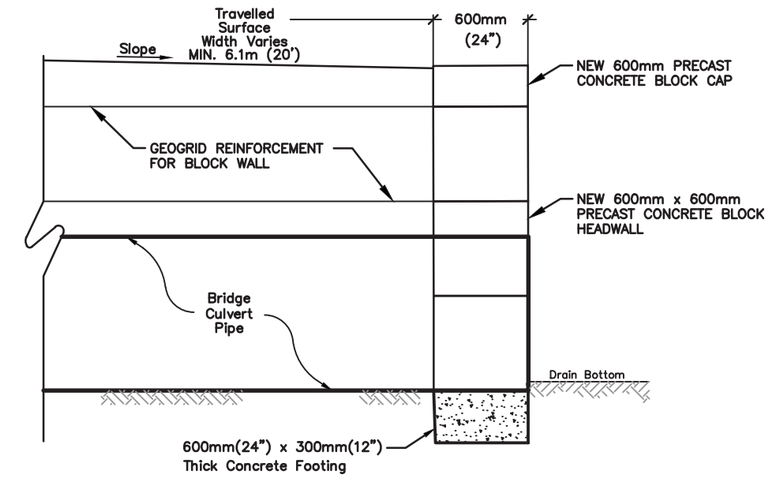
DATE: 2022-04-26

FILE No.: 2018D035
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2018D035.DWG



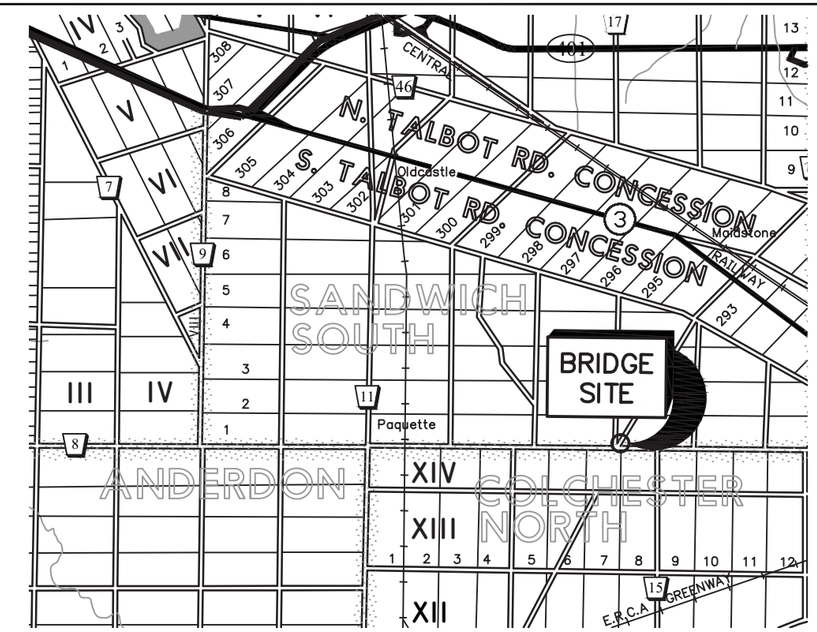
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 18 METRES SOUTH OF 10TH CONCESSION ROAD.

ELEV: 193.563m

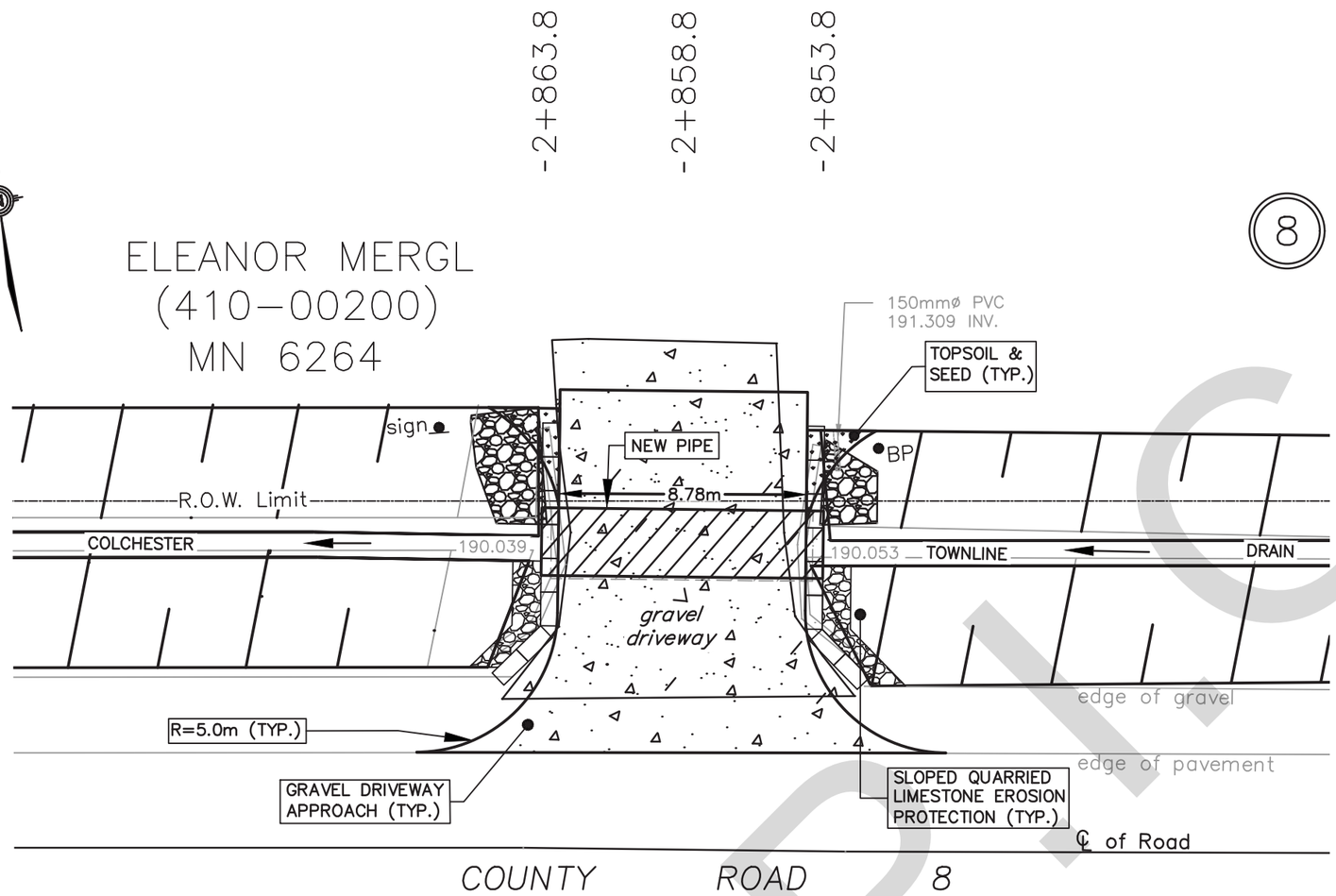
PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2400mm	28.0m (91.86 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 189.931m DOWNSTREAM INV. (W) = 189.917m ℄ TOP OF DRIVEWAY = 193.154m DRAIN GRADE = 0.05%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR CONCESSION ROAD 10
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1821

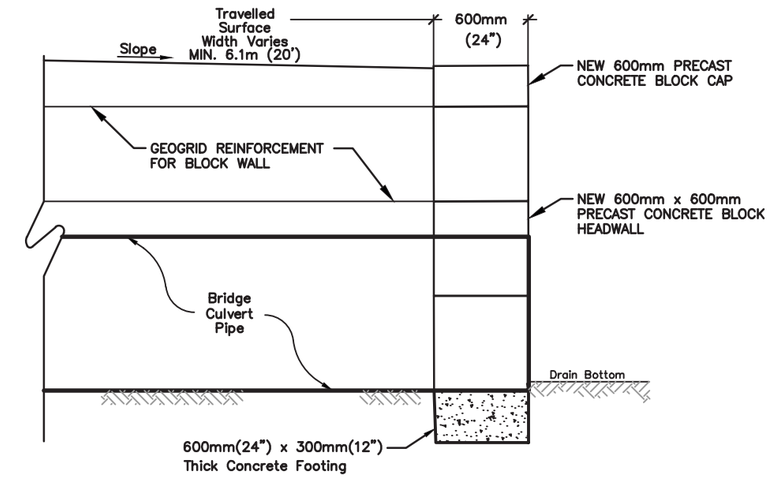
DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
2018D035		7 OF 20



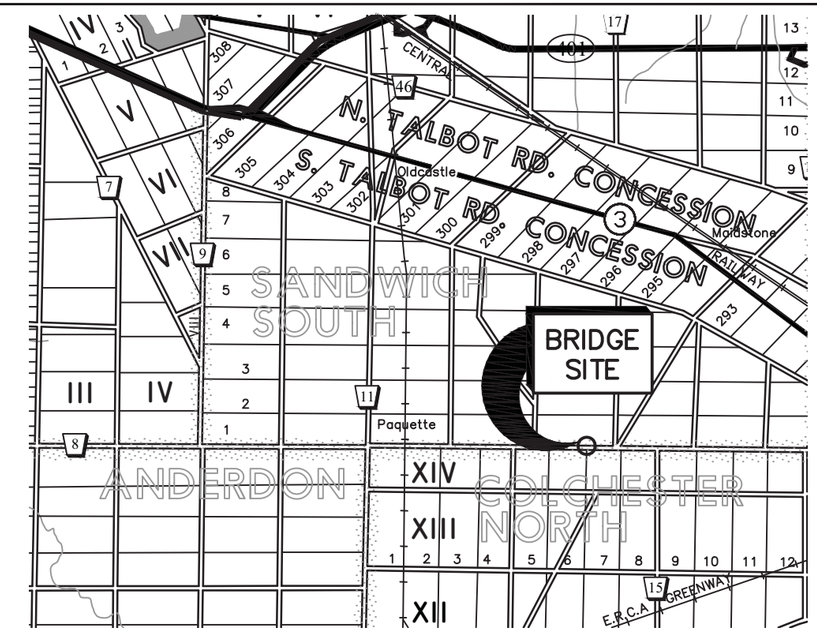
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

CONSTRUCTION

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH WEST OF MN 6264.

ELEV: 193.301m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2400mm	10.0m (32.81 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 189.662m DOWNSTREAM INV. (W) = 189.647m ℄ TOP OF DRIVEWAY = 192.459m DRAIN GRADE = 0.15%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR ELEANOR MERGL (410-00200)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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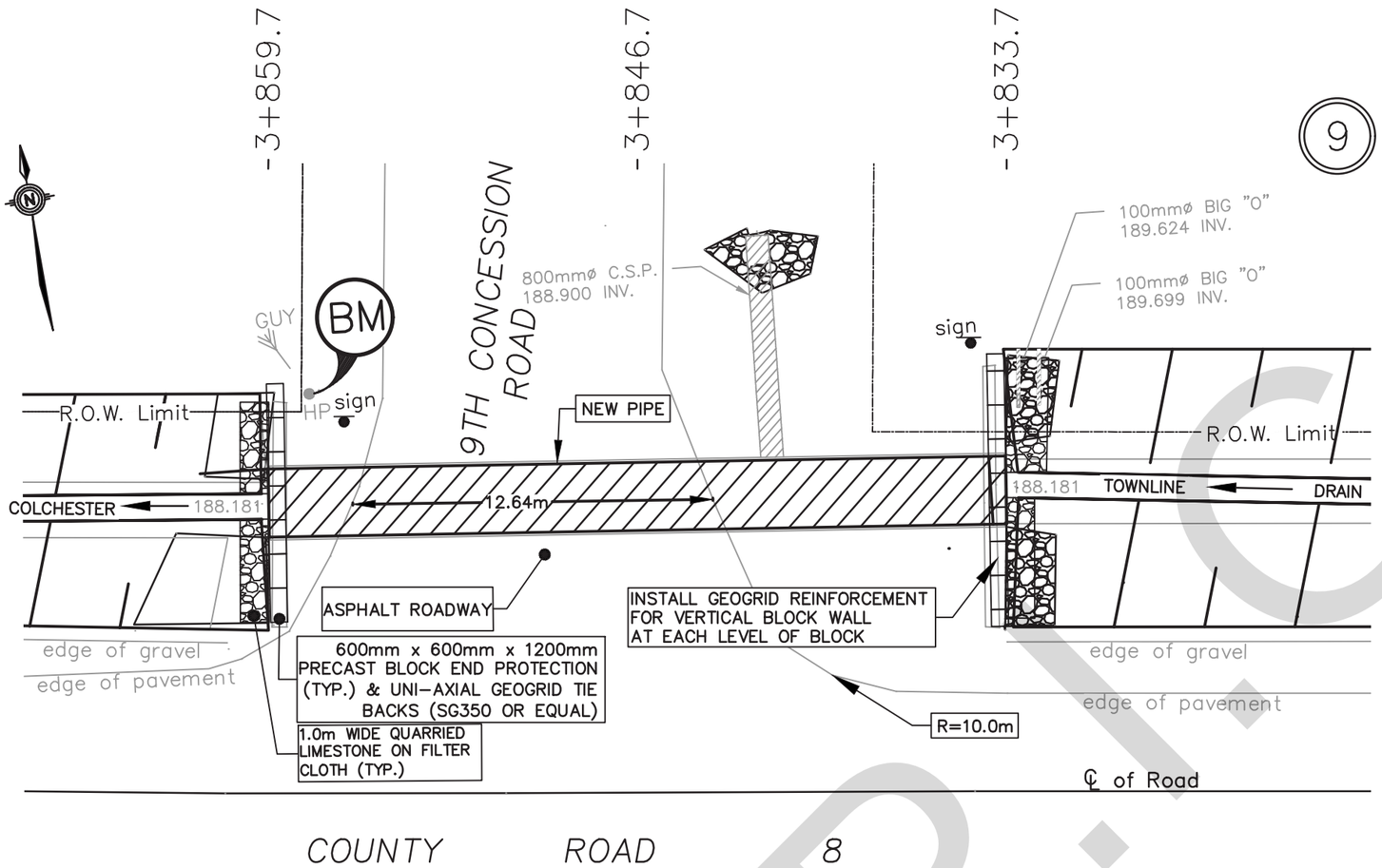
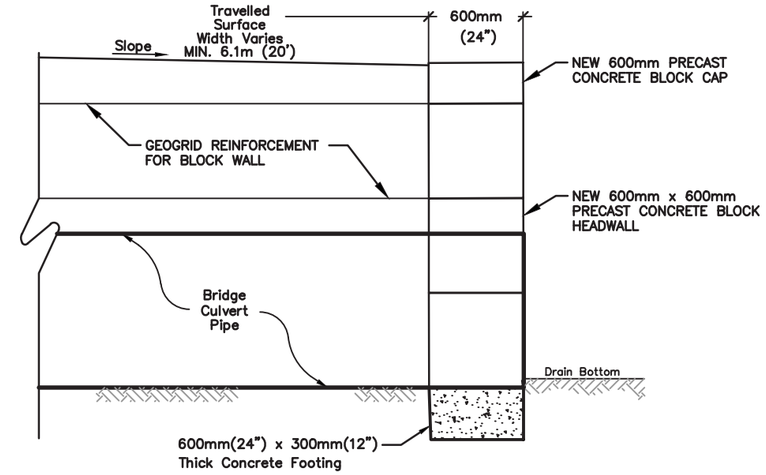


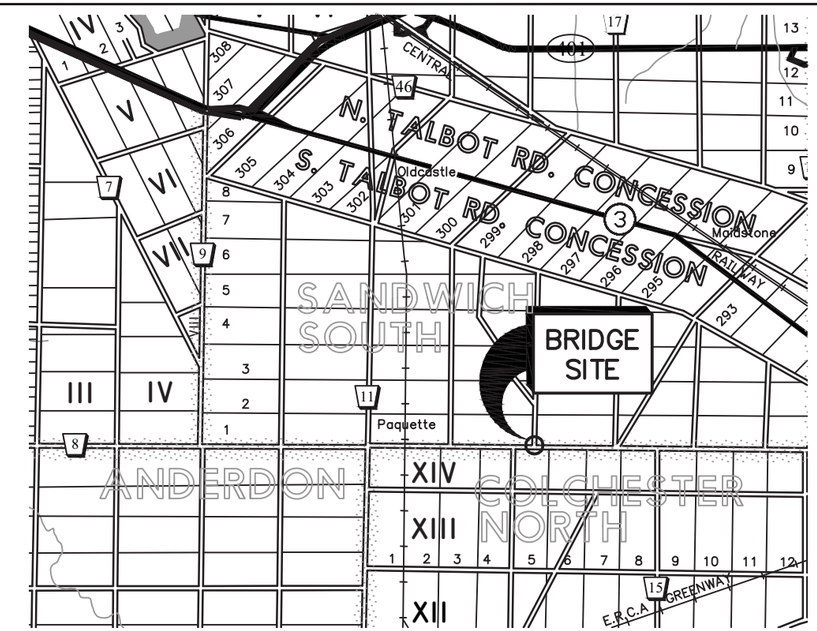
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 1 METRE EAST OF WESTERN HEADWALL OF 9TH CONCESSION ROAD.

ELEV: 191.610m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2400mm	26.0m (85.30 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 188.153m DOWNSTREAM INV. (W) = 188.114m ℄ TOP OF DRIVEWAY = 191.275m DRAIN GRADE = 0.15%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR CONCESSION ROAD 9
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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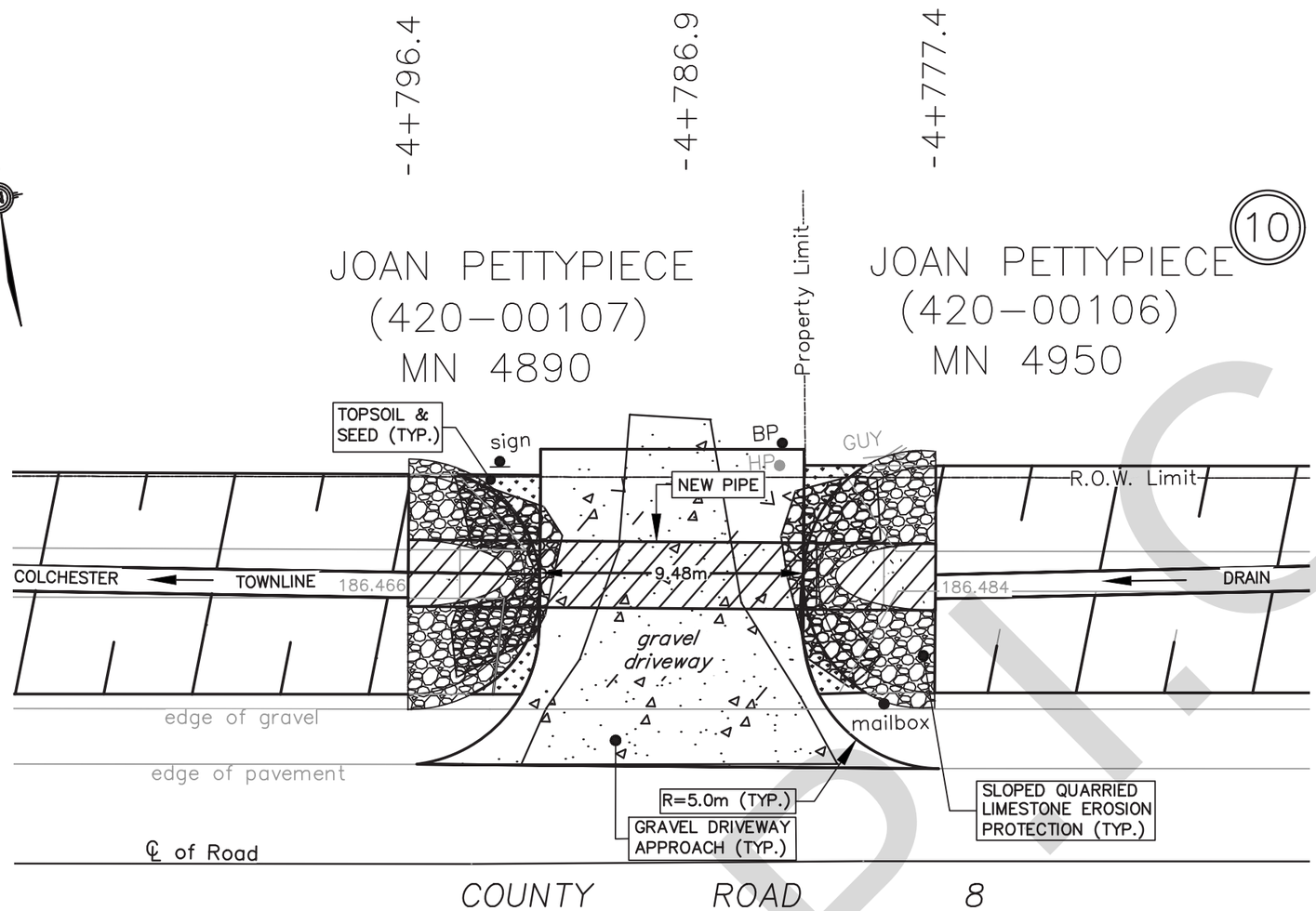
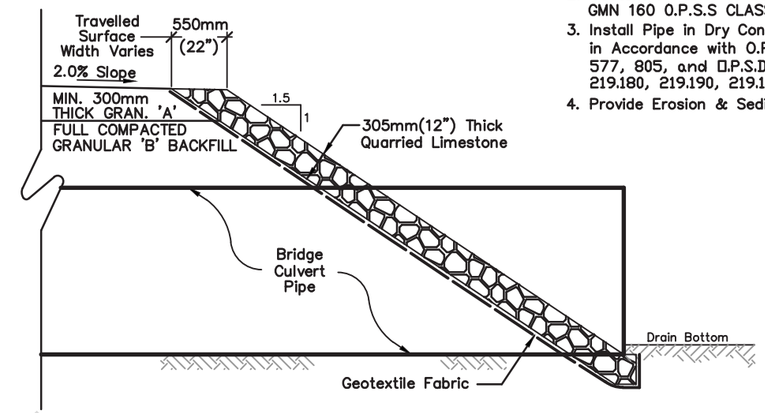


BRIDGE PLAN

SCALE = 1:200

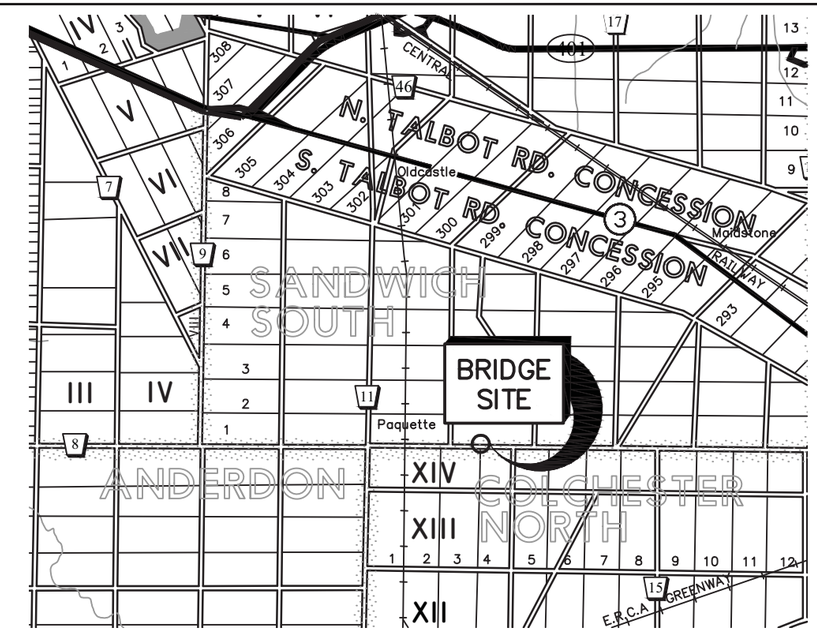
NOTE:

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

MAINTENANCE

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 10 METRES SOUTH OF MN 4890.

ELEV: 189.852m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
2400mm	19.0m (62.33 FT.)	2.0 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR C.S.P.	UPSTREAM INV. (E) = 186.518m DOWNSTREAM INV. (W) = 186.484m ℄ TOP OF DRIVEWAY = 189.325m DRAIN GRADE = 0.18%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR JOAN PETTYPIECE (420-00106) & (420-00107)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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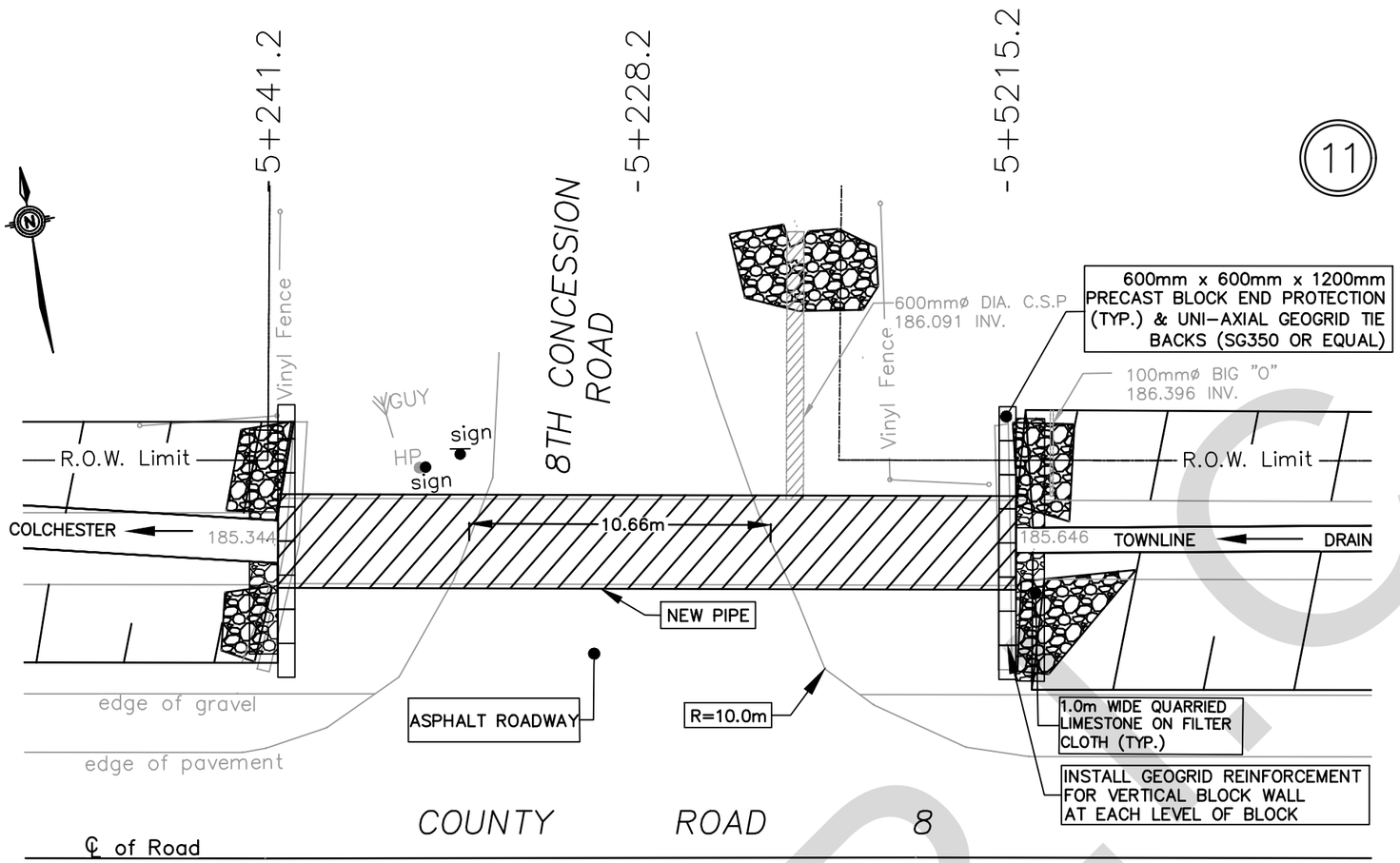
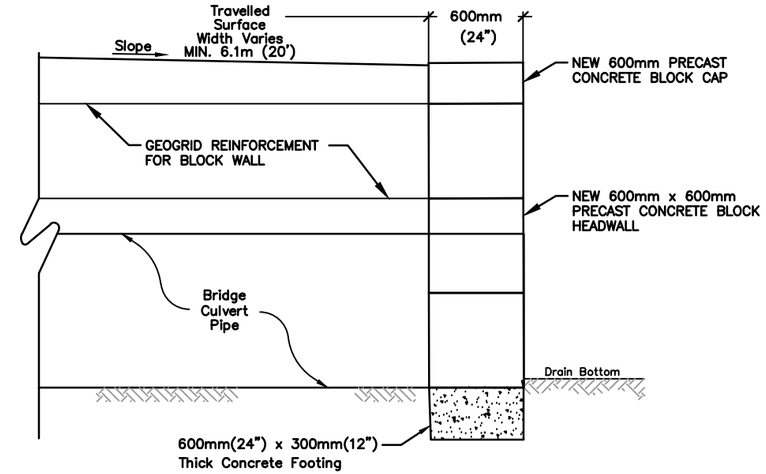


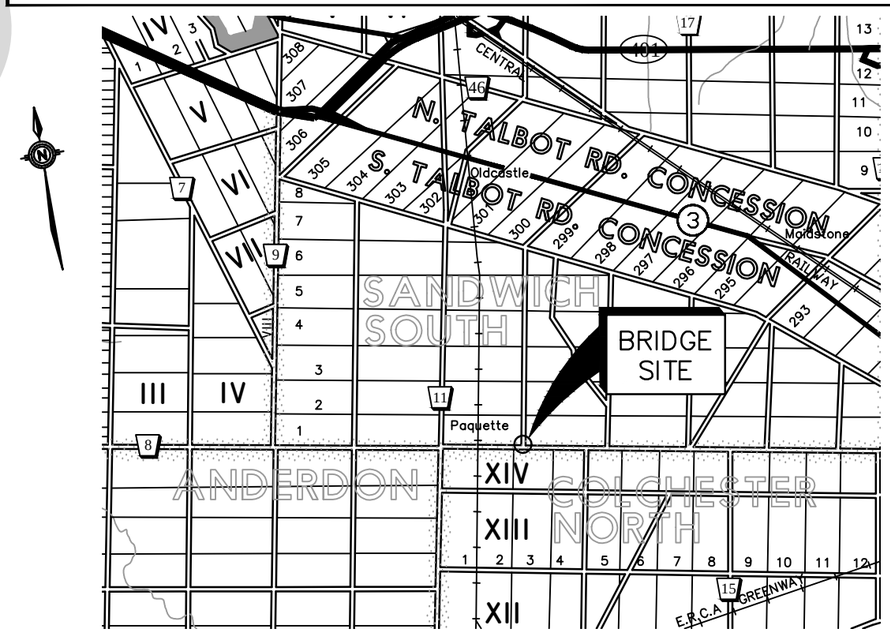
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NAIL ON HYDRO POLE APPROXIMATELY 40 METERS SOUTH WEST OF 8TH CONCESSION ROAD.

ELEV: 188.298m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3300mm x 2080mm	26.0m (85.30 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 185.777m DOWNSTREAM INV. (W) = 185.731m ℄ TOP OF DRIVEWAY = 188.410m DRAIN GRADE = 0.18%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR CONCESSION ROAD 8
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

ROOD ENGINEERING INC.
CONSULTING ENGINEERS
Leamington, Ontario
519-322-1821

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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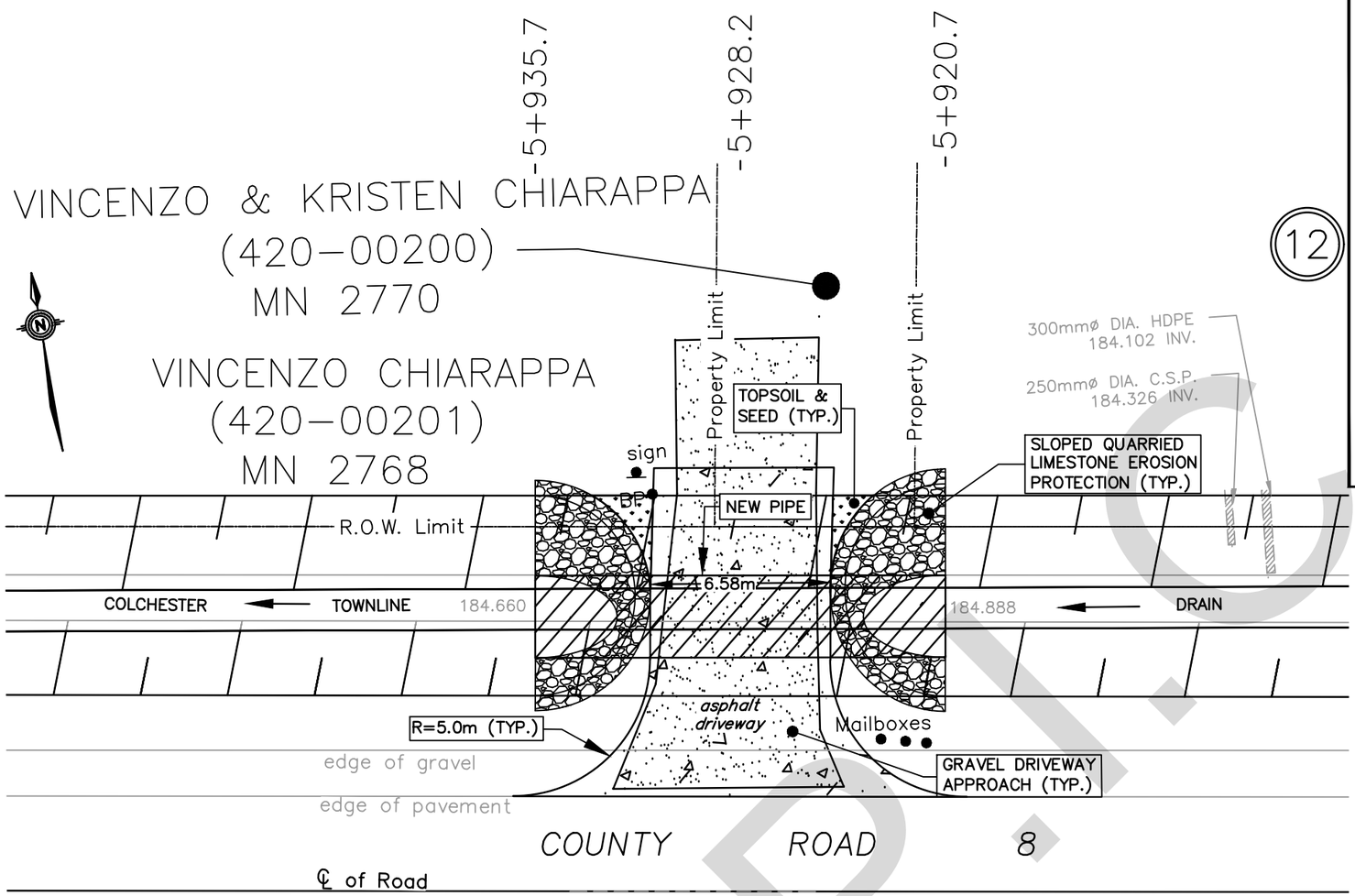
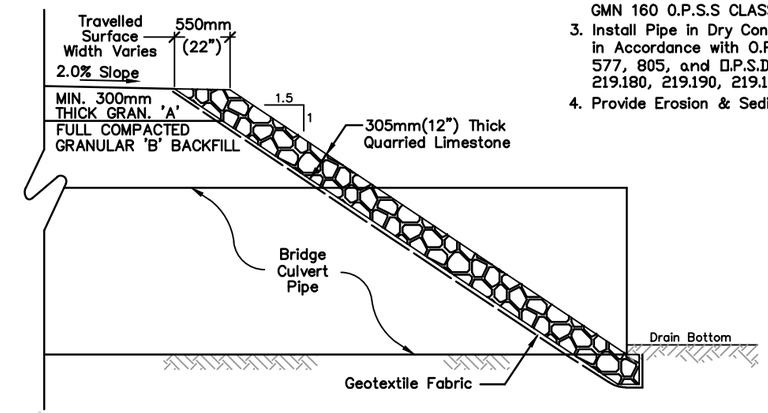


BRIDGE PLAN

SCALE = 1:200

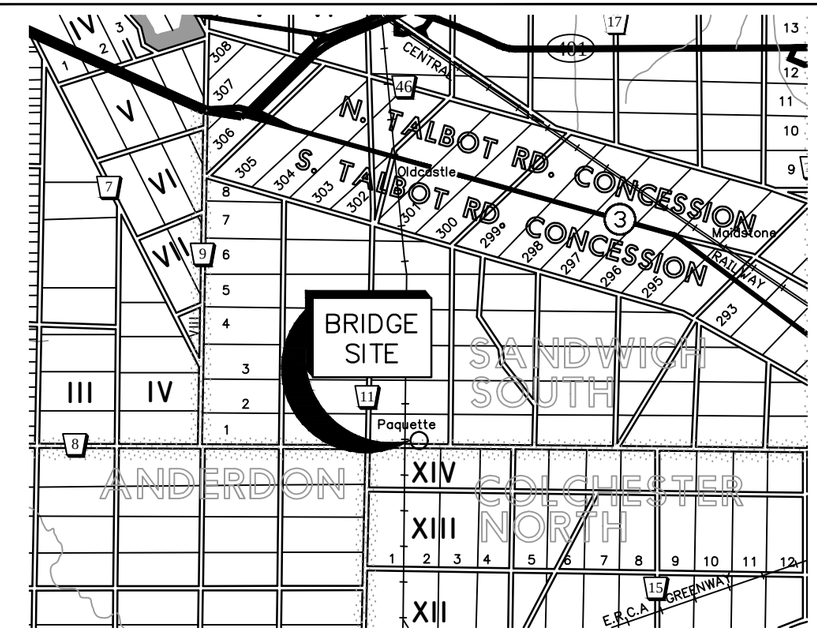
NOTE:

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 NAIL IN HYDRO POLE NORTH OF MN 15415. APPROXIMATELY 50 METRES SOUTH EAST OF MN 2770.

ELEV: 187.602m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm x 2000mm	15.0m (49.21 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 184.833m DOWNSTREAM INV. (W) = 184.818m ℄ TOP OF DRIVEWAY = 187.271m DRAIN GRADE = 0.10%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR VINCENZO & KRISTEN CHIARAPPA (420-00200) & (420-00201)

(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)

IN THE

TOWN OF TECUMSEH

IN THE

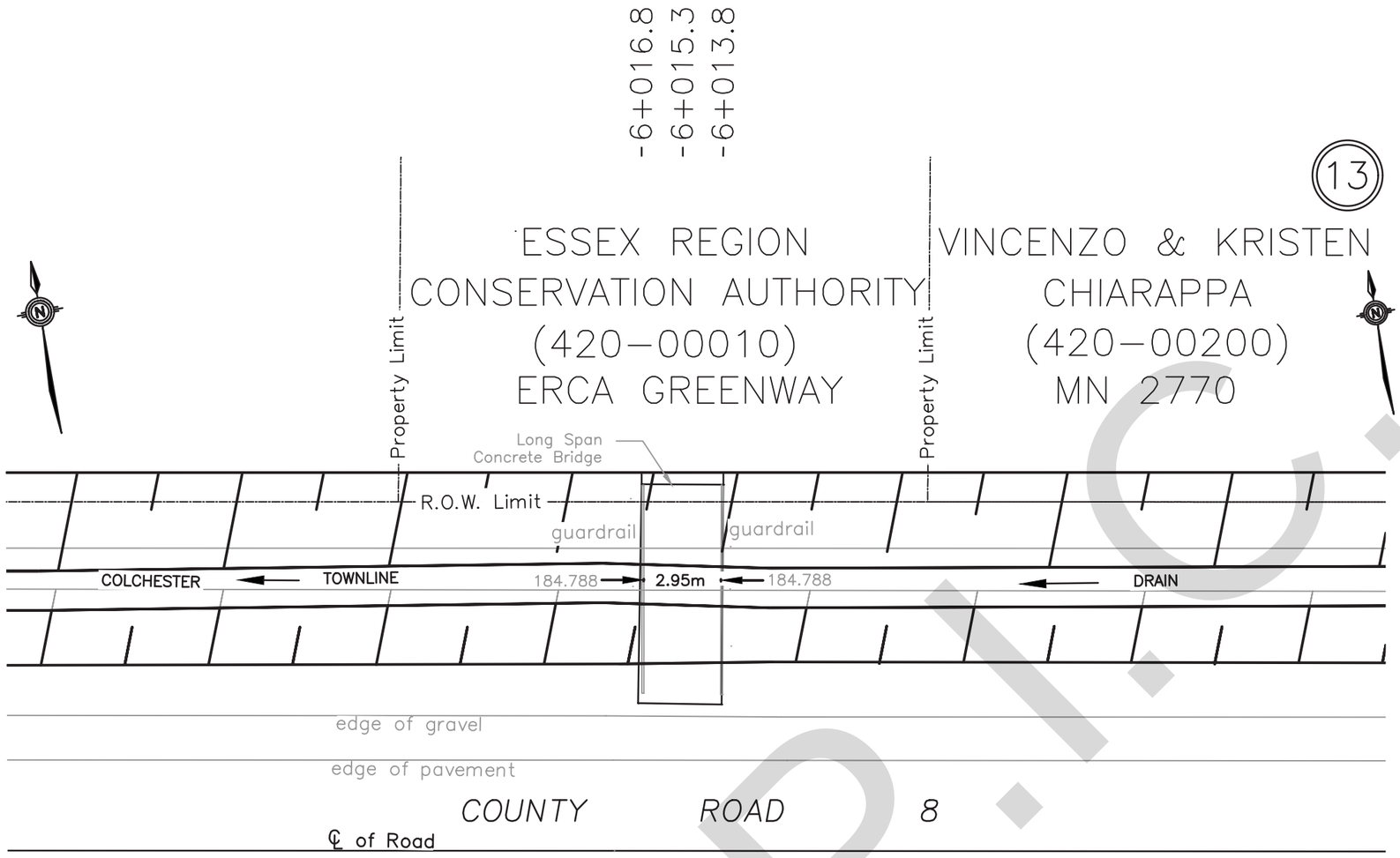
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

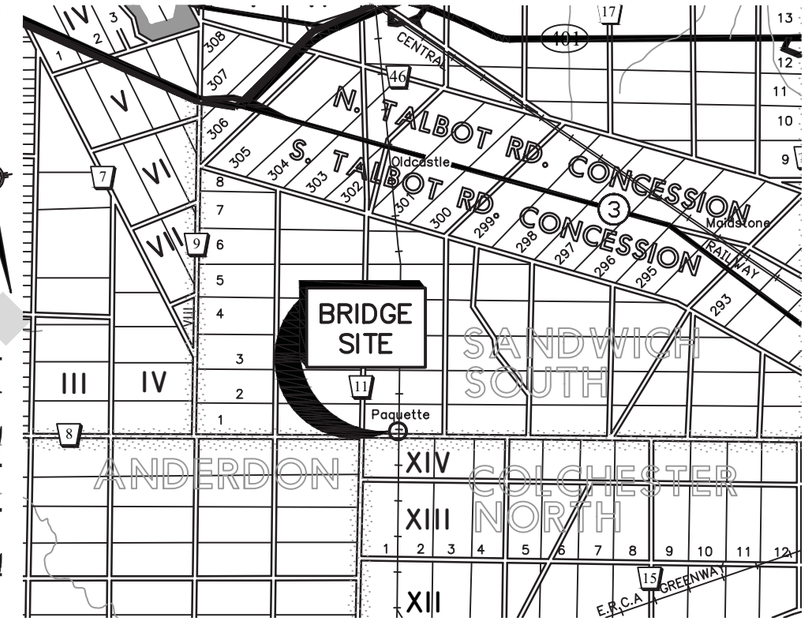
FILE No.: 2018D035

DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2018D035.DWG



BRIDGE PLAN

SCALE = 1:200



KEY PLAN

Scale = 1:100,000

BENCHMARK:
TOP OF NAIL IN HYDRO POLE NORTH OF MN 15415. APPROXIMATELY 50 METRES SOUTH EAST OF MN 2770.

ELEV: 187.602m

PIPE SIZE:	BRIDGE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF BRIDGE:	DESIGN ELEVATIONS:
	3.0m (9.84 FT.)			LONG SPAN CONCRETE BRIDGE	UPSTREAM SOFFIT (E) = 187.235 DOWNSTREAM SOFFIT (W) = 187.255 ℄ TOP OF DRIVEWAY = 187.788m DRAIN GRADE = 0.10%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR CONSERVATION AUTHORITY ESSEX REGION (420–00010)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022–04–26

FILE No.: 2018D035
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2018D035.DWG

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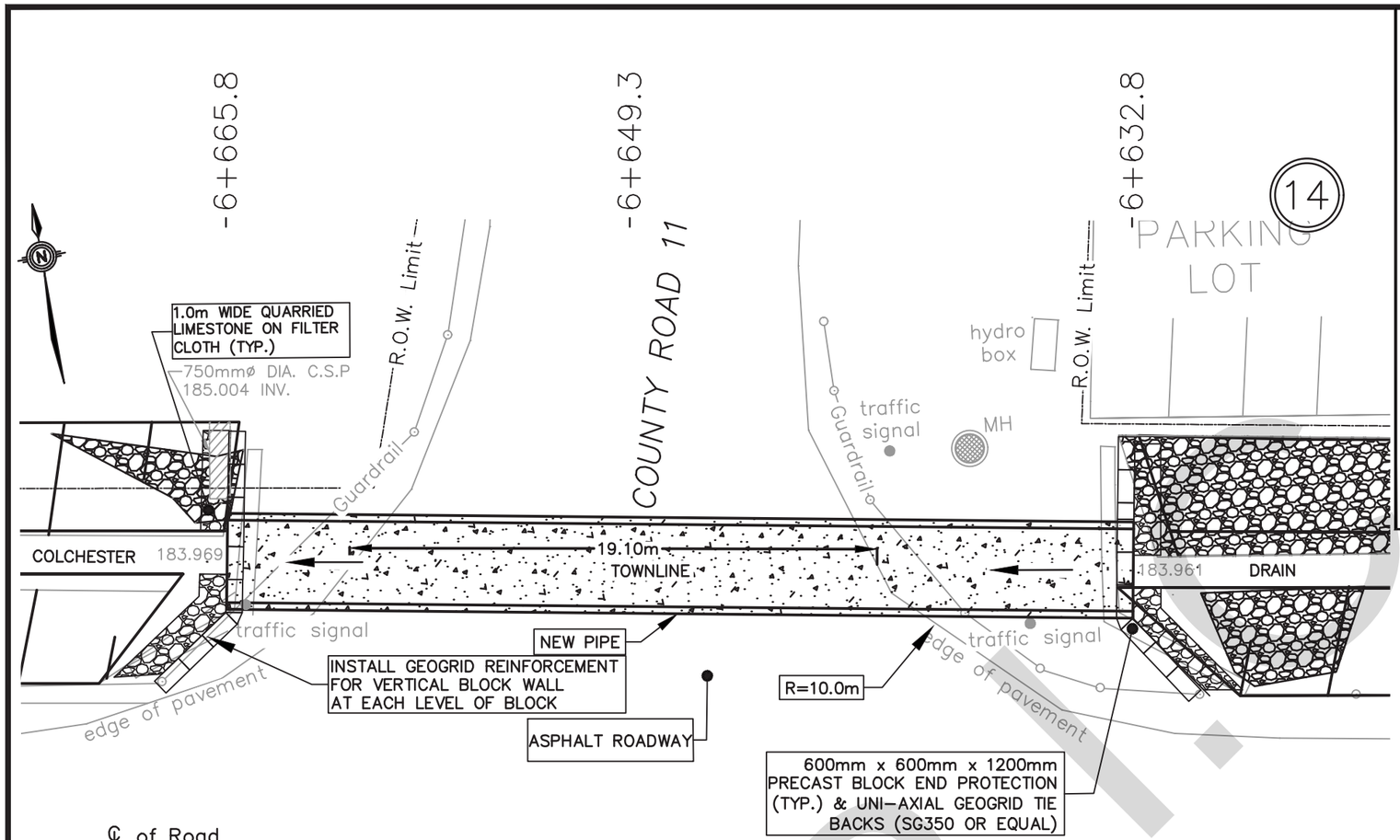
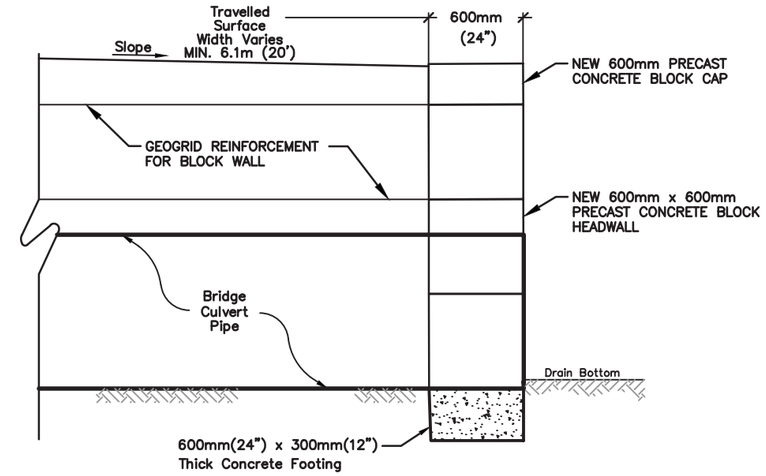


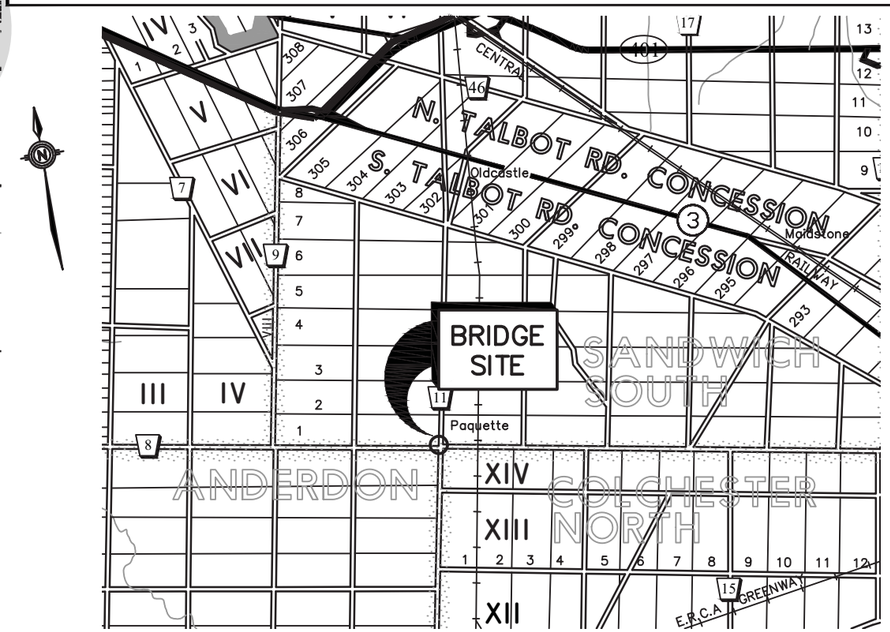
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NUT ON FIRE HYDRANT APPROXIMATELY 10 METRES SOUTH EAST OF WALKER ROAD.

ELEV: 187.524m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm x 2700mm	26.0m (85.30 FT.)			REINFORCED NON-STANDARD CONCRETE BOX CULVERT	UPSTREAM INV. (E) = 183.942m DOWNSTREAM INV. (W) = 183.896m ℄ TOP OF DRIVEWAY = 187.345m DRAIN GRADE = 0.14%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR COUNTY ROAD 11
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.: 2018D035
DRAWN BY: M.A.
PLOT CODE: 1:1
FILE: REI2018D035.DWG

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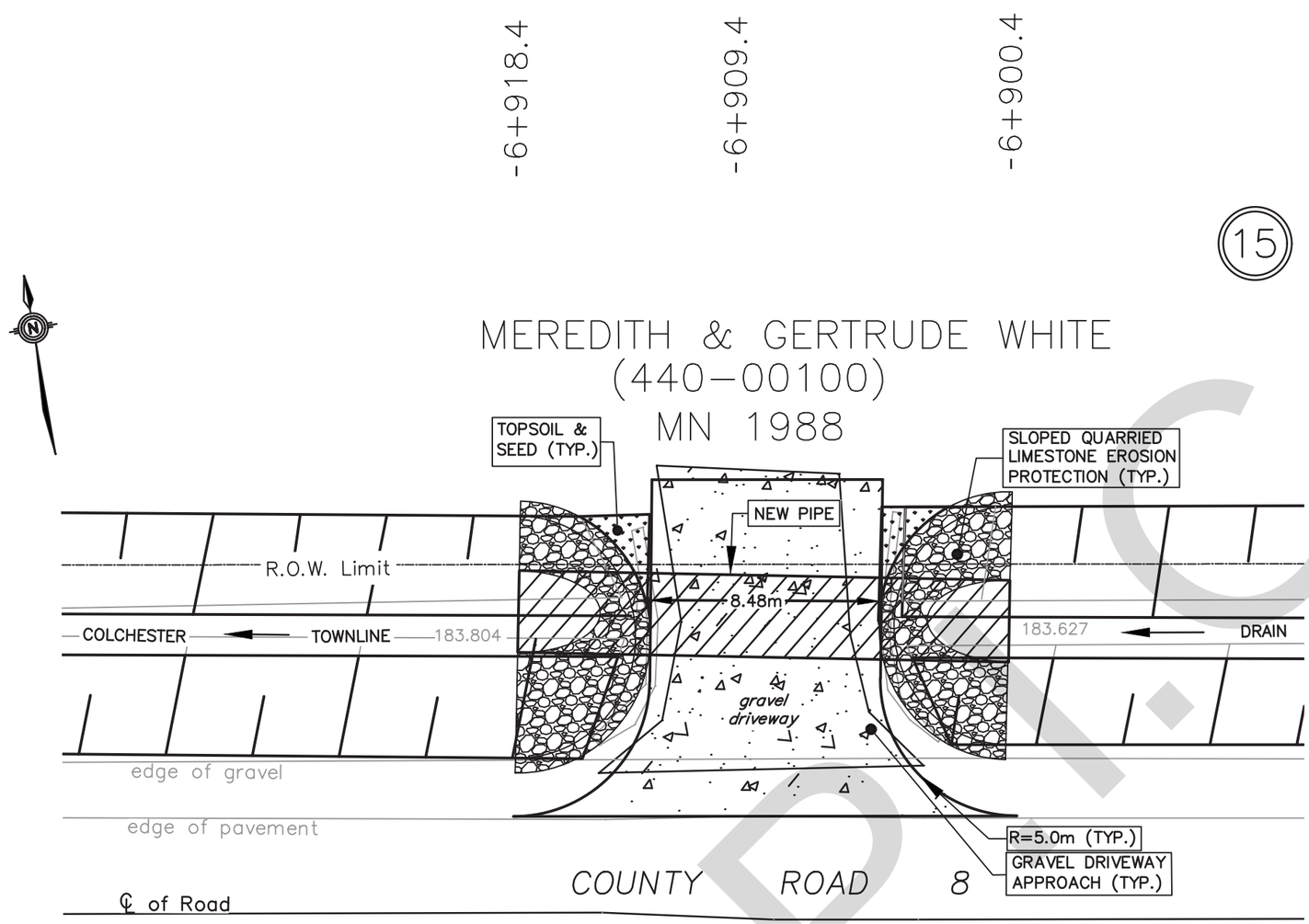
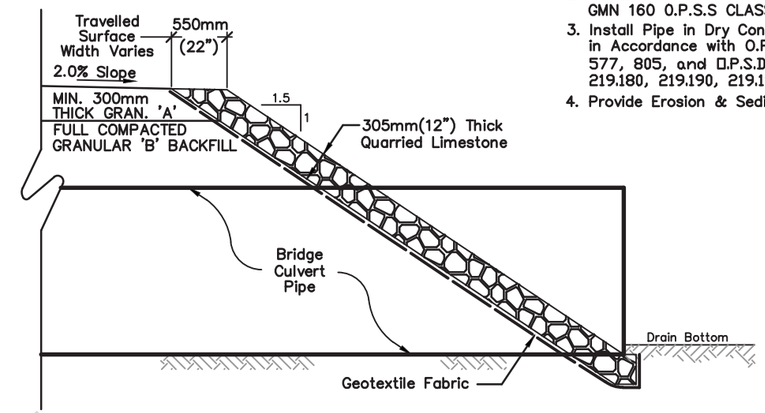


BRIDGE PLAN

SCALE = 1:200

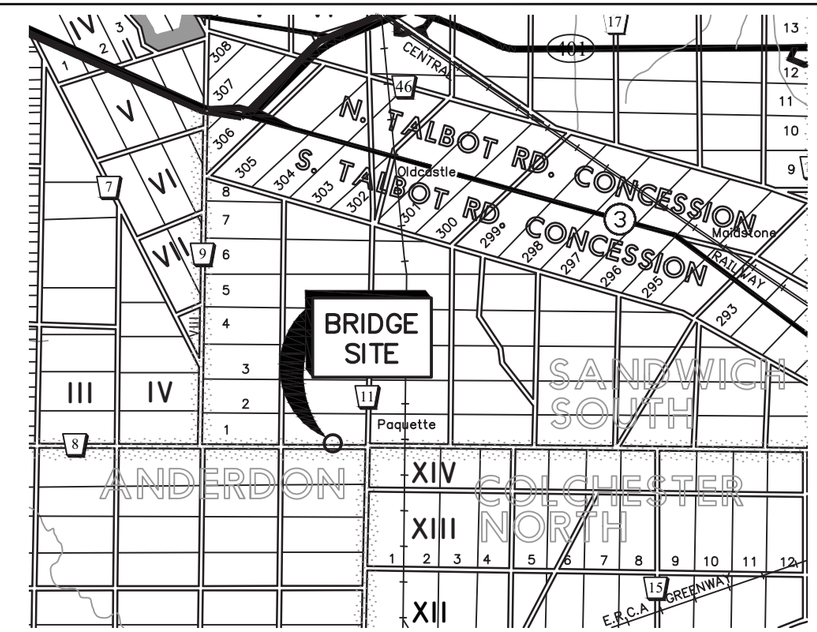
NOTE:

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 NAIL IN HYDROPOLE APPROXIMATELY 15 METRES SOUTH OF MN 1800.

ELEV: 186.805m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm x 2000mm	18.0m (59.05 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 183.638m DOWNSTREAM INV. (W) = 183.612m ℄ TOP OF DRIVEWAY = 186.446m DRAIN GRADE = 0.14%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR MEREDITH & GERTRUDE WHITE (440-00100)

(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)

IN THE

TOWN OF TECUMSEH

IN THE

COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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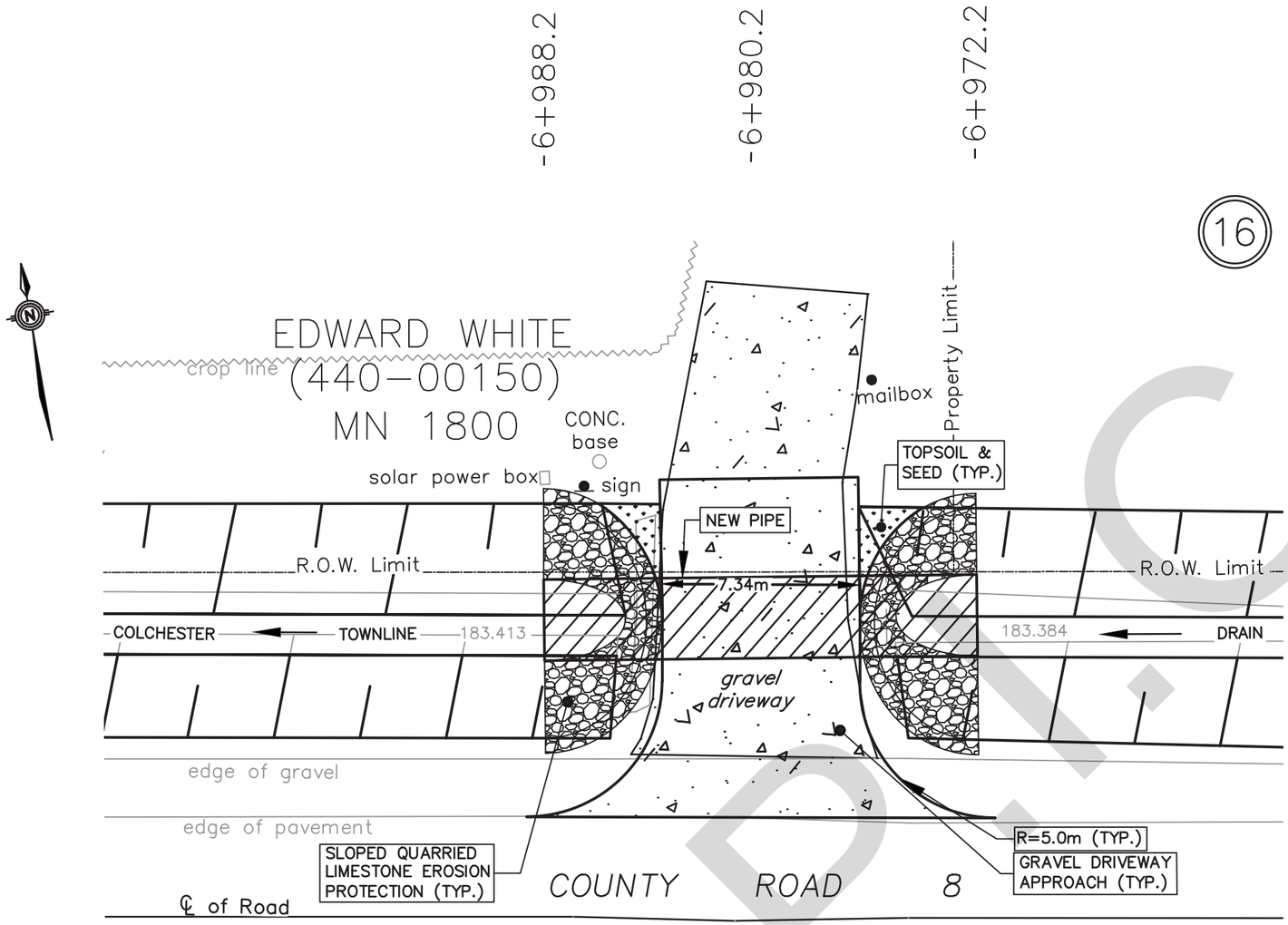
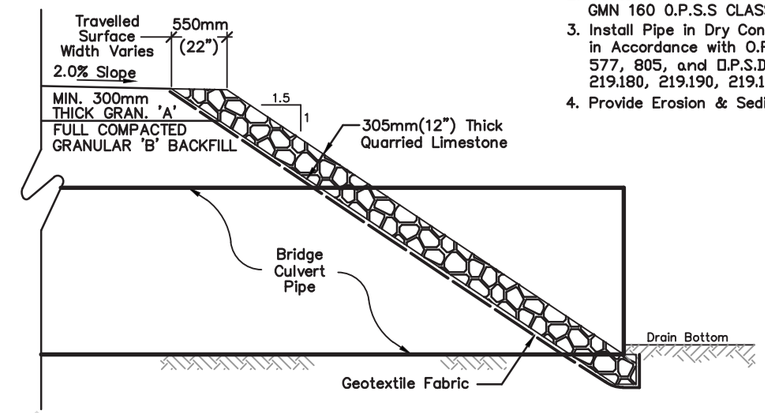


BRIDGE PLAN

SCALE = 1:200

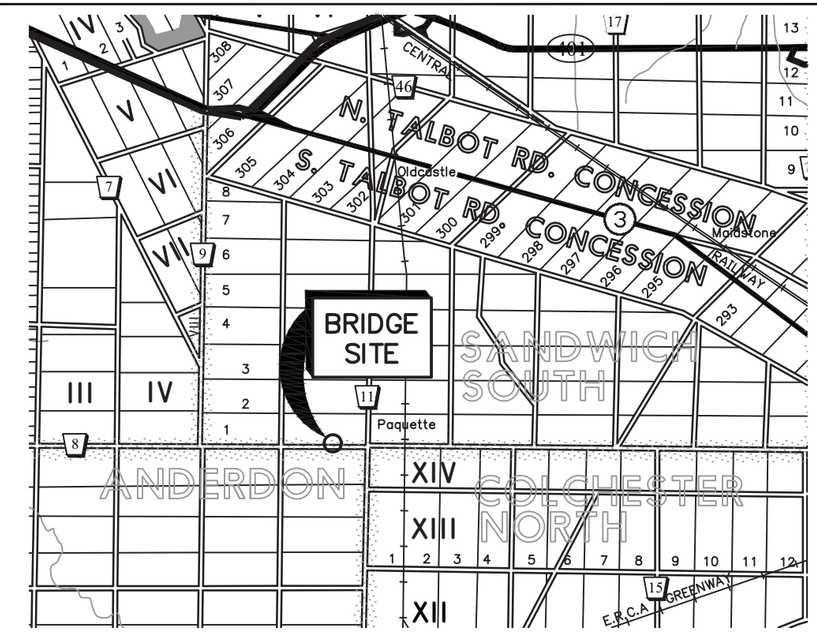
NOTE:

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 NAIL IN HYDROPOLE APPROXIMATELY 15 METRES SOUTH OF MN 1800.

ELEV: 186.805m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm x 2000mm	16.0m (52.49 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 183.537m DOWNSTREAM INV. (W) = 183.515m ℄ TOP OF DRIVEWAY = 186.057m DRAIN GRADE = 0.14%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR EDWARD WHITE (440-00150)

(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)

IN THE

TOWN OF TECUMSEH

IN THE

COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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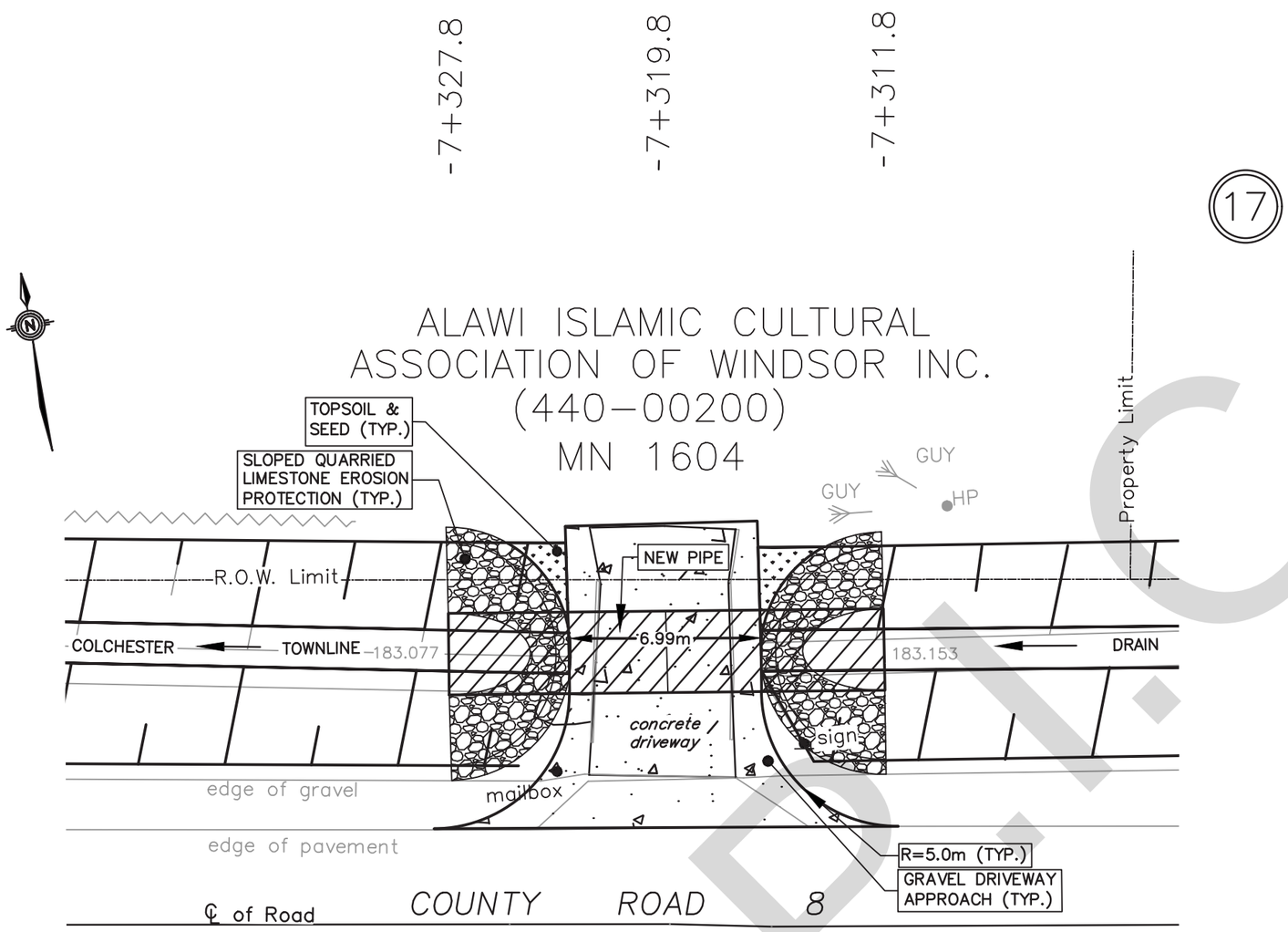
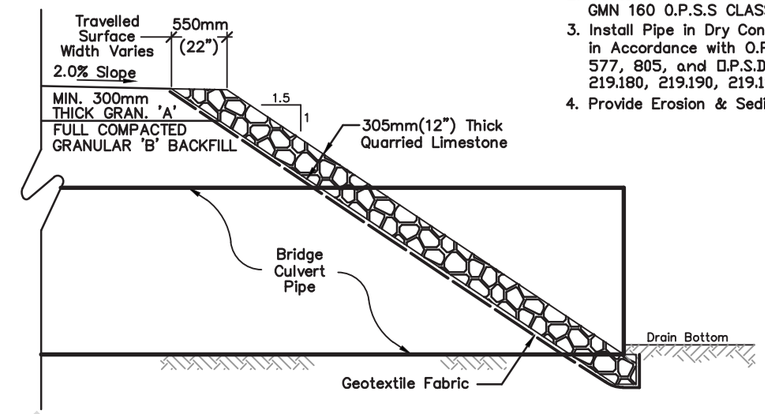


BRIDGE PLAN

SCALE = 1:200

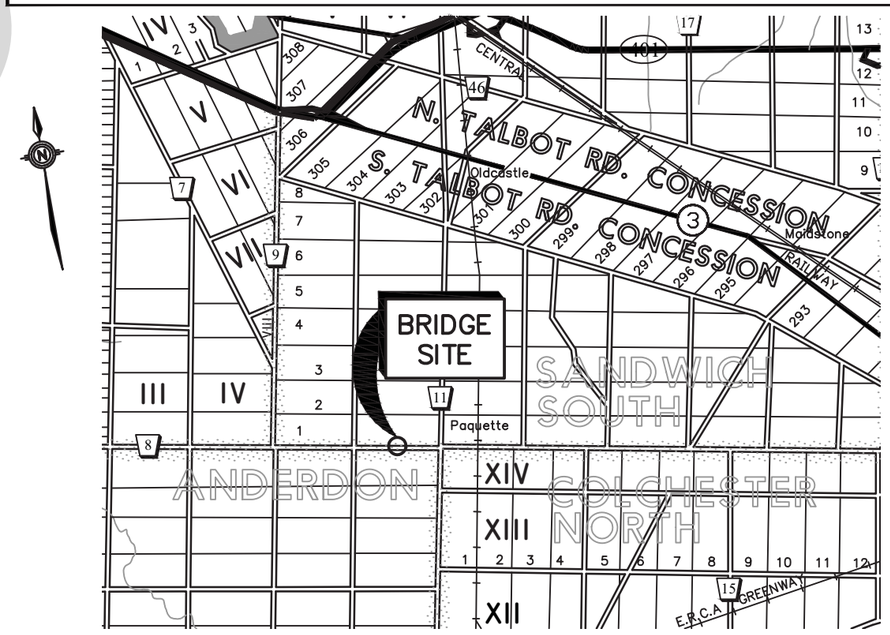
NOTE:

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 NAIL IN HYDRO POLE 35 METRES SOUTH EAST OF MN 1604.

ELEV: 185.652m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm x 2000mm	16.0m (52.49 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 183.062m DOWNSTREAM INV. (W) = 183.040m ℄ TOP OF DRIVEWAY = 185.700m DRAIN GRADE = 0.14%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR ALAWI ISLAMIC CULTURAL ASSOCIATION WINDSOR INC.
(440-00200)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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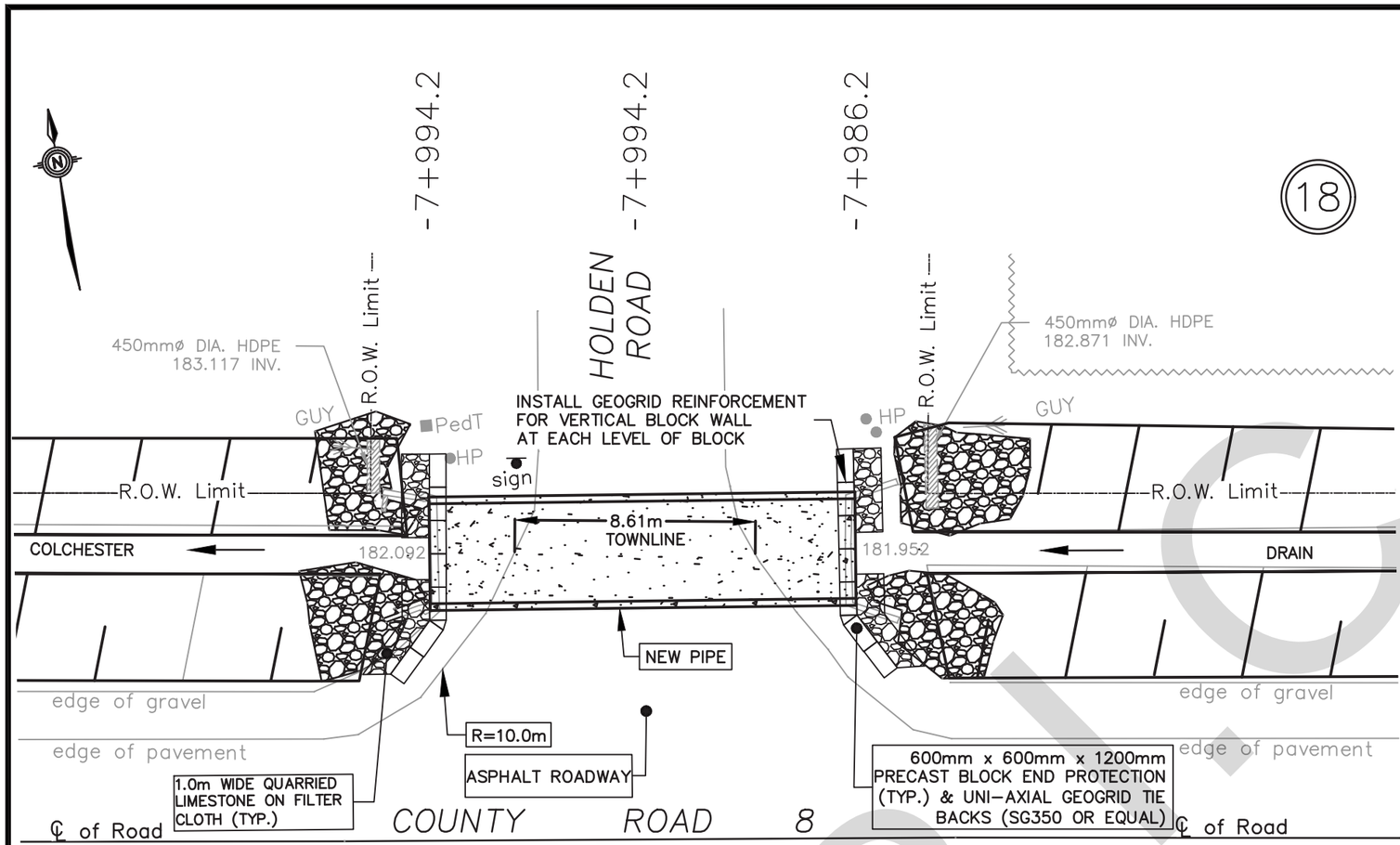
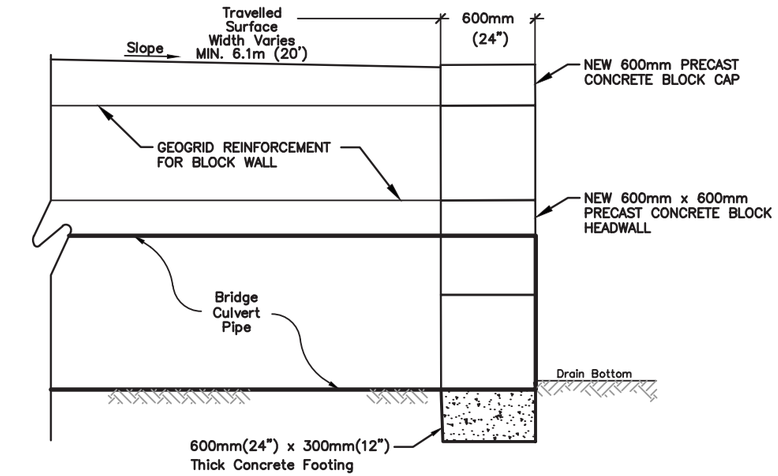


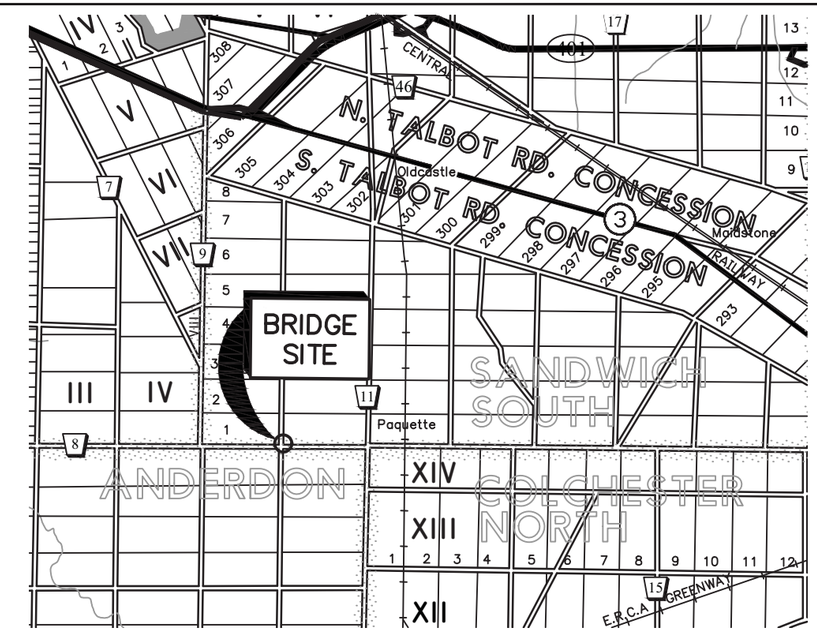
BRIDGE PLAN

SCALE = 1:200



TYPICAL VERTICAL PRECAST CONCRETE BLOCK END PROTECTION

Scale = N.T.S.



KEY PLAN

Scale = 1:100,000

MAINTENANCE

BENCHMARK:
TOP OF NAIL IN HYDRO POLE APPROXIMATELY 20 METRES SOUTH OF HOLDEN ROAD.

ELEV: 184.504m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3600mm x 1800mm	16.0m (52.49 FT.)			REINFORCED NON-STANDARD CONCRETE BOX CULVERT	UPSTREAM INV. (E) = 182.065m DOWNSTREAM INV. (W) = 182.023m ℄ TOP OF DRIVEWAY = 184.527m DRAIN GRADE = 0.26%

COLCHESTER TOWNLINE DRAIN

BRIDGE FOR HOLDEN ROAD
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

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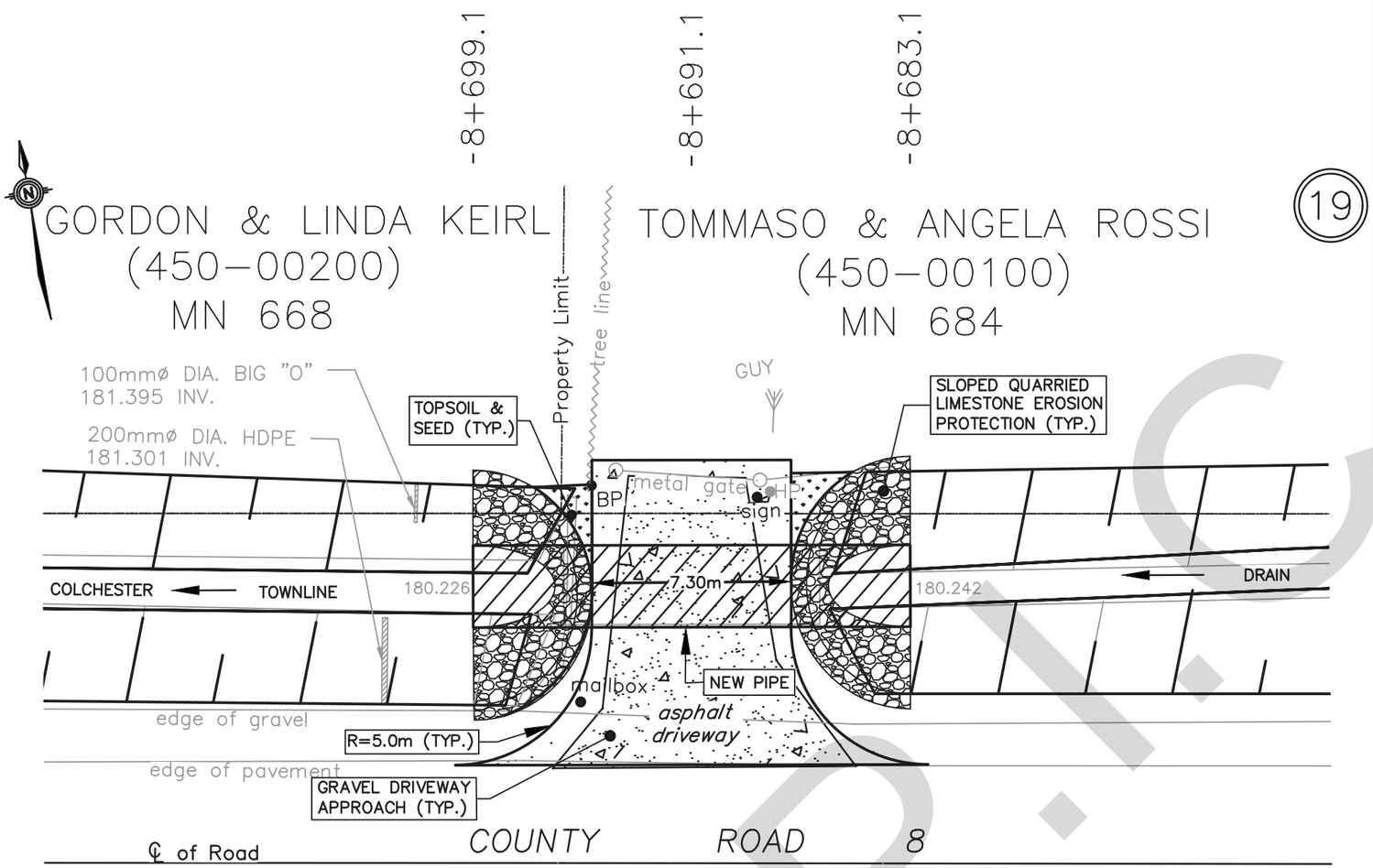
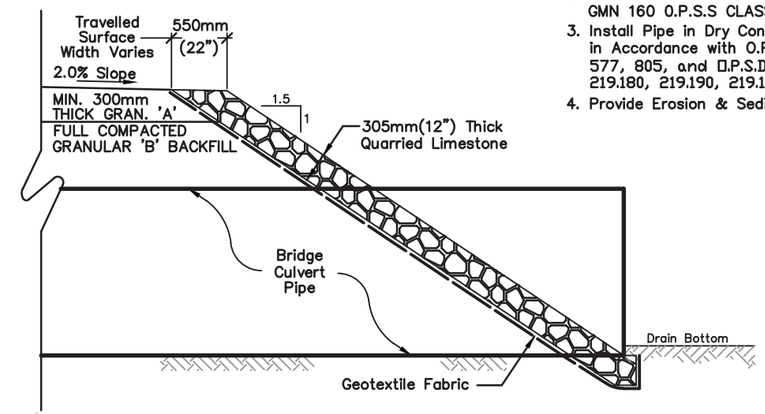


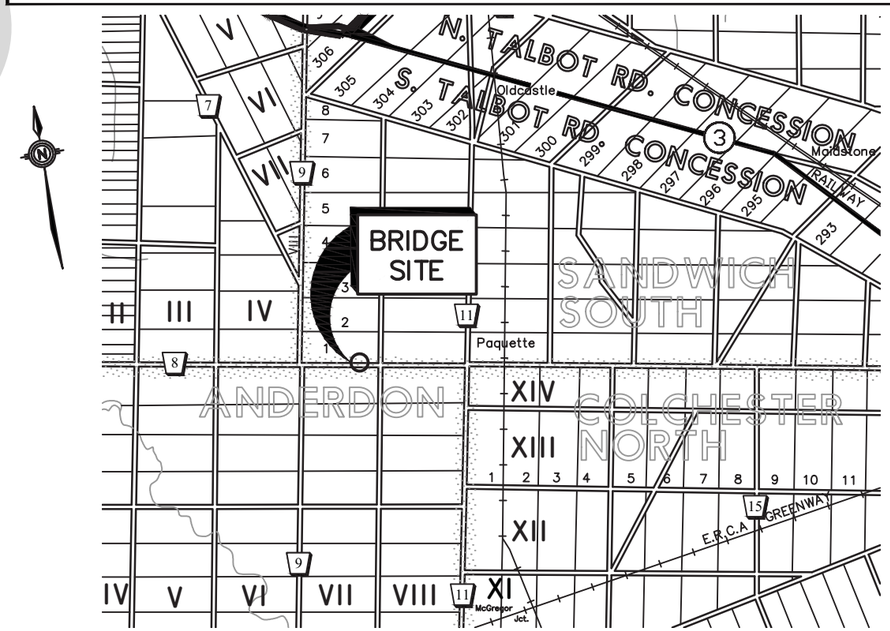
BRIDGE PLAN
SCALE = 1:200

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 FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.

ELEV: 184.018m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm X 2000mm	16.0m (52.49 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 180.230m DOWNSTREAM INV. (W) = 180.188m ℄ TOP OF DRIVEWAY = 182.764m DRAIN GRADE = 0.26%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR TOMMASO & ANGELA ROSSI (450-00100)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

FILE No.:	DRAWN BY: M.A. PLOT CODE: 1:1 FILE: REI2018D035.DWG	APPENDIX 'E'
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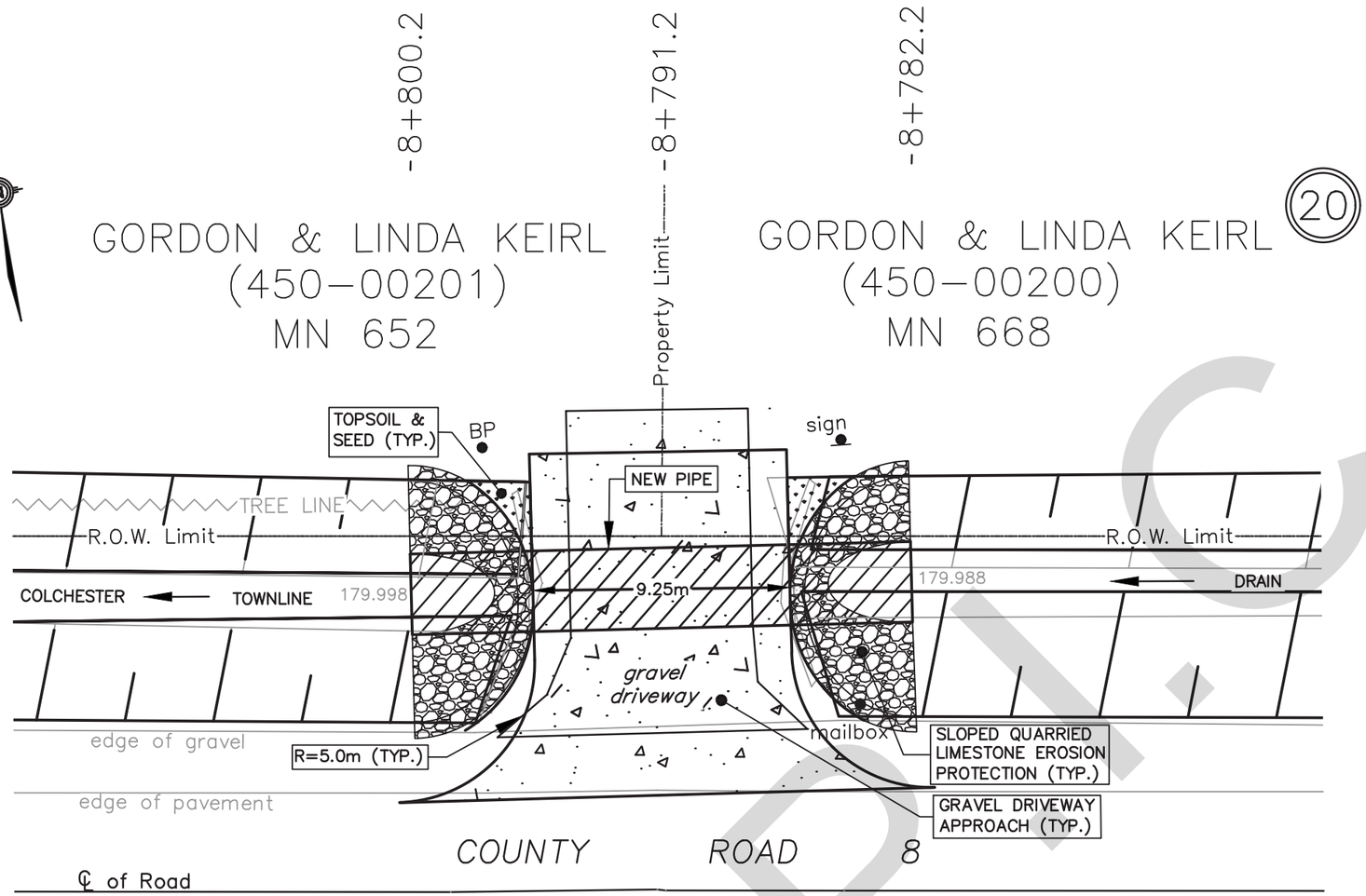
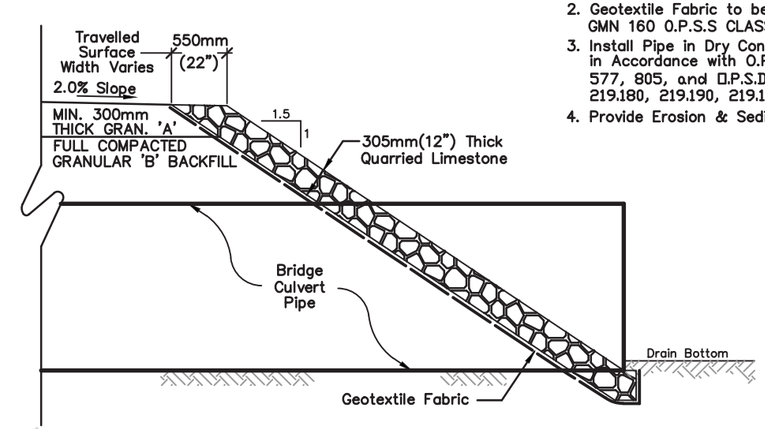


BRIDGE PLAN

SCALE = 1:200

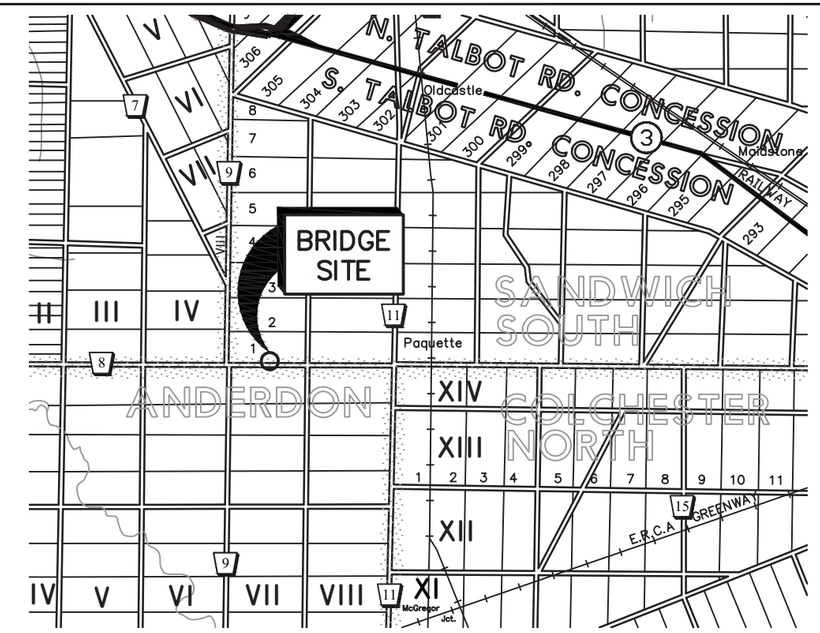
NOTE:

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

NOTE:
REMOVE EXISTING TREES & BRUSH WITHIN NEW BRIDGE INSTALLATION

CONSTRUCTION

BENCHMARK:
TOP OF FIRE HYDRANT NUT APPROXIMATELY 230 METRES WEST OF 8TH CONCESSION ROAD AND 180 METRES WEST OF MN 8996.

ELEV: 184.018m

PIPE SIZE:	PIPE LENGTH:	PIPE GAUGE:	CORRUGATIONS:	TYPE OF PIPE:	DESIGN ELEVATIONS:
3000mm X 2000mm	18.0m (59.05 FT.)	2.8 mm	125 X 25	ALUMINIZED CORRUGATED HEL-COR ARCH C.S.P.	UPSTREAM INV. (E) = 179.971m DOWNSTREAM INV. (W) = 179.925m ℄ TOP OF DRIVEWAY = 182.522m DRAIN GRADE = 0.26%

COLCHESTER TOWNLINE DRAIN
BRIDGE FOR GORDON & LINDA KEIRL (450-00200) & (450-00201)
(GEOGRAPHIC TOWNSHIP OF SANDWICH SOUTH)
IN THE
TOWN OF TECUMSEH
IN THE
COUNTY OF ESSEX • ONTARIO

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

DATE: 2022-04-26

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