

**DRAINAGE REPORT
FOR THE**

MARSHALL DRAIN

TOWN OF TECUMSEH



FINAL
30 JULY 2026
OLIVER E. T. MOIR, P.ENG.
FILE No. 25-2239

File No. 25-2239

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

Drainage Report for the MARSHALL DRAIN Town of Tecumseh

Mayor and Council:

Instructions

The Municipality received a request from the landowner of property Roll No. 510-01200 to repair and improve the Marshall Drain. Council accepted the request under Section 78 of the Drainage Act and on 23 September 2025 appointed Dillon Consulting Limited to prepare a report.

Watershed Description

The Marshall Drain consists of an open channel drain with a highpoint in the bottom third of Lot 11, Concession 11. The northern portion drain flows northerly along the easterly limit of County Road No. 43 (11th Concession Road) to its outlet into the roadside ditch of Highway 401. The highway ditch flows easterly to the Pike Creek Drain. The southern portion drain flows southerly along the easterly limit of County Road No. 43 (11th Concession Road) to its outlet into the Gzowski Drain.

The lands comprising the watershed are predominately under intense agricultural production with cash crops. There is little topographic relief. The soils are predominantly Brookston Clay which is characterized as poorly drained. Agricultural land parcels are systematically tiled, however they are directed outside of the Marshall Drain watershed.

The north portion of the Marshall Drain is approximately 864 metres in length and serves a watershed area of approximately 7.61 hectares (18.8 acres). The south portion is approximately 208 metres in length and serves approximately 4.13 hectares (10.2 acres).

Drain History

The recent history of Engineers' reports for the Marshall Drain follows:

- **22 November 1963 by C.G.R. Armstrong, P.Eng.:** The recommended work included relocating the roadside ditch easterly away from the road and incorporating it as a municipal drain. Works also included constructing two new drain enclosures.



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On-Site Meeting

We conducted an on-site meeting on 20 November 2025. A record of the meeting is provided in Schedule 'A', which is appended hereto.

Survey

Our survey and examination of the Marshall Drain was carried out in November 2025. The survey comprised the recording of topographic data and examining the channel for available depth necessary to provide sufficient drainage. We commenced the survey at the Southerly outlet of the drain to the Gzowski Drain. We then proceeded northerly along the channel, parallel to and east of County Road No. 43, to its northerly outlet the roadside ditch adjacent to Kings Highway 401.

Our examination of the drain and review of previous reports reveals the drain is severely out of repair. We find the drain has approximately 0.3 m to 0.4 m of sediment accumulation and the drain width has narrowed from what was expected considering the previous design cross section and depth of the drain.

Design Considerations

The Guide for Engineers Working Under the Drainage Act of Ontario, OMAFA Publication 852 (2018) recommends that open drainage systems be designed to effectively contain and convey the peak runoff generated from a storm event having a frequency of occurrence of once in two years. We have applied this criterion to the Marshall Drain.

The Guide also recommends that drain crossings and enclosures installed in open drains be designed to freely pass the peak runoff generated from a storm event having a frequency of occurrence of once in two years for low hazard crossings. This standard was applied in the design of the access bridges. Design invert elevations of the new bridges are approximately 10% of the pipe diameter below the bylaw grade.

We believe that these design standards should provide a reasonable level of service, but it should be clearly understood that runoff generated from large storms or fast snow melts may sometimes exceed the capacity of the proposed systems and result in surface ponding for short periods of time.

Existing Conditions and Recommendations

The last report for repair and improvement of the drain was completed in 1963. The drain will require re-excavation to align with the improved drain profile and cross-sections.

Drain spoils are recommended to be cast over agricultural lands, as specified in the specifications attached herein. Spoils excavated from the drain fronting non-agricultural lands are to be trucked to adjacent agricultural lands for spreading to avoid trucking off-site and the increased cost resulting from the requirements of O.Reg 406/19 On-Site and Excess Soil Management.

All of the access culverts were inspected during the course of our investigation. Our assessment identified culverts that are in poor condition or good condition but are undersized. All seven culverts are noted to be replaced. Specific structure numbers have been designated for ease of reference between the specifications and the drawings.

The locations, dimensions, condition and use of each structure are as follows:

Bridge No. 1 Station 0+374 – Wayde J. & Dana J. O’Neil (Roll No. 510-01300)

A 7.4 m long, 450 mm diameter corrugated steel pipe with rip rap end protection on south end provides the primary access to this property. The origin of this culvert is unknown. The culvert is deteriorated and is considered to have reached the end of its serviceable life.

We recommend the culvert be replaced with a new 12.5 m long, 525 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 6.1 m driveable top width.

Bridge No. 2 Station 0+399 – Wayde J. & Dana J. O’Neil (Roll No. 510-01300)

A 26.7 m long, 450 mm diameter concrete pipe with broken concrete end protection provides access to this property. This culvert was installed under the 1963 report. This culvert is considered a secondary access for the property. This culvert is deficient in hydraulic capacity and end protection.

We recommend the culvert be replaced with a new 29.5 m long, 525 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 9.1 m driveable top width.

Bridge No. 3 Station 0+540 – Jerome P. St Louis (Roll No. 510-01250)

A 20.5 m long, 450 mm diameter CSP with rip rap endwalls provides access and lawn enclosure for this property. This culvert was installed under the 1963 report. The culvert is deteriorated and is considered to have reached the end of its serviceable life.

We recommend the culvert be replaced with a new 12.5 m long, 450 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 6.1 m driveable top width and the remainder as a drain enclosure. The length of pipe necessary to service the primary access portion would otherwise be 12.5 m in length.

Bridge No. 4 Station 0+605 – Jerome P. & Paula E. St Louis (Roll No. 510-01200)

A 5.8 m long, 600 mm diameter CSP provides access to the farmed portion of this property. This culvert was installed by the property owner to access the farm lands of the property. This culvert is considered a secondary access for the property. This culvert needs to be lowered to meet the new drain bottom.

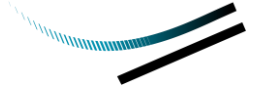
We recommend the culvert be replaced with a new 15.0 m long, 450 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 9.1 m driveable top width.

Bridge No. 5 Station 0+646 – Jerome P. & Paula E. St Louis (Roll No. 510-01200)

A 7.5 m long, 400 mm diameter CSP with broken concrete endwalls provides access to this property. The origin of this culvert is unknown. This culvert is deficient in hydraulic capacity and needs to be lowered to meet the new drain bottom.

We recommend the culvert be replaced with a new 16.5 m long, 450 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 6.1 m driveable top width.

At the landowners request, the bridge is recommended to include a lawn enclosure portion extending upstream. The enclosure is to directly connect with Bridge No. 6. A shared in-line catchbasin is recommended at the property line for future maintenance and a connection point into the drain.



Bridge No. 6 Station 0+665 – Russell & Nadine Bennett (Roll No. 510-01110)

A 7.2 m long, 400 mm diameter CSP with broken concrete endwalls provides access to this property. The origin of this culvert is unknown. This culvert is deficient in hydraulic capacity and needs to be lowered to meet the new drain bottom.

We recommend the culvert be replaced with a new 14.5 m long, 450 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 6.1 m driveable top width.

At the landowners request, the bridge is recommended to include a lawn enclosure portion extending downstream. The enclosure is to directly connect with Bridge No. 5. A shared in-line catchbasin is recommended at the property line for future maintenance and a connection point into the drain.

Bridge No. 7 Station 1+108 – Evelyn O’Neil (Roll No. 510-01100)

A 12.0 m long, 450 mm diameter CSP provides access to this property and the adjacent property Roll No. 510-01000. This culvert was reported to be constructed under by-law in the 1970's by landowners, however no documentation could be found. This culvert has reached the end of its serviceable life and needs to be lowered to meet the new drain bottom.

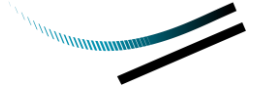
We recommend the culvert be replaced with a new 14.5 m long, 450 mm diameter HDPE pipe with rip rap endwalls with filter fabric underlay and a 9.1 m driveable top width. The new culvert is to be relocated northerly so that it is entirely within the frontage of Roll No. 510-01100.

We find that the roadside ditch along King’s Highway 401 and the Gzowski Drain to the south provides a sufficient outlet for the proposed drainage works.

Allowances

Throughout the length of the work, the excavated material is to be disposed of as set out in the Special Provisions in ‘Schedule F’ herein. In accordance with Section 30 of the Drainage Act, we determined the amount to be paid to the owners for damages to lands and crops (if any) occasioned by the operation of equipment and the disposal of material excavated from the drain. The allowance for damages is calculated at a rate of \$4,448 per hectare, (\$1,800 per acre).

Bridge No. 7 lies on the line between property Roll Nos. 510-01000 and 510-01100. The bridge provides access to approximately 0.03 hectares of Roll No. 510-01000 and approximately 8.4 hectares of Roll No. 510-01100. The Town of Tecumseh zoning by-law requires that every property have one access. To ensure the legal use of a shared access by both parties, it must be approved through the Planning Act where landowners would be required to register the shared access and associated easements. The costs associated to have the access registered on title exceed \$5,000, which is greater than the value of land accessed to Roll No. 510-01000. We therefore recommend an allowance of \$1,800.00 under Section 33 of the Drainage Act be provided to Roll No. 510-01000. This allowance was determined using a land rate of \$59,305 per hectare (\$24,000 per acre) considering the land will no longer be accessible.



We recommend the Town file this allowance with the land registry office in accordance with Section 68 of the Drainage Act. We estimate the associated fees to be \$1,000.00 and shall form part of the drainage works.

Recommendations and Cost Estimate

Based on our review of the history, the information obtained during the site meeting and our examination and analysis of the survey data, we recommend that the Marshall Drain be repaired and improved as described in the following table.

Item	Description	Amount
	<u>OPEN DRAIN WORK</u>	
1.	Light brushing of the drain from Station 0+374 to Station 0+861 and Station 0+924 to Station 1+132 including the disposal by burning on-site or removal off-site with trimming and/or removal of existing trees as required to accommodate the drainage works.	\$5,000.00
2.	Excavation, levelling and trucking of excavated materials works, as follows:	
	a) Excavation of drain widening, as follows:	
	i) Station 0+380 to Station 0+865 and Station 0+924 to Station 1+132, totalling approximately 693 lineal metres of drain and approximately 500 m ³ of material.	\$20,000.00
	b) Levelling of excavated materials at all agricultural properties, totalling approximately 500 m ³ of material	\$2,150.00
	c) Trucking of excavated materials to nearby working corridor for levelling, as follows:	
	i) Station 0+505 to Station 0+528 and Station 0+550 to Station 0+553, approximately 30 m ³ of material.	\$450.00
	ii) Station 0+611 to Station 0+641 and Station 0+653 to Station 657, approximately 40 m ³ of material.	\$700.00
	iii) Station 0+657 to Station 0+659, Station 0+671 to Station 0+689, approximately 25 m ³ of material	\$400.00
3.	Hydraulic seeding of drain banks with fibre bonded matrix from Station 0+380 to Station 0+865 and Station 0+924 to Station 1+132 (approximately 1,750 m ²). Work includes supply and placement of 50 mm thick topsoil. (approximately 90 m ³) Seeding shall be completed immediately following placement of topsoil.	\$13,000.00

Item	Description	Amount
4.	Private Access Bridge works, as follows:	
	a) <u>Bridge No. 1</u> - Station 0+374 (Roll No. 510-01300) – Removal and disposal of existing 7.4 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), full Granular 'B' backfill up to underside of driveway materials (approximately 35 tonnes), clean native or imported clean native backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m ³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m ²).	\$8,400.00
	b) <u>Bridge No. 2 (Driveway portion only)</u> - Station 0+399 (Roll No. 510-01300) – Removal and disposal of existing 10.3 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 13.0 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes). Full granular 'B' backfill up to underside of driveway material (approximately 35 tonnes) clean native or imported backfill material for outside of driveway portion to construct the 0.5 m wide native buffer strip (approximately 10 m ³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m ²).	\$8,450.00
	c) <u>Bridge No. 2 (Enclosure portion only)</u> - Station 0+399 (Roll No. 510-01300) – Removal and disposal of existing 16.4 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 16.5 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes). Granular 'B' backfill up to pipe springline of	\$5,350.00

Item	Description	Amount
	pipe (approximately 15 tonnes), clean native or imported clean native backfill material from springline of pipe culvert to the underside of the topsoil layer (approximately 45 m ³), imported topsoil and seed (residential mix), minimum 100 mm thickness (approximately 35 m ²). Work includes supply and installation of prefabricated 450 mm diameter catch basin 'tee' complete with heavy duty cast iron grate.	
	d) <u>Bridge No. 3 (Driveway portion only)</u> - Station 0+540 (Roll No. 510-01250) Driveway portion – Removal and disposal of existing 12.5 m long 400 mm diameter CSP pipe, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), Full Granular 'B' backfill up the underside of driveway materials (approximately 40 tonnes), clean native or imported clean native backfill material outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m ³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 20 m ²).	\$8,100.00
	e) <u>Bridge No. 3</u> - (Roll No. 510-01250) – Removal and disposal of existing 10.0 m long portion of 375 mm diameter CSP pipe enclosure, existing end walls and backfill off-site that are not suitable for native backfill. Excavate drain to the design open drain cross section from Station 0+541 to Station 0+551. Work includes placement of topsoil (minimum 50 mm thickness) fine-graded and hydro-seeded (bonded fibre matrix).	\$1,800.00
	f) <u>Bridge No. 4</u> - Station 0+605 (Roll No. 510-01200) – Removal and disposal of existing 5.8 m long 600 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 15.0 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), Granular 'B' backfill up to springline of pipe (approximately 8 tonnes), clean native or imported clean native backfill material up	\$6,950.00

Item	Description	Amount
	to the underside of driveway material and for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 25 m ³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m ²).	
	g) <u>Bridge No. 5</u> - Station 0+646 (Roll No. 510-01200) – Removal and disposal of existing 7.5 m long 400 mm diameter CSP pipe, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), full Granular 'A' backfill up to underside of driveway materials (approximately 40 tonnes), clean native or imported clean native backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m ³), complete with sloping stone end walls (approximately 20 m ²).	\$7,600.00
	h) <u>Bridge No. 5</u> - Supply and installation of asphalt driveway surface, minimum 80 mm thickness (approximately 10 tonnes).	\$1,900.00
	i) <u>Bridge No. 5 & Bridge No. 6 (Enclosure portion only)</u> - Station 0+657 (Roll No. 510-01200 & Roll No. 510-01110) –Supply and installation of a new 6.0 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 5 tonnes). Granular 'B' backfill up to pipe springline of pipe (approximately 5 tonnes), clean native or imported clean native backfill material from springline of pipe culvert to the underside of the topsoil layer (approximately 35 m ³), imported topsoil and seed (residential mix), minimum 100 mm thickness (approximately 30 m ²). Work includes supply and installation of prefabricated 450 mm diameter catch basin 'tee' complete with heavy duty cast iron grate located on the property line between property Roll Nos. 510-01200 & 510-01110.	\$2,400.00

Item	Description	Amount
	j) <u>Bridge No. 6</u> - Station 0+665 (Roll No. 510-01110) – Removal and disposal of existing 7.2 m long 400 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), full Granular 'A' backfill up to underside of driveway materials (approximately 35 tonnes), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 30 tonnes) clean native or imported clean native backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m ³), complete with sloping stone end walls (approximately 20 m ²).	\$ 7,600.00
	k) <u>Bridge No. 7</u> - Station 1+108 (Roll No. 510-01100) – Removal and disposal of existing 12.0 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 14.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), Granular 'B' backfill up to springline of pipe (approximately 10 tonnes), clean native or imported clean native backfill material up to underside of driveway material and for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 30 m ³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 10 m ²). The culvert shall be relocated approximately 6 metres north to Station 1+102. Work includes restoration of the disturbed drain banks with 50mm thick topsoil fine graded and seed.	\$7,400.00
5.	Temporary Silt Control Measures During Construction	<u>\$1,000.00</u>
	SUB-TOTAL – EXCLUDING SECTION 26 COSTS	\$108,650.00
6.	Allowances under Sections 30 & 33	\$5,750.00
7.	Survey, Report, Assessment and Final Inspection (cost portion)	\$43,000.00
8.	Expenses and incidentals including registration of Section 33 Allowance (cost portion)	\$2,000.00



Item	Description	Amount
9.	Contract Administration & Construction Inspection Services.	\$8,000.00
10.	ERCA application review and permit fee.	<u>\$800.00</u>
	TOTAL – EXCLUDING SECTION 26 COSTS	\$168,200.00
	SECTION 26 NON PRO-RATEABLE COSTS	
11.	Stone Erosion protection works as follows:	
	a) (County Road No. 43) Station 0+979 – Supply and install approximately 10 m ² (min. 300 mm thickness) of stone erosion protection (SEP) complete with filter fabric underlay around pipe outlet. Work includes replacement of existing 400 mm CSP pipe outlet (approximately 3 metre length) complete with full Granular 'A' backfill. Connection with existing pipe to be made with Marmac Dissimilar coupler (or approved equivalent).	\$ 1,500.00
12.	Co-ordination with Bell Canada to facilitate locates of any existing underground lines. Any utility works required as a result of the drainage works if any (actual costs) are at the expense of the operating utility as per Section 26 of the Drainage Act.	\$ 2,500.00
13.	Co-ordination with Hydro-One to facilitate locates of any existing underground lines and to facilitate two (2) pole holds as required to complete drainage work. Any utility works required as a result of the drainage works if any (actual costs) are at the expense of the operating utility as per Section 26 of the Drainage Act.	<u>\$5,900.00</u>
	SUB-TOTAL – SECTION 26 NON PRO-RATEABLE COSTS	\$9,900.00
14.	Engineering cost portion.	<u>\$4,500.00</u>
	TOTAL – SECTION 26 NON PRO-RATEABLE COSTS	\$14,400.00
	TOTAL ESTIMATE – MARSHALL DRAIN	\$182,600.00

The estimate provided in this report was prepared according to current materials and installation prices as of the date of this report. In the event of delays from the time of filing of the report by the Engineer to the time of tendering the work, it is understood that the estimate of cost is subject to inflation. The rate of inflation shall be calculated using the Consumer Price Index applied to the cost of construction from the date of the report to the date of tendering.

Assessment of Costs

The individual assessments are comprised of three (3) assessment components:

- i. Benefit (*advantages relating to the betterment of lands, roads, buildings, or other structures resulting from the improvement to the drain*).
- ii. Outlet Liability (*part of cost required to provide outlet for lands and roads*).
- iii. Special Benefit (*additional work or feature that may not affect function of the drain*).

We have assessed the estimated costs against the affected lands and roads as listed in Schedule 'C' under "Value of Special Benefit," "Value of Benefit" and "Value of Outlet." Details of the Value of Special Benefit listed in Schedule 'C' are provided in Schedule 'D.'

Consideration has been given to agricultural lands which have subsurface drainage directed outside of the watershed. These lands have a reduced assessment.

Assessment Rationale

Special Benefit assessment shown in Schedule 'C' and detailed in Schedule 'D' were derived as follows:

1. Replacement of the primary access culverts (driveway portion only) (Bridge No. 1, No. 3, No. 4, No. 5, No. 6, No. 7) are assessed 50% against the adjoining property and 50% against upstream lands and roads.
2. Replacement of Bridge No. 2 (including enclosure portion) and Bridge No. 4 are assessed 100% against the adjoining properties being a secondary access as a non-proratable assessment.
3. Costs associated with removal of the existing Bridge No. 3 lawn enclosure and re-establishing an open drain cross-section is assessed 100% against the abutting property as a non-proratable assessment.
4. Costs associated with the enclosure portions of Bridge No. 5 & 6 are assessed 66% against property Roll No. 510-01200 and 34% against property Roll No. 510-01110. The cost sharing split is proportional to the amount of drain enclosed fronting the respective properties.
5. For tile outlet repairs including stone erosion protection as required, at the location of the said tile outlets, the Drainage Superintendent and/or Engineer may direct the contractor to make these repairs at the expense of the landowner. Private tile repairs shall be assessed 100% against the property on which the said tile exists. Tile repairs shall be assessed 100% to the Road Authority under Section 26 of the Drainage Act if the repair is on the west side of the drain along County Road No. 43 (11th Concession Road). These assessments shall be non-proratable.
6. Bank failure repairs caused by surface water inlets on abutting lands along the drain shall be assessed 100% to the abutting landowner. Where a surface inlet is located on a property line, the cost shall be equally shared between abutting landowners. Bank failures along the west side of the drain along County Road No. 43 (11th Concession Road) shall be assessed 100% to the road authority under Section 26 of the Drainage Act. These assessments shall be non-proratable.

7. Cost associated with trucking of spoils excavated from the drain where they cannot be immediately spread are assessed 100% against the lands fronting the drain where they would have otherwise spread. These assessments shall be non-proratable.

Utilities

It may become necessary to temporarily or permanently relocate utilities that may conflict with the construction recommended under this report. In accordance with Section 26 of the Drainage Act, we assess any relocation cost against the public utility having jurisdiction. Under Section 69 of the Drainage Act, the public utility is at liberty to do the work with its own forces, but if it should not exercise this option within a reasonable time, the Municipality will arrange to have this work completed and the costs will be charged to the appropriate public utility.

Future Maintenance (Open Drain)

After completion, the Marshall Drain shall be maintained by the Town of Tecumseh at the expense of the lands and road herein assessed in 'Schedule E-1' for the north portion and 'Schedule E-3' for the south portion, and in the same relative proportions subject, of course, to any variations that may be made under the authority of the Drainage Act. The assessments are based on an arbitrary amount of \$10,000.00.

Future Maintenance (Private Access Bridges)

We recommend that future work of repair and maintenance of the Marshall Drain private access bridges be carried out by the Town of Tecumseh at the expense of the property or properties accessed by the bridge and of the lands and roads.

Part of the maintenance cost of each bridge will be assessed as a Special Benefit assessment against the property or properties served by the bridge. The remainder of the maintenance cost will be assessed as Outlet assessment only to the lands and roads upstream of each bridge prorated to the assessments shown in 'Schedule E-2' for the north portion and 'Schedule E-4' for the south portion.

'Schedule E-2' represents all the lands and roads upstream of Bridge No. 1 and is applicable to other primary access bridges located further upstream by including only those properties that are upstream of the said bridge. 'Schedule E-4' represents all the lands and roads upstream of Bridge No. 7. The assessment is based on an arbitrary amount of \$10,000.00 of future access bridge maintenance costs.

The division between Special Benefit and Outlet assessment for each bridge shall be as follows:

Bridge No.	Type	Owner(s)	Special Benefit	Outlet
1	Primary	Roll No. 510-01300	50%	50%
2	Secondary	Roll No. 510-01300	100%	0%
3	Primary	Roll No. 510-01250	50%	50%
3	Enclosure (10.0 m)	Roll No. 510-01250	100%	0%
4	Secondary	Roll No. 510-01200	100%	0%
5	Primary	Roll No. 510-01200	50%	50%
5 & 6	Enclosure (6.0 m)	Roll No. 510-01200 Roll No. 510-01110	66% 34%	0%
6	Primary	Roll No. 510-01110	50%	50%
7	Primary	Roll No. 510-01100	50%	50%

Drawings and Specifications

Attached to this report is “Schedule F,” which contains specifications setting out the details of the recommended works, and “Schedule G,” which represents the following drawings that are also attached to this report:

- Page 1 of 7: Overall Plan**
- Page 2 of 7: Profile**
- Page 3 of 7: Cross Sections**
- Page 4 of 7: Farm Access Bridges**
- Page 5 of 7: Residential Access Bridges**
- Page 6 of 7: Residential Access Bridge Enclosures**
- Page 7 of 7: Miscellaneous Details**

Approvals

The construction and/or improvement to drainage works, including repair and maintenance activities, and all operations connected therewith are subject to the approval, inspection, by-law, and regulations of all Municipal, Provincial, Federal and other authorities having jurisdiction in respect to any matters embraced by the proposed works. Prior to any construction or maintenance works, the Municipality or proponent designated on the Municipality’s behalf shall obtain all required approvals/permits and confirm any construction limitations including timing windows, mitigation/off-setting measures, standard practices or any other limitations related to in-stream works.

In terms of a review of the proposed works by the Department of Fisheries and Oceans (DFO), we have undertaken a self-assessment and have determined that application requesting review is not required provided works proceed in accordance with DFO's interim code of practice. The Marshall Drain has been classified as a "Type F" drain by DFO. Type F drains experience intermittent water flow only and provide minimal habitat for fish. As part of the work the following mitigation measures shall be implemented to avoid any adverse effects to the waterway.

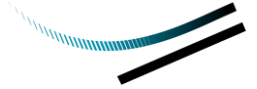
- Works will not be conducted at times when flows are elevated due to the local rain events, storms, or seasonal floods. Work will be done in the dry.
- All disturbed soils on both banks and within the channel, including spoil must be stabilized immediately upon completion of work. The restoration of the site must be completed to a like or better conditions to what existed prior to the works.
- 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 his/her contractors to ensure that sediment and erosion control measures are functioning and are maintained/upgraded as required.
- All activities should be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the water. Vehicular refueling and maintenance should be conducted away from the water.

The Marshall Drain may provide habitat to species at risk listed as listed under the Species Conservation Act.

The Town of Tecumseh has developed a mitigation plan document recommending mitigation measures to minimize adverse effects on species at risk including monitoring and reporting requirements should an endangered, threatened, or special concern species (fishes, reptiles, amphibians, mollusks, birds, plants, trees) be encountered. The document will be made available to contractors during the tendering process and construction period.

Grants

In accordance with the provisions of Sections 85, 86 and 87 of the Drainage Act, a grant in the amount of 33-1/3 percent of the assessment eligible for a grant may be made in respect to the assessment made under this report upon privately owned lands used for agricultural purposes. The assessments levied against privately owned agricultural land must also satisfy all other eligibility criteria set out in the Agricultural Drainage Infrastructure Program policies. Most of the privately owned lands are used for agricultural purposes and are eligible under the A.D.I.P. policies. We are not aware of any lateral drains involved in this work that would not be eligible for a grant.



We recommend that application be made to the Ontario Ministry of Agriculture and Food in accordance with Section 88 of the Drainage Act, for this grant, as well as for all other grants for which this work may be eligible.

Respectfully submitted,

DILLON CONSULTING LIMITED



Oliver E. T. Moir, P.Eng.
OEM:sjc:lld



MEETING MINUTES

Subject: Marshall Drain – Onsite Meeting
 Date and Time: 20 November 2025, 10:00am
 Location: 5396 11th Concession Rd
 Our File: 25-2239

Attendees

Jerome P. St Louis	Landowner
Paula E. St Louis	Landowner
Russell Bennett	Landowner
Nadine Bennett	Landowner
Matthew Shiha	Town of Tecumseh
Anne-Marie Moniz	Town of Tecumseh
Oliver Moir	Dillon Consulting Limited (Dillon)
Stefan Calabrese	Dillon Consulting Limited (Dillon)

Notes

Item	Discussion	Action By
1.	Introductions: Dillon Consulting Limited was appointed by the Town of Tecumseh for the repair and improvement of the Marshall Drain under Section 78 of the Drainage Act.	
2.	Project Background:	
2.1.	Drain History: - The drain was constructed under the 1963 report by CGR Armstrong - original petition (initiated by landowners) and serves as the By-law for this drain. At the time of construction there were 4 land owners on the drain. 2 new culverts - 375mm CSP, 19.5m long (64') (Jerome St. Louis) and 450 mm CSP, 26.2m long (86') (Wayde & Dana O'neil) were part of the original report while additional culverts were added after the report was written. - Additional culverts were installed but were not incorporated as part of the drain	INFO
2.2.	Drainage works needed - A new assessment schedule for maintenance is required because of various severance in the watershed. - Various bridges on the drain do not have status under the act. - Current by-law does not provide provisions for future maintenance. - Open portion of the drain has largely been filled in with sediment and obstructs flow. - Bridges have reached the end of their serviceable life.	INFO

3. Discussion: INFO
- Current working corridor not usable anymore (residential properties)
 - Known bridge history
 - o Culvert at 5108 11th Conc constructed as part of the 1963 report and is a lawn enclosure.
 - o Culvert at 5016 11th Conc. constructed as part of the 1963 report and appears to be now 2 culverts with a lawn enclosure.
 - Landowners on Mun No. 5110 & 5160 both requested asphalt residential driveways reinstated
 - Known drainage issues
 - o Drain filled with sediment and restricting flow to the culverts
 - o The drain downstream of Mun No. 5016 was recently cleaned out under maintenance
 - o Downstream most culvert was damaged and partially removed under maintenance.
 - Location/presence of farm tile
 - o Farm tiles go to a header and outlet to Gzowski Drain.
 - Expectation of bridge replacements
 - o Culverts will be inspected as conditions allow. The report will include recommendations for replacement if necessary.
 - o Culvert Material will likely be HDPE (cost dependant). End treatment will be sloping stone.
 - o Drivable top width minimum for farm access to be 30' (9.1 m), and 20' (6.1 m) for residential access. Larger top width would be at the sole expense of the owner.
 - Construction timing consideration
 - o Construction could be expected after the restricted timing window.
4. Drainage Act Process:
- The Town will host a Public Information Center to consider landowner comments and Concerns.
 - A Final report will be presented to council for consideration of the technical aspects of the report, including compensation for the land used or damages.
 - A Second council meeting will follow referred to as the Court of Revision to hear appeals on assessments.
5. Assessments:
- Dillon explained Benefit, Outlet, Special Benefit and Section 26 assessments.
 - Assessments for existing culverts would be shared. New culverts would be assessed 100% to the benefiting owner but would have a shared assessment for future maintenance.

- Enclosures portions would be assessed 100% to the abutting landowner
6. Grants:
- Land that falls under the farm class rate may be eligible for grants for Ag related drainage work.
7. Next Steps:
- Dillon will proceed to prepare a report and will contact landowners as necessary as it relates to their bridge or other special considerations
 - Town of Tecumseh to provide additional Drainage history if available.

Errors and/or Omissions

These minutes were prepared by Stefan Calabrese who should be notified of any errors and/or omissions.

"SCHEDULE B"
SCHEDULE OF ALLOWANCES
MARSHALL DRAIN
TOWN OF TECUMSEH

Roll No.	Con.	Description	Owner	Section 33 Loss of Access	Section 30 Damages	Section 29 Land	Total Allowances
510-01300	11	Pt. Lot 12	Wayde J. & Dana J. O'Neil	\$0.00	\$2,000.00	\$0.00	\$2,000.00
510-01200	11	Pt. Lot 11	Jerome P & Paula E. St. Louis	\$0.00	\$420.00	\$0.00	\$420.00
510-01100	11	Pt. Lot 11	Evelyn O'Neil	\$0.00	\$1,430.00	\$0.00	\$1,430.00
510-01000	11	Pt. Lot 10	Wesley J. & Maureen E. O'Neil	\$1,800.00	\$100.00	\$0.00	\$1,900.00
TOTAL ALLOWANCES				\$1,800.00	\$3,950.00	\$0.00	\$5,750.00

"SCHEDULE C"
SCHEDULE OF ASSESSMENT
MARSHALL DRAIN
TOWN OF TECUMSEH

MUNICIPAL LANDS:

Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43	2.80	1.13	County of Essex Road Authority	\$0.00	\$28,511.00	\$23,287.00	\$51,798.00
Total on Municipal Lands.....				\$0.00	\$28,511.00	\$23,287.00	\$51,798.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01110	11	Lot 11	0.48	0.19	Russell & Nadine Bennett	\$7,359.00	\$1,618.00	\$3,310.00	\$12,287.00
510-01120	11	Lot 11	1.00	0.40	Aaron M. & Chantelle R. Child	\$0.00	\$2,660.00	\$5,297.00	\$7,957.00
510-01250	11	Lot 11	0.94	0.38	Jerome P. St Louis	\$9,242.00	\$2,286.00	\$2,152.00	\$13,680.00
Total on Privately-Owned - Non-Agricultural Lands.....						\$16,601.00	\$6,564.00	\$10,759.00	\$33,924.00

PRIVATELY-OWNED - AGRICULTURAL LANDS (GRANTABLE):

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01000	11	Lot 10	0.12	0.05 *	Wesley J. & Maureen E. O'Neil	\$0.00	\$206.00	\$27.00	\$233.00
510-01100	11	Lot 11	8.52	3.45 *	Evelyn O'Neil	\$5,428.00	\$6,296.00	\$8,675.00	\$20,399.00
510-01200	11	Lot 11	2.06	0.83 *	Jerome P. & Paula E. St Louis	\$21,909.00	\$2,891.00	\$2,809.00	\$27,609.00
510-01300	11	Lot 12	2.80	1.13 *	Wayde J. & Dana J. O'Neil	\$26,332.00	\$2,528.00	\$1,204.00	\$30,064.00
520-04800	11	Lot 12	6.00	2.43 *	Wayne J. & Carol A. O'Neil	\$0.00	\$1,479.00	\$2,694.00	\$4,173.00
Total on Privately-Owned - Agricultural Lands (Grantable).....						\$53,669.00	\$13,400.00	\$15,409.00	\$82,478.00

SECTION 26 & NON-AGRICULTURAL LANDS (NON PRO-RATABLE)

Roll No.	Con.	Description	Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43			County of Essex	\$2,182.00	\$0.00	\$0.00	\$2,182.00
Public Utility			Bell Canada	\$3,636.00	\$0.00	\$0.00	\$3,636.00
Public Utility			Hydro One	\$8,582.00	\$0.00	\$0.00	\$8,582.00
Total Section 26 & Non-Agricultural Lands (Non Pro-ratable).....				\$14,400.00	\$0.00	\$0.00	\$14,400.00

TOTAL ASSESSMENT	\$84,670.00	\$48,475.00	\$49,455.00	\$182,600.00
	(Acres)	(Ha.)		
Total Area:	24.72	9.99		

* denotes reduced assessment for surface water only

"SCHEDULE D"
DETAILS OF SPECIAL BENEFIT
MARSHALL DRAIN
TOWN OF TECUMSEH

SPECIAL BENEFIT ASSESSMENT
(NON - AGRICULTURAL LANDS)

Roll No.	Owner	Item Description	Estimated Cost	Cost of Report	Special Benefit
510-01250	Jerome P. St Louis	<u>Bridge No. 3</u> - Driveway Portion (50%)	\$4,050.00	\$1,891.00	\$5,941.00
		Bridge No. 3 - Open Drain Reinstatement (100%)	\$1,800.00	\$841.00	\$2,641.00
		Trucking of excavated material to adjacent lands (100%)	\$450.00	\$210.00	\$660.00
Total Special Benefit - Roll No. 510-01250			\$6,300.00	\$2,942.00	\$9,242.00
510-01110	Russell & Nadine Bennett	<u>Bridge No. 6</u> (50%)	\$3,800.00	\$1,775.00	\$5,575.00
		Bridge No. 6 - Enclosure Portion (34%)	\$816.00	\$381.00	\$1,197.00
		Trucking of excavated material to adjacent lands (100%)	\$400.00	\$187.00	\$587.00
Total Special Benefit - Roll No. 510-01110			\$5,016.00	\$2,343.00	\$7,359.00
Total Special Benefit Assessment (Non - Agricultural Lands).....			\$11,316.00	\$5,285.00	\$16,601.00

SPECIAL BENEFIT ASSESSMENT
(AGRICULTURAL LANDS GRANTABLE)

Roll No.	Owner	Item Description	Estimated Cost	Cost of Report	Special Benefit
510-01100	Evelyn O'Neil	<u>Bridge No. 7</u> (50%)	\$3,700.00	\$1,728.00	\$5,428.00
510-01300	Wayde J. & Dana J. O'Neil	<u>Bridge No. 1</u> (50%)	\$4,200.00	\$1,961.00	\$6,161.00
		<u>Bridge No. 2</u> Enclosure Portion (100%)	\$13,750.00	\$6,421.00	\$20,171.00
Total Special Benefit - Roll No. 510-01300			\$17,950.00	\$8,382.00	\$26,332.00
510-01200	Jerome P. & Paula E. St Louis	<u>Bridge No. 4</u> (100%)	\$6,950.00	\$3,246.00	\$10,196.00
		<u>Bridge No. 5</u> (50%)	\$3,800.00	\$1,775.00	\$5,575.00
		Bridge No. 5 - Enclosure Portion (66%)	\$1,584.00	\$740.00	\$2,324.00
		<u>Bridge No. 5</u> - Asphalt Surface (100%)	\$1,900.00	\$887.00	\$2,787.00
		Trucking of excavated material to adjacent lands (100%)	\$700.00	\$327.00	\$1,027.00
Total Special Benefit - Roll No. 510-01200			\$14,934.00	\$6,975.00	\$21,909.00
Total Special Benefit Assessment (Agricultural Lands Grantable).....			\$36,584.00	\$17,085.00	\$53,669.00

(SECTION 26 & NON - AGRICULTURAL LANDS NON PRO-RATABLE)

Roll No.	Owner	Item Description	Estimated Cost	Cost of Report	Special Benefit
County Road No. 43	County of Essex	Station 0+979 Stone erosion protection approx. 10m ² (min. 300mm thickness) around 400 mm dia. CSP outlet pipe.	\$1,500.00	\$682.00	\$2,182.00
Public Utility	Bell Canada	Co-ordination with Bell Canada to facilitate locates of any existing underground lines. Any utility works required as a result of the drainage works if any (actual costs) are at the expense of the operating utility as per Section 26 of the Drainage Act.	\$2,500.00	\$1,136.00	\$3,636.00
Public Utility	Hydro One	Co-ordination with Hydro-One to facilitate pole holds as required to complete drainage work if necessary (actual utility relocation costs) are at the expense of the operating utility as per Section 26 of the Drainage Act).	\$5,900.00	\$2,682.00	\$8,582.00
Total Special Benefit Assessment (Section 26 & Non-Agricultural Lands Non Pro-Ratable).....			\$9,900.00	\$4,500.00	\$14,400.00
OVERALL TOTAL SPECIAL BENEFIT ASSESSMENT					\$84,670.00

"SCHEDULE E-1"
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE
MARSHALL DRAIN NORTH (DRAIN)
TOWN OF TECUMSEH

MUNICIPAL LANDS:

Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43	3.00	1.21	County of Essex Road Authority	\$0.00	\$4,607.00	\$1,833.00	\$6,440.00
Total on Municipal Lands.....				\$0.00	\$4,607.00	\$1,833.00	\$6,440.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01110	11	Lot 11	0.48	0.19	Russell & Nadine Bennett	\$0.00	\$245.00	\$173.00	\$418.00
510-01120	11	Lot 11	0.50	0.20	Aaron M. & Chantelle R. Child	\$0.00	\$255.00	\$182.00	\$437.00
510-01250	11	Lot 11	0.94	0.38	Jerome P. St Louis	\$0.00	\$347.00	\$166.00	\$513.00
Total on Privately-Owned - Non-Agricultural Lands.....						\$0.00	\$847.00	\$521.00	\$1,368.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01100	11	Lot 11	5.52	2.23 *	Evelyn O'Neil	\$0.00	\$675.00	\$338.00	\$1,013.00
510-01200	11	Lot 11	2.06	0.83 *	Jerome P. & Paula E. St Louis	\$0.00	\$456.00	\$199.00	\$655.00
510-01300	11	Lot 12	2.80	1.13 *	Wayde J. & Dana J. O'Neil	\$0.00	\$415.00	\$109.00	\$524.00
Total on Privately-Owned - Agricultural Lands (Grantable).....						\$0.00	\$1,546.00	\$646.00	\$2,192.00

SECTION 26 & NON-AGRICULTURAL LANDS (NON PRO-RATABLE)

Roll No.	Con.	Description	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Public Utility			Bell Canada	\$0.00	\$0.00	\$0.00	\$0.00
Public Utility			Hydro One	\$0.00	\$0.00	\$0.00	\$0.00
Total Section 26 & Non-Agricultural Lands (Non Pro-ratable).....				\$0.00	\$0.00	\$0.00	\$0.00
TOTAL ASSESSMENT				\$0.00	\$7,000.00	\$3,000.00	\$10,000.00

(Acres) (Ha.)
Total Area: 15.30 6.17

* denotes reduced assessment for surface water only

"SCHEDULE E-2"
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE
MARSHALL DRAIN NORTH (BRIDGES)
TOWN OF TECUMSEH

MUNICIPAL LANDS:

Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43	3.00	1.21	County of Essex Road Authority	\$0.00	\$0.00	\$5,747.00	\$5,747.00
Total on Municipal Lands.....				\$0.00	\$0.00	\$5,747.00	\$5,747.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01110	11	Lot 11	0.48	0.19	Russell & Nadine Bennett	\$0.00	\$0.00	\$541.00	\$541.00
510-01120	11	Lot 11	0.50	0.20	Aaron M. & Chantelle R. Child	\$0.00	\$0.00	\$570.00	\$570.00
510-01250	11	Lot 11	0.94	0.38	Jerome P. St Louis	\$0.00	\$0.00	\$758.00	\$758.00
Total on Privately-Owned - Non-Agricultural Lands.....						\$0.00	\$0.00	\$1,869.00	\$1,869.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01100	11	Lot 11	5.52	2.23 *	Evelyn O'Neil	\$0.00	\$0.00	\$1,059.00	\$1,059.00
510-01200	11	Lot 11	2.06	0.83 *	Jerome P. & Paula E. St Louis	\$0.00	\$0.00	\$788.00	\$788.00
510-01300	11	Lot 12	2.80	1.13 *	Wayde J. & Dana J. O'Neil	\$0.00	\$0.00	\$537.00	\$537.00
Total on Privately-Owned - Agricultural Lands (Grantable).....						\$0.00	\$0.00	\$2,384.00	\$2,384.00

SECTION 26 & NON-AGRICULTURAL LANDS (NON PRO-RATABLE)

Roll No.	Con.	Description	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Public Utility			Bell Canada	\$0.00	\$0.00	\$0.00	\$0.00
Public Utility			Hydro One	\$0.00	\$0.00	\$0.00	\$0.00
Total Section 26 & Non-Agricultural Lands (Non Pro-ratable).....				\$0.00	\$0.00	\$0.00	\$0.00
TOTAL ASSESSMENT				\$0.00	\$0.00	\$10,000.00	\$10,000.00

(Acres) (Ha.)

Total Area: 15.30 6.17

* denotes reduced assessment for surface water only

"SCHEDULE E-3"
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE
MARSHALL DRAIN SOUTH (DRAIN)
TOWN OF TECUMSEH

MUNICIPAL LANDS:

Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43	1.00	0.40	County of Essex Road Authority	\$0.00	\$3,870.00	\$1,315.00	\$5,185.00
Total on Municipal Lands.....				\$0.00	\$3,870.00	\$1,315.00	\$5,185.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01120	11	Lot 11	0.50	0.20	Aaron M. & Chantelle R. Child	\$0.00	\$608.00	\$394.00	\$1,002.00
Total on Privately-Owned - Non-Agricultural Lands.....						\$0.00	\$608.00	\$394.00	\$1,002.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01000	11	Lot 10	0.12	0.05 *	Wesley J. & Maureen E. O'Neil	\$0.00	\$132.00	\$16.00	\$148.00
510-01100	11	Lot 11	4.00	1.62 *	Evelyn O'Neil	\$0.00	\$1,475.00	\$532.00	\$2,007.00
520-04800	11	Lot 11	6.00	2.43 *	Wayne J. & Carol A. O'Neil	\$0.00	\$915.00	\$743.00	\$1,658.00
Total on Privately-Owned - Agricultural Lands (Grantable).....						\$0.00	\$2,522.00	\$1,291.00	\$3,813.00

SECTION 26 & NON-AGRICULTURAL LANDS (NON PRO-RATABLE)

Roll No.	Con.	Description	Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43			County of Essex	\$0.00	\$0.00	\$0.00	\$0.00
Total Section 26 & Non-Agricultural Lands (Non Pro-ratable).....				\$0.00	\$0.00	\$0.00	\$0.00

TOTAL ASSESSMENT **\$0.00 \$7,000.00 \$3,000.00 \$10,000.00**

(Acres) (Ha.)
Total Area: 11.62 4.70

* denotes reduced assessment for surface water only

"SCHEDULE E-4"
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE
MARSHALL DRAIN SOUTH (BRIDGES)
TOWN OF TECUMSEH

MUNICIPAL LANDS:

Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43	1.00	0.40	County of Essex Road Authority	\$0.00	\$0.00	\$4,525.00	\$4,525.00
Total on Municipal Lands.....				\$0.00	\$0.00	\$4,525.00	\$4,525.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01120	11	Lot 11	0.50	0.20	Aaron M. & Chantelle R. Child	\$0.00	\$0.00	\$1,357.00	\$1,357.00
Total on Privately-Owned - Non-Agricultural Lands.....						\$0.00	\$0.00	\$1,357.00	\$1,357.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres) (Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
510-01000	11	Lot 10	0.12	0.05 *	Wesley J. & Maureen E. O'Neil	\$0.00	\$0.00	\$0.00	\$0.00
510-01100	11	Lot 11	3.00	1.21 *	Evelyn O'Neil	\$0.00	\$0.00	\$1,369.00	\$1,369.00
520-04800	11	Lot 11	6.00	2.43 *	Wayne J. & Carol A. O'Neil	\$0.00	\$0.00	\$2,749.00	\$2,749.00
Total on Privately-Owned - Agricultural Lands (Grantable).....						\$0.00	\$0.00	\$4,118.00	\$4,118.00

SECTION 26 & NON-AGRICULTURAL LANDS (NON PRO-RATABLE)

Roll No.	Con.	Description	Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 43			County of Essex	\$0.00	\$0.00	\$0.00	\$0.00
Total Section 26 & Non-Agricultural Lands (Non Pro-ratable).....				\$0.00	\$0.00	\$0.00	\$0.00

TOTAL ASSESSMENT **\$0.00 \$0.00 \$10,000.00 \$10,000.00**

(Acres) (Ha.)
Total Area: 10.62 4.29

* denotes reduced assessment for surface water only

”SCHEDULE F”
DRAINAGE REPORT FOR THE
MARSHALL DRAIN
IN THE TOWN OF TECUMSEH
SPECIAL PROVISIONS - GENERAL

1.0 GENERAL SPECIFICATIONS

The General Specifications attached hereto is part of “Schedule F.” It also forms part of this specification and is to be read with it, but where there is a difference between the requirements of the General Specifications and those of the Special Provisions which follow, the Special Provisions will take precedence.

2.0 DESCRIPTION OF WORK

The work to be carried out under this Contract includes, but is not limited to, the supply of all **labour, equipment and materials** to complete the following items:

- Light brushing of the drain from Station 0+374 to Station 0+861 and Station 0+924 to Station 1+132 including the disposal by burning on-site or removal off-site with trimming and/or removal of existing trees as required to accommodate the drainage works.
- Excavation, levelling and trucking of excavated materials works, as follows:
 - Excavation of drain as follows:
 - Station 0+380 to Station 0+865 and Station 0+924 to Station 1+132, totalling approximately 693 lineal metres of drain and approximately 500 m³ of material.
 - Levelling of excavated materials at all agricultural properties, totalling approximately 500 m³ of material.
 - Trucking of excavated materials to nearby working corridor for levelling, as follows:
 - Station 0+505 to Station 0+528 and Station 0+550 to Station 0+553, approximately 30 m³ of material.
 - Station 0+611 to Station 0+641 and Station 0+653 to Station 657, approximately 40 m³ of material.
 - Station 0+657 to Station 0+659, Station 0+671 to Station 0+689, approximately 25 m³ of material.
- Hydraulic seeding of drain banks with fibre bonded matrix from Station 0+380 to Station 0+865 and Station 0+924 to Station 1+132 (approximately 1,750 m²). Work includes supply and placement of 50 mm thick topsoil. (approximately 90 m³) Seeding shall be completed immediately following placement of topsoil.
- Private Access Bridge works, as follows:
 - Bridge No. 1 - Station 0+374 (Roll No. 510-01300) – Removal and disposal of existing 7.4 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), full Granular ‘B’ backfill up to underside of driveway materials (approximately 35 tonnes), clean native or imported clean native

backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m²).

- Bridge No. 2 (Driveway portion only) - Station 0+399 (Roll No. 510-01300) – Removal and disposal of existing 10.3 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 13.0 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes). Full granular 'B' backfill up to underside of driveway material (approximately 35 tonnes) clean native or imported backfill material for outside of driveway portion to construct the 0.5 m wide native buffer strip (approximately 10 m³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m²).
- Bridge No. 2 (Enclosure portion only) - Station 0+399 (Roll No. 510-01300) – Removal and disposal of existing 16.4 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 16.5 m long, 525 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes). Granular 'B' backfill up to pipe springline of pipe (approximately 15 tonnes), clean native or imported clean native backfill material from springline of pipe culvert to the underside of the topsoil layer (approximately 45 m³), imported topsoil and seed (residential mix), minimum 100 mm thickness (approximately 35 m²). Work includes supply and installation of pre-fabricated 450 mm diameter catch basin tee complete with heavy duty cast iron grate.
- Bridge No. 3 (Driveway portion only) - Station 0+540 (Roll No. 510-01250) Driveway portion – Removal and disposal of existing 12.5 m long 400 mm diameter CSP pipe, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), Full Granular 'B' backfill up the underside of driveway materials (approximately 40 tonnes), clean native or imported clean native backfill material outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 20 m²).
- Bridge No. 3 - (Roll No. 510-01250) – Removal and disposal of existing 10.0 m long portion of 375 mm diameter CSP pipe enclosure, existing end walls and backfill off-site that are not suitable for native backfill. Excavate drain to the design open drain cross section from Station 0+541 to Station 0+551. Work includes placement of topsoil (minimum 50 mm thickness) fine-graded and hydro-seeded (bonded fibre matrix).

- Bridge No. 4 - Station 0+605 (Roll No. 510-01200) – Removal and disposal of existing 5.8 m long 600 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 15.0 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), Granular 'B' backfill up to springline of pipe (approximately 8 tonnes), clean native or imported clean native backfill material up to the underside of driveway material and for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 25 m³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 15 m²).
- Bridge No. 5 - Station 0+646 (Roll No. 510-01200) – Removal and disposal of existing 7.5 m long 400 mm diameter CSP pipe, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), full Granular 'A' backfill up to underside of driveway materials (approximately 40 tonnes), clean native or imported clean native backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m³), complete with sloping stone end walls (approximately 20 m²).
- Bridge No. 5 - Supply and installation of asphalt driveway surface, minimum 80 mm thickness (approximately 10 tonnes).
- Bridge No. 5 & Bridge No. 6 (Enclosure portion only) - Station 0+657 (Roll No. 510-01200 & Roll No. 510-01110) –Supply and installation of a new 6.0 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 5 tonnes). Granular 'B' backfill up to pipe springline of pipe (approximately 5 tonnes), clean native or imported clean native backfill material from springline of pipe culvert to the underside of the topsoil layer (approximately 35 m³), imported topsoil and seed (residential mix), minimum 100 mm thickness (approximately 30 m²). Work includes supply and installation of prefabricated 450 mm diameter catch basin 'tee' complete with heavy duty cast iron grate located on the property line between property Roll Nos. 510-01200 & 510-01110.
- Bridge No. 6 - Station 0+665 (Roll No. 510-01110) – Removal and disposal of existing 7.2 m long 400 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 12.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 8 tonnes), full Granular 'A' backfill up to underside of driveway materials (approximately 35 tonnes), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 30 tonnes) clean native or imported clean native backfill material for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 10 m³), complete with sloping stone end walls (approximately 20 m²).

- Bridge No. 7 - Station 1+108 (Roll No. 510-01100) – Removal and disposal of existing 12.0 m long 450 mm diameter CSP, existing end walls and backfill off-site that are not suitable for native backfill. Supply and installation of a new 14.5 m long, 450 mm diameter corrugated (non-perforated) high density polyethylene smooth interior wall pipe (HDPE) with bell and spigot joining system, clearstone bedding material beneath pipe, minimum 150 mm thickness (approximately 10 tonnes), Granular 'B' backfill up to springline of pipe (approximately 10 tonnes), clean native or imported clean native backfill material up to underside of driveway material and for outside of driveway portion to construct the 0.50 m wide native buffer strips (approximately 30 m³), Granular 'A' (crushed limestone) compacted driveway surface, minimum 200 mm thickness (approximately 25 tonnes) complete with sloping stone end walls (approximately 10 m²). The culvert shall be relocated approximately 6 metres north to Station 1+102. Work includes restoration of the disturbed drain banks with 50mm thick topsoil fine graded and seed. Temporary Silt Control Measures During Construction.
- Stone Erosion protection works as follows:
 - (County Road No. 43) Station 0+979 – Supply and install 10 m² (300 mm thick) of stone erosion protection (SEP) around pipe outlet. Work includes replacement of existing 400 mm CSP pipe outlet (approximately 3 metre length) complete with full Granular 'A' backfill. Connection with existing pipe to be made with Marmac Dissimilar coupler (or approved equivalent).
- Co-ordination with Bell Canada to facilitate locates of any existing underground lines. Any utility works required as a result of the drainage works if any (actual costs) are at the expense of the operating utility as per Section 26 of the Drainage Act.
- Co-ordination with Hydro-One to facilitate locates of any existing underground lines and to facilitate two (2) pole holds as required to complete drainage work. Any utility works required as a result of the drainage works if any (actual costs) are at the expense of the operating utility as per Section 26 of the Drainage Act.

3.0 ACCESS TO THE WORK

Access to the drain shall be from County Road No. 43 (11th Concession Road) using the defined working corridor. In addition, the Contractor shall be allowed to utilize any of the legal access culverts within the municipal drain for access if required. The Contractor shall make his/her own arrangements for any additional access for his/her convenience. All road areas and grass lawn areas disturbed shall be restored to original conditions at the Contractor's expense.

4.0 WORKING AREA

For the repair and improvement of the Marshall Drain, the primary working corridor shall be 9.0 metres East of the East top of bank along the entire drain. This corridor shall be used for the spreading of drain spoils which accumulated in the drain. The County Road No. 43 (11th Concession Road) road allowance may be used as a secondary corridor for the purposes of repairs and maintenance to the drain banks, as well as drain excavation where the primary working corridor is otherwise inaccessible provided through traffic is maintained as per the General Specifications.

SPECIAL PROVISIONS – OPEN DRAIN

5.0 BRUSHING

Brushing shall be carried out on the entire drain within the above identified sections of the drain where required and as specified herein. **All** brush and trees located within the drain side slopes shall be cut parallel to the side slopes, as close to the ground as practicable. Tree branches that overhang the drain shall be trimmed. Small branches and limbs are to be disposed of by the Contractor along with the other brush. Tree stumps, where removed to facilitate the drain excavation and reshaping of the drain banks, may be burned by the Contractor where permitted; otherwise, they shall be disposed of, off the site. The Contractor shall make every effort to preserve mature trees which are beyond the drain side slopes, and the working corridors. If requested to do so by the Drainage Superintendent, the Contractor shall preserve certain mature trees within the designated working corridors (see Section 4.0).

Except as specified herein, all brush and trees shall be stockpiled adjacent to the drain within the working corridors. Stockpiles shall not be less than 100 m apart and shall be a minimum of 2.0 m from the edge of the drain bank. All brush, timber, logs, stumps, large stones or other obstructions and deleterious materials that interfere with the construction of the drain, as encountered along the course of the drain are to be removed from the drain by the Contractor. Large stones and other similar material shall be disposed of by the Contractor off the site.

Following completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which remain standing, disposing of the branches cut off along with other brush and leaving the trees in a neat and tidy condition. Brush and trees removed from the working area are to be put into piles by the Contractor, in locations where they can be safely burned, and to be burned by the Contractor after obtaining the necessary permits, as required. If, in the opinion of the Drainage Superintendent, any of the piles are too wet or green to be burned, he shall so advise the Contractor to haul away the unburned materials to an approved dump site.

The Contractor shall apply for and obtain a permit under By-Law 2021-50 and shall be responsible for complying with all requirements for open-air burning under the By-Law, obtaining all utility locates in the area of each approved burn site; and be held responsible for liabilities related to the burning of the brush and smoke generated. The Contractor would be required to submit a Burn Permit Application to the Fire Department including detailed information on the burn process, extinguishing method, map of burn piles as well as a signature from the landowner acknowledging burning will occur on their property. The Contractor shall in no way be guaranteed to burn except with the explicit permission from the Fire Department.

Prior to, and during the course of burning operations, the Contractor shall comply with the current guidelines prepared by the Air Quality Branch of the Ontario Ministry of Environment and shall ensure that the Environmental Protection Act is not violated. Since the trees and brush that are cut off flush with the earth surface may sprout new growth later, it is strongly recommended that the Municipality make arrangements for spraying this new growth at the appropriate time so as to kill the trees and brush.

As part of this work, the Contractor shall remove any loose timber, logs, stumps, large stones or other debris from the drain bottom and from the side slopes. Timber, logs, stumps, large stones or other debris shall be disposed of off-site.

6.0 EXCAVATION AND LEVELLING OF EXCAVATED MATERIALS

6.1 Excavation of Existing Drain Channel

In all cases, the Contractor shall use the benchmarks to establish the proposed grade. However, for convenience, the drawings provide the approximate depth from the surface of the ground and from the existing drain bottom to the proposed grades. **THE CONTRACTOR SHALL NOT EXCAVATE DEEPER THAN THE GRADELINES SHOWN ON THE DRAWINGS.** Should over-excavation of the drain bank occur, the Contractor will **not** be permitted to repair with native material packed into place by the excavator and reshaped.

Should over-excavation occur, the Contractor will be required to have a bank repair detail engineered by a Professional Engineer (hired by the Contractor), to ensure long term stability of the bank is maintained. Such repairs shall be subject to approval by the Engineer and will be at no extra cost to the item.

All excavated material shall be handled as specified in Section 6.2. Materials deposited on the farmlands shall be within the working corridors, at least 2.0 m from the top of the drain bank, or as specified on the drawings. Upon allowing drying of excavated materials (if necessary) and as approved by the Drainage Superintendent, the Contractor shall level excavated materials in accordance with Section 6.2. Excavated material shall not be placed on dykes, in ditches, tiles or depressions intended to conduct water into the drain.

Seeding of the disturbed drain banks shall be completed immediately following drain construction and as specified in these Special Provisions.

All excavation work shall be done in such a manner as to not harm any vegetation or trees, not identified in this report or by the Drainage Superintendent for clearing. Any damages to trees or vegetation caused by the Contractors work shall be rectified to the satisfaction of the Drainage Superintendent.

The Contractor shall exercise caution around existing tile inlets and shall confirm with the property owners that all tiles have been located and tile ends repaired as specified.

Excavated material that is not suitable for spreading on agricultural lands shall be trucked off site and disposed of at the Contractors expense.

6.2 Levelling of Excavated Materials & Topsoil

Excavation of the drain bottom shall be completed as specified in Section 6.1, above and also as specified below and as shown on the drawings.

Excavated drain materials shall be spread to a depth not to exceed 300 mm, unless specified otherwise on the drawings. The material shall be sufficiently levelled to allow further working by agricultural implements. No materials shall be spread on non agricultural lands unless directed otherwise by the Engineer or Drainage Superintendent. All stones and other debris removed from the drain, which may interfere with agricultural implements, shall be disposed of off-site. Excavated material shall not be placed on dykes, in ditches, tiles or depressions intended to conduct water into the drain.

6.3 Trucking of Excavated Materials

Excavated materials from the drain fronting non-agricultural lands are to be trucked to an adjacent primary working corridor. Excavated materials which are to be hauled off site are the property of the Contractor and trucking of excavated materials to off-site disposal site to be arranged by Contractor.

The Contractor shall be solely responsible for acquiring any and all permits and approvals required prior to hauling and disposal of materials off-site where required. The Contractor shall abide by all requirements under O.Reg. 406/19 On-Site and Excess Soil Management. Should excavated material leave the site, the Contractor shall be responsible for the costs incurred by the Town associated with third party soil analysis and related engineering fees. The Contractor shall restore any such areas which are damaged by his operations, to original or better condition. The Contractor will be held liable for damages to roads, sodded areas and gardens, resulting from his non-compliance with these Specifications.

7.0 STONE EROSION PROTECTION (SEP)

The Contractor shall supply and install the required quantities of graded stone rip-rap erosion protection materials where specified. All stone to be used for erosion protection shall be 150 - 300 mm clear **quarried rock** or OPSS 1001 placed over a non-woven filter fabric Terrafix 270R or approved equivalent. **Concrete rip-rap will not be permitted.**

The minimum thickness requirement of the erosion stone layer is 300 mm with no portion of the filter fabric to be exposed.

8.0 HYDRAULIC SEEDING OF DRAIN BANKS

The newly established drain bank and any other disturbed drain bank shall be hydraulic mulch seeded as specified herein. The surface shall be predominantly fine and free from weeds and other unwanted vegetation. All other loose surface litter shall be removed and disposed of.

Bonded Fibre Matrix shall consist of thermally refined wood fibers and 10% cross-linked hydro-colloidal tackifiers. It should be 100% biodegradable. The curing period shall be not more than 48 hours. Bonded Fibre Matrix shall be hydraulically applied and after application be capable of adhering to the soil. In a dry state, shall be comprised of not less than 70% by weight of long, stranded wood fibres held together by organic or mineral bonding agents or both.

Bonded Fibre Matrix shall be applied at a minimum rate of 3,700 kg of dry product per 10,000 m². It shall be thoroughly mixed with water in a hydraulic seeder and mulcher at a rate of 20-30 kg of dry product to 500-600 litres of water to form a homogeneous slurry. Refer to OPSS.PROV 804 for specifications.

Seeding and mulching shall be a one step process in which the seed, fertilizer and hydraulic mulch are applied simultaneously in a water slurry via the hydraulic seeder/mulcher. The materials shall be added to the supply tank while it is being loaded with water. The materials shall be thoroughly mixed into a homogeneous water slurry and shall be distributed uniform, cohesive mat over the prepared surface. The materials shall be measured by mass or by a mass-calibrated volume measurement, acceptable to the Drainage Superintendent.

The hydraulic seeder/mulcher shall be equipped with mechanical agitation equipment capable of mixing the materials into a homogenous state until applied. The discharge pumps and gun nozzles shall be capable of applying the material uniformly.

Grass seed shall be Canada No. 1 grass seed mixture meeting the requirements of a Waterway Slough Mixture as supplied by Growmark or approved equal, as follows:

<i>Creeping Red Fescue</i>	20%
<i>Meadow Fescue</i>	30%
<i>Tall Fescue</i>	30%
<i>Timothy</i>	10%
<i>White Clover</i>	10%

Bags shall bear the label of the supplier indicating the content by species, grade and mass. Seed shall be applied at a rate of 200 kg per 10,000 m².

Fertilizer shall be 8-32-16 applied at 350 kg per 10,000 m². It shall be in granular form, dry, free from lumps and in bags bearing the label of the manufacturer, indicating mass and analysis.

The seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer with minimum 75% coverage. Re-seeding and/or other methods required to establish the grass will be given consideration to achieve the end result, and the costs shall be incidental to the works.

Vegetation of the drain banks shall be required to consider the drain in working condition and the work substantially performed. Bank slumps which occur in the duration of the contract that are believed to be caused by the works shall be rectified by at the Contractor's expense.

9.0 SEEDING (RESIDENTIAL)

All existing grassed areas disturbed by construction shall be hydraulic mulch seeded as specified herein. The existing ground surface to be seeded shall be loosened to a depth of 25 mm and shall be rendered uniformly loose for that 25 mm depth. The surface shall be predominantly fine and free from weeds and other unwanted vegetation. All other loose surface litter shall be removed and disposed of.

Hydraulic mulch shall consist of finely ground cellulose pulp derived from recycled newsprint and shall be dyed green. Its fiber consistency shall be approximately 60% fine fiber with the balance being paper particles, 40% of which shall be a diameter of 3 mm minimum and 6 mm maximum. Hydraulic mulch shall be applied at 2,000 kg per 10,000 m². Clean water shall be applied at 42,700 liters per 10,000 m².

Seeding and mulching shall be a one step process in which the seed, fertilizer and hydraulic mulch are applied simultaneously in a water slurry via the hydraulic seeder/mulcher. The materials shall be added to the supply tank while it is being loaded with water. The materials shall be thoroughly mixed into a homogeneous water slurry and shall be distributed uniformly over the prepared surface. The materials shall be measured by mass or by a mass-calibrated volume measurement, acceptable to the Drainage Superintendent.

The hydraulic seeder/mulcher shall be equipped with mechanical agitation equipment capable of mixing the materials into a homogenous state until applied. The discharge pumps and gun nozzles shall be capable of applying the material uniformly.

Grass seed shall be Canada No. 1 grass seed mixture meeting, as follows:

<i>Creeping Red Fescue</i>	30%
<i>Premium Kentucky Bluegrass</i>	25%
<i>Turf-type Perennial Rye Grass</i>	45%

Bags shall bear the label of the supplier indicating the content by species, grade and mass. Seed shall be applied at a rate of 200 kg per 10,000 m². Fertilizer shall be 8-32-16 applied at 350 kg per 10,000 m². It shall be in granular form, dry, free from lumps and in bags bearing the label of the manufacturer, indicating mass and analysis.

The hydraulic seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer with minimum 90% coverage. Re-seeding and/or other methods required to establish the grass will be given consideration to achieve the end result, and the costs shall be incidental to the works.

10.0 PRIVATE ACCESS BRIDGE WORK

10.1 Location of New Bridges

The new culvert shall be installed as shown on the drawings attached hereto. The centerline of the new culvert shall be located to align itself with the existing driveway or laneway unless otherwise specified.

10.2 Removal of Existing Culverts

The Contractor shall exercise caution when removing these materials as to minimize damage to the drain banks. Any damage to the drain shall be restored to original conditions at the expense of the Contractor. The removed materials (existing culvert debris and end wall materials) shall be hauled away off-site.

10.3 Materials for New Bridges

Materials shall be as follows:

<i>Culvert Pipe</i>	Bridge No. 1 - Station 0+374: New 525 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) "bell and spigot" connection type. Joints wrapped in "Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted. Bridge No. 2 – Station 0+399: New 525 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) "bell and spigot" connection type. Joints wrapped in "Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.
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Bridge No. 3 – Station 0+540: New 450 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) “bell and spigot” connection type. Joints wrapped in “Non-Woven” geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.

Bridge No. 4 – Station 0+605: New 450 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) “bell and spigot” connection type. Joints wrapped in “Non-Woven” geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.

Bridge No. 5 – Station 0+646: New 450 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) “bell and spigot” connection type. Joints wrapped in “Non-Woven” geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.

Bridge No. 6 – Station 0+665: New 450 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) “bell and spigot” connection type. Joints wrapped in “Non-Woven” geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.

Bridge No. 7 – Station 1+108: New 450 mm diameter solid (non-perforated) corrugated High Density Polyethylene (H.D.P.E.) smooth wall interior (Armtec Boss 2000 or approved equivalent) unless otherwise specified conforming to the following specifications: ASTM @3350, CSA B182.8-02 and OPSS 1840. The pipe is to provide a minimum pipe stiffness of 320 kPa. Joined using (water tight) “bell and spigot” connection type. Joints wrapped in “Non-Woven” geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 446, Mirafi 140NC or approved equivalent. No single pipe length less than 6.0 m in length shall be permitted.

<i>Pipe Bedding Below Pipe</i>	<i>19 mm clear stone conforming to OPSS Division 10.</i>
<i>Backfill up to Pipe Culvert Springline</i>	<i>Granular 'B' conforming to OPSS Division 10.</i>
<i>Backfill Above Pipe Springline up to Bottom of Driveway Surface Materials (Residential)</i>	<i>Granular 'B' conforming to OPSS Division 10.</i>
<i>Backfill Above Pipe Springline up to Bottom of Driveway Surface Materials (Farm & Enclosure</i>	<i>Dry native material free of topsoil, organic matter, broken concrete, steel, wood and deleterious substances. Alternatively, Granular 'A' or 'B' conforming to OPSS Division 10.</i>
<i>Backfill from Pipe Invert to Underside of Hard Surface (Asphalt)</i>	<i>Granular 'A' conforming to OPSS Division 10.</i>
<i>Driveway Surface</i>	<i>Granular 'A' made from crushed limestone conforming to OPSS Division 10. Minimum 200 mm thickness.</i>
<i>Erosion Stone</i>	<i>All stone to be used for erosion protection shall be 150 - 300 mm clear quarried rock or OPSS 1004, minimum 300 mm thickness.</i>
<i>Buffer Strips</i>	<i>Dry native material free of topsoil, organic matter, broken concrete, steel, wood and deleterious substances.</i>
<i>Filter Fabric</i>	<i>"Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 4546, Mirafi 140NC or approved equivalent.</i>

10.4 Culvert Installation

Suitable dykes shall be constructed in the drain so that the installation of the pipe can be accomplished in the dry. The drain bottom shall be cleaned, prepared, shaped and compacted to suit the new culvert configuration, as shown on the drawings. Granular materials shall be compacted to 98% of their maximum dry density; imported clean native materials shall be supplied, placed and compacted to 95% of their maximum dry density. All backfill material shall be installed and compacted in maximum 300 mm thick lifts.

10.5 Sloping Stone End Walls

End walls shall be constructed of quarry stone rip-rap, as specified herein. Each end wall shall extend from the invert of the new culvert to the top of the proposed lane. The end walls shall be sloped 1 vertical to 1.5 horizontal with a filter fabric underlay surrounding the pipe and spanning across the entire width of the drain and wrapping around the drain banks to align with the ends of the new pipe culvert. The minimum thickness requirement of the erosion stone layer is 300 mm with no portion of the filter fabric to be exposed to sunlight.

10.6 Granular 'A' Driveway

The Contractor shall construct the driveway with a maximum 3% longitudinal grade approach over the new culvert providing a minimum 300 mm cover. This work includes the installation of a minimum 200 mm thickness of compacted Granular 'A' (crushed limestone) surface. The minimum top width of the driveway shall be as shown on the drawings.

10.7 Granular Driveway/Laneway Restoration

The Contractor shall restore the driveway and laneway approaches as shown on the attached drawings. The driveway and laneway top width at each location shall match the existing drivable top width. The work shall include excavation, grading and compaction of the Granular "A" (crushed limestone) material.

10.8 Native Materials

Native materials suitable for use as backfill, as defined under Section 10.3, shall be salvaged from the existing bridge site, as required to complete the work as shown on the drawings, **(Native Backfill Zone only)**. Where there is an insufficient amount of native fill materials for backfilling the culvert, the Contractor may elect to import additional dry native materials or alternatively use Granular 'B' at his/her own expense.

10.9 Lateral Tile Drains

Should the Contractor encounter any lateral tiles within the proposed culvert limits not shown on attached drawings, the Contractor shall re-route the outlet tile drain(s) downstream or in consultation with the Drainage Superintendent, as required, to accommodate the new culvert. **Tile drain outlets through the wall of the new culvert pipe will not be permitted.** All costs associated with re-routing lateral tile drains (if any) shall be at the Contractor's expense.

Care must be taken in handling plastic drain pipe in cold weather to avoid causing damage.

Plastic drain pipe shall be held in position on planned grade immediately after installation by careful placement of backfill material.

10.10 Site Cleanup and Restoration

As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

10.11 Hot Mix, Hot Laid Asphaltic Concrete

OPSS Form 310 shall apply and govern the work except as amended or extended herein. This item covers asphalt driveway travelled surface restoration.

The Contractor shall supply and place hot mix, hot laid asphaltic concrete (HL3 surface) as detailed on the Contract Drawings, including the use of the specified performance grades of asphalt cement, as shown on the Contract Drawings. Asphalt cement shall be 85-100. The Contractor shall retain a qualified material testing company, at his expense, to design the mixes.

The mix designs shall be submitted to the Contract Administrator for review prior to carrying out any asphalt placement. The maximum percentage of recycled asphalt in the mix design shall be 15 percent.

Prior to placing the finish course asphalt, the Contractor shall mill headers if directed by the Contract Administrator, clean existing pavements of all dirt, loose sand or other foreign material, which may prevent proper bonding. A tack coat shall be applied if existing pavement cannot be adequately cleaned.

No asphalt shall be placed on a wet or damp surface or one which is not properly broomed to remove loose gravel etc. The pavers shall be operated at whatever speed is necessary to match the output of the plant to ensure continuous operation of the pavers but conditional on a consistent and satisfactory mat being laid and compacted.

In consideration of potential settlement cracks in the asphalt driveway, the contractor is authorized to install a temporary asphalt surface to allow property access for a maximum period of one (1) year. Following this period, a compaction test may be conducted at the discretion of the Drainage Superintendent to ensure compliance with specified standards before proceeding with the construction of the asphalt driveway.

Alternatively, the Contractor may propose an immediate construction methodology, to be approved by the Engineer. Should the Contractor choose this option, it must be noted that if settlement cracks do develop within the driveway during the one-year maintenance period of this contract, the Contractor shall bear full responsibility for the removal and reconstruction of the driveway at their own expense.

11.0 TEMPORARY EROSION & SEDIMENT CONTROL

It is incumbent on the Contractor to keep sediment out of the receiving drainage system through his/her operations and use of temporary erosion and sediment control (ESC) measures. ESC measures shall follow applicable OPSDs and be regularly inspected and maintained throughout the duration of the project at the cost of the contractor. Any temporary ESC measures shall be removed, and the drain restored following establishment of vegetation on the drain banks and completion of the project.

GENERAL SPECIFICATIONS

1.0 AGREEMENT AND GENERAL CONDITIONS

The part of the Specifications headed "Special Provisions" which is attached hereto forms part of this Specification and is to be read with it. Where there is any difference between the requirements of this General Specification and those of the Special Provisions, the Special Provisions shall govern.

Where the word "Drainage Superintendent" is used in this specification, it shall mean the person or persons appointed by the Council of the Municipality having jurisdiction to superintend the work.

Tenders will be received and contracts awarded only in the form of a lump sum contract for the completion of the whole work or of specified sections thereof. The Tenderer agrees to enter into a formal contract with the Municipality upon acceptance of the tender. The General Conditions of the contract and Form of Agreement shall be those of the Stipulated Price Contract CCDC2-Engineers, 1994 or the most recent revision of this document.

2.0 EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

Each tenderer must visit the site and review the plans and specifications before submitting his/her tender and must satisfy himself/herself as to the extent of the work and local conditions to be met during the construction. Claims made at any time after submission of his/her tender that there was any misunderstanding of the terms and conditions of the contract relating to site conditions, will not be allowed. The Contractor will be at liberty, before bidding to examine any data in the possession of the Municipality or of the Engineer.

The quantities shown or indicated on the drawings or in the report are estimates only and are for the sole purpose of indicating to the tenderers the general magnitude of the work. The tenderer is responsible for checking the quantities for accuracy prior to submitting his/her tender.

3.0 MAINTENANCE PERIOD

The successful Tenderer shall guarantee the work for a period of one (1) year from the date of acceptance thereof from deficiencies that, in the opinion of the Engineer, were caused by faulty workmanship or materials. The successful Tenderer shall, at his/her own expense, make good and repair deficiencies and every part thereof, all to the satisfaction of the Engineer. Should the successful Tenderer for any cause, fail to do so, then the Municipality may do so and employ such other person or persons as the Engineer may deem proper to make such repairs or do such work, and the whole costs, charges and expense so incurred may be deducted from any amount due to the Tenderer or may be collected otherwise by the Municipality from the Tenderer.

4.0 GENERAL CO-ORDINATION

The Contractor shall be responsible for the coordination between the working forces of other organizations and utility companies in connection with this work. The Contractor shall have no cause of action against the Municipality or the Engineer for delays based on the allegation that the site of the work was not made available to him by the Municipality or the Engineer by reason of the acts, omissions, misfeasance or non-feasance of other organizations or utility companies engaged in other work.

5.0 RESPONSIBILITY FOR DAMAGES TO UTILITIES

The Contractor shall note that overhead and underground utilities such as hydro, gas, telephone and water are not necessarily shown on the drawings. It is the Contractor's responsibility to contact utility companies for information regarding utilities, to exercise the necessary care in construction operations and to take other precautions to safeguard the utilities from damage. All work on or adjacent to any utility, pipeline, railway, etc., is to be carried out in accordance with the requirements of the utility, pipeline, railway, or other, as the case may be, and its specifications for such work are to be followed as if they were part of this specification. The Contractor will be liable for any damage to utilities.

6.0 CONTRACTOR'S LIABILITY

The Contractor, his/her agents and all workmen or persons under his/her control including sub-contractors, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work. The Contractor shall be solely responsible for all damages, by whomsoever claimable, in respect to any injury to persons or property of whatever description and in respect of any infringement of any right, privilege or easement whatever, occasioned in the carrying on of the work, or by any neglect on the Contractor's part.

The Contractor, shall indemnify and hold harmless the Municipality and the Engineer, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or attributable to the Contractor's performance of the contract.

7.0 PROPERTY BARS AND SURVEY MONUMENTS

The Contractor shall be responsible for marking and protecting all property bars and survey monuments during construction. All missing, disturbed or damaged property bars and survey monuments shall be replaced at the Contractor's expense, by an Ontario Land Surveyor.

8.0 MAINTENANCE OF FLOW

The Contractor shall, at his/her own cost and expense, permanently provide for and maintain the flow of all drains, ditches and water courses that may be encountered during the progress of the work.

9.0 ONTARIO PROVINCIAL STANDARDS

Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) shall apply and govern at all times unless otherwise amended or extended in these Specifications or on the Drawing. Access to the electronic version of the Ontario Provincial Standards is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web go to <http://www.mto.gov.on.ca/english/transrd/>. Under the title Technical Manuals is a link to the Ontario Provincial Standards. Users require Adobe Acrobat to view all pdf files.

10.0 APPROVALS, PERMITS AND NOTICES

The construction of the works and all operations connected therewith are subject to the approval, inspection, by-laws and regulations of all Municipal, Provincial, Federal and other authorities having jurisdiction in respect to any matters embraced in this Contract. The Contractor shall obtain all approvals and permits and notify the affected authorities when carrying out work in the vicinity of any public utility, power, underground cables, railways, etc.

11.0 SUBLETTING

The Contractor shall keep the work under his/her personal control, and shall not assign, transfer, or sublet any portion without first obtaining the written consent of the Municipality.

12.0 TIME OF COMPLETION

The Contractor shall complete all work on or before the date fixed at the time of tendering. The Contractor will be held liable for any damages or expenses occasioned by his/her failure to complete the work on time and for any expenses of inspection, superintending, re-tendering or re-surveying, due to their neglect or failure to carry out the work in a timely manner.

13.0 TRAFFIC CONTROL

The Contractor will be required to control vehicular and pedestrian traffic along roads at all times and shall, at his/her own expense, provide for placing and maintaining such barricades, signs, flags, lights and flag persons as may be required to ensure public safety. The Contractor will be solely responsible for controlling traffic and shall appoint a representative to maintain the signs and warning lights at night, on weekends and holidays and at all other times that work is not in progress. All traffic control during construction shall be strictly in accordance with the **Occupational Health and Safety Act** and the current version of the **Ontario Traffic Manuals**. Access to the electronic version of the **Ontario Traffic Manual** is available online through the MTO website, free of charge to all users.

To access the electronic standards on the Web go to <http://www.mto.gov.on.ca/english/transrd/>, click on "Library Catalogue," under the "Title," enter "Ontario Traffic Manual" as the search. Open the applicable "Manual(s)" by choosing the "Access Key," once open look for the "Attachment," click the pdf file. Users require Adobe Acrobat to view all pdf files.

Contractors are reminded of the requirements of the Occupational Health and Safety Act pertaining to Traffic Protection Plans for workers and Traffic Control Plan for Public Safety.

14.0 SITE CLEANUP AND RESTORATION

As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

15.0 UTILITY RELOCATION WORKS

In accordance with Section 26 of the Drainage Act, if utilities are encountered during the installation of the drainage works that conflict with the placement of the new culvert, the operating utility company shall relocate the utility at their own costs. The Contractor however will be responsible to co-ordinate these required relocations (if any) and their co-ordination work shall be considered incidental to the drainage works.

16.0 FINAL INSPECTION

All work shall be carried out to the satisfaction of the Drainage Superintendent for the Municipality, in compliance with the specifications, drawings and the Drainage Act. Upon completion of the project, the work will be inspected by the Engineer and the Drainage Superintendent. Any deficiencies noted during the final inspection shall be immediately rectified by the Contractor.

Final inspection will be made by the Engineer within 20 days after the Drainage Superintendent has received notice in writing from the Contractor that the work is completed, or as soon thereafter as weather conditions permit.

17.0 FISHERIES CONCERNS

Standard practices to be followed to minimize disruption to fish habitat include embedment of the culvert a minimum 10% below grade, constructing the work 'in the dry' and cutting only trees necessary to do the work (no clear-cutting). No in-water work is to occur during the timing window unless otherwise approved by the appropriate authorities.



PLAN
NORTH

LEGEND

- MARSHALL DRAIN DRAINAGE AREA
- SUBCATCHMENT
- MARSHALL DRAIN
- OTHER DRAINS
- BRIDGE REPLACEMENT
- BRIDGE NO.
- SURFACE WATER ONLY
- LOCAL BENCHMARK

SITE BENCHMARKS

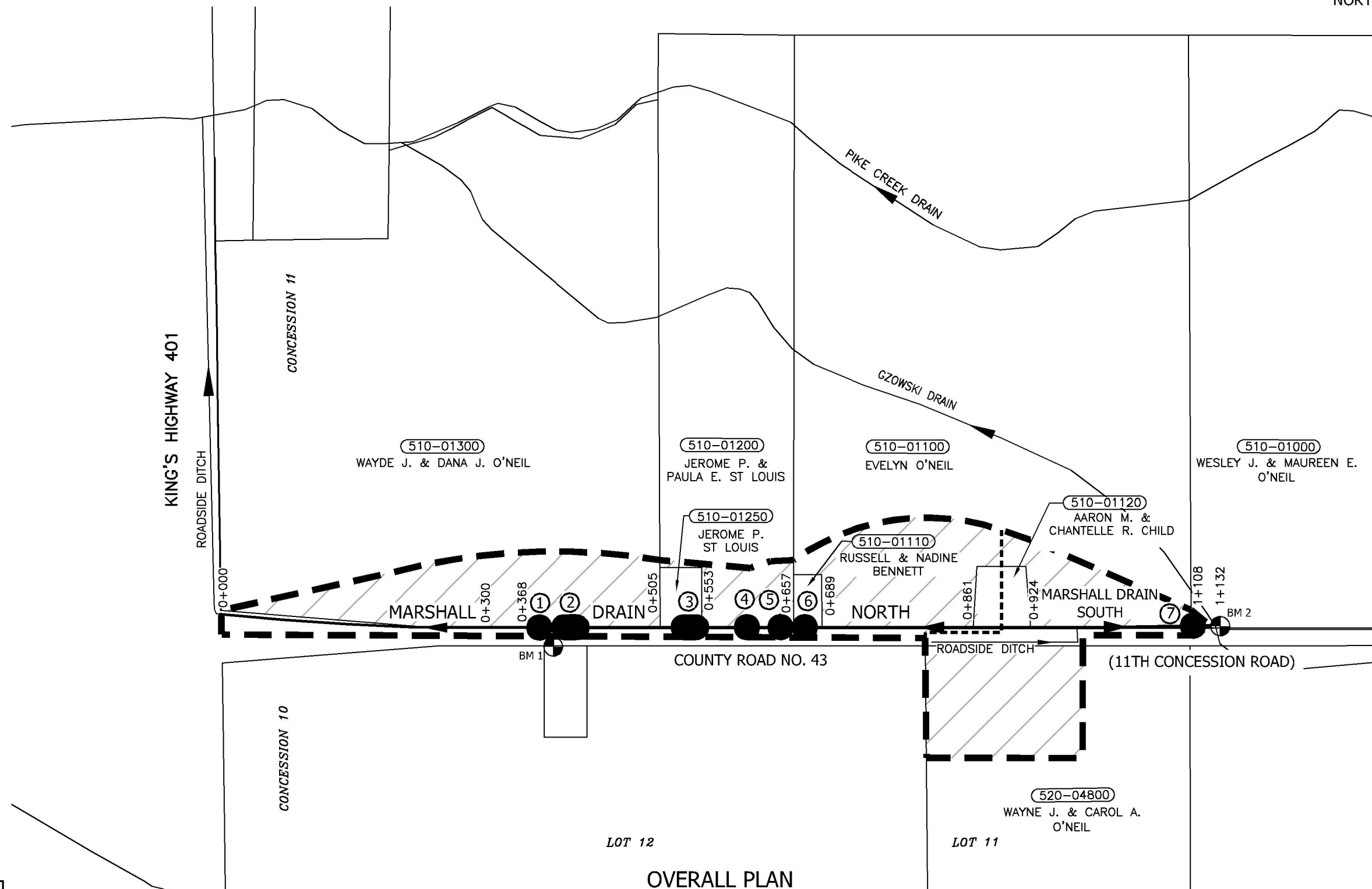
BM1- TOP OF NAIL IN WEST FACE OF HYDRO POLE IN FRONT OF MUN. NO. 5015 COUNTY ROAD No. 43 (11TH CONCESSION ROAD) AT APPROX. STA. 0+316.

ELEVATION=186.47m

BM2- TOP OF SOUTH CONCRETE WING WALL OF CONCRETE BRIDGE ALONG COUNTY ROAD No. 43 (11TH CONCESSION ROAD) CROSSING THE GZOWSKI DRAIN AT APPROX. STA. 1+135.

ELEVATION=187.28m

NOTE: CONTRACTOR TO VERIFY BENCHMARKS PRIOR TO CONSTRUCTION.



OVERALL PLAN SCALE=1:5,000

'SCHEDULE G'

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2	PUBLIC INFORMATION CENTRE	July 16/26	OEM
1	CLIENT REVIEW	July 3/26	OEM

DESIGN	SJC	REVIEWED BY	VJH
DRAWN	EKC	CHECKED BY	OEM
DATE	JULY 30, 2026		
SCALE	AS SHOWN		

PROJECT NO.	25-2239
DRAWING SCALES BASED ON A 11" X 17" SHEET	

Drainage Report for the Improvements to the MARSHALL DRAIN Town of Tecumseh	SHEET TITLE OVERALL PLAN
PAGE NO.	1 of 7





Q-399-BRIDGE NO. 2
EX. 450mmø CSP, 26.7m LONG TO BE REPLACED WITH
NEW 525mmø HDPE, 29.5m LONG

D-4540-BRIDGE NO. 3
EX. 450mmØ CSP, 20.5m LONG TO BE REPLACED WITH
NEW 450mmØ HDPE, 12.5m LONG

D-4805-BRIDGE NO. 4
EX. 600mm ϕ CSP, 5.8m LONG TO BE REPLACED WITH
NEW 450mm ϕ HDPE, 15.0m LONG

2+646-BRIDGE NO. 5
EX. 400mmø CSP, 7.5m LONG TO BE REPLACED WITH
NEW 450mmø HDPE, 16.5m LONG

D+665-BRIDGE NO. 6
EX. 400mmø CSP, 7.2m LONG TO BE REPLACED WITH
NEW 450mmø HDPE, 14.5m LONG

10+864-TOP END OF DRAIN SECTION

00+924-TOP END OF DRAIN SECTION

D+979-ROAD CROSSING

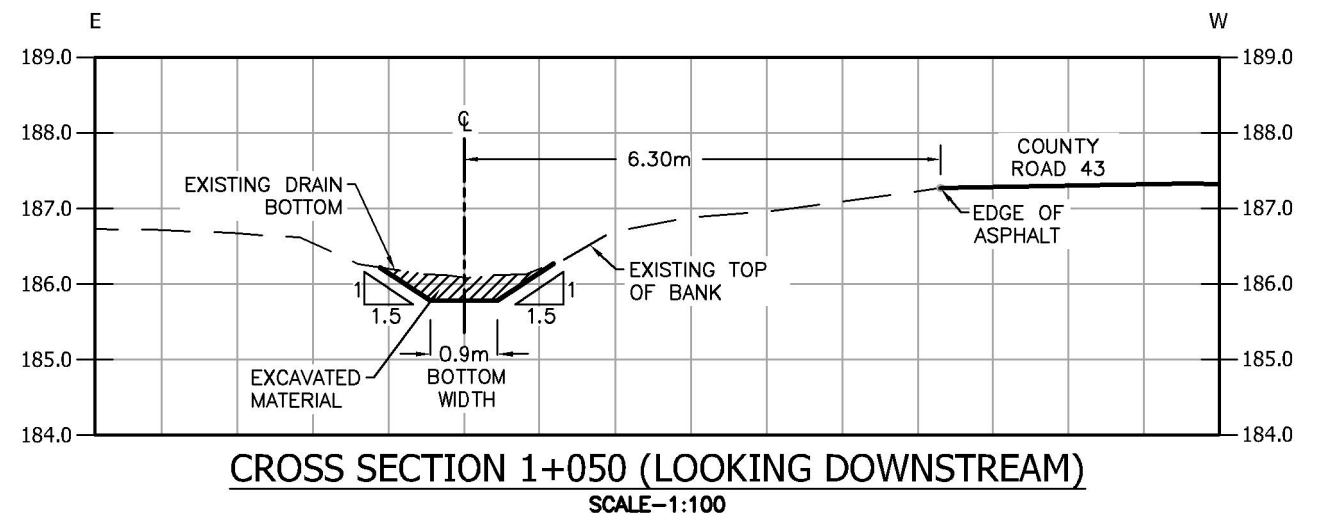
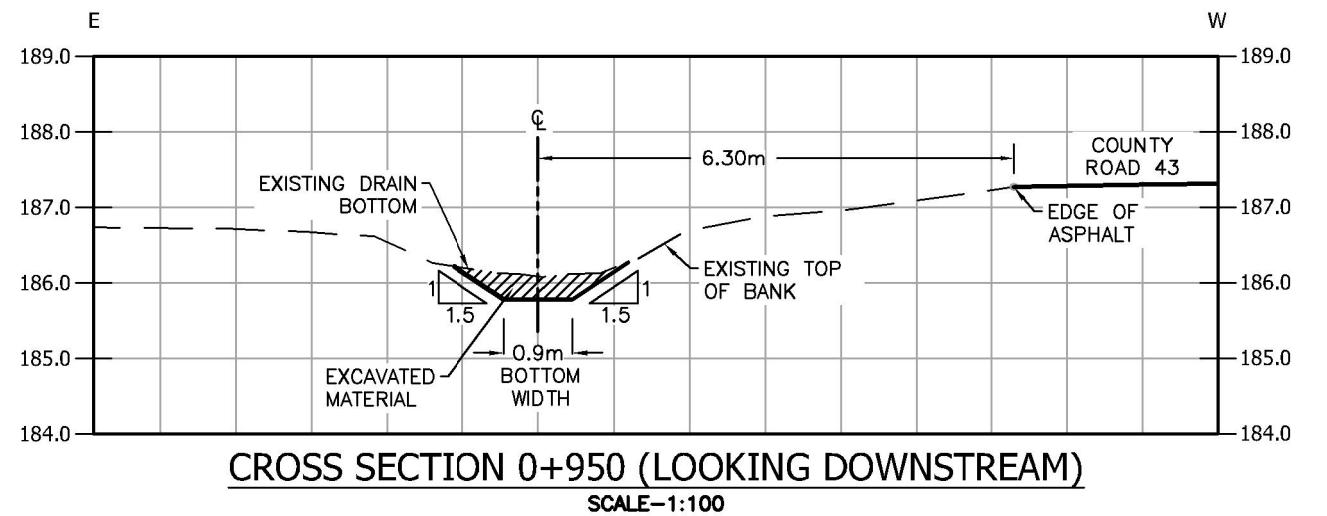
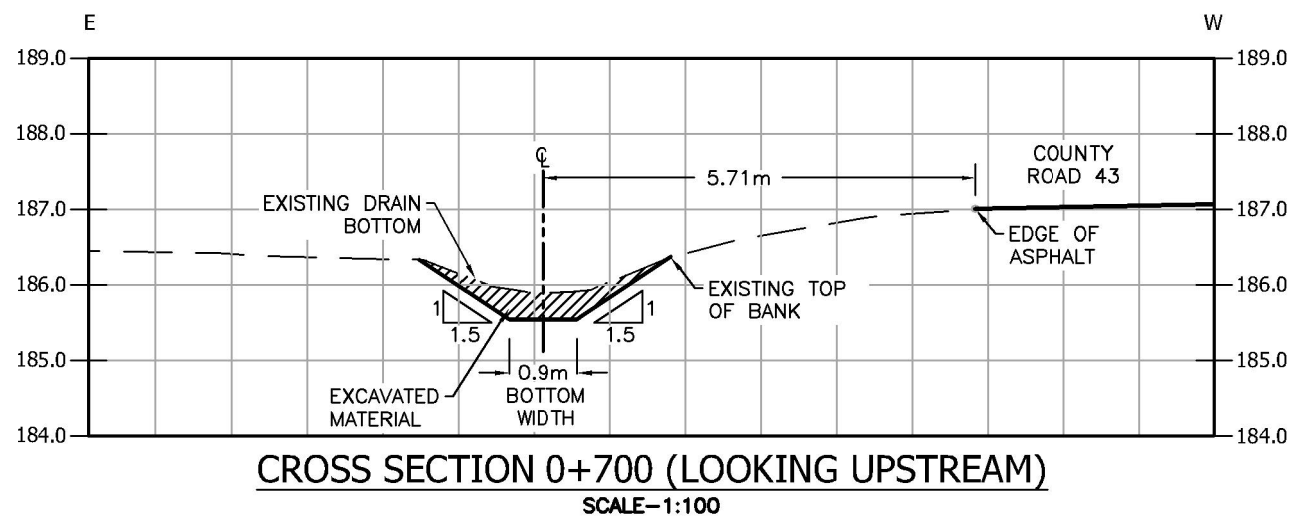
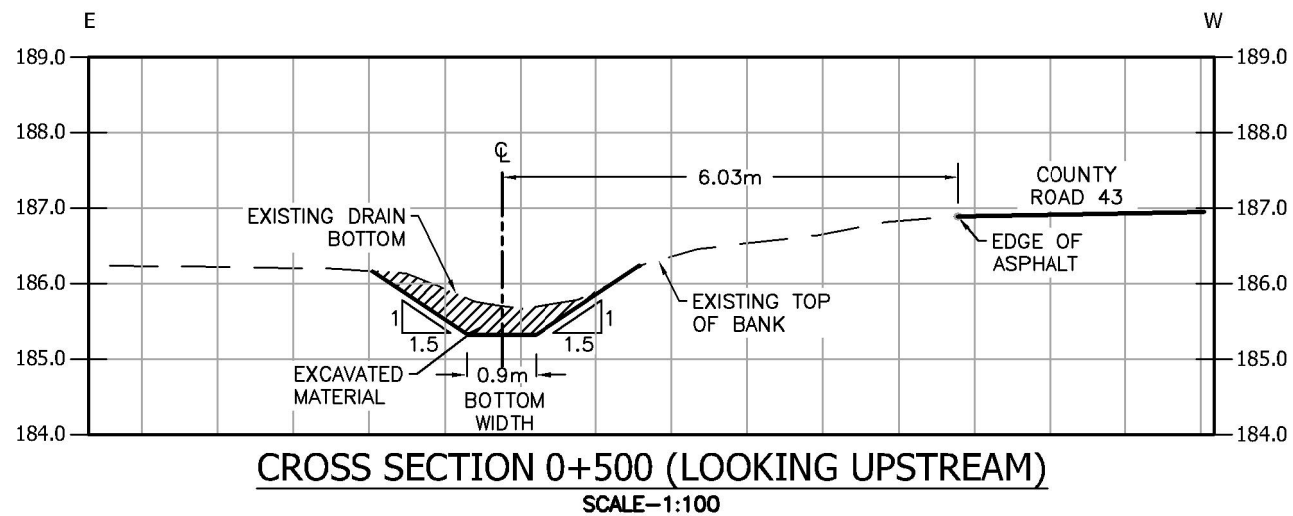
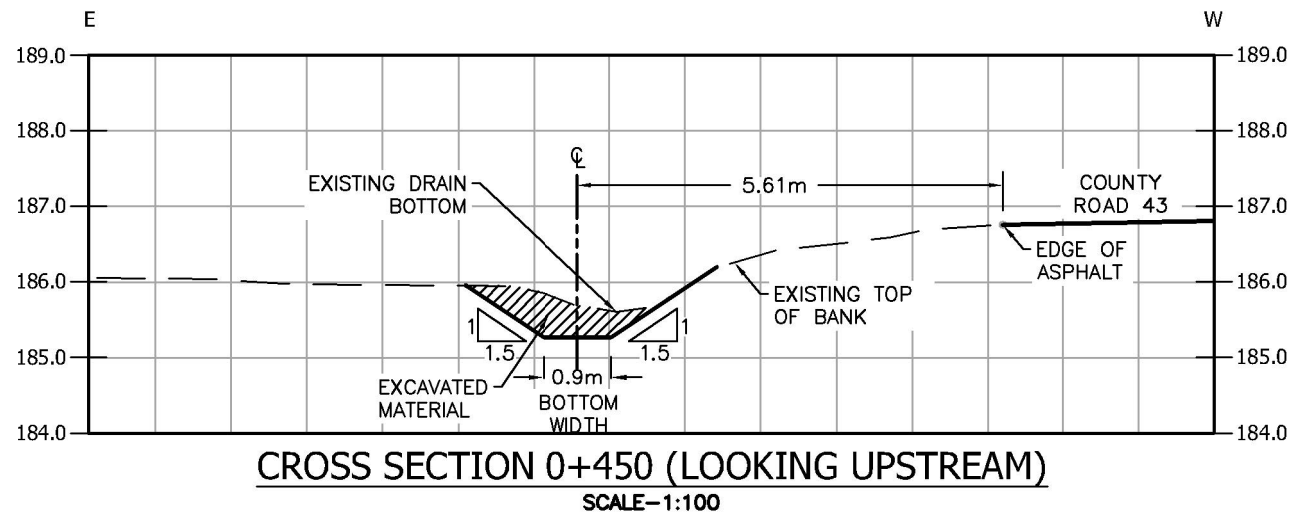
**+108-BRIDGE NO. 7
EX. 450mmø CSP, 12.0m LONG TO BE REPLACED AND RELOCATED
WITH NEW 450mmø HDPE, 14.5m LONG
+132 - OUTLET TO GZOWSKI DRAIN**

1+132 - OUTLET TO GZOWSKI DRAIN

PAGE NO. 2 of 7



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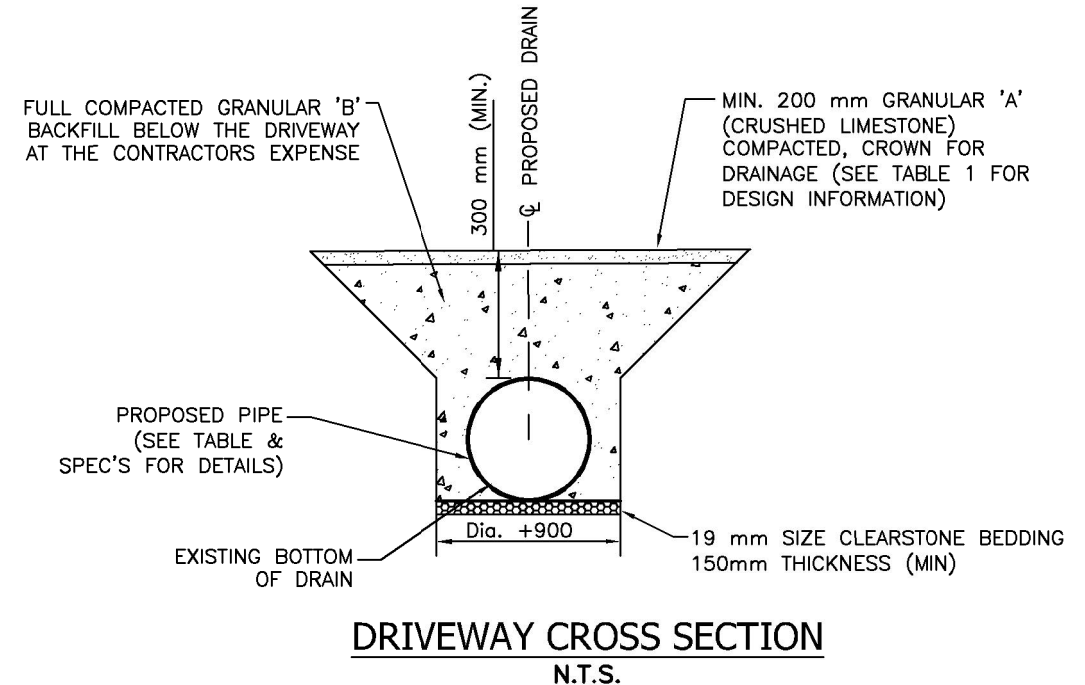
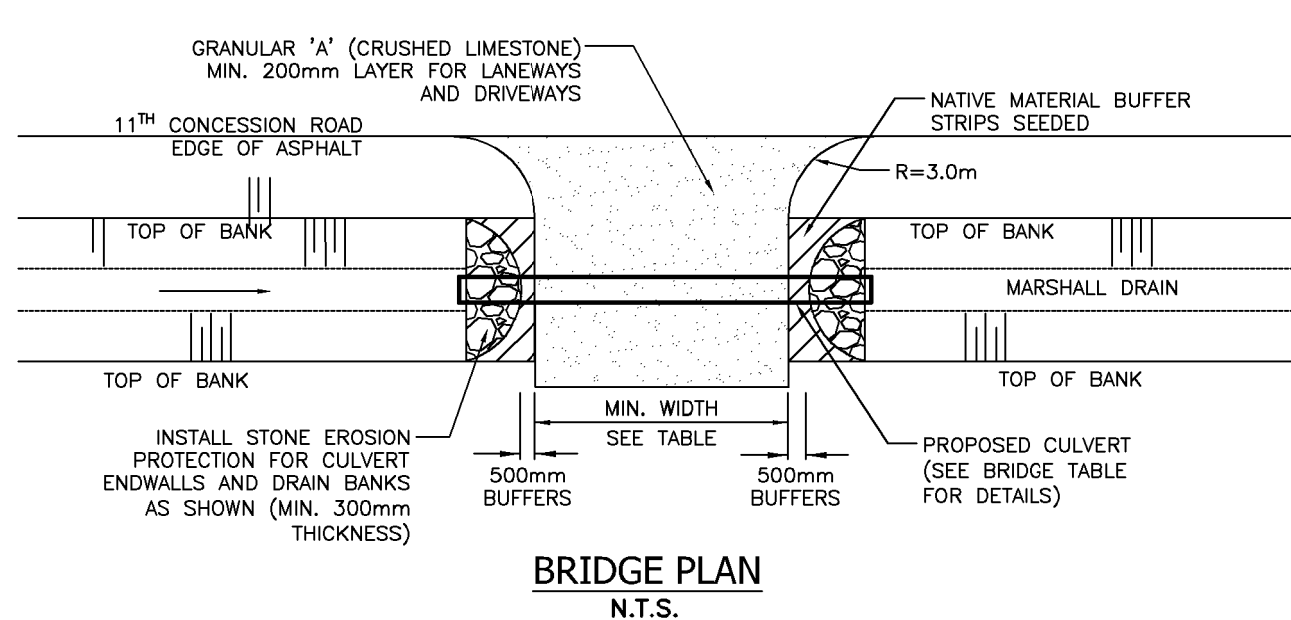
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SCALE	AS SHOWN		

 DILLON CONSULTING	PROJECT NO.	25-2239
	DRAWING SCALES BASED ON A 11" X 17" SHEET	

'SCHEDULE G'	
Drainage Report for the Improvements to the MARSHALL DRAIN Town of Tecumseh	
SHEET TITLE	CROSS SECTION
PAGE NO.	3 of 7



NOTE:

- CULVERT PIPES ARE DESIGNED FOR A MINIMUM EMBEDMENT OF 10% OF THE PIPE DIAMETER.

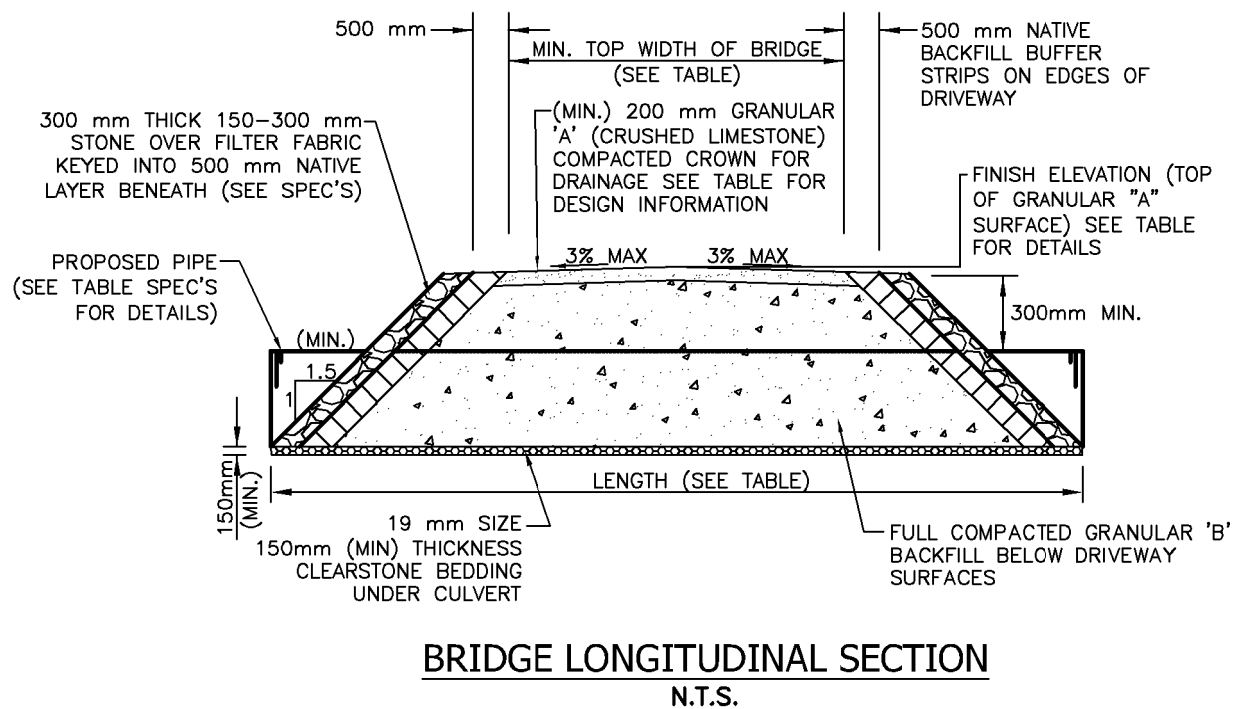


TABLE 2 – RESIDENTIAL ACCESS CULVERTS			
DESCRIPTION	BRIDGE No. 1	BRIDGE No. 5	BRIDGE No. 6
BRIDGE LOCATION (STA.)	0+374	0+646	0+665
PIPE INVERT ELEV. U/S SIDE(m)	185.14	185.44	185.46
PIPE INVERT ELEV. D/S SIDE(m)	185.12	185.42	185.44
TOP OF ϕ DRIVEWAY SURFACE ELEV. (m)	186.45	186.79	186.86
DRAIN BOTTOM (m) (DESIGN) (AT CENTRELINE OF CULVERT)	185.19	185.49	185.51
MIN. TOP WIDTH OF DRIVEWAY (m)	6.1	6.1	6.1
MIN. CULVERT GRADE (%)	0.11	0.11	0.11
PIPE SIZE (mm)	525	450	450
CULVERT LENGTH (m)	12.5	16.5	14.5
CULVERT TYPE	320 kPa	320 kPa	320 kPa
CULVERT MATERIAL	H.D.P.E	H.D.P.E	H.D.P.E
CULVERT ENDWALL TYPE	SLOPING STONE	SLOPING STONE	SLOPING STONE
GRATE RIM ELEV. (m)	–	186.50	

TABLE 3 – RESIDENTIAL BRIDGE CULVERT ENCLOSURES		
DESCRIPTION	BRIDGE No. 2	BRIDGE No. 3
BRIDGE LOCATION (STA.)	0+399	0+540
PIPE INVERT ELEV. U/S SIDE(m)	185.17	185.32
PIPE INVERT ELEV. D/S SIDE(m)	185.14	185.30
TOP OF ϕ DRIVEWAY SURFACE ELEV. (m)	186.37	186.73
DRAIN BOTTOM (m) (DESIGN) (AT CENTRELINE OF CULVERT)	185.23	185.37
MIN. TOP WIDTH OF DRIVEWAY (m)	9.1	6.1
MIN. CULVERT GRADE (%)	0.11	0.11
PIPE SIZE (mm)	525	450
CULVERT LENGTH (m)	29.5	12.5
CULVERT TYPE	320 kPa	320 kPa
CULVERT MATERIAL	H.D.P.E	H.D.P.E
CULVERT ENDWALL TYPE	SLOPING STONE	SLOPING STONE
GRATE RIM ELEV. (m)	186.07	186.43

SEE SHEET 6 FOR PRIVATE BRIDGE ENCLOSURE DETAILS



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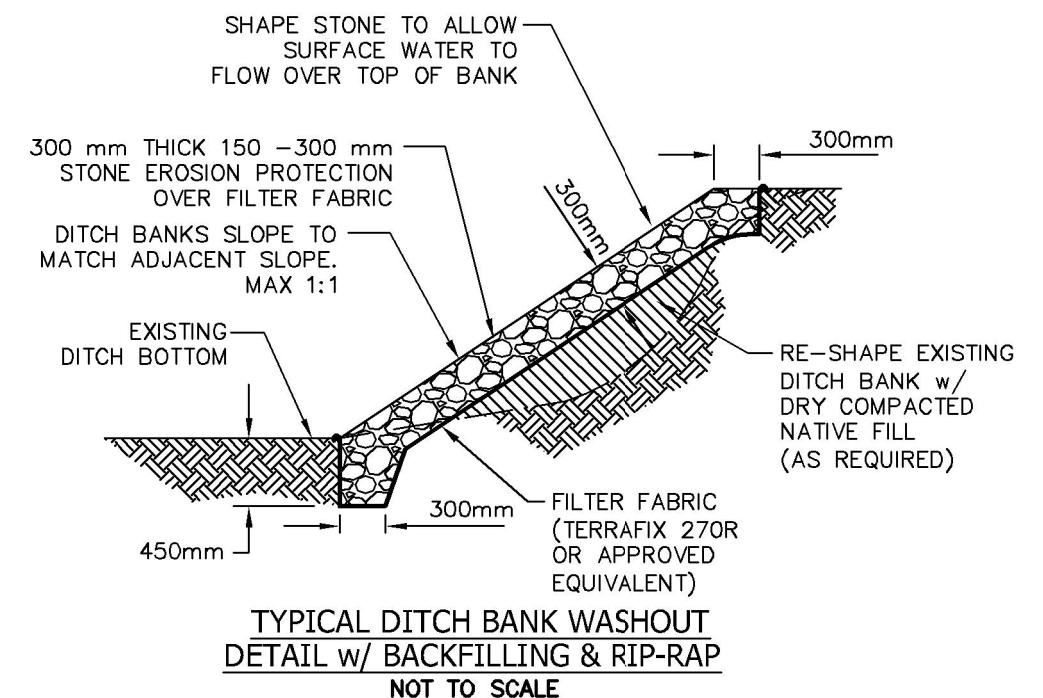
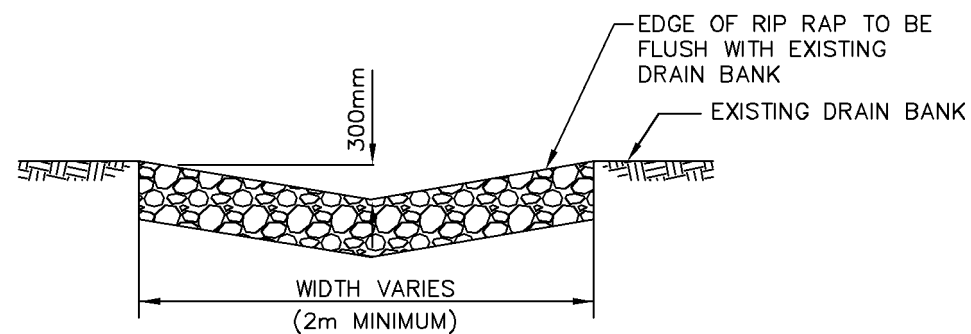
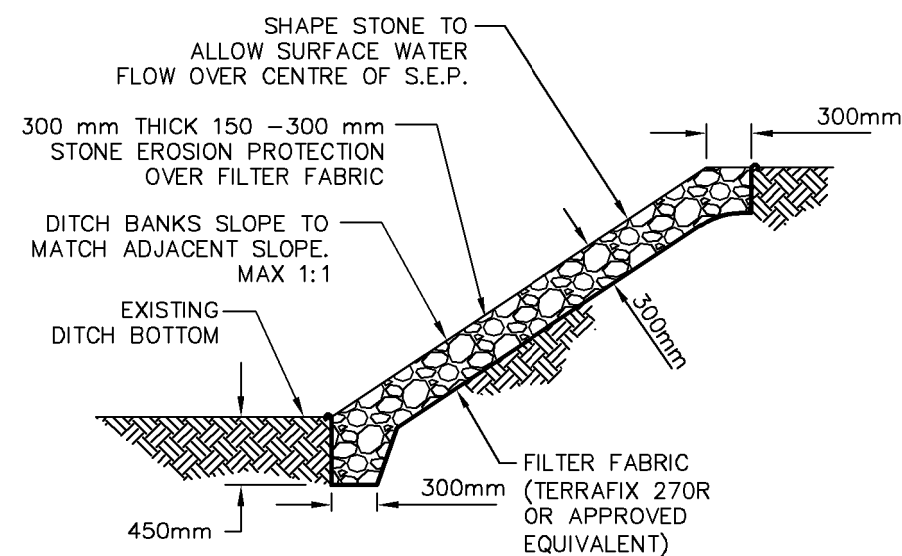
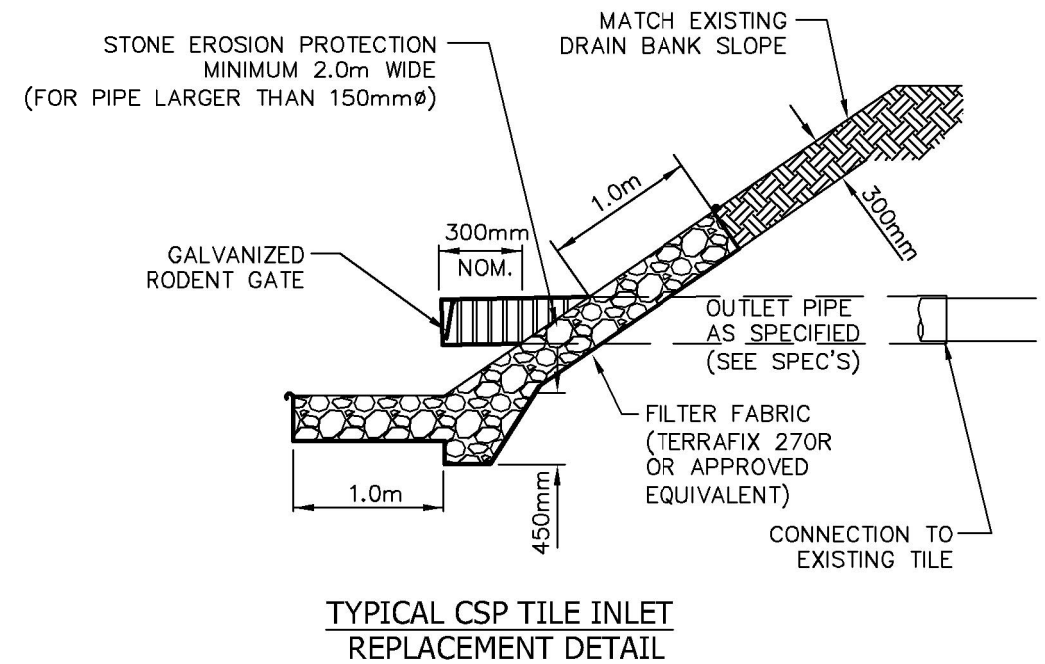
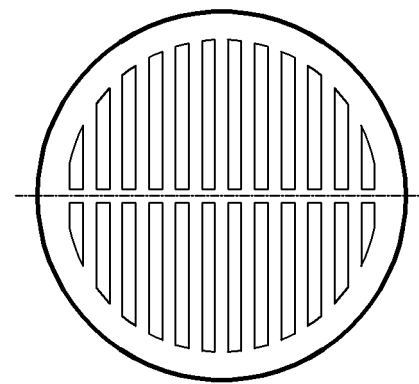
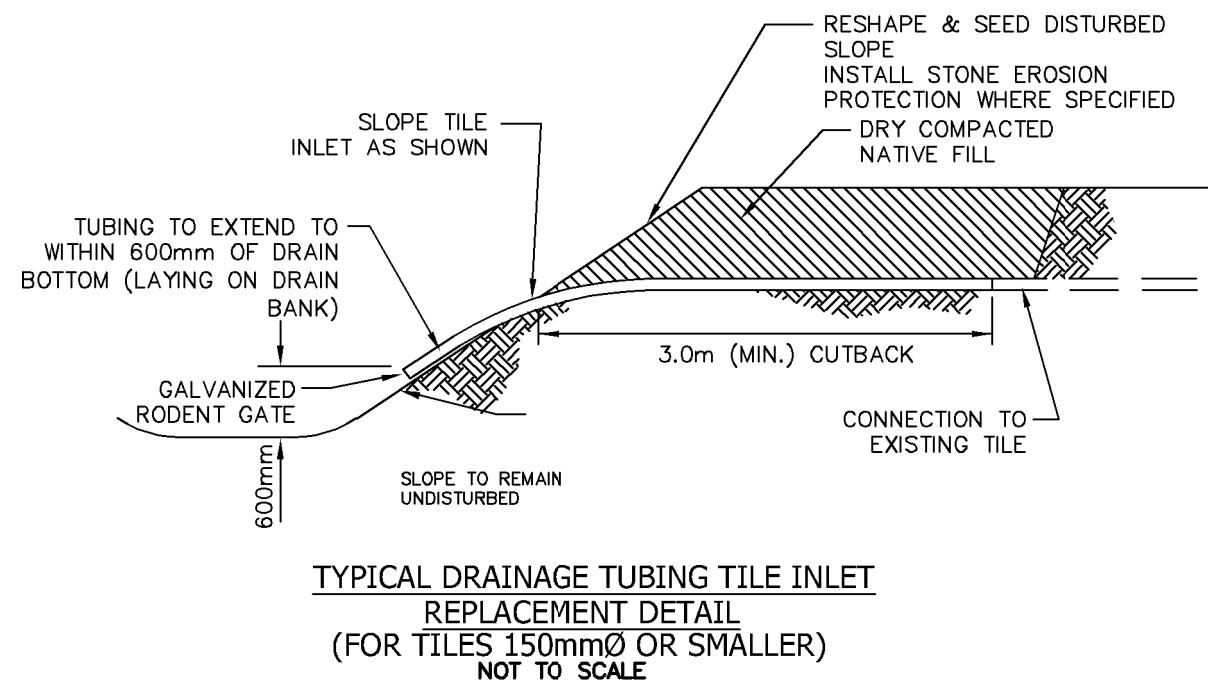
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'SCHEDULE G'

Drainage Report for the Improvements to the
MARSHALL DRAIN
Town of Tecumseh

SHEET TITLE
RES. ACCESS BRIDGES

PAGE NO.
5 of 7



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'SCHEDULE G'

Drainage Report for the Improvements to the **MARSHALL DRAIN** Town of Tecumseh

SHEET TITLE	MISCELLANEOUS DETAILS
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