DRAINAGE REPORT
FOR THE

IMPROVEMENTS TO THE UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN

FORMER TOWNSHIP OF GOSFIELD SOUTH

TOWN OF KINGSVILLE

DILLON CONSULTING

FINAL REPORT
23 JULY 2024
TIM R. OLIVER, P. ENG.
FILE No. 21-3142

File No. 21-3142

Members of Council
Town of Kingsville
2021 Division Road North
Kingsville, Ontario
N9Y 2Y9

Drainage Report for the

IMPROVEMENTS TO THE UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN

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Now In the Town of Kingsville

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Mayor and Members of Council:

Instructions

The Municipality received a request on 10 July 2023 from the Ministry of Transportation Ontario for the realignment of the 4th Concession Road Drain to the east of King's Highway No. 3 and the extension of the highway culvert. The proposed drainage works are required to facilitate the King's Highway No. 3 widening and intersection modifications at County Road No. 18. Council accepted the request under Section 78(1) of the Drainage Act for major improvements to a drainage works and on 14 August, 2023 appointed Dillon Consulting Limited to prepare a report.

Watershed Description

The upper portion of the 4th Concession Road Drain consists of an open channel commencing near the west half of Lot 18, Concession 4 and flowing west across King's Highway No. 3 and proceeding westerly along the north side of County Road No. 18 to the nearest existing access culvert within Lot A, Concession S.T.R. The length of this upper portion of the drain, as described herein, to be improved being approximately 842 metres. The drainage area for the said upper portion of the 4th Concession Road Drain, being approximately 47.3 hectares (117 acres). The surficial soils are predominately Burford Loam – Shallow Phase, Parkhill Loam – Red sand spot Phase, Brookston Clay which is defined as having poor natural drainage.

Drain History

The recent history of Engineers' reports for the 4th Concession Road Drain follows:

- **4 April 1991 by Lou Zarlenga, P. Eng:** The report was prepared to recommend a new maintenance schedule of assessment for the 4th Concession Road Drain. The report serves as the current governing bylaw for assessing drain cleaning and maintenance costs.
- **18 March 1971 by William J. Setterington, P. Eng:** The report was prepared to recommend improvements to the entire length of drain including the moving of the drain off the road allowance for the portion between Concessions 3 and 4 and the replacement of several access culverts to facilitate the said drain realignment. This report currently serves as the governing technical report that is combined with the 1991 report to assess future maintenance costs.

Dillon Consulting Limited

Landowner Meeting

A landowner meeting was held on July 18, 2024 to discuss the proposed improvements to the 4th Concession Road Drain. A summary of the on-site meeting is provided within Schedule 'A-1' herein.

Survey

Our survey and examination of the 4th Concession Road Drain was carried out in September 2023. The survey comprised the recording of topographic data and examining the channel for available depth necessary to provide sufficient drainage.

Design Considerations

Drain Cleanout (Modified Drain Bottom Profile)

A minor design adjustment to the drain bottom gradient has been made to more closely match in with the existing access culvert elevations as per our survey. Downstream of Highway No. 3, the drain gradient was maintained at 0.12% slope (same as 1971 report). Across the highway the drain slope for the 4th Concession Road Drain was increased to 1.23% and upstream of Highway No. 3 to Culvert No. 8 reduced to 0.04%. For the remaining portion of drain upstream of Culvert No. 8, it remains at the 0.12% drain slope as per the 1971 report. This grade adjustment will best align with these existing and new culverts situated within the upper portion of the 4th Concession Road Drain.

Given the existing sediment build up that presently exists within the drain, a clean out of the upper portion to establish the new drain gradient is warranted to improve the drain's performance. When cleaned out to its full cross section, the open channel for the upper portion of the 4th Concession Road Drain will convey the peak flows from a 1 in 10 year design storm with no overtopping of the drain banks.

Drain Realignment and Gabion Mat Protection (Station 0+519 to Station 0+672)

For the upper portion of the 4th Concession Road Drain situated along the north side of County Road No. 18 from Highway No. 3 eastward, we recommend the drain be realigned to accommodate the road improvements involving regrading and widening for the addition of a turning lane. The new channel bank slopes shall be constructed at 4:1 fore slope (east bank) and 2:1 back slope (west bank). With the proposed raising of the road platform for County Road No. 18, as it approaches the intersection with Highway No. 3, there is a significant infilling that will be overlapped by the new broader drain channel. To prevent future erosion to the new channel's easterly bank, a 4.0 m wide portion of the upper channel section shall be lined with R-10 rip rap that shall be encapsulated within a wire mesh gabion mattress, having a minimum 300 mm thickness. The gabion mat erosion protection shall extend from Station 0+519 to Station 0+590 and from Station 0+655 to Station 0+672. In between these drain segments, from Station 0+590 to Station 0+655, the new reshaped drain banks shall be hydro seeded.

Entire Drain Channel Erosion Protection

For the realigned drain bend from Station 0+340 to Station 0+354 where the existing fire hydrant and associated access culvert is being removed, the drain channel shall be fully lined with R-50 riprap, minimum 350 mm thickness. For the portion of drain between Culvert No. 7 and Culvert No. 8, the drain channel shall be fully lined with R-50 riprap, minimum 350 mm thickness.

Culvert Works

A hydraulic analysis was performed on the existing and new culverts situated along the upper

portion of the 4th Concession Road Drain and the level of service is described below:

For Culvert No. 1, an existing farm access culvert in fair condition serving the south part of Lot A, Concession STR, is adequate to convey peak flows from a 1 in 10 year storm event.

For Culvert No. 2, an existing 900 mm CSP farm access culvert in fair condition, however with the future roadworks and realignment being made to County Road No. 18 to suit the new Highway No. 3 improvements, a new access culvert is proposed. The proposed replacement culvert is a 16.0 m long, 1000 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 9.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert.

For Culvert No. 3, an existing 900 mm CSP residential access culvert in fair condition, however with the future roadworks and realignment being made to County Road No. 18 to suit the new Highway No. 3 improvements, a new access culvert is proposed. The proposed replacement culvert is a 13.0 m long, 1000 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 6.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert.

For Culvert No. 4, a proposed new culvert to support an existing hydro pole that was recently relocated to facilitate the future County Road No. 18 alignment and intersection with Highway No. 3. The proposed culvert is an 11.5 m long, 900 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 5.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert. The purpose of this culvert is to enclose the drain within the vicinity of the existing pole for structural support, as it is too close and encroaching into the existing open drain alignment.

For Culvert No. 5, the size of the culvert extension is to match the existing culvert opening dimension, being 1830 mm span x 1220 mm rise concrete culvert supported on footings. The downstream extension is a similar 1830 mm x 1220 mm culvert and is to be connected to the existing culvert on a skewed alignment and is 21.8 m in length. The upstream extension is a similar 1830 mm x 1220 mm culvert and is 5.0 m in length. Both culvert extensions are to accommodate road widening and construction of the new east bound lanes for the King's Highway No. 3 by-pass. Both ends of the culvert shall consist of gabion basket headwalls. Beyond the headwalls, the disturbed drain channel section shall be lined with R-50 riprap, minimum 350 mm thickness for a minimum distance of 5 metres.

The MTO design criteria for rural arterial road bridges is to convey a 1 in 25 year event such that approximately 1 metre of freeboard is provided from the high water level to the edge of the travelled lane. This criterion was used to assess the affects the culvert extensions may have on the upstream high water level. A Drainage, Hydrology/Hydraulics and Stormwater Management Report was completed by Dillon Consulting Limited (August 2023) to document the expected high water levels in the drain upstream in both an existing and proposed condition. The report identified that the existing culvert currently does meet the MTO freeboard design criteria, despite the limited capacity of the downstream 4th Concession Road Drain being less than the flows expected during a 1 in 25 year storm event. The extension of the culvert recommended would have a negligible increase in the 25 year storm water elevation and therefore no adverse impacts to the upstream lands served by the 4th Concession Road Drain.

For Culvert No. 6, a proposed new culvert to support an existing hydro pole that was recently relocated to facilitate the future County Road No. 18 alignment and intersection with Highway No. 3. The proposed culvert is an 11.5 m long, 900 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 5.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert. The purpose of this culvert is to enclose the drain within the vicinity of the existing pole for structural support, as it is too close and encroaching into the existing open drain alignment.

For Culvert No. 7, an existing 900 mm CSP residential access culvert in fair condition, however with the future roadworks and realignment being made to County Road No. 18 to suit the new Highway No. 3 improvements, a new access culvert is proposed. There is also an existing hydro service pole beyond the west end of the access culvert that requires the realigned drain to be enclosed. The proposed replacement culvert is a 16.0 m long, 900 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 6.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert.

For Culvert No. 8, an existing 900 mm CSP farm access culvert in fair condition, however with the future roadworks and realignment being made to County Road No. 18 to suit the new Highway No. 3 improvements, a new access culvert is proposed. The proposed replacement culvert is a 16.0 m long, 900 mm diameter aluminized corrugated steel pipe complete with sloping stone end treatment and providing a minimum 9.0 m driveable top width. In terms of level of service, the new culvert is designed to adequately convey a 1 in 10 year design storm with minimal increase in headwaters upstream of the culvert.

Allowances

In accordance with Section 29 of the Drainage Act, we have determined that some landowners on the north side of the 4th Concession Road Drain shall receive compensation for additional lands required to be used in establishing a new 6.0 m wide working corridor, as outlined below.

From Station 0+275 to Station 0+360 (downstream of Highway 3), there is both an existing steel chain link fence and an established tree row along the north side of the drain that is situated as close as 2 metres away from the top of the existing drain bank. Presently, the trees are inhibiting access for the purposes of cleaning the drain within the working corridor. A clearing of the existing tree row between the drain and the fence shall be required. Despite that part of County Road No. 18 is being realigned further south away from the drain and that performing drain maintenance from the roadside would be an alternative to removing the trees, there is a proposed earth berm being constructed between the drain and the road as a part of the highway project to dispose of excess soils. The earth berm obstructs access along the south side of the drain for future drain cleaning purposes.

In terms of the working corridor on the north side of the drain, a portion of these lands were previously awarded allowances when the drain was moved off the County Road No. 18 lands in 1971. However, since that time, construction of the Highway No. 3 by-pass occurred and the County Road No. 18 was realigned to construct the intersection with the highway. Now with the new proposed intersection improvements involving widening of County Road No. 18 to allow for left hand turn lanes, and more lands were acquired by the road authority and as a result, additional lands beyond the road property limits are required for a working corridor to remain along the north side of the drain.

From Station 0+360 to Station 0+440, the drain shall be maintained from the Highway No. 3 corridor including future maintenance and cleaning of highway culverts and the open drain portion.

From Station 0+440 to Station 0+514 (upstream of Highway 3), there is an established woodlot on the north side of the drain where a partial clearing of the said woodlot is required to gain access for future drain maintenance purposes. Despite that part of County Road No. 18 is being realigned further south away from the drain and that performing drain maintenance from the roadside would be an alternative to removing the trees, there is a proposed earth berm being constructed between the drain and the road as a part of the highway project to dispose of excess soils. The earth berm obstructs access along the south side of the drain for future drain cleaning purposes. In terms of the working corridor on the north side of the drain, a portion of these lands were previously awarded allowances when the drain was moved off the County Road No. 18 lands in 1971.

However, since that time, construction of the Highway No. 3 by-pass occurred and the County Road No. 18 was realigned to construct the intersection with the highway. Now with the new proposed intersection improvements involving widening of County Road No. 18 to allow for left hand turn lanes, and more lands were acquired by the road authority and as a result, additional lands beyond the road property limits are required for a working corridor to remain along the north side of the drain.

Upstream of Station 0+514 to Station 0+672, future drain maintenance shall be from the roadside. Performing drain maintenance from the roadside would be an alternative to removing the trees and for this segment of drain, we recommend future drain maintenance shall be from the south side of the drain and the partial clearing of existing woodlot would be limited to that within the expanded right-of-way to facilitate the realigned and widened portion of the 4th Concession Road Drain.

From Station 0+672 to Station 0+842, future drain maintenance shall be from the north side of the drain upon agricultural lands.

In accordance with Section 29 of the Drainage Act, we determined the compensation to the affected landowners for the additional lands to be used for maintaining the drainage works defined within a 6 m wide corridor. Schedule 'B' herein, shows the distribution of these allowances for land used in the total amount of $3,600.00 for the 4th Concession Road Drain realigned drain portion.

In accordance with Section 30 of the Drainage Act, we determined the compensation to affected agricultural landowners for damages in the spreading and levelling of drain spoils with the designated working corridor between Station 0+000 and Station 0+210 and between Station 0+710 and Station 0+842. Drain spoils generated from the proposed drain cleanout and modified drain profile gradient between Station 0+000 and Station 0+842. Schedule 'B' herein, shows the distribution of these allowances for damages in the total amount of $900.00 for the said works.

Recommendations and Cost Estimate

Based on our review of the history, the information obtained from our examination and analysis of the survey data, we recommend that the drainage works be repaired and improved as described below:

Item	Description	Amount
	4th CONCESSION ROAD DRAIN	
1.	Brushing of the drain from Station 0+000 to Station 0+842 including removal off-site with trimming and/or removal of existing trees within the drain and also within the specified working corridors (north side of drain) to accommodate the drainage works. The work shall include disposal of brush, trees and stumps by means of stockpiling and burning where permitted, or alternatively to be trucked off-site. Working corridor is confined to the County Road No. 18 right-of-way between Station 0+514 and Station 0+672 so brushing within the existing drain channel only.	$ 35,000.00
2.	Drain excavation and levelling of drain spoils within designated working corridors, as follows:	
	a) Excavation of drain bottom from Station 0+000 to Station 0+208, and levelling of drain spoils on west side of drain, totaling 208 lineal metres and approx. 30 m^3.	$ 4,500.00
	b) Excavation of drain bottom from Station 0+704 to Station 0+842 and levelling of drain spoils on west side of drain, totaling 138 lineal metres and approx. 20 m^3.	$ 3,000.00
3.	Drain excavation and trucking of drain spoils off-site to an approved soil management disposal area, as follows:	
	a) Excavation of drain bottom from Station 0+208 to Station 0+354, from South Talbot Road totaling 146 lineal metres and approx. 30 m^3.	$ 6,500.00
4.	Open Drain Realignment Work, as follows:	
	a) Excavate new open channel along proposed realignment, approximately 153 lineal metres, Station 0+519 to Station 0+672. Any excess soils not required to fill in the original drain alignment shall be hauled off-site under the management of the Contractor for the highway improvements.	$32,000.00
5.	Strip and remove vegetation and topsoil from the existing channel from Station 0+519 to Station 0+672 and fill up to existing grade with clean native backfill including compaction in maximum 300 mm lifts.	$20,000.00
6	Placement of salvaged or imported topsoil complete with fine grading over the following areas between Station 0+519 and Station 0+672.	
	a) On top of the filled drain portion at 100 mm depth.	$3,500.00
	b) On the new drain banks at 50 mm depth.	$4,000.00

Item	Description	Amount
7.	Supply and placement of fibre reinforced matrix hydraulic mulch seed on new drain banks from Station 0+519 to Station 0+672 (approx. 1,500 m^2).	$10,500.00
8.	Stone erosion protection work, as follows:	
	a) Supply and placement of stone erosion protection (R-50 riprap) on downstream end of Culvert No. 4 (Station 0+340 to Station 0+354) minimum 350 mm thickness, complete with filter fabric underlay, (approx. 100 m^2).	$10,000.00
	b) Supply and placement of stone erosion protection consisting of a wire mesh gabion mat (R-10 riprap) on drain banks (Station 0+519 to Station 0+590) 4.0 m wide, minimum 300 mm thickness, complete with filter fabric underlay, (approx. 284 m^2).	$52,000.00
	c) Supply and placement of stone erosion protection consisting of a wire mesh gabion mat (R-10 riprap) on drain banks (Station 0+660 to Station 0+672) 4.0 m wide, minimum 300 mm thickness, complete with filter fabric underlay, (approx. 48 m^2).	$9,000.00
	d) Supply and placement of stone erosion protection (R-50 riprap) between Culverts No. 7 and No. 8 (Station 0+690 to Station 0+694) minimum 350 mm thickness, complete with filter fabric underlay, (approx. 40 m^2).	$4,000.00
9.	Culvert Extension Work, as follows:	
	a) Culvert No. 5 D/S Extension (King's Highway No. 3) Supply and installation of a new 21.8 m long culvert 1830 mm x 1220 mm open bottom concrete box culvert with footings connected to the existing culvert with skewed end, complete with flush outlet end, waterproofing membrane and protection board, compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, gabion basket headwall and R-50 riprap within the drain channel beyond fully lined for a minimum 5 m distance and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$200,000.00

Item	Description	Amount
	b) Culvert No. 5 U/S Extension (King's Highway No. 3) Supply and installation of a new 2.5 m long culvert 1830 mm x 1220 mm open bottom concrete box culvert with footings connected to the existing culvert complete with flush outlet end, waterproofing membrane and protection board, compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, gabion basket headwall and R-50 riprap within the drain channel beyond fully lined for a minimum 5 m distance and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$45,000.00
10.	Culvert Replacements, as follows:	
	a) Culvert No. 3 – (Private Access Culvert): Remove existing 900 mm diameter CSP culvert and broken concrete headwalls, including disposal of debris off-site and replace with new 13.0 m long 1000 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$17,000.00
	b) Culvert No. 7 – (Private Access Culvert): Remove existing 900 mm diameter CSP culvert and broken concrete headwalls, including disposal of debris off-site and replace with new 16.0 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$18,000.00
	c) Culvert No. 8 – (Private Access Culvert): Remove existing 900 mm diameter CSP culvert and rip-rap end treatment, including disposal of debris off-site and replace with new 16.0 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$17,000.00
11.	New Culvert Work, as follows:	

Item	Description	Amount
	a) Culvert No. 2 – (Private Access Culvert): Supply and installation of new 16.0 m long 1000 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas	$16,000.00
	b) Culvert No. 4 – (Hydro Pole Support Culvert): Remove existing 1780mm x 1360mm CSPA culvert, 13.7 m long including disposal of debris off-site and replace with new 11.5 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$15,000.00
	c) Culvert No. 6 – (Hydro Pole Support Culvert): Supply and installation of new 11.5 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.	$14,000.00
12.	Temporary silt control measures during construction.	$5,000.00
	SUB-TOTAL	**$541,000.00**
13.	Allowances under Sections 29 and 30	$4,500.00
14.	Report, Assessments and Final Inspection	$23,500.00
15.	Expenses and Incidentals	$1,000.00
16.	ERCA application and permit fee	$800.00
	TOTAL ESTIMATE – 4th CONCESSION ROAD DRAIN (excluding Net HST)	**$570,800.00**

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 for the improvements to the 4th Concession Road Drain against the affected roads as listed in Schedule 'C' under "Special Benefit." Details of the Special Benefit assessment listed are provided in the Assessment Rationale below.

Assessment Rationale

Special Benefit assessment shown in Schedule 'C' was derived as follows:

1. As the drain improvement works are only required for the proposed highway widening including associative drain bottom excavation, realignment and culvert work beyond the highway corridor limits, we have assessed 100% of the costs to the Ministry of Transportation Ontario in accordance with Section 26 of the Drainage Act as a non-proratable special assessment. Since there are no special benefit assessments to other landowners, Schedule 'D' for the purposes of Special Benefit details has been omitted from this report.

Future Maintenance (Upper Portion of Drain)

For the portion of open drain that resides along the north side of County Road No. 18 extending easterly from Culvert No. 1 (Roll No. 410-01600) to the upper end of the drain near Graham Sideroad, the future maintenance costs for the open drain shall be assessed in the same relative proportions as outlined within Schedule 'E-1' appended hereto. The assessment of costs is based closely on the previous 1991 reassessment report in terms of proportions between benefit and outlet assessments, however includes new updated areas for County Road No. 18 and King's Highway No. 3. The assessment is based on an arbitrary $10,000.00 of future maintenance costs to the existing drain channel.

Future Maintenance (Private Access Crossings)

For new private culverts, denoted herein as Culvert No. 3, Culvert No. 7 and Culvert No. 8, the future maintenance costs shall be assessed 50% to the property that is being provided a primary access by the said crossing, and the remaining 50% as an outlet assessment against the lands and roads using the 4th Concession Road Drain that are upstream of the affected access culvert. The costs shall be assessed in the same relative proportions as outlined within Schedule 'E-2' appended hereto. Schedule 'E-2' represents the assessed lands and roads upstream of Culvert No. 3. The assessment of costs is based on an arbitrary $10,000.00.

For the private access culvert, denoted as Culvert No. 2, it serves as a secondary access to the property and the future maintenance costs shall be assessed 100% to property Roll No. 410-01600.

Future Maintenance (Hydro Pole Support Culverts)

For the hydro pole support culverts, denoted herein as Culvert No 4 and Culvert No. 6, the future maintenance costs shall be assessed 100% to Hydro One Networks Inc., in accordance with Section 26 of the Drainage Act.

Future Maintenance (Road Culvert Crossing of King's Highway No. 3)

For the road culvert across King's Highway No. 3, denoted herein as Culvert No. 5, the future maintenance costs shall be assessed 100% to the Ministry of Transportation Ontario, in accordance with Section 26 of the Drainage Act.

Drawings and Specifications

Attached to this report is Schedule 'F', which are Specifications setting out the details of the recommended works and Schedule 'G' which represent the drawings that are attached to this report.

Page 1 of 6 – Overall Plan
Page 2 of 6 – Culvert No. 2 -4 Details
Page 3 of 6 – Culvert No. 5 Extension Details
Page 4 of 6 – Culvert No. 6-8 Details
Page 5 of 6 – Profile
Page 6 of 6 –Cross Sections

Construction Drawings and Specifications

The work included in this report will be performed under the provincial contract for the Widening of King's Highway No. 3 starting from 0.8 km west of Cameron Sideroad and continuing easterly to 1.8 km west of County Road No. 31. Culvert drawings across Highway No. 3 have been prepared for the construction complete with associated specifications which shall adhere to the elevations, alignment, sizes, materials and location and be generally in compliance with this report.

Approvals

The construction and/or improvement to a drainage works, including repair and maintenance activities, 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 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.

Agency Reviews

The Essex Region Conservation Authority (ERCA) has been previously notified and provided the opportunity to review the proposed drainage works as outlined within this report. An application for permit shall be made by the Town of Kingsville for the proposed undertakings associated with this municipal drain.

Correspondence received from the Department of the Fisheries and Oceans (DFO) on January 31, 2023 (Letter of Advice approval) is included herein as Schedule 'A-2' of this report. Specifically, for the 9th Concession Drain, the measures to be implemented to avoid and mitigate the potential for prohibited effects to fish and fish habitat will not require an authorization under the *Fisheries Act* or permit under the *Species at Risk Act*.

Respectfully submitted,

DILLON CONSULTING LIMITED

Tim R. Oliver, P.Eng.
TRO:sjc

SCHEDULE 'A-1'
SUMMARY OF LANDOWNER MEETING
July 18, 2024 @ 9:00 a.m.
Grovedale Art & Culture Centre, Kingsville

Present:

Tania Young	Landowner
Albert DeCook	Landowner
Murray Hickmott	Landowner
Jeff Kettlewell	Ministry of Transportation Ontario
Iqbal Muhammad	Ministry of Transportation Ontario
Wayne Bell	Ministry of Transportation Ontario
Mohammad Al-Ahmad	Ministry of Transportation Ontario
Jaclyn Charlton	Ministry of Transportation Ontario
Siva Tharmabala	Ministry of Transportation Ontario
O'Neil Nembhard	Ministry of Transportation Ontario
Orion Raes	Green Infrastructure Partners Inc.
Carlo DiMambro	Green Infrastructure Partners Inc.
Tamish Gupta	Altus Group
Jeff Zhang	GHD Engineering Canada
Lu-Ann Marentette	Town of Kingsville
Todd Kerr	Town of Kingsville
Clarke Campbell	Dillon Consulting Limited
Tim Oliver	Dillon Consulting Limited

Tim Oliver provided an overview of relevant drainage history of the 4th Concession Road Drain referring to the last improvements made to the upper portion of the drain along the north side of County Road No. 18 as part of a 1971 engineer's report and by-law under the Drainage Act. In 1971 the upper portion of drain was relocated further north and moved entirely off the road allowance for County Road No. 18 and onto private property.

The upstream drainage area affected by the proposed improvements represents approximately 120 acres for which property owners within this area were given notice to attend the site meeting. This is a requirement under the Drainage Act legislation.

Proposed works include the extension of the Highway No. 3 culvert, both upstream and downstream ends of the existing culvert, in order to facilitate the highway widening. The portion of the 4th Concession Drain starting from an existing access culvert located approx. 350 metres downstream of Highway 3 and proceeding upstream across Highway No. 3 and easterly for a total length of approx. 850 metres. shall require cleaning such that the new culverts provide the necessary capacity and can accommodate the revised grading and modifications that are required to be made to the drain bottom design profile to suit the existing culvert crossing of Highway 3. Other works include the replacement of four existing driveway access culverts to private properties within the proposed realignment of County Road No. 18 and revised intersection work with Highway 3. There are also new hydro pole access culverts proposed including one on each side of and close to the highway corridor limits where these poles are in new locations to accommodate the new highway intersection configuration. Associated with the drain cleanout where there are agricultural lands the soils removed, as part of the work, shall be spread and levelled in the designated working corridors and the landowners are being provided allowances to compensate them as required as per the Drainage Act for the temporary loss of crop production due to soil placement. All the costs of the drain improvements are being assessed to the Ministry of Transportation.

Tim Oliver stated that the drainage report would be completed and the council meeting is scheduled for August 12, 2024 for Town of Kingsville Council to consider and adopt the report.

Meeting summary prepared by Tim Oliver, P. Eng.

SCHEDULE 'A-2'

Fisheries and Oceans Canada | Pêches et Océans Canada

Ontario and Prairies Region
Fish and Fish Habitat
Protection Program
867 Lakeshore Road
Burlington, ON L7S 1A1

Région de l'Ontario et des Prairies
Programme de la protection
du poisson et de son habitat
867 Lakeshore Road
Burlington, ON L7S 1A1

January 31, 2023

Our file *Notre référence*
22-HCAA-02305

Ontario Ministry of Transportation
ATTENTION: Michael Nadeau
659 Exeter Road
London, Ontario, N6E 1L3

Subject: Culvert Replacements and Drain Realignments, Three Class F Drains, Essex County – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Michael Nadeau:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on July 28, 2022. We understand that you propose the following:

- Realign an ~200m^2 (~102 linear meters) section of 9th Concession Road Drain resulting in ~275m^2 (~126 linear meters) of new drain.
- Remove the culvert under 9th Concession Road;
- Realign an ~200m^2 (~155 linear meters) section of Schiller Drain resulting in ~225m^2 (~209 linear meters) of new drain;
- Relocate and resize four Schiller Drain culverts;
- Realign an ~390m^2 (~191 linear meters) section of 4th Concession Road Drain resulting in ~360m^2 (~190 linear meters) of new drain;
- Relocate and resize two 4th Concession Road Drain culverts; and
- Perform one fish rescue per drain if the drain is not dry during construction.

Our review considered the following information:

- Request for review form submitted to DFO on July 28, 2022; and
- Email and telephone correspondence between Colby Nolan (DFO), Kelly Evertsen (GHD), Ian Dobrindt (GHD), Jordan Widmaier (GHD), and Chris Evans (MTO) from September 22, 2022 to December 15, 2022.

Your proposal has been reviewed to determine whether it is likely to result in:

Canada

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*; and
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the *Species at Risk Act*.

The aforementioned outcomes are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend implementing the measures outlined in your plan, in addition to the following listed below:

- Conduct work outside the spring timing windows (i.e. no in-water work between March 15 to July 15).
- Minimize duration of in-water work;
- Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Screen size requirements will be determined as per DFO's Freshwater Intake End-of-Pipe Screen Guideline (1995);
- Retain a qualified environmental professional to ensure appropriate protocols are applied and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding of the coffer dams occur;
- Install appropriate sediment erosion controls downstream of construction activities (e.g. silt curtain, straw-bale check dam, rock check dam etc.);
    - Conduct works during low or no flow;
    - Schedule work to avoid wet, windy, and rainy periods that may increase erosion and sedimentation; and
    - Work in the dry.

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal will not require an authorization under the *Fisheries* Act or permit under the *Species at Risk Act*.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act*, the *Species at Risk Act* and the *Aquatic Invasive Species Regulations*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of

fish habitat. Such notifications should be directed to (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html).

Notify this office at least 10 days before starting any in-water works. Send your notification to Colby Nolan (Colby.Nolan@dfo-mpo.gc.ca) and the DFO 10 notification mailbox: DFO.OP.10DayNotification-Notification10Jours.OP.MPO@dfo-mpo.gc.ca. A copy of this letter should be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

If you have any questions with the content of this letter, please contact Colby Nolan at our Burlington office at (289) 253-8302, or by email at Colby.Nolan@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Emily Morton

A/Senior Biologist

CC: Kelly Evertsen – GHD
Chris Evans – MTO
Ian Dobrindt – GHD
Colby Nolan – DFO

"SCHEDULE B"

SCHEDULE OF ALLOWANCES

UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN

TOWN OF KINGSVILLE

Roll No.	Con.	Description	Owner	Section 30 Damages	Section 29 Land	Total Allowances
410-01600	S.T.R.	Lot A	Murray F. & Jan M. Hickmott	$550.00	$0.00	$550.00
410-01610	S.T.R.	Lot A	Douglas C. & Linda G. Taylor	$0.00	$825.00	$825.00
410-00800	4	Lot 16	John D. & Linda J. Upcott	$0.00	$2,775.00	$2,775.00
410-00600	4	Lot 17	Hillside Hothouse Limited	$350.00	$0.00	$350.00
TOTAL ALLOWANCES				**$900.00**	**$3,600.00**	**$4,500.00**

SCHEDULE C
SCHEDULE OF ASSESSMENT
UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN
TOWN OF KINGSVILLE

ONTARIO LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
King's Highway No. 3	6.55	2.65	Ministry of Transportation	$570,800.00	$0.00	$0.00	$570,800.00
Total on Ontario Lands				$570,800.00	$0.00	$0.00	$570,800.00
TOTAL ASSESSMENT				**$570,800.00**	**$0.00**	**$0.00**	**$570,800.00**

"SCHEDULE E-1"
SCHEDULE OF ASSESSMENT FOR FUTURE DRAIN MAINTENANCE
UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN
TOWN OF KINGSVILLE

ONTARIO LANDS:

Description/Roll No.	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
King's Highway No. 3	6.55	2.65	Ministry of Transportation Ontario	$0.00	$520.00	$859.00	$1,379.00
Total on Ontario Lands				$0.00	$520.00	$859.00	$1,379.00

MUNICIPAL LANDS:

Description/Roll No.	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 18	10.55	4.27	County of Essex	$0.00	$1,709.00	$1,804.00	$3,513.00
Total on Municipal Lands				$0.00	$1,709.00	$1,804.00	$3,513.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
410-01610	S.T.R.	Lot A	3.00	1.21	Douglas C. & Linda G. Taylor	$0.00	$152.00	$76.00	$228.00
410-01700	4	Pt Lot 16	0.87	0.35	Andre G. & Tania E. Young	$0.00	$59.00	$55.00	$114.00
360-04150	3	Pt Lot 4	0.57	0.23	Jakob & Mary Friesen	$0.00	$20.00	$37.00	$57.00
360-04170	3	Pt Lot 4	0.69	0.28	Kyle R. Paquin & Kyla B.M. Vegh	$0.00	$22.00	$43.00	$65.00
360-04201	3	Pt Lot 4	0.69	0.28	Johan & Anna Klassen	$0.00	$22.00	$43.00	$65.00
Total on Privately-Owned - Non-Agricultural Lands						$0.00	$275.00	$254.00	$529.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
410-01600	S.T.R.	Lot A	11.00	4.45		Murray F. & Jan M. Hickmott	$0.00	$225.00	$134.00	$359.00
410-00800	4	Pt. Lot 16	6.00	2.43	*	John D. & Linda J. Upcott	$0.00	$123.00	$80.00	$203.00
410-00600	4	Pt Lot 16	14.00	5.67	*	Hillside Hothouse Limited	$0.00	$221.00	$297.00	$518.00
410-01800	4	Pt Lot 17	40.84	16.53		John A. & Linda M. Driedger	$0.00	$1,076.00	$1,397.00	$2,473.00
360-04200	3	Pt Lot 4	28.75	11.63		Barbara J. DeCook	$0.00	$351.00	$675.00	$1,026.00
Total on Privately-Owned - Agricultural Lands							$0.00	$1,996.00	$2,583.00	$4,579.00

TOTAL ASSESSMENT			**$0.00**	**$4,500.00**	**$5,500.00**	**$10,000.00**

	(Acres)	(Ha.)
Total Area:	**116.96**	**47.33**

* Denotes reduced assessment for woodlot areas

"SCHEDULE E-2"
SCHEDULE OF ASSESSMENT FOR CULVERT No. 3 FUTURE MAINTENANCE
UPPER PORTION OF THE 4TH CONCESSION ROAD DRAIN
TOWN OF KINGSVILLE

ONTARIO LANDS:

Description/Roll No.	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
King's Highway No. 3	6.55	2.65	Ministry of Transportation Ontario	$0.00	$0.00	$2,364.00	$2,364.00
Total on Ontario Lands				$0.00	$0.00	$2,364.00	$2,364.00

MUNICIPAL LANDS:

Description/Roll No.	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
County Road No. 18	9.30	3.76	County of Essex	$0.00	$0.00	$3,354.00	$3,354.00
Total on Municipal Lands				$0.00	$0.00	$3,354.00	$3,354.00

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
410-01610	S.T.R.	Lot A	3.00	1.21	Douglas C. & Linda G. Taylor	$0.00	$0.00	$216.00	$216.00
410-01700	4	Pt Lot 16	0.87	0.35	Andre G. & Tania E. Young	$0.00	$0.00	$141.00	$141.00
Total on Privately-Owned - Non-Agricultural Lands						$0.00	$0.00	$357.00	$357.00

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)		Owner	Special Benefit	Benefit	Outlet	Total Assessment
410-00800	4	Pt. Lot 16	6.00	2.43	*	John D. & Linda J. Upcott	$0.00	$0.00	$217.00	$217.00
410-00600	4	Pt Lot 16	14.00	5.67	*	Hillside Hothouse Limited	$0.00	$0.00	$759.00	$759.00
410-01800	4	Pt Lot 17	40.84	16.53		John A. & Linda M. Driedger	$0.00	$0.00	$2,949.00	$2,949.00
Total on Privately-Owned - Agricultural Lands							$0.00	$0.00	$3,925.00	$3,925.00

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

	(Acres)	(Ha.)
Total Area:	**74.01**	**29.95**

* Denotes reduced assessment for woodlot areas

"SCHEDULE F"
DRAINAGE REPORT FOR THE
IMPROVEMENTS TO THE UPPER PORTION OF THE
4TH CONCESSION ROAD DRAIN
TOWN OF KINGSVILLE

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:

- Brushing of the drain from Station 0+000 to Station 0+842 including removal off-site with trimming and/or removal of existing trees within the drain and also within the specified working corridors (north side of drain) as required to accommodate the drainage works. The work shall include disposal of brush, trees and stumps by means of stockpiling and burning where permitted, or alternatively to be trucked off-site. Working corridor is confined to the County Road No. 18 right-of-way between Station 0+514 and Station 0+672 so brushing within the existing drain channel only.
- Drain excavation and levelling of drain spoils within designated working corridors, as follows:
  - Excavation of drain bottom from Station 0+000 to Station 0+208, and levelling of drain spoils on west side of drain, totaling 208 lineal metres and approx. 30 m^3.
  - Excavation of drain bottom from Station 0+704 to Station 0+842 and levelling of drain spoils on west side of drain, totaling 138 lineal metres and approx. 20 m^3.
- Drain excavation and trucking of drain spoils off-site to an approved soil management disposal area, as follows:
  - Excavation of drain bottom from Station 0+208 to Station 0+354, from South Talbot Road totaling 146 lineal metres and approx. 30 m^3.
- Open Drain Realignment Work, as follows:
  - Excavate new open channel along proposed realignment, approximately 153 lineal metres, Station 0+519 to Station 0+672. Any excess soils not required to fill in the original drain alignment shall be hauled off-site under the management of the Contractor for the highway improvements.
- Strip and remove vegetation and topsoil from the existing channel from Station 0+519 to Station 0+672 and fill up to existing grade with clean native backfill including compaction in maximum 300 mm lifts.
- Placement of salvaged or imported topsoil complete with fine grading over the following areas between Station 0+519 and Station 0+672.

- On top of the filled drain portion at 100 mm depth.
- On the new drain banks at 50 mm depth.

- Supply and placement of fibre reinforced matrix hydraulic mulch seed on new drain banks from Station 0+519 to Station 0+672 (approx. 1,500 m^2).
- Stone erosion protection work, as follows:
  - Supply and placement of stone erosion protection (R-50 riprap) on downstream end of Culvert No. 4 (Station 0+340 to Station 0+354) minimum 350 mm thickness, complete with filter fabric underlay, (approx. 100 m^2).
  - Supply and placement of stone erosion protection consisting of a wire mesh gabion mat (R-10 riprap) on drain banks (Station 0+519 to Station 0+590) 4.0 m wide, minimum 300 mm thickness, complete with filter fabric underlay, (approx. 284 m^2).
  - Supply and placement of stone erosion protection consisting of a wire mesh gabion mat (R-10 riprap) on drain banks (Station 0+660 to Station 0+672) 4.0 m wide, minimum 300 mm thickness, complete with filter fabric underlay, (approx. 48 m^2).
  - Supply and placement of stone erosion protection (R-50 riprap) between Culverts No. 7 and No. 8 (Station 0+690 to Station 0+694) minimum 350 mm thickness, complete with filter fabric underlay, (approx. 40 m^2).
- Culvert Extension Work, as follows:
  - Culvert No. 5 D/S Extension (King's Highway No. 3) - Supply and installation of a new 21.8 m long culvert 1830 mm x 1220 mm open bottom concrete box culvert with footings connected to the existing culvert with skewed end, complete with flush outlet end, waterproofing membrane and protection board, compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, gabion basket headwall and R-50 riprap within the drain channel beyond fully lined for a minimum 5 m distance and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.
  - Culvert No. 5 U/S Extension (King's Highway No. 3) - Supply and installation of a new 2.5 m long culvert 1830 mm x 1220 mm open bottom concrete box culvert with footings connected to the existing culvert complete with flush outlet end, waterproofing membrane and protection board, compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, gabion basket headwall and R-50 riprap within the drain channel beyond fully lined for a minimum 5 m distance and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.
- Culvert Replacements, as follows:
  - Culvert No. 3 – (Private Access Culvert) - Remove existing 900 mm diameter CSP culvert and broken concrete headwalls, including disposal of debris off-site and replace with new 13.0 m long 1000 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.
  - Culvert No. 7 – (Private Access Culvert) - Remove existing 900 mm diameter CSP culvert

and broken concrete headwalls, including disposal of debris off-site and replace with new 16.0 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.

- Culvert No. 8 – (Private Access Culvert) - Remove existing 900 mm diameter CSP culvert and rip-rap end treatment, including disposal of debris off-site and replace with new 16.0 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.

- New Culvert Work, as follows:

  - Culvert No. 2 – (Private Access Culvert) - Supply and installation of new 16.0 m long 1000 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas

  - Culvert No. 4 – (Hydro Pole Support Culvert) - Remove existing 1780mm x 1360mm CSPA culvert, 13.7 m long including disposal of debris off-site and replace with new 11.5 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.

  - Culvert No. 6 – (Hydro Pole Support Culvert) - Supply and installation of new 11.5 m long 900 mm diameter CSP culvert complete with compacted Granular 'A' bedding (min. 300 mm thickness), compacted full Granular 'B' Type II backfill up to road subgrade, Granular 'A' driveway surface (min. 200 mm thickness) and sloping R-50 riprap for culvert end treatment and minimum 350 mm thickness. Work to include fine grading, seeding and restoration of all disturbed areas.

- Temporary silt control measures during construction.

3.0 ACCESS TO THE WORK

Access to the drain shall be from the King's Highway No. 3 right-of-way and County Road No. 18 right-of-way. The Contractor shall make his/her own arrangements for any additional access for his/her convenience. All grass areas disturbed shall be restored to original conditions at the Contractor's expense.

4.0 WORKING AREA

The working area for both construction and future maintenance purposes shall be restricted to the road right-of-way. Any damages to lands and/or roads from the Contractor's work within the working areas for the new culvert site shall be rectified to pre-existing conditions at his/her expense.

FROM STA.	TO STA.	PRIMARY (See Note 1)	SECONDARY (See Note 2)
0+000	0+208	6.0 m wide on the north side of the drain measured off top of south bank	County Road No. 18 right of way
0+208	0+360	6.0 m wide on the north side of the drain measured off top of north bank	N/A
0+360	0+440	King's Highway No. 3 right of way	N/A
0+440	0+514	6.0 m wide on the north side of the drain measured off top of north bank	N/A
0+514	0+672	County Road No. 18 right of way	N/A
0+672	0+842	6.0 m wide on the north side of the drain measured off top of south bank	County Road No. 18 right of way

Note 1: *Primary working corridor* indicates the access corridor along the side of the drain where excavation is recommended (unless noted otherwise below and/or in the Specifications, as well as all purposes listed for Secondary Working Corridors).

Note 2: *Secondary working corridor* indicates the access corridor alongside the drain where construction equipment may travel for the purpose of trucking.

5.0 CLEARING & GRUBBING DRAIN PRIOR TO DRAIN EXCAVATION

Prior to drain excavation and removal of sediment within the existing drain as well as drain infilling activities, all brush and trees within the limits of the channel and within 1 metre from the top of the drain banks and in the designated spread area for the excavated material, are to be cut and those roots and stumps within the channel and on the banks where the filling takes place shall be completely removed to a depth at least 1 metre below the level of the finished grade.

Brush and trees removed from the existing drain 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 or advise the Contractor to obtain an agreement in writing with the owners when to return to burn the materials. 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.

The Contractor shall first consult with and obtain approval from the landowner, Drainage Superintendent and Town of Kingsville Fire Services prior to burning the brush removed from this specified area.

6.0 EXCAVATION FOR DRAIN BOTTOM PROFILE MODIFICATION

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 1.0 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.

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.

Where the existing guy anchors may be affected by the proposed work, the Contractor shall notify the utility in advance of the work to determine if the guy anchor requires relocation outside of open drain channel limits.

6.2 Levelling of Excavated Materials

Excavation of the drain bottom shall be completed as specified in Section 6.1, above 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. 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

Contractor shall be solely responsible for acquiring all permits required prior to hauling any fill materials off-site. 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. Should the landowner prefer to have the excavated materials trucked rather than levelled on site, all additional costs shall be at the landowner's expense.

7.0 DRAIN REALIGNMENT

7.1 New Drain Excavation

Excavation shall be carried out in accordance with the profile shown on the drawings for the drain relocation. In all cases, the Contractor shall use the benchmarks to establish the proposed grade.

All excavated material from the new drain realignment construction (Station 0+619 to Station 0+672), shall be used as backfill for the infilling of the old section of drain. All roadways and laneways disturbed by the trucking of excavated materials shall be restored to original conditions.

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.

Prior to seeding of the drain, the stripped topsoil shall be placed on the drain banks at 50 mm depth.

Hydraulic Seeding of the newly shaped drain banks shall be completed immediately following drain construction and as specified in Section 9.0.

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.

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.

8.0 DRAIN INFILLING

Prior to the infilling of the open drain, the contractor shall remove all vegetation and organic debris from the existing drain slopes. The native materials used to fill the drain shall be placed in maximum 300 mm loose lifts and compacted with vibratory compaction equipment capable of achieving 95% of the maximum standard proctor density or better.

9.0 HYDRAULIC SEEDING OF NEW DRAIN CHANNEL

The newly established drain banks and all existing grassed areas disturbed by construction 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.

The Contractor shall apply a fibre reinforced matrix (FRM) hydromulch engineered with pasteurized wood fibers and cross-linked with dispersible synthetic fibers and exclusive soil bonding agents for immediate and effective soil erosion control on newly constructed drain channels such as the FlexGuard product by Fibremulch company or approved equal . The hydromulch should be non-toxic and 100% biodegradable with a minimal curing period and up to 12 months longevity. The hydromulch shall be applied at a minimum rate of 3,300 kg of dry product per 10,000 m^2. It shall be thoroughly mixed with water in a hydraulic seeder and mulcher at a rate of 20 kg of dry product to 225 litres of water. Refer to OPSS.PROV 803 for additional specifications on vegetative cover.

Seeding and mulching shall be a one step process in which the seed 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 MTO Modified Native Standard roadside seed mixture meeting the requirements as follows:

Creeping Red Fescue	*60%*
Intermediate Ryegrass	*20%*
Colonial Bentgrass	*20%*
Canada Bluegrass	*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 170 kg per 10,000 m². **The hydraulic seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer. Re-seeding and/or other methods required to establish the grass will be taken into consideration to achieve the end result and the costs shall be incidental to the works.**

10.0 STONE EROSION PROTECTION

Erosion protection, within the drain channel, shall be constructed of quarry stone rip-rap (R50) as shown on the drawings and as specified herein. The size of the rip-rap shall mostly vary between 150 mm and 250 diameter. The rip-rap shall be sloped 1 vertical to 4 horizontal on the foreside and be sloped 1 vertical to 2 horizontal on the backside, with filter fabric underlay spanning across the entire width of the drain for a minimum of 3 metre distance beyond the end of the culvert.

The minimum thickness requirement of the erosion stone layer is 350 mm with no portion of the filter fabric to be exposed.

11.0 GABION BASKET END PROTECTION

Gabion baskets shall be manufactured from galvanized steel wire mesh or PVC coated galvanized steel wire mesh as specified in the Contract Documents. When the type of mesh is not specified in the Contract Documents, the gabion baskets shall be manufactured from PVC coated galvanized steel wire mesh.

Gabion baskets shall be manufactured so that the sides, ends, lid, base, and diaphragms can be readily assembled into rectangular units.

Where the length of the gabion basket exceeds its horizontal width, the gabion basket shall be divided into equal cells by diaphragms. Cell length shall not exceed its horizontal width. Diaphragms shall be made of wire mesh and shall be secured in the proper position on the base section. Gabion baskets shall be manufactured with all components connected at the production facility with the exception of the gabion mat lid. Gabion baskets manufactured from galvanized wire mesh shall be assembled using either lacing wire or fasteners. Gabion baskets manufactured from PVC coated galvanized wire mesh shall be assembled using stainless steel ring fasteners. Fasteners shall be installed at a maximum spacing of 150 mm with at least one fastener per gabion mesh opening.

Gabion baskets shall be according to OPSS 1430.

Gabion stones shall be according to OPSS 1004 and as specified in the Contract Documents.

Excavation for gabions shall be according to OPSS 206.

Bedding and backfill shall be as specified in the Contract Documents.

Gabions shall be installed at the locations and to the line, grade, and dimensions specified in the Contract Documents.

Gabions shall be assembled according to the manufacturer's instructions and as specified in the Contract Documents.

Gabions shall be assembled so that wire ends do not project outside the units on any exposed surface.

Gabion stones shall be placed in a manner as not to damage the wire mesh or the PVC coating on the wire or cause deformation of the gabion. Gabion stones shall be placed to minimize the voids between the stones. When specified in the Contract Documents, the front face of exposed wall surfaces shall be hand placed gabion stone to ensure a uniform appearance.

Prior to securing the lids on the gabion basket, the gabion basket shall be slightly overfilled by 25 to 50 mm of gabion stone in order to allow for settlement of the stone within the units.

Internal connecting wires shall be installed according to the manufacturer's recommendations. When gabions are used as a channelling revetment, internal connecting wires are not necessary.

When the gabion has been filled, the gabion lid shall be bent over until all lid edges coincide with the front and side edges of the gabion and shall be secured to the front and sides by wire according to manufacturer's instructions and as specified in the Contract Documents.

Geotextile shall be placed uniformly, free of folds, tears or punctures and as specified in the Contract Documents. The geotextile shall be joined so that the material overlaps a minimum of 500 mm and shall be pinned together. Alternatively, the geotextile shall be joined to conform to the seam requirements of OPSS 1860. Geotextile shall be fixed to prevent movement during installation.

12.0 GABION MATS (STA. 0+519 TO STA. 0+590 & FROM STA. 0+660 TO STA. 0+672)

Gabion mats shall be manufactured from PVC or HDPE based polymer coated galvanized steel wire mesh. Gabion mats shall be manufactured so that the sides, ends, lid, base, and diaphragms can be readily assembled into rectangular units.

Where the length of the gabion mat exceeds its horizontal width, the gabion mat shall be divided into equal cells by diaphragms. Cell length shall not exceed its horizontal width. Diaphragms shall be made of wire mesh and shall be secured in the proper position on the base section. Gabion mats shall be manufactured with all components connected at the production facility with the exception of the gabion mat lid. Gabion mats manufactured from PVC coated galvanized wire mesh shall be assembled using stainless steel ring fasteners. Fasteners shall be installed at a maximum spacing of 150 mm with at least one fastener per gabion mesh opening.

Gabion mats shall be according to OPSS 1430 Tables 2, 4 & 5. Gabion stones shall be according to OPSS 1004 and as specified in the Contract Documents. Excavation for gabion mats shall be according to OPSS 206.

Gabions shall be installed at the locations and to the line, grade, and dimensions specified in the Contract Documents. As per Table 2, Mat Size 14 having a length of 30 m, 2 m width and 0.3 m depth is recommended for this application for two mats fastened together to form a 4 m wide gabion mat. Gabions shall be assembled according to the manufacturer's instructions and as specified in the Contract Documents. Gabions shall be assembled so that wire ends do not project outside the units on any exposed surface.

Gabion stones shall be placed in a manner as not to damage the wire mesh or the PVC coating on the wire or cause deformation of the gabion. Gabion stones shall be placed to minimize the voids between the stones. When specified in the Contract Documents, the front face of exposed wall surfaces shall be hand placed gabion stone to ensure a uniform appearance.

Prior to securing the lids on the gabion mat, the gabion mat shall be slightly overfilled by 25 to 50 mm of gabion stone in order to allow for settlement of the stone within the units.

Internal connecting wires shall be installed according to the manufacturer's recommendations. When gabions are used as a channeling revetment, internal connecting wires are not necessary.

When the gabion has been filled, the gabion lid shall be bent over until all lid edges coincide with the front and side edges of the gabion and shall be secured to the front and sides by wire according to manufacturer's instructions and as specified in the Contract Documents.

Geotextile shall be placed uniformly, free of folds, tears or punctures and as specified in the Contract Documents. The geotextile shall be joined so that the material overlaps a minimum of 500 mm and shall be pinned together. Alternatively, the geotextile shall be joined to conform to the seam requirements of

OPSS 1860. Geotextile shall be fixed to prevent movement during installation.

13.0 CULVERT CONSTRUCTION

13.1 Location

The road culvert shall be located and installed as shown on the drawings attached hereto.

13.2 Materials

Materials shall be as follows:

Culvert No. 2	*New 16.0 m long, 1000 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert No. 3	*New 13.0 m long, 1000 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert No. 4	*New 11.5 m long, 900 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert No. 5 Downstream Extension	*New 21.8 m long, 1830 mm x 1220 mm reinforced concrete open footing culvert per OPSS 1821 or CHBDC CAN/CSA 56-06 standards where applicable.*
Culvert No. 5 Upstream Extension	*New 2.5 m long, 1830 mm x 1220 mm reinforced concrete open footing culvert per OPSS 1821 or CHBDC CAN/CSA 56-06 standards where applicable.*
Culvert No. 6	*New 11.5 m long, 900 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert No. 7	*New 16.0 m long, 900 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert No. 8	*New 16.0 m long, 900 mm diameter aluminized Type II corrugated steel pipe, 68mm x 13 mm corrugations, 2.0 mm thickness.*
Culvert Backfill	*Granular 'B' conforming to OPSS Division 10.*
Erosion Stone	*All stone to be used for erosion protection shall be R-50 clear quarried rock per OPSS 1004, minimum 350 mm thickness.*
Filter Fabric	*"Non-Woven" geotextile filter fabric with a minimum strength equal or greater than Terrafix 270R, Amoco 4546, Mirafi 140NC, or approved equivalent.*

13.3 Culvert Installation

Suitable dykes shall be constructed in the drain so that the installation of the culvert 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 100% of their maximum dry density; imported clean native materials shall be supplied, placed and compacted to 95% of their maximum dry density.

13.4 Lateral Tile Drains

The Contractor shall re-route any outlet tile drains, in consultation with the Drainage Superintendent, as required to accommodate the new culverts. Tile drain outlets through the wall of the new culvert will not be permitted. All costs associated with re-routing lateral tile drains (if any) shall be at the Contractor's expense.

13.5 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.

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 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.

12.0 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.

13.0 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.

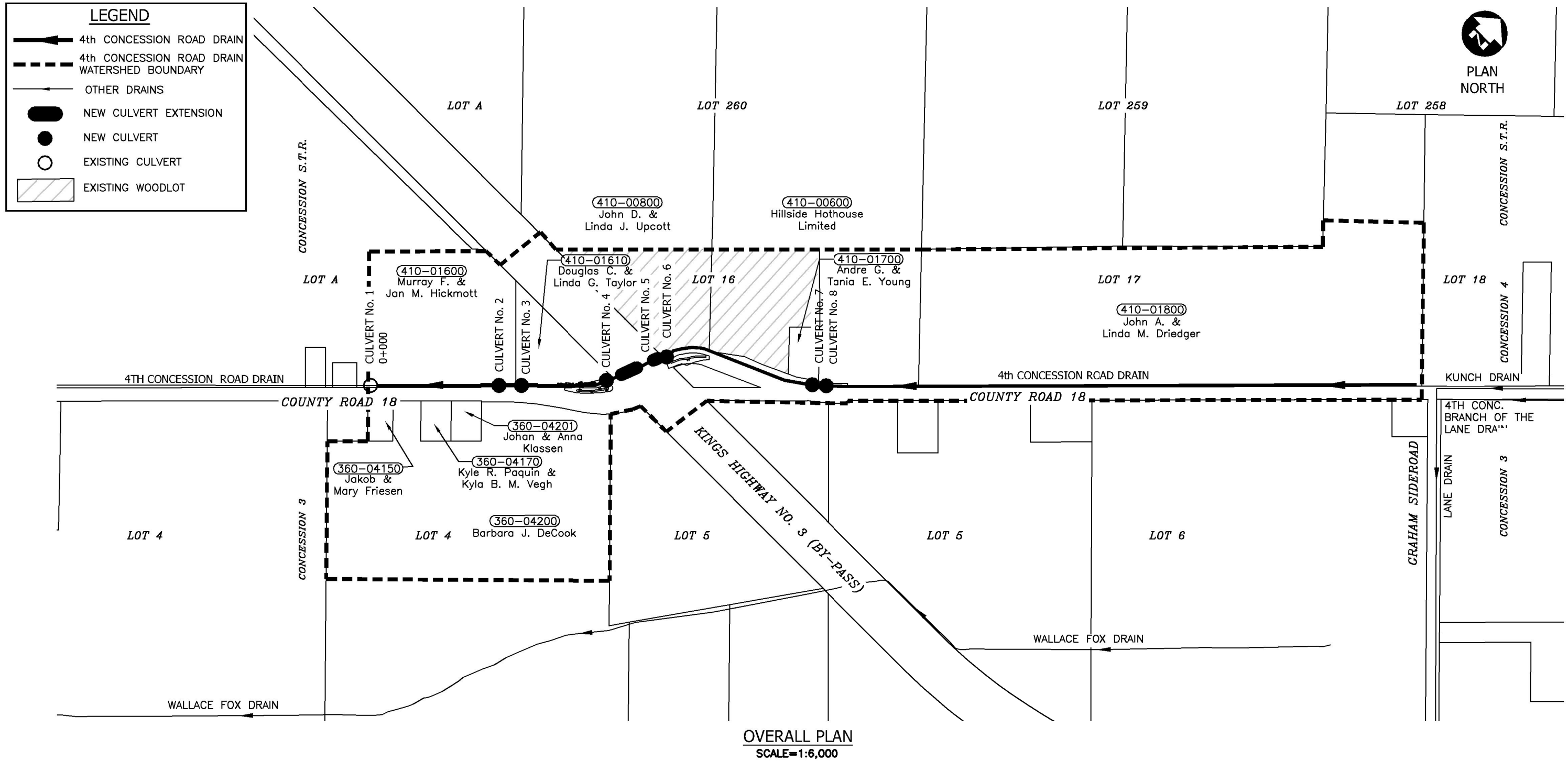
14.0 FINAL INSPECTION

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.

15.0 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.



OVERALL PLAN
SCALE=1:6,000

'SCHEDULE G'

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

T. R. OLIVER
100046433
23/07/24
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

No.	ISSUED FOR	DATE	BY
2	FINAL REPORT SUBMISSION	July 23/24	TRO
1	CLIENT REVIEW	July 3/24	TRO

DESIGN: TRO	REVIEWED BY: MDH
DRAWN: SJC	CHECKED BY: TRO
DATE: July 23, 2024	
SCALE: AS SHOWN	

DILLON CONSULTING

PROJECT NO. 21-3142

DRAWING SCALES BASED ON A 11" X 17" SHEET

Drainage Report for the Improvements to the Upper Portion of the
4th CONCESSION ROAD DRAIN
Town of Kingsville

SHEET TITLE: OVERALL PLAN

PAGE NO. 1 of 6

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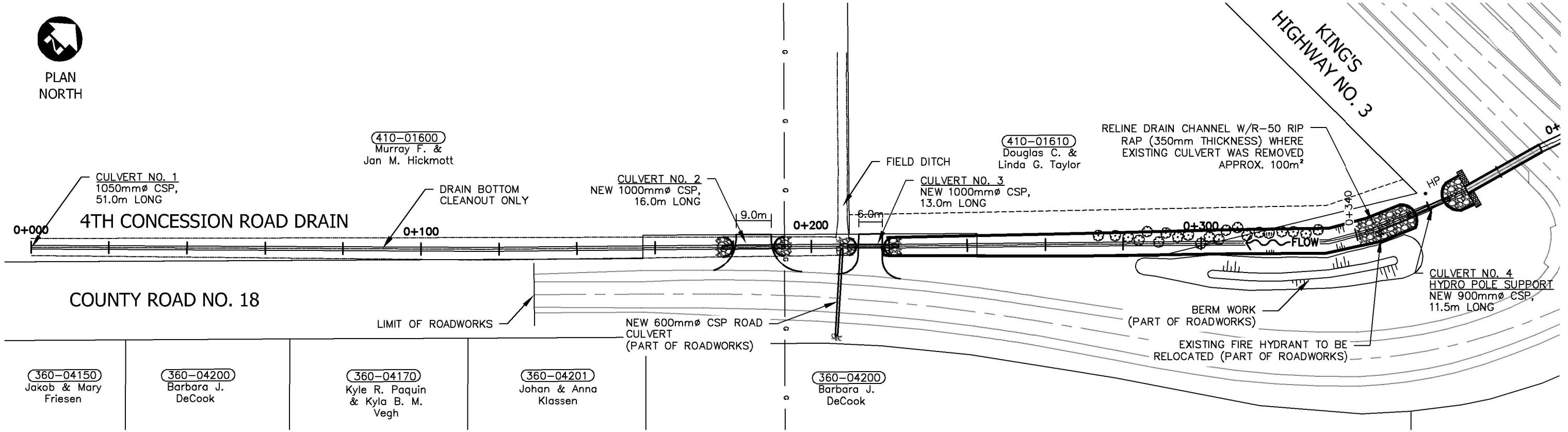
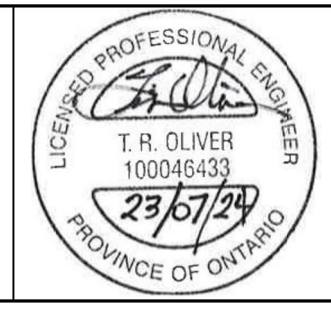


4th CONCESSION ROAD DRAIN - SOUTH OF HIGHWAY 3

SCALE=1:1000

TABLE 1 – CULVERT DESIGN INFORMATION

DESCRIPTION	CULVERT NO. 2	CULVERT NO. 3	CULVERT NO. 4
DRAIN BOTTOM DESIGN ELEVATION	198.19(S)198.21(N)	198.23(S)198.25(N)	198.41(S)198.42(N)
CULVERT INVERT ELEVATION	198.10(S)198.12(N)	198.14(S)198.16(N)	198.32(S)198.33(N)
CULVERT SIZE	1000mmø CSP	1000mmø CSP	900mmø CSP
CULVERT TYPE (mm)	68x13	68x13	68x13
CULVERT MATERIAL	ALUMINIZED STEEL	ALUMINIZED STEEL	ALUMINIZED STEEL
CULVERT THICKNESS (mm)	2.0	2.0	2.0
CULVERT LENGTH (m)	16.0	13.0	11.5
CULVERT GRADE (%)	0.12	0.12	0.12
DRIVEWAY ELEVATION (m)	199.60	199.63	199.65



No.	ISSUED FOR	DATE	BY
2	FINAL REPORT SUBMISSION	July 23/24	TRO
1	CLIENT REVIEW	July 3/24	TRO

DESIGN	TRO
REVIEWED BY	MDH
DRAWN	SJC
CHECKED BY	TRO
DATE	July 23, 2024
SCALE	AS SHOWN

DILLON CONSULTING

PROJECT NO. 21-3142

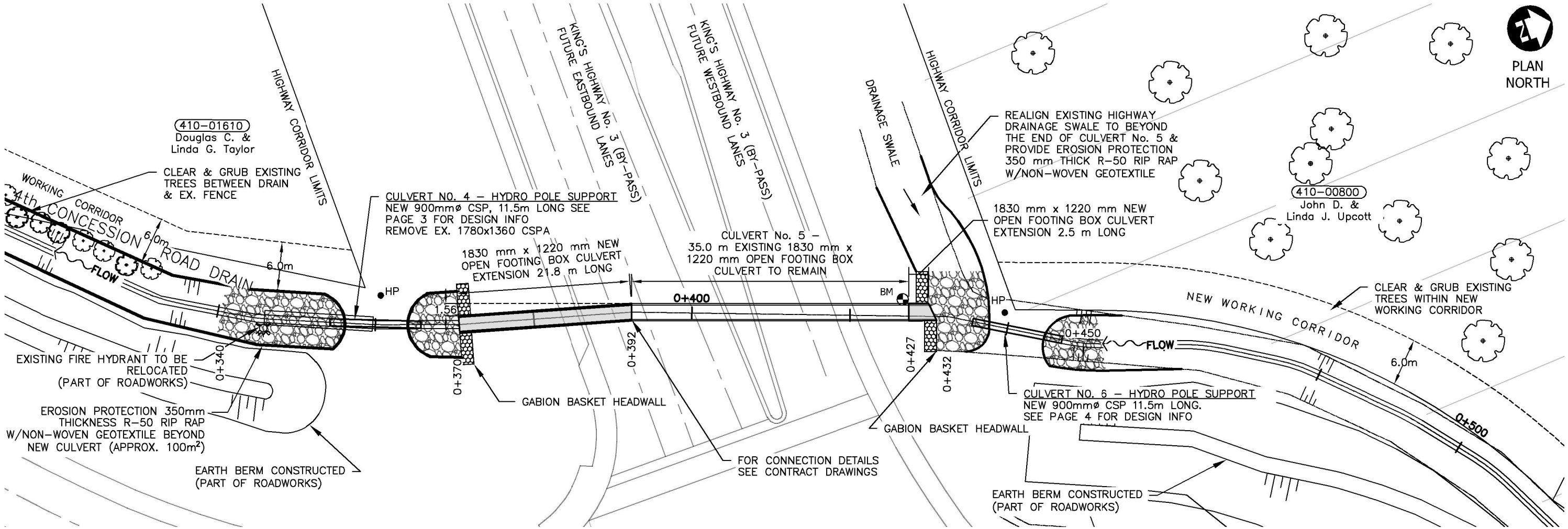
DRAWING SCALES BASED ON A 11" X 17" SHEET

'SCHEDULE G'

Drainage Report for the
Improvements to the Upper Portion of the
4th CONCESSION ROAD DRAIN
Town of Kingsville

SHEET TITLE: CULVERT NO. 2-4 DETAILS

PAGE NO. 2 of 6



CULVERT No. 5 EXTENSION DETAIL

SCALE=1:500

TABLE 2 – CULVERT DESIGN INFORMATION CULVERT NO. 5

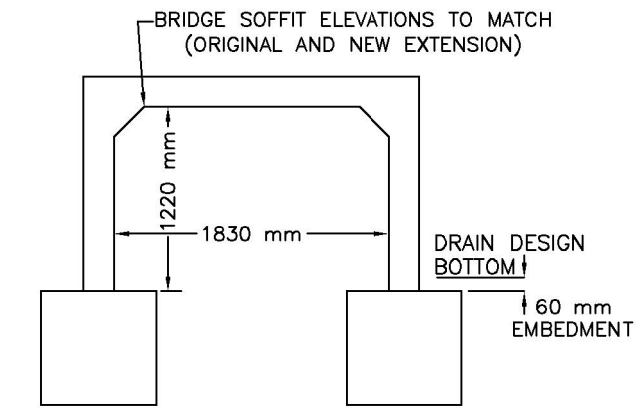
DESCRIPTION	EXISTING CULVERT	DOWNSTREAM EXTENSION	UPSTREAM EXTENSION
TOP OF FOOTING ELEV. U/S SIDE(m)	198.70	198.69	198.70
TOP OF FOOTING ELEV. D/S SIDE(m)	198.69	198.36	198.70
DRAIN BOTTOM (m) (DESIGN) (AT U/S SIDE OF CULVERT)	198.70	198.69	198.70
DRAIN BOTTOM (m) (DESIGN) (AT D/S SIDE OF CULVERT)	198.69	198.42	198.70
MIN. CULVERT GRADE (%)	0.03	1.50	0.04
CULVERT TYPE	BOX CULVERT	BOX CULVERT	BOX CULVERT
CULVERT MATERIAL	CONC. RFO	CONC. RFO	CONC. RFO
CULVERT LENGTH (m)	35.0	21.8	2.5
CULVERT SIZE (mm)	1830x1220	1830x1220	1830x1220
CULVERT ENDWALL TYPE	N/A	GABION BASKETS	GABION BASKETS

SITE BENCHMARK BM

BM– TOP OF CONCRETE BRIDGE DECK OF NORTH END OF EXISTING KING'S HIGHWAY NO. 3 BRIDGE.

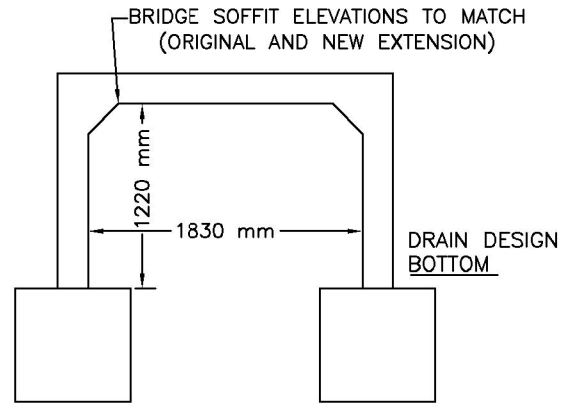
ELEVATION=200.16m

NOTE: CONTRACTOR TO VERIFY BENCHMARKS PRIOR TO CONSTRUCTION.



DOWNSTREAM CULVERT EXTENSION CROSS SECTION

N.T.S.



UPSTREAM CULVERT EXTENSION CROSS SECTION

N.T.S.

'SCHEDULE G'

LICENSED PROFESSIONAL ENGINEER
T. R. OLIVER
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23/07/24
PROVINCE OF ONTARIO

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DESIGN TRO	REVIEWED BY MDH
DRAWN SJC	CHECKED BY TRO
DATE July 23, 2024	
SCALE AS SHOWN	

DILLON CONSULTING

PROJECT NO. 21-3142

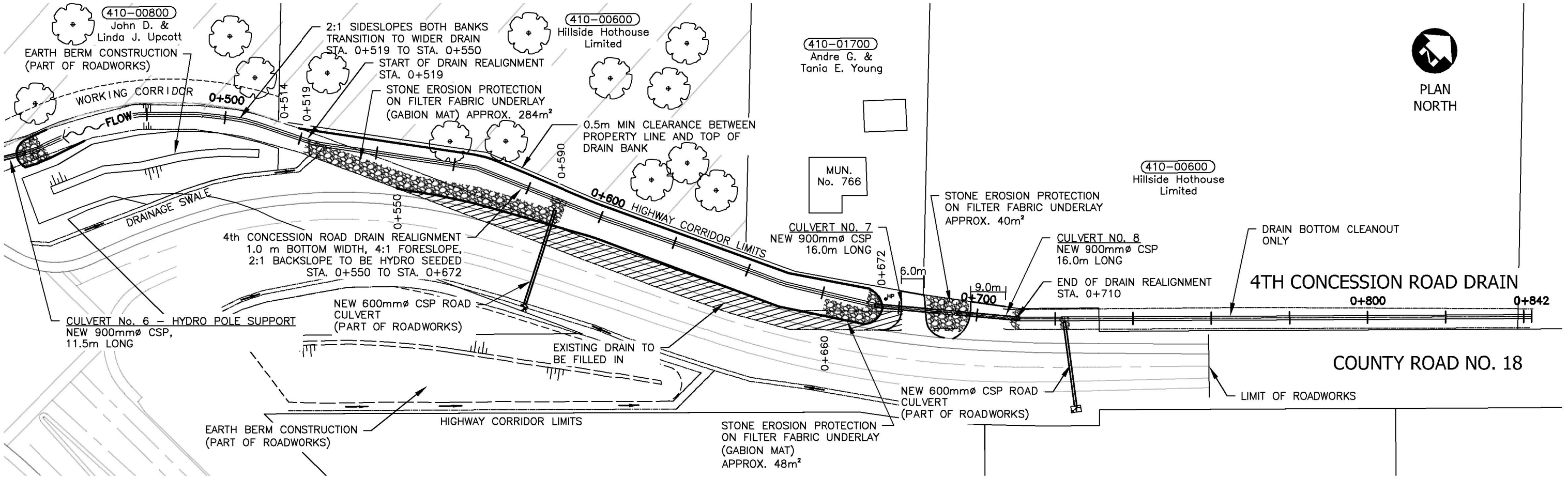
DRAWING SCALES BASED ON A 11" X 17" SHEET

Drainage Report for the Improvements to the Upper Portion of the
4th CONCESSION ROAD DRAIN
Town of Kingsville

SHEET TITLE CULVERT NO. 5 EXTENSION DETAIL

PAGE NO. 3 of 6

Jul 23, 2024 – 10:27am C:\pw working directory\projects 2021\33tro\d0123855\21314 2-03-DRN-4th Concession Road Drain.dwg

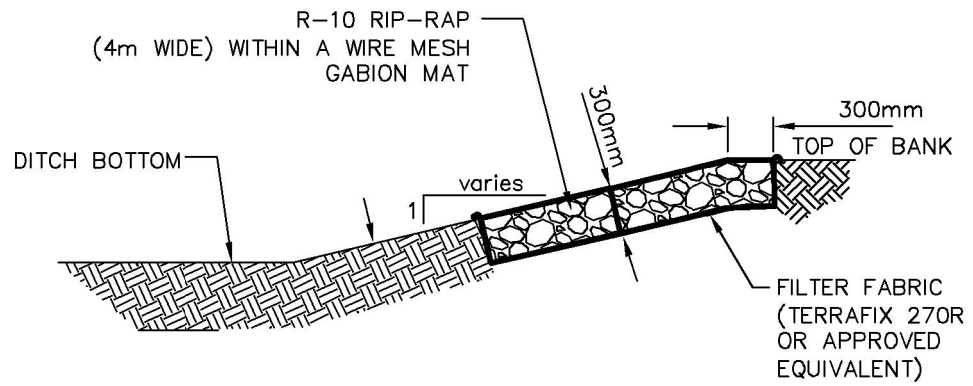


4th CONCESSION ROAD DRAIN - NORTH OF HIGHWAY 3

SCALE=1:1000

TABLE 3 – CULVERT DESIGN INFORMATION

DESCRIPTION	CULVERT NO. 6	CULVERT NO. 7	CULVERT NO. 8
DRAIN BOTTOM DESIGN ELEVATION	198.70(W)198.71(E)	198.80(W)198.81(E)	198.81(W)198.82(E)
CULVERT INVERT ELEVATION	198.61(W)198.62(E)	198.71(W)198.72(E)	198.72(W)198.73(E)
CULVERT SIZE	900mmø CSP	900mmø CSP	900mmø CSP
CULVERT TYPE (mm)	68x13	68x13	68x13
CULVERT MATERIAL	ALUMINIZED STEEL	ALUMINIZED STEEL	ALUMINIZED STEEL
CULVERT THICKNESS (mm)	2.0	2.0	2.0
CULVERT LENGTH (m)	11.5	16.0	16.0
CULVERT GRADE (%)	0.04	0.04	0.04
DRIVEWAY ELEVATION (m)	200.44	200.01	200.21



GABION MAT DETAIL (STA. 0+519 TO STA. 0+590)

N.T.S.

'SCHEDULE G'

LICENSED PROFESSIONAL ENGINEER
T. R. OLIVER
100046433
23/07/24
PROVINCE OF ONTARIO

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

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No.	ISSUED FOR	DATE	BY
2	FINAL REPORT SUBMISSION	July 23/24	TRO
1	CLIENT REVIEW	July 3/24	TRO

DESIGN: TRO | REVIEWED BY: MDH
DRAWN: SJC | CHECKED BY: TRO
DATE: July 23, 2024
SCALE: AS SHOWN

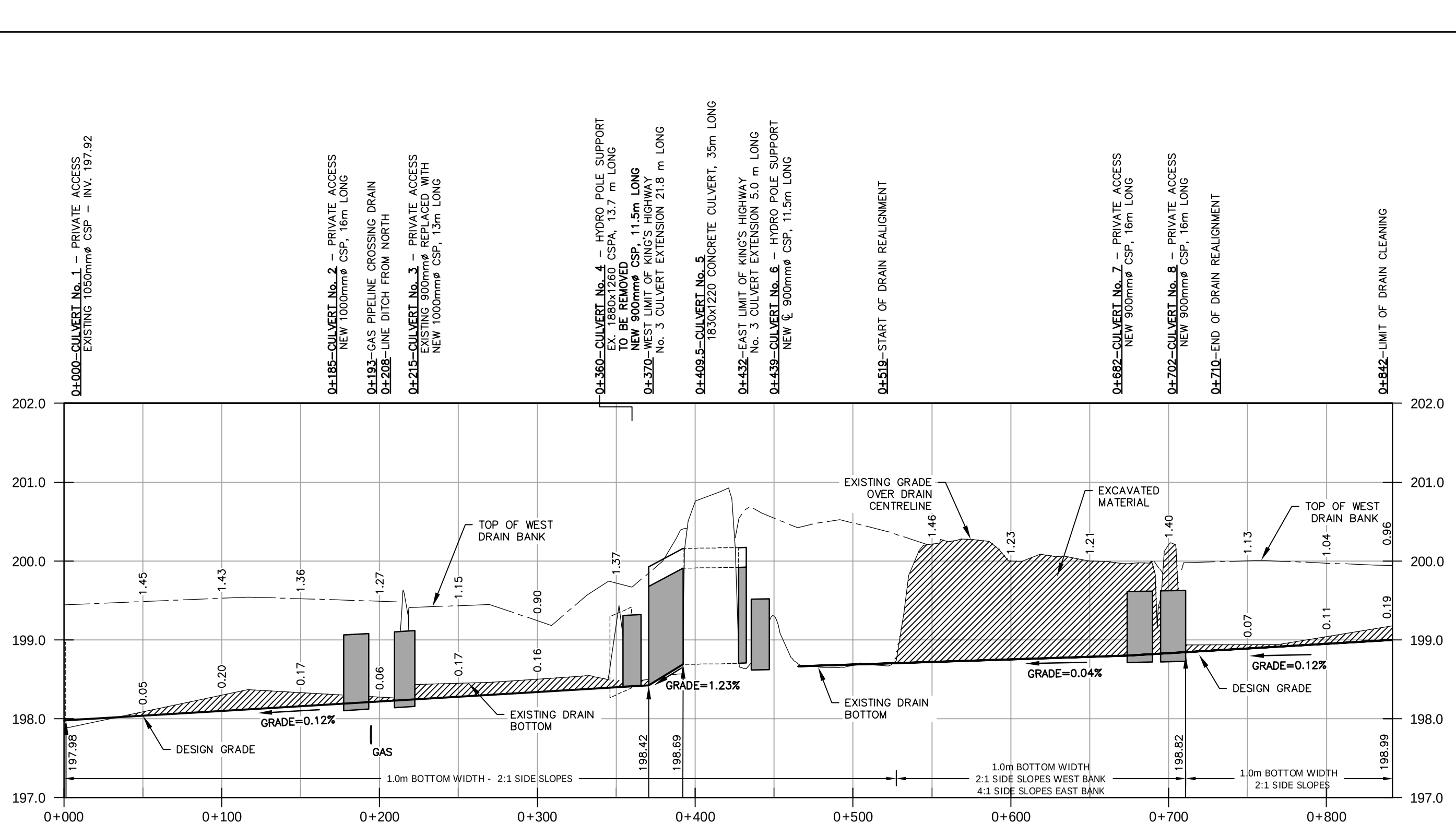
DILLON CONSULTING

PROJECT NO. 21-3142
DRAWING SCALES BASED ON A 11" X 17" SHEET

Drainage Report for the
Improvements to the Upper Portion of the
4th CONCESSION ROAD DRAIN
Town of Kingsville

SHEET TITLE: CULVERT NO. 6-8 DETAILS
PAGE NO. 4 of 6

Jul 22, 2024 – 6:07pm C:\pw working directory\projects 2021\33tro\d0123865\213142-03-DRN-4th Concession Road Drain.dwg



PROFILE

SCALE – HORZ.=1:2,500
VERT.=1:50

LICENSED PROFESSIONAL ENGINEER
T. R. OLIVER
100046433
23/07/24
PROVINCE OF ONTARIO

No.	ISSUED FOR	DATE	BY
2	FINAL REPORT SUBMISSION	July 23/24	TRO
1	CLIENT REVIEW	July 3/24	TRO

DESIGN	TRO
REVIEWED BY	MDH
DRAWN	SJC
CHECKED BY	TRO
DATE	July 23, 2024
SCALE	AS SHOWN

DILLON CONSULTING

'SCHEDULE G'

Drainage Report for the
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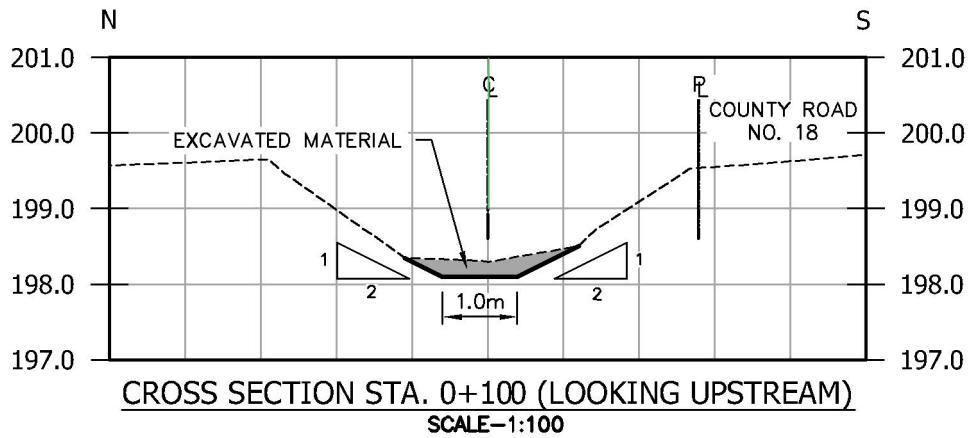
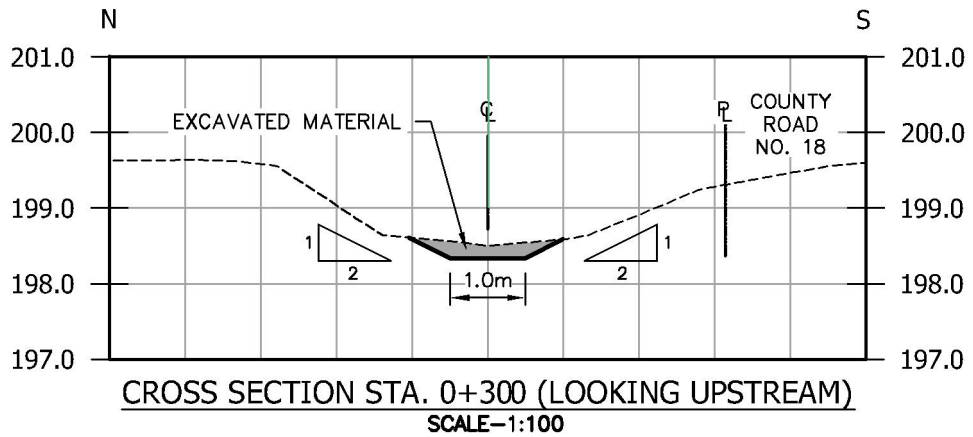
4th CONCESSION ROAD DRAIN
Town of Kingsville

PROJECT NO.	21-3142
SHEET TITLE	PROFILE
DRAWING SCALES BASED ON A 11" X 17" SHEET	
PAGE NO.	5 of 6



CROSS SECTION STA. 0+100 (LOOKING UPSTREAM)

SCALE–1:100



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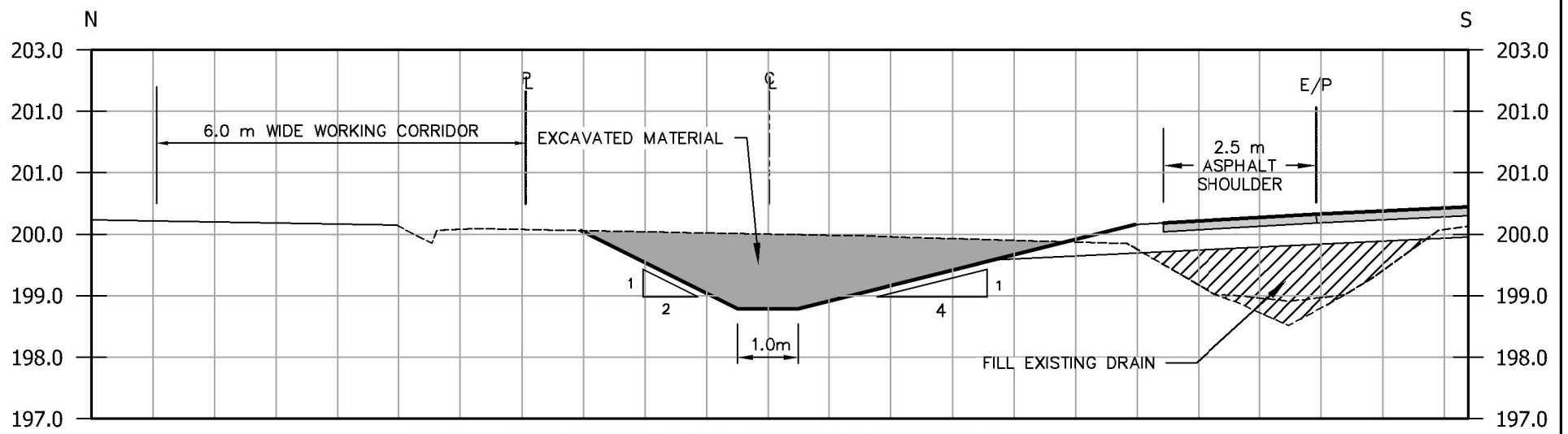
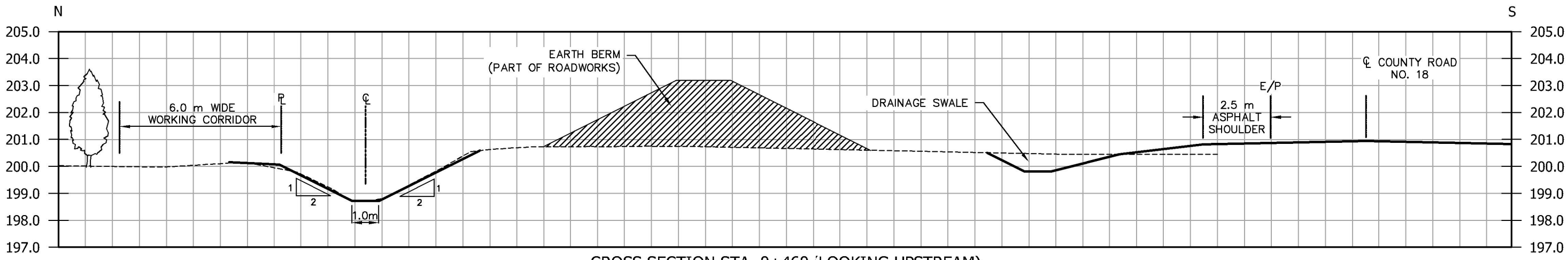
SCALE–1:100



CROSS SECTION STA. 0+650 (LOOKING UPSTREAM)

SCALE–1:100



CROSS SECTION STA. 0+460 (LOOKING UPSTREAM)

SCALE–1:150

Jul 22, 2024 – 6:08pm C:\pw working directory\projects 2021\33tro\d0123855\213142–03–DRN–4th Concession Road Drain.dwg

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No.	ISSUED FOR	DATE	BY
2	FINAL REPORT SUBMISSION	July 23/24	TRO
1	CLIENT REVIEW	July 3/24	TRO

DESIGN	TRO
REVIEWED BY	MDH
DRAWN	SJC
CHECKED BY	TRO
DATE	July 23, 2024
SCALE	AS SHOWN

DILLON CONSULTING

PROJECT NO. 21-3142

DRAWING SCALES BASED ON A 11" X 17" SHEET

'SCHEDULE G'

Drainage Report for the Improvements to the Upper Portion of the

4th CONCESSION ROAD DRAIN

Town of Kingsville

SHEET TITLE: CROSS SECTIONS

PAGE NO.: 6 of 6